CUPERTINO

CITY OF CUPERTINO

CLIMATE ACTION PLAN

JANUARY 2015

ACKNOWLEDGEMENTS

This Climate Action Plan was developed in partnership with the community with assistance from City employees and leaders. The following individuals are specifically acknowledged for their time in the creation of this document.

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EXECUTIVE SUMMARY

This Climate Action Plan (CAP) defines Cupertino's path toward creating a healthy, livable, and vibrant place for its current and future residents to live, learn, work, and play. The strategies outlined in this CAP seek to not only reduce greenhouse gas emissions, but also provide energy, water, fuel, and cost savings for the City, its community members and businesses, further improving Cupertino's already high quality of life. The plan also represents another example of a successful partnership between engaged community members and City staff to jointly plan for Cupertino's sustainable future and continue to lead by example on important environmental issues.

Cupertino has a rich history of environmental leadership, showcased throughout its operational spectrum including policy adoption (e.g., Mayor's Climate Protection Agreement, Bay Area Climate Compact, General Plan Sustainability Element), program design (e.g., city-wide organics collection, Green@Home, GreenBiz), and infrastructure investment (e.g., Don Burnett Bicycle Pedestrian Bridge, Stevens Creek Restoration Plan and Project, streetlight retrofit project). Despite this progress, City leaders driving these efforts recognize that there is more to do to safeguard Cupertino's natural resources for future use and enjoyment. Specifically, delays in addressing the effects of climate change will accelerate the potential for irreversible damage by depleting nonrenewable resources, harming the shared environment on which we depend and impairing the community we all call home. To address this growth risk, the City of Cupertino worked with our community to develop its first Climate Action Plan (CAP), a strategic document that provides a roadmap for our community and municipal government to accelerate our environmental advancements by strategically working to abate our climate impacts, which arise from local greenhouse gas (GHG) emissions. The CAP builds from the City's broad past and ongoing environmental efforts and identifies opportunities for additional action to achieve even greater emissions reductions. The CAP also serves to support California's statewide climate change efforts through identification of actions that can be taken locally, by residents, businesses, and the City itself, to ensure the state's ambitious reduction goals are achieved. As an incentive for voluntarily taking such bold local action, the CAP can also provide benefits to future development projects within Cupertino through a streamlined environmental review process, allowed as part of the California Environmental Quality Act. Aligned with the community's vision as defined in its General Plan, the CAP will serve as a blueprint to ensure Cupertino's long-term quality of life and vitality.

This document seeks to answer a series of questions to more fully inform the City's emissions reduction efforts and effectively engage the community in this process. It begins with an introduction to the purpose of preparing a Climate Action Plan, details the elements of the City's Plan, shares linkages with state law, and offers an overview of the City's current greenhouse gas emissions generated.

Purpose of a CAP

As directed by the City's General Plan Sustainability Element, the CAP seeks to identify emissions reduction strategies that are informed by the goals, values, and priorities of our community. CAPs prepared in California also typically provide a process through which communities can contribute to the state's climate protection efforts, recognizing that:

1. cities are the population and business centers where emissions are generated, and
2. local governments can serve as a direct connector to policies, programs, and infrastructure to reduce these emissions at their source.

In partnership with the Santa Clara County Office of Sustainability and the Pacific Gas and Electric Company (PG&E), the City of Cupertino developed this CAP as part of a regional effort to support achievement of five objectives:

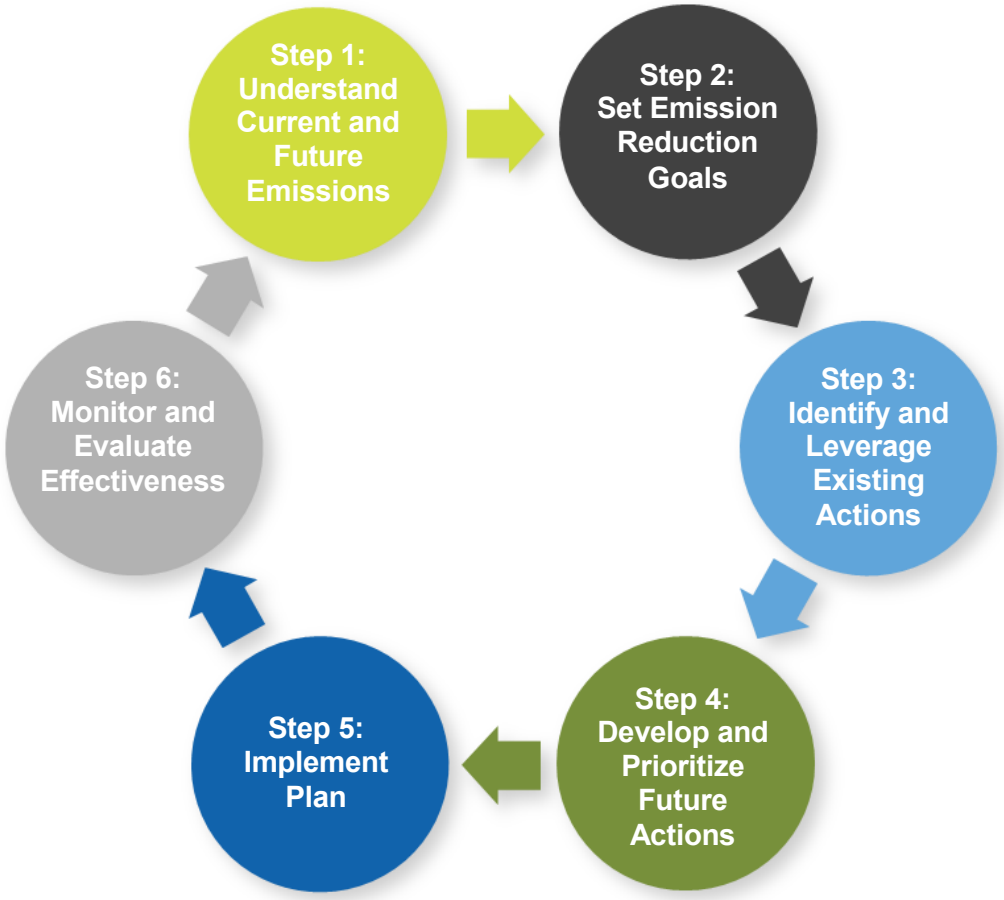
- **To demonstrate environmental leadership** – Cupertino as a community can rise to the difficult challenge of reducing the impact of climate change by defining measurable, reportable, verifiable climate actions to reduce its contribution to local and global GHG emissions that can serve as a model for small cities in the state and nationwide.
- **To save money and promote green jobs** – Residents, businesses, and government can reduce their utility costs through increased energy and water efficiency, and a focus on efficiency can create job opportunities within the community that contribute to protecting our shared environmental resources.
- **To comply with the letter and spirit of state environmental initiatives** – California is taking the lead in tackling climate change while driving new energy markets and fostering new environmental services. As coordination with cities serves as the keystone to achieving statewide greenhouse gas emissions reductions, Cupertino has a responsibility to help the state address emissions sources that arise in our geography and meet its goals to reduce these emissions.
- **To promote sustainable development** – By developing this Climate Action Plan to reinforce General Plan policies and align with the Bay Area Air Quality Management District guidelines, a new class of sustainable development projects, such as mixed use and transit oriented developments, can be fast-tracked (i.e., "streamlined") through the California Environmental Quality Act (CEQA) review process by not requiring GHG emissions for proposed projects consistent with the CAP.
- **To support regional climate change efforts** – Cupertino developed its CAP through a county-wide effort that established consistency in the local response to the climate change issue, and created a framework to collaborate regionally on implementation of different CAP programs. This partnership elevates the credibility of local climate action planning by allowing transparency, accountability, and comparability of the plans' actions, performance, and commitments across all participating jurisdictions.

In realizing these CAP-driven goals, the City also hopes to advance actionable ways our community can engage in initiatives that can improve our environment and overall quality of life.

Components of a CAP

A CAP is a tool that many cities in California are using to quantify their share of statewide GHG emissions and establish action steps toward achieving a local emissions reduction target. A CAP provides a set of strategies intended to guide GHG emissions reduction efforts, typically through a combination of statewide and local action. Figure ES.1 illustrates the basic steps of the CAP development process.

Figure ES.1 – CAP Development Process



COMMUNITY-WIDE AND MUNICIPAL OPERATIONS PERSPECTIVES

Using this CAP development process, the City of Cupertino's CAP analyzes climate change strategies through two different lenses. The **community-wide** perspective considers the total impact of emissions-generating activities and reduction opportunities within the City's jurisdictional boundaries. This approach relies upon the participation from residents, businesses, and local government employees to achieve community-wide reduction targets. The **municipal operations** perspective considers only those emissions resulting from the provision of local government services. Reduction strategies associated with municipal operations describe ways for the City to continue to provide a high-level of service to its residents, while more efficiently consuming resources. Municipal operations emissions can be considered a subset of the community-wide emissions, as shown in Figure ES.2, and typically represent 2-5% of total community-wide emissions. In Cupertino, emissions from government activities make up less than 1% of total community-wide emissions. However, development of the municipal operations components of this CAP reinforces the City's commitment to emissions reductions, and includes strategies that will lay the foundation for deeper reduction opportunities throughout the community.

Figure ES.2 – Relationship of Community-wide and Municipal Operations Emissions

In addition to reducing GHG emissions, many of the strategies included in this plan will also help make Cupertino a more attractive place to live – lowering energy and water bills through conservation, improving bicyclist and pedestrian safety, improving local air quality, and extending the operational life of local landfills through waste diversion activities. Chapters 3 and 4 identify other "co-benefits" associated with the CAP's measures, beyond their emissions reduction potential.

DOCUMENT CONTENT

This document is structured according to the following seven chapters:

- **Chapter 1 – Climate Change and Cupertino** provides an overview of the CAP and introduces the current state of climate change science, as well as the state's vision for a lower emissions future.
- **Chapter 2 – Greenhouse Gas Emissions and Targets** describes the components of an emissions inventory, and then presents the community-wide and municipal operations inventories for 2010. It describes the process for forecasting future emissions and presents the community-wide and municipal operations emissions forecasts for years 2020, 2035, and 2050. It concludes with a discussion of the CAP's emission reduction targets.
- **Chapter 3 – Community-wide Reduction Measures** presents the goals, measures, and actions that can be implemented at the community-wide level to achieve the community's emissions reduction target for 2020. It also describes a pathway for future

progress towards the 2035 target, outlining the large-scale actions that would need to occur to make that target attainable.

- **Chapter 4 – Municipal Operations Reduction Measures** presents the goals, measures, and actions that can be implemented with regards to the local governments' provision of services in order to achieve the City's reduction target. Similar to Chapter 3, this chapter also considers a pathway towards the City's longer-term targets in 2035 and 2050 in order to continue leading by example.
- **Chapter 5 – Personal Actions** describes the steps that Cupertino's residents, local businesses, and our schools can take starting today to kick-off the implementation phase of the CAP in their own homes, neighborhoods or organizations.
- **Chapter 6 – Adaptation and Resiliency** shares next generation goals for Cupertino's climate agenda, building upon state and regional resources that identify the social, economic, and environmental vulnerabilities that our changing climate presents. It also offers a resilience framework that will enable our community to plan, adapt, and thrive.
- **Chapter 7 – Benchmarks and Next Steps** provides a schedule and framework for CAP implementation, including a description of future inventory updates, measure tracking and revisions, and comprehensive CAP updates.

CAP PREPARATION

The City prepared this CAP as part of a Santa Clara County regional climate mitigation and adaptation initiative named Silicon Valley 2.0 (SV 2.0). As part of this shared effort, the cities of Cupertino, Gilroy, Morgan Hill, Mountain View, San Jose, Saratoga and unincorporated Santa Clara County prepared CAPs to achieve the climate mitigation objectives of the SV 2.0 project. Through this effort, a common list of reduction measures was developed from which individual jurisdictions selected their preferred list. This approach provided a framework for overlapping initiatives regionally to allow collaboration through resource and knowledge sharing when it comes time to implement the plans.

This regional approach also included joint preparation of baseline emissions inventories and forecasts for the purpose of using a consistent methodology and common reduction targets and timelines. This will allow CAP comparisons from one jurisdiction to the next in support of future collaboration opportunities. Early project meetings among the participants also established a local network of colleagues across jurisdictions to build the foundation of this regional collaboration framework.

Cupertino's CAP was also prepared with input from community members, elected officials, and government employees. Two community open house workshops were held to introduce the CAP project and gather public comments on the types of reduction measures it should include and the role that Cupertino should play in contributing to the state's emissions reduction goals. Additional focus group meetings were held with members of the local business community to ensure the CAP was developed in way that would not impair Cupertino's excellent reputation as

a business center. Public study sessions with the Planning Commission and City Council provided further refinement to the collection of measures included in the plan and described in Chapters 3 and 4. Additionally, City employee feedback was collected to accurately represent the City's past programmatic successes in sustainability and focus the CAP on the best opportunities for new or expanded local action. Through this open process Cupertino developed a strategy that has resident, business, and City support, which will help in the transition from the planning phase to CAP implementation.

Relation to the California Environmental Quality Act

One of the considerations for the City in deciding to prepare its Climate Action Plan was the ability to provide future project California Environmental Quality Act (CEQA) streamlining benefits. Local governments may prepare a Plan for Reduction of Greenhouse Gases that is consistent with the state's emission reduction goals as described in Assembly Bill 32. By preparing such a plan, the City can streamline CEQA review of subsequent plans and projects that are consistent with the GHG reduction strategies and targets in the plan (this is often referred to as "streamlining"). To meet the standards of a qualified GHG reduction plan, Cupertino's CAP must achieve the following criteria (which parallel and elaborate upon criteria established in state CEQA Guidelines Section 15183.5[b][1]):

- Complete a baseline emissions inventory and project future emissions
- Identify a community-wide reduction target
- Prepare a CAP to identify strategies and measures to meet the reduction target
- Monitor effectiveness of reduction measures and adapt the plan to changing conditions
- Adopt the CAP in a public process following environmental review

This approach allows jurisdictions to analyze and mitigate the significant effects of GHGs at a programmatic level, by adopting a plan for the reduction of GHG emissions in a public process following environmental review. As part of the implementation process, the City will establish the means by which it will determine consistency of future proposed projects (e.g., development projects, plans, and other actions subject to CEQA review) with the CAP. Later, as individual projects are proposed and found to be consistent with the CAP, project-specific environmental documents may rely on the GHG emissions reductions measures in the CAP to determine that estimated project-level GHG emissions would be less-than-significant in their cumulative impacts analysis.

Emissions Inventories and Forecasts

Baseline inventories of community-wide and municipal operations emissions for 2010 were prepared to serve as the starting point for the CAP's analysis. The baseline inventories were then used to forecast future emissions growth for 2020, 2035, and 2050 under a business-as-

usual (BAU) scenario. This BAU scenario assumes historic trends describing energy and water consumption, travel, and solid waste generation will remain the same in the future. Therefore, emissions forecasts demonstrate what emissions levels are likely to be under a scenario in which no future statewide or local actions are taken to curtail emissions growth (beyond what was already in place as of the 2010 baseline year). BAU emissions forecasts are important because they are used to calculate the amount of emissions reductions necessary to achieve the City's future reduction targets.

Growth factors for these future scenarios were based upon the General Plan's estimated growth in population, employment, and vehicle miles traveled under the highest growth scenario. As the CAP and General Plan Amendment development ran in tandem, the CAP was designed to address the highest projected emissions anticipated to arise from future development in the City based on build out of the General Plan's Land Use diagram. However, if an alternative General Plan scenario is adopted (i.e., a scenario other than the highest growth scenario), the resulting emissions under that build out scenario are expected to be lower than the levels assumed in this CAP, and therefore fewer reductions would be required to achieve the City's emissions targets.

Table ES.1 shows Cupertino's community-wide emissions baseline and BAU forecasts by sector for 2010, 2020, 2035, and 2050. Figure ES.3 illustrates this data, showing that the Energy sector is the greatest contributor to the community's emissions profile, followed by the Transportation sector. Off-Road Sources, Solid Waste, Wastewater, and Potable Water contribute relatively less to the inventory. Cupertino's community-wide emissions are forecasted to increase by 63% by 2050 (see Figure ES.4), based upon the growth factors utilized for the General Plan as described above.

Table ES.1
Community-wide BAU Emissions (2010 - 2050)

Emission Sector	2010 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	2035 Emissions (MT CO_2e/yr)	2050 Emissions (MT CO_2e/yr)
Energy	**169,547**	**195,535**	**234,518**	**273,500**
Electricity Subtotal	*85,452*	*100,062*	*121,977*	*143,894*
Residential	25,427	27,239	29,958	32,677
Commercial	60,025	72,823	92,020	111,217
Natural Gas Subtotal	*84,095*	*95,473*	*112,540*	*129,607*
Residential	49,986	53,549	58,894	64,238
Commercial	34,109	41,924	53,647	65,369
Transportation	**104,112**	**119,641**	**142,569**	**165,371**
Off-Road Sources	**22,390**	**27,519**	**35,214**	**42,909**
Solid Waste	**5,403**	**6,215**	**7,558**	**8,714**
Wastewater	**4,640**	**5,325**	**6,318**	**7,285**
Potable Water	**1,197**	**1,374**	**1,630**	**1,880**
Total	**307,288**	**355,610**	**427,807**	**499,659**

Source: AECOM 2014
Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

Figure ES.3 – Community-wide Emissions by Sector - 2010

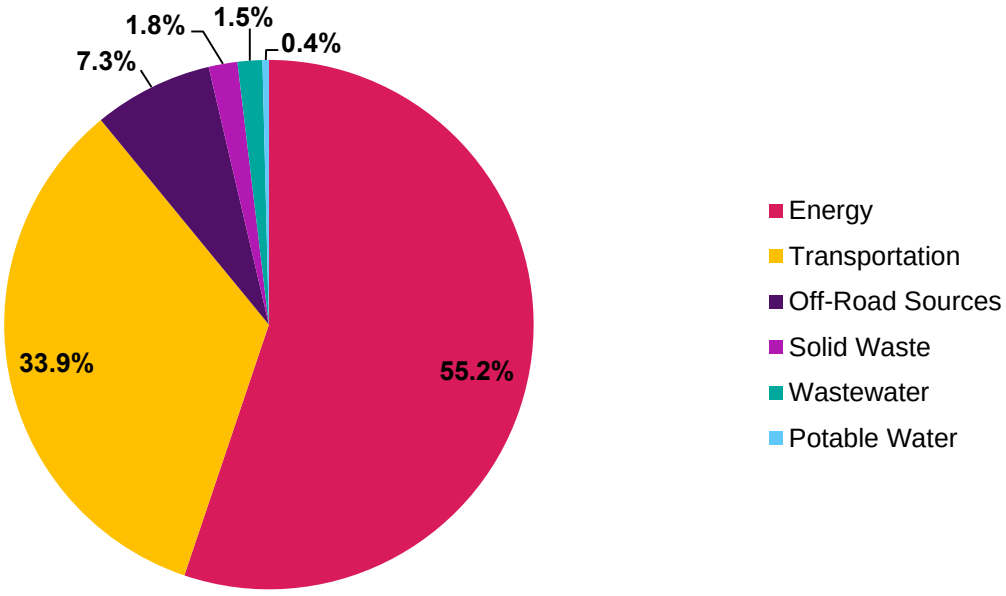


Figure ES.4 – Community-wide Emissions Forecasts by Sector – 2020, 2035, 2050

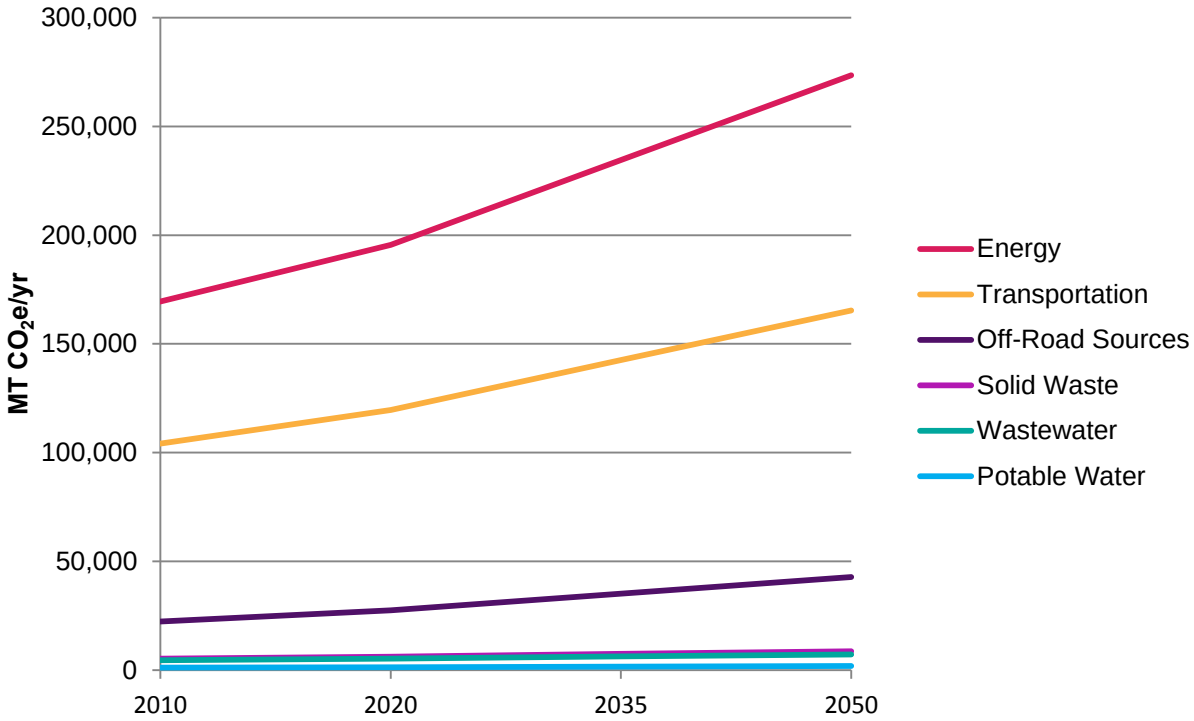


Table ES.2 shows emissions associated with Cupertino's municipal operations for the same planning years as the community-wide inventory. Figure ES.5 illustrates the municipal operations inventory, showing that the Facilities sector contributes approximately 70% of total emissions, with the City's Vehicle Fleet contributing another 24%. The remaining emissions come from the Solid Waste and Water Services sector. This mirrors the community-wide inventory with energy-related emissions (i.e., Facilities) and transportation-related emissions (i.e., Vehicle Fleet) contributing the largest share of total emissions. Municipal operations emissions are forecast to increase by 17% by 2050, a much slower rate than shown in the community-wide forecasts, since government services do not increase at a one-to-one ratio with the community's population and employment growth (see Figure ES.6). Appendix B describes the methodology used to prepare both the community-wide and municipal operations inventories and forecasts.

Table ES.2
Municipal Operations Business-as-Usual Emissions (2010 - 2050)

Emission Sector	2010 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	2035 Emissions (MT CO_2e/yr)	2050 Emissions (MT CO_2e/yr)
Facilities	**1,249**	**1,299**	**1,370**	**1,436**
Building Energy	837	871	918	962
Public Lighting	412	428	452	473
Vehicle Fleet	**424**	**449**	**486**	**521**
Solid Waste	**95**	**99**	**105**	**110**
Water Services	**7**	**7**	**8**	**9**
Total	**1,775**	**1,855**	**1,969**	**2,076**

Source: AECOM 2013

Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

Figure ES.5 – Municipal Operations Emissions by Sector - 2010

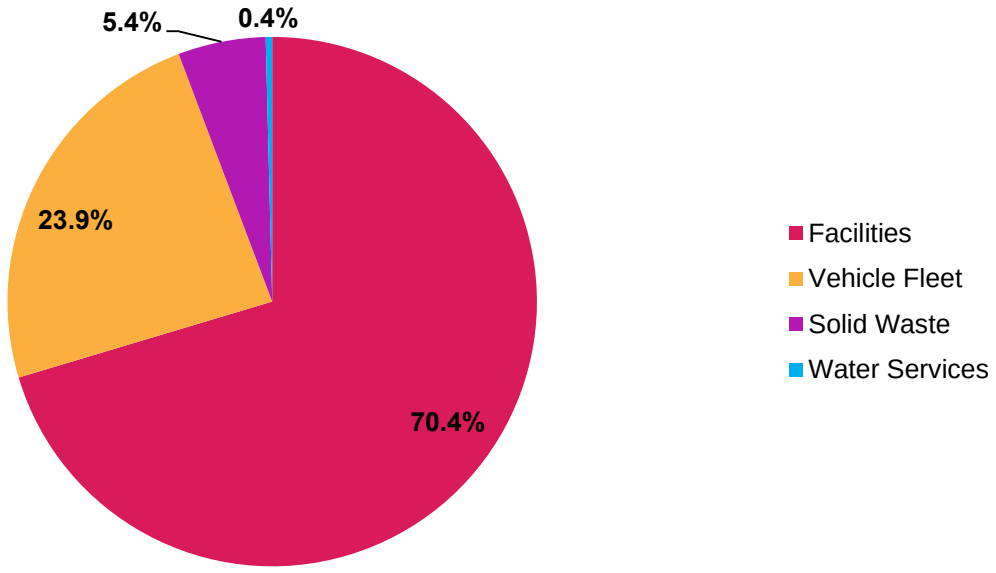
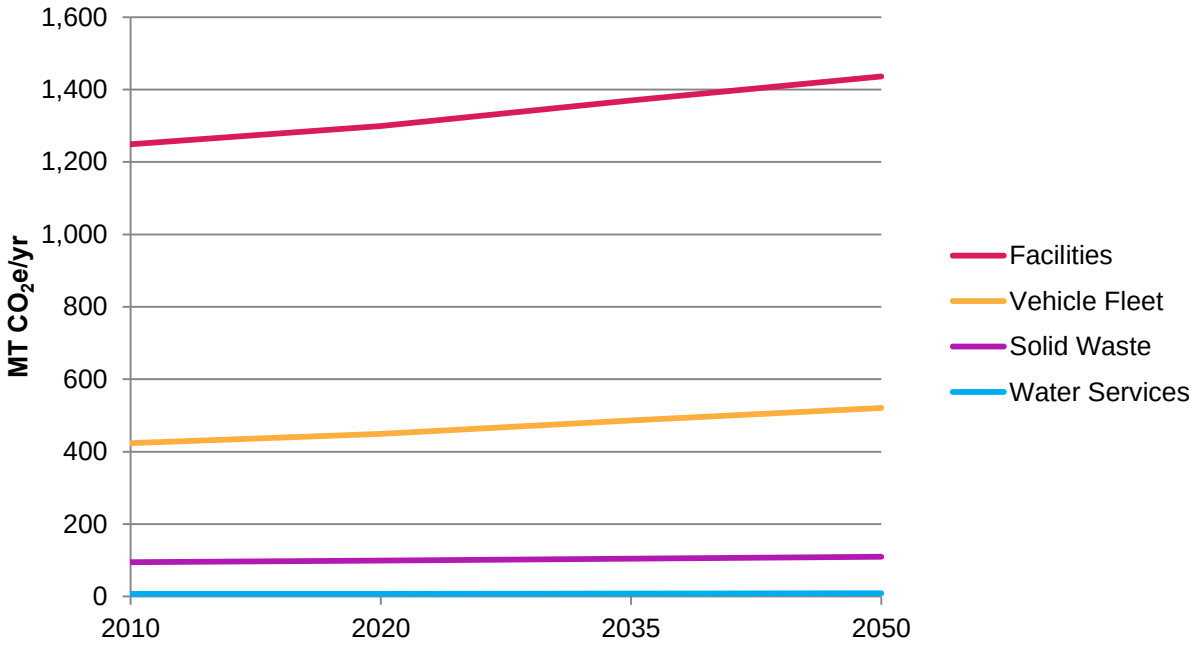


Figure ES.6 – Municipal Operations Emissions Forecasts by Sector – 2020, 2035, 2050



Reduction Targets

The CAP's primary goal is to create a roadmap to reduce greenhouse gas emissions in Cupertino. Setting an emissions reduction target for future years serves as a concrete quantifiable metric to help focus City strategies to that end. The targets selected in this CAP are designed to support statewide emissions reduction efforts and to enable use of recently enacted CEQA streamlining benefits. Much like creating a retirement savings plan for your family, establishing a clear and attainable target can focus and motivate staff and community members to reach these future goals. Targets also help drive long-term strategies and elevate transparency and accountability to achieve the objectives of this CAP.

The state's near-term emissions reduction goal, as defined in Assembly Bill 32, is to return to 1990 levels by 2020. Most local governments do not have baseline inventory data for 1990, so the Air Resources Board and the Bay Area Air Quality Management District have developed guidance suggesting that a reduction of 15% below the CAP's baseline year by 2020 can approximate a return to 1990 levels. Governor Schwarzenegger also signed Executive Order S-3-05, which includes a longer-term target to achieve emissions of 80% below 1990 levels by 2050. To demonstrate consistency with the state's long-range target, this CAP also includes targets for 2050, as well as interim year 2035 targets to serve as a midpoint check-in between 2020 and 2050. Based on the state's 2050 target and the fact that this CAP uses a 2010 baseline year, Cupertino has defined its longer-term targets as 49% below baseline levels by 2035 and 83% below baseline levels by 2050 (see Chapter 2 for further details on the target selection process). Table ES.3 shows the community-wide and municipal operations reduction targets for these three planning years. Figures ES.7 and ES.8 illustrate the community-wide and municipal operations BAU emissions forecasts, respectively, compared to their corresponding reduction targets.

Table ES.3
Community-wide and Municipal Operations Reduction Targets

Community-wide Emissions Reduction Targets				
	2010 (MT CO_2e/yr)	**2020 (MT CO_2e/yr)**	**2035 (MT CO_2e/yr)**	**2050 (MT CO_2e/yr)**
BAU Emissions	307,288	355,610	427,807	499,659
Reduction Target	-	15% below 2010 levels	49% below 2010 levels	83% below 2010 levels
	307,288	261,195	156,717	52,239
Reductions Needed	-	94,415	271,090	447,420
Municipal Operations Emissions Reduction Targets				
	2010 (MT CO_2e/yr)	**2020 (MT CO_2e/yr)**	**2035 (MT CO_2e/yr)**	**2050 (MT CO_2e/yr)**
BAU Emissions	1,775	1,855	1,969	2,076
Reduction Target	-	15% below 2010 levels	49% below 2010 levels	83% below 2010 levels
	1,775	1,509	905	302
Reductions Needed	-	346	1,064	1,774

Figure ES.7 – Community-wide BAU Emissions and Targets

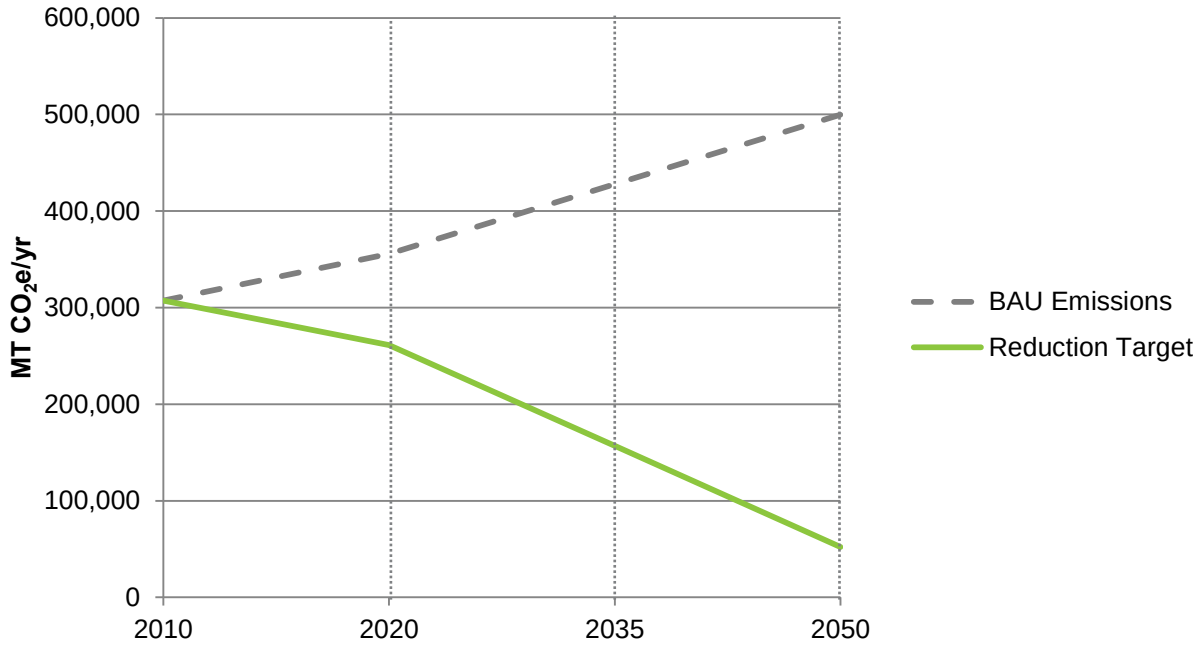
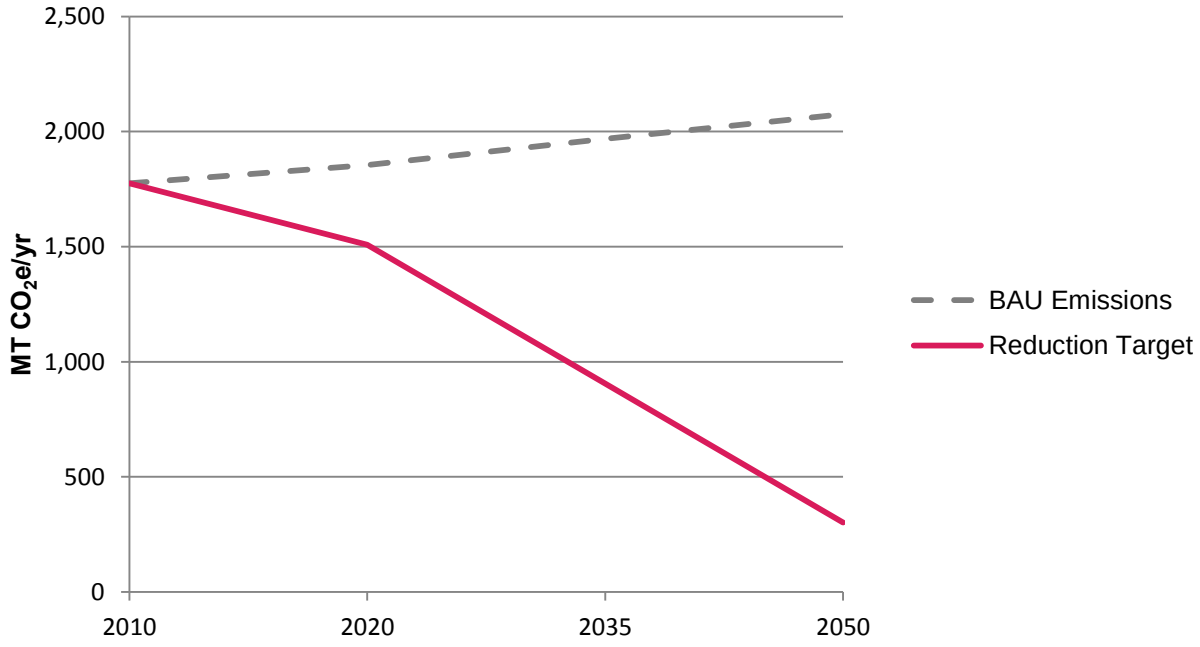


Figure ES.8 – Municipal Operations BAU Emissions and Targets



Greenhouse Gas Emissions Reduction Strategies

Chapters 3 and 4 describe the reduction strategies developed to achieve the City's emissions targets. As the foundation of its CAP approach, the City has identified bold, overarching goals that guide its pursuit of the emissions reduction targets, which include:

Reduce Energy Use / Improve Facilities: recommends ways to increase energy efficiency in existing buildings and increase use of renewable energy community-wide.

Encourage Alternative Transportation / Convert Vehicle Fleet: encourages transit, carpooling, walking, and bicycling as viable transportation modes to decrease the number of single-occupancy vehicle trips within the community, and facilitates a shift towards cleaner, alternative fuel vehicles.

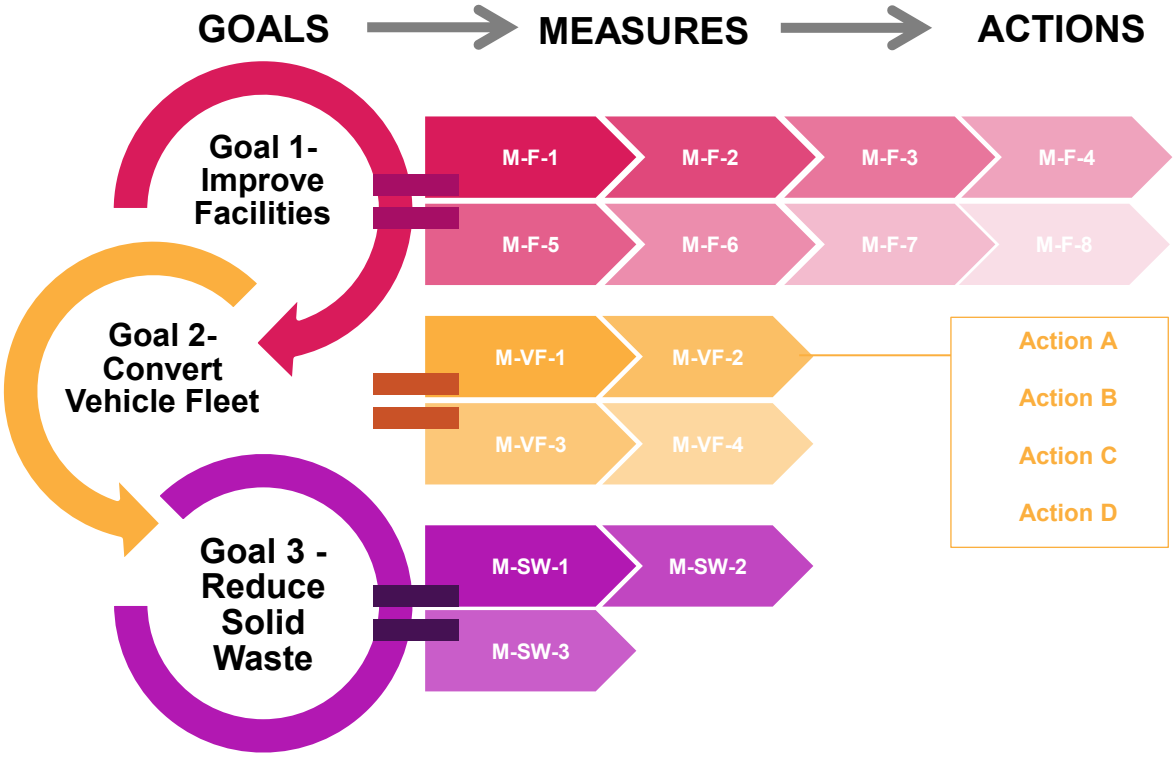
Conserve Potable Water: promotes the efficient use and conservation of water in buildings and landscapes.

Reduce Solid Waste: increases waste diversion through recycling and organics collection, and reducing consumption of materials that will otherwise end up in landfills.

Expand Green Infrastructure: enhances the City's existing urban forest and landscapes on public and private land.

The City's CAP strategies comprise a framework of goals, measures, and actions through which the near-term (i.e., 2020) targets can be achieved, and progress can be made on the longer-term (i.e., 2035, 2050) targets. The reduction strategies are defined by the previously presented goals, which align with different emissions sectors (with the exception of Green Infrastructure which is not an emissions source because carbon dioxide released as a result of the natural carbon cycle (i.e., plant growth, death, and decay) is considered a biogenic emissions source and is not included in emissions inventories). Reduction measures then describe how each goal can be achieved, and actions describe the specific steps to be taken during the implementation process. Figure ES.9 illustrates the hierarchy of goals, measures, and actions, using the municipal operations strategy as an example.

Figure ES.9 – Hierarchy of Goals, Measures, and Actions



EMISSION REDUCTION MEASURES

Chapter 3 describes 20 community-wide reduction measures and their corresponding action steps for implementation. The measures were selected based on existing City programs, policies, or actions to leverage these past efforts and to identify opportunities for expansion or new efforts. Table ES.4 presents a summary of these measures, organized according to their corresponding goal, and presents the 2020 emissions reduction estimates that would result from their implementation. Chapter 3 provides more detail than that summarized in Table ES.4, including how these actions contribute to the City's longer-term reduction targets. Several measures are described as "Supporting Measures" because no emissions reductions are directly associated with that measure (or cannot be accurately quantified at this time). However, these supporting measures still play an important role in the implementation of other measures and achievement of the City's reduction targets. For example, programs that share information and provide educational resources on energy efficiency to the public and City staff cannot be accurately quantified as a discrete action. However, increasing knowledge about energy conservation techniques, financing, and success stories is widely believed to be an important driver to increase voluntary participation in such activities. As shown at the bottom of Table ES-4, the combination of CAP measures, statewide actions, and the contribution of municipal operations reductions will allow the City to achieve its 2020 target of 15% emissions reductions below the 2010 baseline level. Chapter 3 provides details of each measure, including:

- descriptions of how it will reduce emissions
- estimates of reduction potential by 2035
- actions steps defining the implementation process
- responsibilities for leading the implementation process
- co-benefits associated with the measure in addition to emissions reductions, and
- progress indicators to allow progress tracking and monitoring.

Chapter 3 also presents a discussion about how these measures can help lay the foundation upon which the City can make progress towards its long-term 2050 target. However, specific 2050 reductions are not estimated in this CAP for each measure due to the numerous variables and assumptions that are required to estimate actions so far into the future.

Table ES.4
Community-wide Reduction Measures

Reduction Goals and Measures		2020 Reductions (MT CO_2e/yr)
REDUCE ENERGY USE		**10,125**
C-E-1	Energy Use Data and Analysis	400
C-E-2	Retrofit Financing	8,150
C-E-3	Home & Commercial Building Retrofit Outreach	Supporting Measure
C-E-4	Energy Assurance Plan	Supporting Measure
C-E-5	Community-wide Solar Photovoltaic Development	1,575
C-E-6	Community-wide Solar Hot Water Development	Supporting Measure
C-E-7	Community Choice Energy Option	Supporting Measure
ENCOURAGE ALTERNATIVE TRANSPORTATION		**3,775**
C-T-1	Bicycle & Pedestrian Environment Enhancements	Supporting Measure
C-T-2	Bikeshare	Supporting Measure
C-T-3	Transportation Demand Management	925
C-T-4	Transit Route Expansion	Supporting Measure
C-T-5	Transit Priority	Supporting Measure
C-T-6	Transit-Oriented Development	Supporting Measure
C-T-7	Communitywide Alternative Fuel Vehicles	2,850
CONSERVE WATER		**325**
C-W-1	SB-7X-7	325
C-W-2	Recycled Water Irrigation Program	Supporting Measure
REDUCE SOLID WASTE		**275**
C-SW-1	Zero Waste Goal	Supporting Measure
C-SW-2	Food Scrap and Compostable Paper Diversion	150
C-SW-3	Construction & Demolition Waste Diversion Program	125

Table ES.4 Community-wide Reduction Measures	
Reduction Goals and Measures	**2020 Reductions (MT CO_2e/yr)**
EXPAND GREEN INFRASTRUCTURE	**200**
C-G-1 Urban Forest Program	200
STATEWIDE REDUCTIONS	**80,261**
Renewable Portfolio Standard	34,267
2013 California Building Energy Efficiency Standards	866
AB 1109 – Lighting Efficiency	5,059
Pavley I and II and Low Carbon Fuel Standard	36,535
Vehicle Efficiency Regulations	3,534
MUNICIPAL OPERATIONS REDUCTIONS	**700**[1]
TOTAL COMMUNITY-WIDE REDUCTIONS	**95,661**
Reductions Needed in 2020	**94,415**
Emissions Reduction Level Achieved	**15.4% below 2010 baseline**

1 See Table ES-4 for Municipal Operations reduction measures

Similarly, Chapter 4 presents the goals, measures, and actions that will contribute to the City's municipal operations reduction targets. Table ES.5 summarizes the 14 proposed measures, (including one statewide measure), and presents their associated GHG emissions reductions anticipated from implementation by the year 2020. As with the community-wide measures, the municipal operations measures are organized according to overarching goals and include two supporting measures that are not quantified. Based on the City's numerous past efforts to reduce energy use in its facilities, conserve water in landscape irrigation and indoor plumbing use, divert solid waste from landfills, and shift its vehicle fleet towards alternative fuel models, the City is estimated to exceed its 2020 reduction target and achieve reductions of nearly 35% below 2010 levels (assuming these CAP measures are implemented by 2020). This represents significant progress towards the next target year in 2035. Chapter 4 presents the same details for municipal operations measures as described above for the community-wide measures. It also considers what long-term actions would need to occur for the City to achieve its ambitious 2050 reduction target.

Table ES.5
Municipal Operations Reduction Measures

Reduction Measures	2020 Reductions (MT CO_2e/year)
FACILITIES GOAL	**552**
M-F-1 Sustainable Energy Portfolio	-[1]
M-F-2 Renewable or Low-Carbon Electricity Generation	108
M-F-3 Advanced Energy Management	91
M-F-4 Existing Building Energy Retrofit	41
M-F-5 New Building Energy Performance	Supporting Measure
M-F-6 Public Realm Lighting Efficiency	125
M-F-7 Landscape Water Conservation	1
Statewide Actions	186[2]
VEHICLE FLEET GOAL	**66**
M-VF-1 Low Emission and Alternative Fuel Vehicles	48
M-VF-2 Alternative Fuel Infrastructure	Supporting Measure
M-VF-3 Behavior / Fuel Conservation	19
SOLID WASTE GOAL	**82**
M-SW-1 Waste Reduction	64
M-SW-2 Food Scrap and Compostable Paper Diversion	16
M-SW-3 Construction and Demolition Waste Diversion	2
TOTAL 2020 CAP REDUCTIONS	**700**
Reductions Needed in 2020	**346**
Emissions Reduction Level Achieved	**34.9% below 2010 baseline**

Notes: Columns may not total to values shown due to rounding

[1] Emissions reductions associated with implementation of Measure M-F-1 were omitted from the Facilities Sector subtotal for 2020; See the Measure M-F-1 discussion in Chapter 4 for more information on its role in future target achievement.

[2] The Renewable Portfolio Standard requires California's utilities to provide 33% of their electricity from renewable sources by 2020. Several CAP measures, if implemented, would result in lower municipal electricity use in 2020 than that estimated in the emissions forecasts shown in Table ES.2. To avoid double-counting the cumulative effects of each measure, this table presents the RPS reductions assuming full implementation of Measures M-F-2 through M-F-7 by 2020. If any of these measures are not fully implemented by 2020, then reductions associated with the RPS would increase as a greater amount of electricity demand would be subject to the effects of this regulation. This table further assumes that Measure M-F-1 is not implemented prior to 2020. If Measure M-F-1 is implemented prior to 2020, then reductions associated with the RPS would decrease based on the level of clean electricity purchased as part of Measure M-F-1.

Additional Considerations

As shown in Tables ES.4 and ES.5, the goals, measures, and actions included within this CAP have been designed to achieve the City's near-term 2020 reduction targets. Chapters 3 and 4 also consider the on-going effects of these measures as compared to the City's longer-term targets. A variety of factors and uncertainties can influence the ability to achieve the 2035 and 2050 targets, including:

- accuracy of emissions forecasts,
- actual population and employment growth within the community,
- development of new emissions-reducing technologies (or, emissions-generating technologies), and
- continued influence of state-level actions related to climate change planning.

This CAP is a living document that needs regular monitoring and updates to ensure the City is making real progress towards it reduction targets in the context of ever-changing social and financial priorities. Though Cupertino already has a long history of leadership in environmental stewardship and sustainability planning, this CAP provides an extension of those past local successes into a space of planetary influence. To that end, this CAP also represents another example of how the community and City government are partnering to ensure the city remains a vibrant, healthy, and attractive community for residents and businesses in the future.

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ACRONYMS

Acronym	Definition
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ABAU	Adjusted-Business-as-Usual
AMA	advanced metering analytics
AMI	advanced meter infrastructure
ARB	California Air Resources Board
BAAQM	Bay Area Air Quality Management District
BAU	Business-as-Usual
C&D	construction and demolition
CalRecycle	California Department of Resources Recycling and Recovery
CAP	Climate Action Plan
CCA	Community Choice Aggregation
CCE	Community Choice Energy
CDT	Community Design and Transportation
CEQA	California Environmental Quality Act
CIWMP	Countywide Integrated Waste Management Plan
CNG	Compressed Natural Gas
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
EIR	Environmental Impact Report
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPC	energy performance contracting
ESA	energy service agreement
ESCO	energy service companies
EV	Electric Vehicle
FEMP	Federal Energy Management Program
GHG	Greenhouse Gas
GVWR	gross vehicle weight rating
HAN	Home and Business Area Networking
HPS	High-Pressure Sodium
kW	kilowatt
kWh	Kilowatt Hour
LCFS	Low Carbon Fuel Standard

Acronym	Definition
LEED	Leadership in Energy and Environmental Design
LGOP	Local Government Operations Protocol
MT CO_2e	Metric Tons of Carbon Dioxide Equivalent
MTC	Metropolitan Transportation Commission
MW	Megawatt
OPR	California Office of Planning and Research
PACE	property-assessed clean energy
PDA	Planned Development Area
PG&E	Pacific Gas and Electric Company
PPA	power purchase agreement
psi	pounds per square inch
PV	photovoltaic
RPS	Renewable Portfolio Standard
SB	Senate Bill
Scoping Plan	Climate Change Scoping Plan
TDM	Transportation demand management
TOD	transit-oriented development
TSP	transit signal priority
VMT	vehicle miles traveled
VTA	Santa Clara Valley Transportation Authority

CHAPTER 1
CLIMATE CHANGE AND CUPERTINO

This chapter defines the purpose of the City's Climate Action Plan (CAP) and the planning framework used to develop it. An overview of the State of California's greenhouse gas (GHG) reduction efforts is introduced, along with a policy framework of existing statewide action. The chapter also presents a summary of ongoing local and regional efforts related to climate change planning. It concludes with a description of how the CAP relates to the City's General Plan and to the California Environmental Quality Act.

"No citizen of the global village is free from the damage caused by climate change. For the harmony between human settlements and nature, for the symbiosis of all groups of citizens, and for the happiness of both current and future generations, cities should think and act together."

Park Won Soon, Mayor, Seoul Metropolitan Government, Republic Of Korea; Chair, World Mayors Council on Climate Change

The City of Cupertino's Climate Action Plan is designed to be a blueprint of our community's response to the challenges posed by climate change, recognizing our responsibility as an emissions generator and as a guardian of our locality and all of its members. Aligned with our community's vision as defined in our General Plan, this document serves as a roadmap to ensure our long-term quality of life and vitality. Climate scientists around the world, represented by the Intergovernmental Panel on Climate Change, have presented an unequivocal position on this issue: human activity is changing the earth's climate through the release of greenhouse gas (GHG) emissions resulting from the combustion of fossil fuels. The longer communities delay in taking action, the greater the risk humans will face of irreversibly depleting nonrenewable resources and harming the environment. However, it is conceivable, and increasingly foreseeable, that humans will delay action so long that useful policy and programs will not be able to effectively prevent permanent, and possibly catastrophic, damage to our planet and all of its inhabitants.

> *"Someday, our children, and our children's children, will look at us in the eye and they'll ask us, did we do all that we could when we had the chance to deal with this problem and leave them a cleaner, safer, more stable world?"*
>
> – President Barack Obama's Climate Speech, June 25, 2013

According to most climatologists, the planet is starting to experience shifts in climate patterns and increased frequency of extreme weather events at both the global and local levels. At a statewide level, these impacts include reduced snow pack in the Sierra Nevada affecting California water supplies; rising sea levels threatening cities along the coast, San Francisco Bay, and the state's rivers; decreasing air quality affecting public health; and, rising temperatures impacting the state's agricultural industry. Local communities represent the epicenter of these impacts where the "rubber hits the road," revealing new vulnerabilities that will require cohesive disaster planning, emergency response, and community capacity-building to minimize the social, economic, and environmental challenges arising through this new climate reality. This Climate Action Plan represents our community's efforts to achieve these aims.

CALIFORNIA'S COMMITMENT TO CLIMATE PROTECTION

California has long been a sustainability leader, as illustrated by Governor Schwarzenegger signing Executive Order (EO) S-3-05 dating back to 2005. EO S-3-05 recognizes California's vulnerability to a reduced snowpack, exacerbation of air quality problems, and potential sea level rise due to a changing climate. Figure 1.1 illustrates several primary climate change impacts that state departments are currently tracking in California.

Figure 1.1 – Climate Change in California

Source: http://oehha.ca.gov/multimedia/epic/images/2013infographic.gif

To address these concerns, the Governor established the following targets to reduce statewide GHG emissions:

- 2000 levels by 2010,
- 1990 levels by 2020, and
- 80% below 1990 levels by 2050

In 2006, California became the first state in the country to adopt a statewide GHG reduction target through Assembly Bill (AB) 32. This law codifies the EO S-3-05 requirement to reduce statewide emissions to 1990 levels by 2020. AB 32 also resulted in the 2008 adoption by the California Air Resources Board (ARB) of a *Climate Change Scoping Plan* (Scoping Plan), outlining the state's plan to achieve emission reductions through a mixture of direct regulations, alternative compliance mechanisms, different types of incentives, voluntary actions, market based mechanisms, and funding.

The Scoping Plan also recommends that local governments reduce municipal operation emissions to a level approximately 15% below baseline levels by 2020 to assist in achieving the statewide 2020 reduction target (i.e., a return to 1990 levels). Recent guidance from the State Office of Planning and Research further recommends that local governments plan to reduce their emissions on a trajectory that would contribute to the state's long-term 2050 target expressed in EO-S-3-05 (i.e., 80% below 1990 levels). See Chapter 2 for further discussion on the CAP's target setting rationale.

CUPERTINO'S COMMITMENT TO CLIMATE PROTECTION

The City of Cupertino has long been a leader in practicing resource conservation and efficiency, and formalized its efforts in 2008 through the creation of an Environmental Affairs Division (now called Sustainability Division) within the Office of the City Manager as the team dedicated to designing and implementing the energy, water, and transportation scope set forth in the City's General Plan In 2012, the City chose to partner with other local governments in Santa Clara County to jointly develop climate action plans that address emissions from community-wide and municipal operations sources, an outstanding policy objective defined in the General Plan Sustainability Element.

As the majority of GHG emissions arise from communities, local governments must play a vital role in their mitigation, but the City of Cupertino cannot solve the climate crisis alone. Together with its partners in county, state, and federal government, Cupertino has committed to taking steps to reduce its emissions, and create new programs and services that will support the community and its families to do the same. This CAP offers ways to make Cupertino's homes more energy efficient and increase the amount of locally produced renewable energy. It supports development patterns envisioned in the City's General Plan that emphasize vibrant complete neighborhoods, which allow people to perform daily activities on foot, by bicycle, or via public transportation. It provides transit solutions to further improve this mobility within the community. It offers ways to conserve resources and reduce waste sent to area landfills. Lastly,

it identifies specific actions the City can take to reduce emissions generated from government activities while still providing an exceptional level of service to its residents and businesses.

The strategies presented in this CAP build from the commitment of Cupertino's residents, local businesses, and City government to take actions that will improve the community's quality of life, while also reducing Cupertino's greenhouse gas emissions. By collaborating with individuals and community groups to take these steps toward minimizing our climate change contribution, our City can achieve a common vision for community longevity and environmental vitality, and to reduce our vulnerabilities to current and predicted climate impacts.

Purpose of a Climate Action Plan

At its basic level, climate action planning seeks to identify emissions reduction strategies that are informed by the goals, values, and priorities of our community. CAPs prepared in California also typically developed as a roadmap for cities to contribute to the state's climate protection efforts, recognizing that our communities are the population and business centers that use resources and generate emissions. California's CAPs also define steps to comply with applicable local Air Quality Management Districts' efficiency standards for GHG emissions.

The City of Cupertino, along with climate-committed individuals and interested community groups, partnered with Santa Clara County Office of Sustainability and the Pacific Gas and Electric Company (PG&E), to develop this CAP as part of a regional effort to support Santa Clara County governments in achieving the following five objectives:

- **To demonstrate environmental leadership** – Cupertino as a community can rise to the difficult challenge of reducing the impact of climate change by defining measurable, reportable, verifiable climate actions to reduce its contribution to local and global GHG emissions that can serve as a model for small cities in the state and nationwide.
- **To save money and promote green jobs** – Residents, businesses, and government can reduce their utility costs through increased energy and water efficiency, and a focus

on efficiency can create job opportunities within the community that contribute to protecting our shared environmental resources.

- **To comply with the letter and spirit of state environmental initiatives** – California is taking the lead in tackling climate change while driving new energy markets and fostering new environmental services. As coordination with cities serves as the keystone to achieving statewide greenhouse gas emissions reductions, Cupertino has a responsibility to help the state access emissions sources that arise in our geography and meet its goals to reduce these emissions.
- **To promote sustainable development** – By developing this Climate Action Plan to reinforce General Plan policies and align with the Bay Area Air Quality Management District (BAAQMD) guidelines, a new class of sustainable development projects, such as mixed use and transit oriented developments, can be fast-tracked (i.e., "streamlined") through the California Environmental Quality Act (CEQA) review process by not requiring GHG emissions for proposed projects consistent with the CAP.
- **To support regional climate change efforts** – Cupertino developed its CAP through a county-wide effort that established consistency in the local response to the climate change issue, and created a framework to collaborate regionally on implementation of different CAP programs. This partnership elevates the credibility of local climate action planning by allowing transparency, accountability, and comparability of the plans' actions, performance, and commitments across all participating jurisdictions.

CITY'S COMMITMENT TO EFFECTIVE OPERATIONS AND SERVICE DELIVERY

In addition to its community-wide commitment to climate protection, the City is dedicated to providing services, programs, and facilities in a fiscally responsible manner. The City has already made numerous investments that promote efficient resource use, reduce operation and maintenance costs, reduce risks to future cost uncertainty, and strengthen long-term resilience.

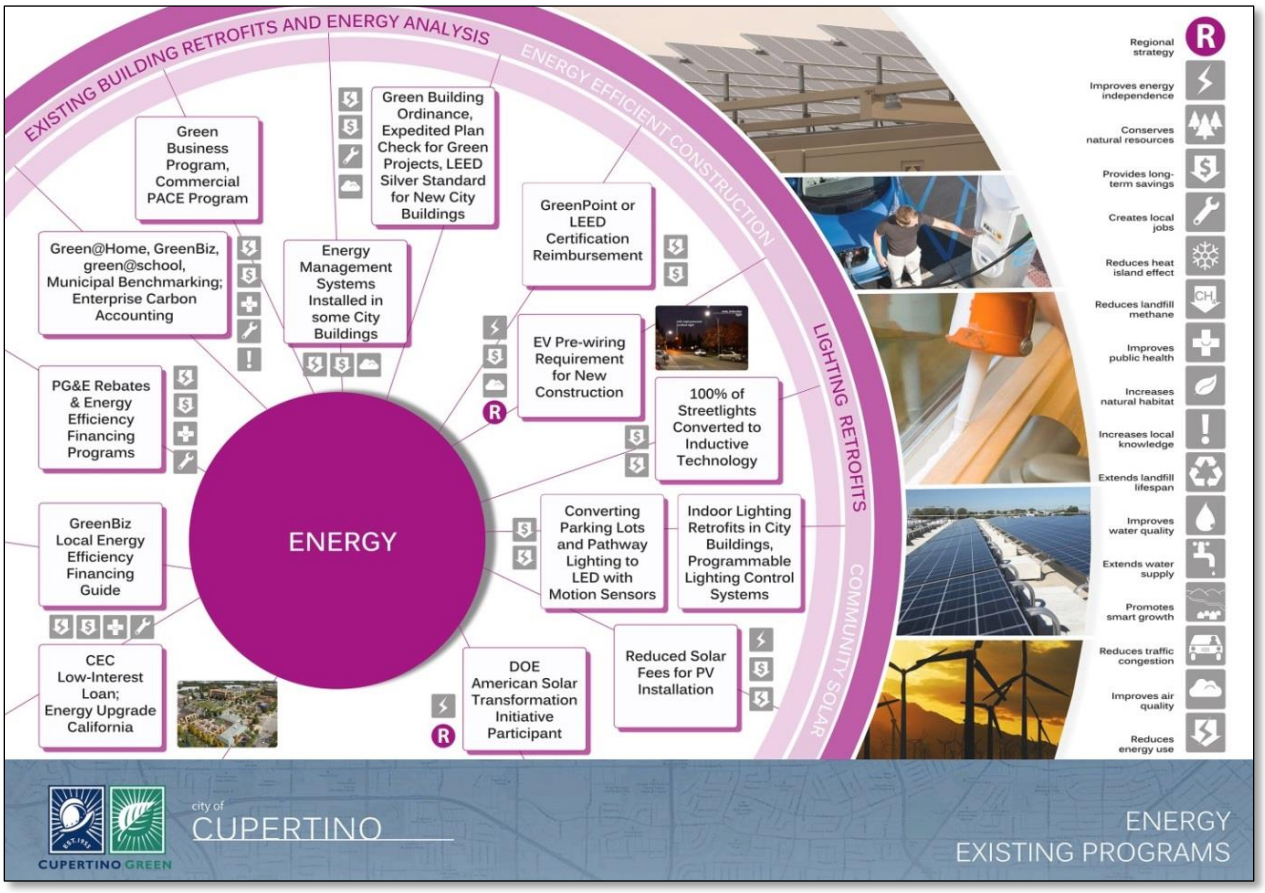
Examples of past initiatives include:

- Retrofitted all City-owned and operated street light fixtures with energy and cost-efficient lighting technologies.
- Replaced irrigation controllers with "smart" weather-based controllers to improve landscaping water conservation, coupled with the application of drought-tolerant landscaping where applicable.

- Replaced all City-owned traffic signals with energy-efficient technologies that also reduce maintenance costs.
- Retrofitted facility parking lot and park pathway lighting with LED technology.
- Upgraded interior lighting to LEDs and T8s, exit signs to LEDs, and office/workstation to ENERGY STAR and EPEAT-certified electronic equipment.
- Adopted a Green Building Ordinance, Water Efficient Landscaping Ordinance, Electric Vehicle Charging System Pre-Wiring Requirement that applies to new and retrofitted City, commercial, and residential buildings.
- Benchmarked energy use in all municipal facilities through ENERGY STAR Portfolio Manager.
- Enrolled and certified all municipal facilities in the California statewide Green Business Program to benchmark and periodically inventoried operational sustainability practices in the areas of energy, water, materials, storm water, health and wellness, and hazardous materials.
- Expanded this comprehensive sustainability-focused, behavior change-driven program to support emissions reduction and resource efficiency cost-savings gains in small to mid-sized businesses (i.e., GreenBiz Cupertino), residents (i.e., Green@Home and the Do-It-Yourself Green@Home Toolkit), and schools (i.e., green@school).
- Incorporated Plug-In-Electric hybrid and fuel-efficient vehicles into the City fleet, prioritized through lifecycle cost assessments as directed by the City's Environmentally Preferable Procurement Policy, and electric vehicle charging stations for municipal and community use.
- Expanded composting services, available to all residents and businesses, beyond municipal facilities into parks to ensure the City is further reducing its landfill contribution.

Figure 1.2 shows an informational poster used during the CAP's public workshop open houses to highlight past City successes in energy conservation and renewable energy development, including several other energy programs launched by the City.

Figure 1.2 – City of Cupertino Existing Energy Programs



Beyond utility-focused efficiencies, which serve as the basis for the City's past, present, and future climate-related objectives detailed in this report, it should also be noted that Cupertino operates under a "lean" government model. This enables the agency, and its taxpayers, to achieve dramatic cost efficiencies through many shared-service provisions, which also serve to reduce its operational emissions. For example, the City contracts with Los Gatos for street-sweeping services, reducing its purchase of this specialized vehicle, and with the County for police and fire services to leverage their public safety-related expertise and equipment. The City is also evaluating opportunities to outsource services itself, including sign and banner printing and sustainability services, identified as two unique city assets relevant to smaller adjacent jurisdictions. Through this shared service model, the City is reducing the agency's demand for additional equipment (e.g., vehicles) and staffing, and associated resources and emissions, a goal that will continue to be considered and prioritized through implementation of the CAP.

Components of a CAP

A CAP is a tool that many cities in California are using to quantify their share of statewide GHG emissions and establish action steps toward achieving a local emissions reduction target. A CAP provides a set of strategies intended to guide community efforts to reduce GHG emissions, typically through a combination of statewide and local actions. CAPs can be developed to address community-wide emissions (i.e., total emissions within a jurisdictional boundary) and/or municipal government emissions (i.e., emissions resulting from the provision of government services). As described in the Executive Summary, Cupertino has prepared its CAP to address the climate change issue from both the community-wide and municipal operations perspectives.

To facilitate local governments' climate protection efforts, California's Air Resources Board prepared the Local Government Operations Protocol (LGOP). The LGOP reporting protocol provides guidance on how to inventory greenhouse gas emissions resulting from government buildings and facilities, government fleet vehicles, wastewater treatment and potable water treatment facilities, landfill facilities, and other operations and services.[i] Local governments are also encouraged to use the LGOP to conduct inventories and prepare a report of GHG emissions compared to a baseline so that achieved reductions can be tracked in a transparent, consistent, and accurate manner. Additionally, the organization ICLEI, Local Governments for Sustainability, provides guidance on how local governments can address environmental impacts from a community-wide perspective, based upon a recently released U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. The City's CAP was developed in conformance with the technical guidance provided within the LGOP as well as climate change

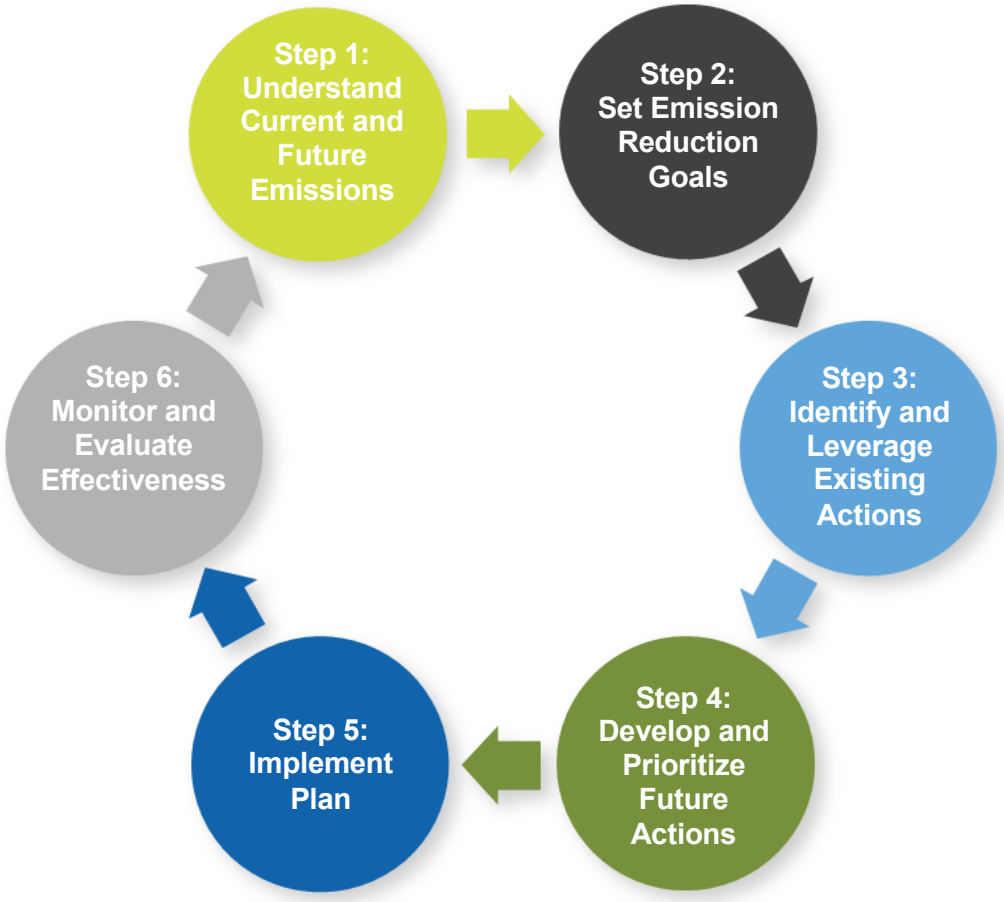
planning guidance from other agencies, including BAAQMD, the United Nations International Panel on Climate Change, and the Climate Change Action Registry.

Like other California communities, the City's CAP development framework was modeled after ICLEI's universally-applied Five Milestones for Climate Mitigation, which includes the following steps:

1. Conduct a baseline emissions inventory and forecast
2. Adopt an emissions reduction target for the forecast year
3. Develop a Local Climate Action Plan
4. Implement policies and measures
5. Monitor and verify results

This 5-step approach was modified for this CAP to split Step 3 into two distinct steps in which the full breadth of Cupertino's past actions and progress on emissions reduction could be evaluated, quantified, and then expanded. Figure 1.3 illustrates this six-step process used to guide Cupertino's CAP development.

Figure 1.3 – CAP Development Process



This CAP evaluated community-wide and municipal operations GHG emission inventories and forecasts to establish a starting point and probable future emissions levels if no action to reduce emissions is taken (Step 1). Reduction targets were then defined to provide aspirational goals for improvement (Step 2). Emission reduction measures and implementation actions were written to help the City achieve its reduction targets (Step 3). Upon adoption of the CAP, the City will take action to implement its reduction measures (Step 4), monitor progress towards achievement of its reduction targets (Step 5), and evaluate effectiveness, celebrate successes, and use monitoring results to make adjustments to improve performance of CAP measures in the future (Step 6).

This CAP represents Cupertino's progress on Steps 1-3, though the agency has already launched a variety of programs to implement emissions reductions (Step 4) throughout the community by implementing its General Plan Sustainability Element; these initiatives are described more fully in Chapter 3. The following discussion provides further detail on each step of the CAP development process.

STEP 1. UNDERSTAND CURRENT AND FUTURE EMISSIONS

Understanding the source and scale of greenhouse gas emissions and the underlying emission-generating activities is a critical element for any climate action planning process. The City's 2010 baseline GHG emissions inventory and future year emissions forecasts for 2020, 2035, and 2050 identify the amount of emissions generated by each sector (e.g., energy/facilities, transportation/vehicle fleet, potable water, solid waste) and relevant subsectors. This information, described in detail within Chapter 2, identifies both the challenges and opportunities facing the City in mitigating its emissions, and will assist the City Council to select appropriate actions to reduce emissions. It also forms the basis for setting emission reduction targets and strategies for future years. As previously mentioned, Cupertino has prepared emissions inventories and forecasts at the community-wide and municipal operations levels.

STEP 2. SET EMISSION REDUCTION GOALS

Statewide guidance recommends that local governments adopt emissions reduction targets that support the state's efforts towards its 2050 target. As described earlier, the state has adopted reduction targets that would return statewide emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050. The state is also encouraging local governments to adopt similar targets through locally-developed climate action plans to contribute to these statewide efforts.

In order to do its part and continue to lead by example, the City has developed reduction targets based on its 2010 baseline emissions inventory, which mirror the efforts at the state level. Per guidance included in the *2008 Scoping Plan*, the City established a near-term target of 15% below baseline levels by 2020, which is meant to approximate a return to 1990 emissions levels. This goal was then extrapolated to 2050 in order to mirror the state's goal for 80% below 1990 levels, which results in a City goal of 83% below 2010 levels by 2050. A 2035 goal of 49%

below 2010 levels was also identified to serve as a mid-point check-in between these near-term and long-term goals. The CAP uses these same targets to evaluate the community-wide and municipal operations reduction strategies.

These targets were presented to the public in the context of the community-wide CAP during community workshops and at Planning Commission and City Council study sessions as part of the consideration for developing appropriate local emissions reduction measures. While some community members expressed a desire to adopt more stringent targets, the majority of participants were more comfortable selecting these targets, which more closely align with statewide efforts and those of neighboring jurisdictions. See Chapter 2 for further description of the target setting process.

Step 3. Identify and Leverage Existing Actions

Greenhouse gas mitigation within local governments is most effective when a city can use existing efforts as a foundation on which to build additional future initiatives. During the development of the CAP, the City identified a wide range of actions that it has already taken to encourage community-wide energy and water conservation, reduce municipal energy and water use, support installation of renewable energy systems, improve vehicle efficiency in the municipal fleet, support alternative vehicle use community-wide, and divert organic waste to reduce landfill emissions. While the purpose of the CAP is to identify and define new actions, the momentum from these existing actions provides a platform to launch additional emissions mitigation in the future. Discussion of existing communitywide and municipal operations efforts is provided within Chapter 3 and 4, respectively, where relevant to the implementation of future action.

Step 4. Develop and Prioritize Future Actions

Future greenhouse gas emissions reduction actions need to be feasible, effective, and compatible with other City objectives. A review of best practices from other leading jurisdictions nationally and internationally was conducted to develop the actions contained within the CAP. City staff preliminarily reviewed these best practices and identified strategies that are compatible with community goals and City Council and other organizational priorities. Once the preliminary list of measures was identified, draft actions and implementation steps were developed that could be used to implement these measures by 2020. Emissions reduction estimates were then developed from the list of measures. This information was shared with the community and elected officials who provided guidance on the final list of CAP strategies and implementation steps, and helped to prioritize the early action items for CAP implementation. This measure development process is illustrated in Figure 1.4.

Figure 1.4 – Measure Development Process

Step 5. Implement Plan

The CAP directs a wide variety of actions to be implemented. Each action identifies specific implementation steps, responsible parties, a timeline for completion, and recommended performance indicators. Some of the actions can be directly executed by City staff or community members, while other actions will require additional research, refinement, development, and coordination in order to achieve the desired outcomes.

Step 6. Monitor and Evaluate Effectiveness

Although climate action planning is still relatively new in California, a key step in the planning process is to monitor and evaluate the effectiveness of a plan and its actions. Effectiveness can be defined in terms of:

- Overall and sector-level emissions as demonstrated by periodic inventories
- Progress toward performance targets defined for each action
- Reduction in City energy, fuel, and related operations and maintenance costs

Chapter 7 concludes the CAP by defining a framework and schedule for monitoring and evaluating CAP effectiveness and updating the document in the future.

Climate Change Science

According to the US Environmental Protection Agency, global warming refers to the recent and ongoing rise in global average temperature near Earth's surface, and is caused primarily by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change. Climate change refers to any significant change in the measures of climate lasting for an extended period of time, including major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.[ii]

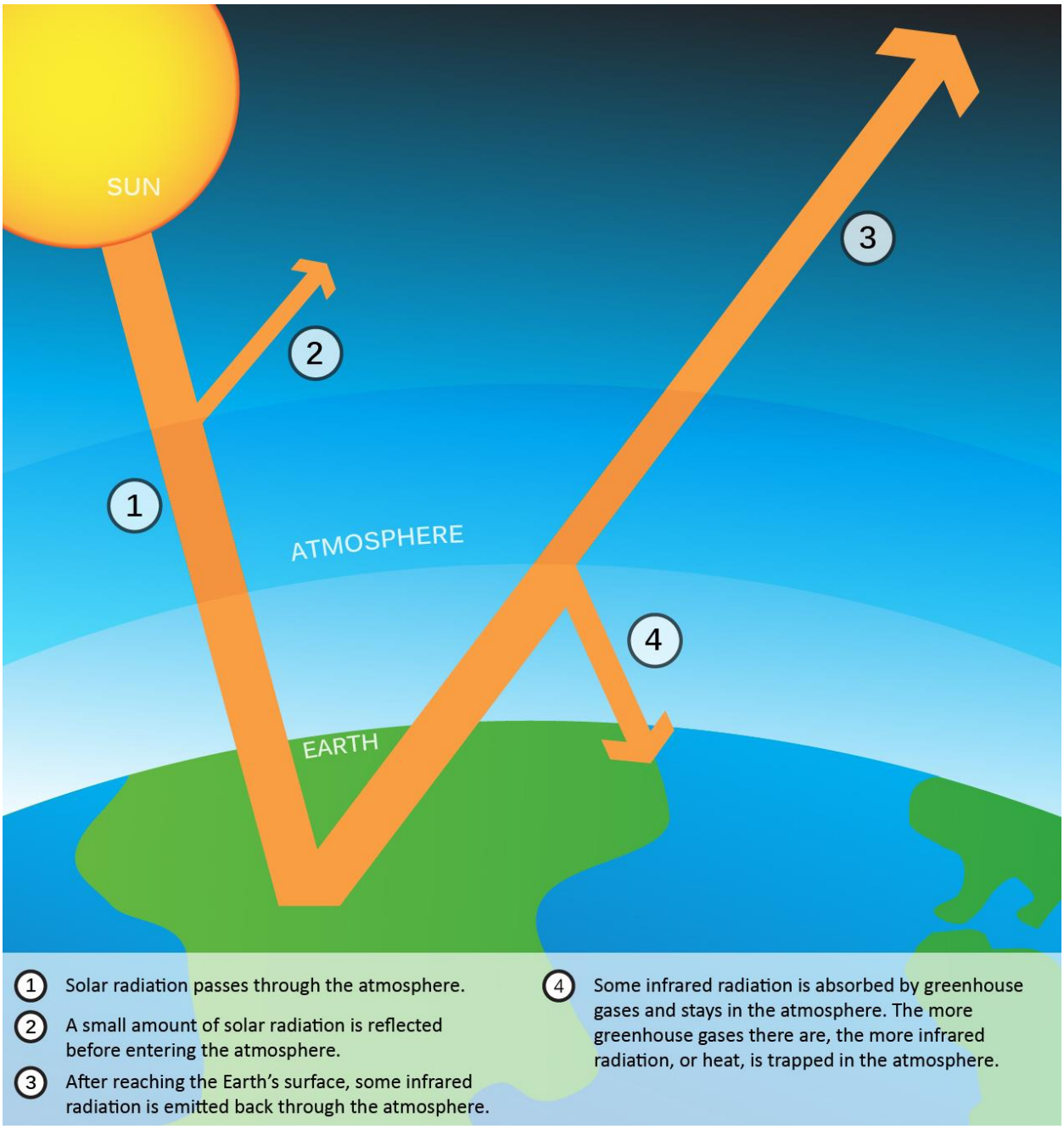
Over the past century, human activities have released large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Greenhouse gases act like a blanket around Earth, trapping energy from the sun in the atmosphere and causing it to warm. This phenomenon is called the greenhouse effect and is natural and necessary to support life on Earth (see Figure 1.5, next page). Many greenhouse gases are also naturally occurring. However, the buildup of greenhouse gases from human activities and resulting global average temperature rise can change Earth's climate and result in dangerous effects to human health and welfare and to ecosystems.[iii]

> *"Increasingly intense droughts in California, all of the Southwest, and even into the Midwest have everything to do with human-made climate change."*
>
> – Dr. James Hansen

In the United States, 83.6% of GHG emissions are from CO_2, with 94.4% of CO_2 emissions coming from the burning of fossil fuels.[iv] Trend projections indicate that atmospheric concentrations of GHG emissions will continue to increase throughout this century. If these projections become reality, climate change will threaten our economic well-being, public health, and environment.

California has an advantage in its scientific understanding of climate change, which stems from public investment into climate research and publications. Much of this research is performed through the California Climate Change Research Center created by the California Energy Commission in 2003 as the first state-funded climate change research program in the country (see: http://energy.ca.gov/research/environmental/climate.html). This research has provided a solid body of vital data, which is available to assist state and local leaders to better understand how climate change is affecting us now, what is in store ahead, and what we can do about it. State-sponsored research has contributed greatly to recent advances in our understanding of the potential impacts of climate change on California. A first assessment prepared by the California Climate Change Center and published in 2006, made clear that the level of impacts is a function of global emissions of greenhouse gases and that lower emissions can significantly reduce those impacts.[v]

Figure 1.5 – Greenhouse Effect



Source: AECOM 2014

The third and most recent publication, *The 2012 Vulnerability and Adaptation Study,* explores local and statewide vulnerabilities to climate change, highlighting opportunities for taking concrete actions to reduce climate change impacts.[vi] The California legislature passed legislation (discussed below in the section *State Climate Change Actions*) based upon the findings of the most comprehensive, advanced, and thoroughly reviewed documents on the science of climate change. The development of CAPs in California, including those in Santa

Clara County, is based upon the actions of the California legislature and its reliance on these findings. For further information on climate science generated for our state, please visit the California Climate Change Portal at http://www.climatechange.ca.gov/.

BENEFITS OF ADDRESSING GHG EMISSIONS

Planning efforts intended to reduce GHG emissions through resource efficiency and conservation measures often have multiple benefits that will improve the local quality of life, help the community adapt to future impacts of climate change, support local economic development, and demonstrate local sustainability leadership. While some of these "co-benefits" (i.e., achieving multiple ends) are qualitative, others are quantifiable improvements over current conditions. This plan generally refers to co-benefits as the additional, yet interconnected, benefits resulting from implementation of various CAP measures. Figure 1.6 presents icons that illustrate the co-benefits discussed during the CAP's public outreach activities, though this list is in no way exhaustive.

Figure 1.6 – CAP Measure Co-Benefits

State Climate Change Actions

Cupertino's strategy for climate protection must be set within the context of the Bay Area and the state, where much of the momentum for local action in the United States originates. As mentioned above, California's climate-related actions were codified in AB 32, the California Global Warming Solutions Act of 2006. In addition to codifying the state's 2020 reduction target as originally envisioned in EO-S-3-05 (i.e., return to 1990 levels by 2020), AB 32 engendered several companion laws that can assist local communities, such as Cupertino, in reducing their community-wide GHG emissions. These legislative actions and regulations are referred to as statewide actions throughout the CAP, and represent a significant source of estimated GHG reductions.

This CAP estimated the GHG emission reductions associated with:

- the Renewable Portfolio Standard (RPS)
- California 2013 Building Energy Efficiency Standards
- AB 1109 – Lighting Efficiency
- AB 1493 – Pavley I and II
- EO-S-1-07 – Low Carbon Fuel Standard
- Vehicle Efficiency Regulations

As the regulatory framework surrounding AB 32 grows, it may be possible to evaluate a wider range of statewide reductions sources in the future. The following section presents an overview of each of these statewide actions included in the CAP. Chapter 2 provides additional information on how these actions relate to achievement of the community-wide and municipal operations targets.

Renewable Portfolio Standard

Senate Bill (SB) 1078, SB 107, EO-S-14-08, and SB X1-2 establish increasingly stringent RPS requirements for California utilities. RPS-eligible energy sources include wind, solar, geothermal, biomass, and small-scale hydro.

- **SB 1078** requires investor-owned utilities to provide at least 20% of their electricity from renewable resources by 2020.
- **SB 107** accelerated the SB 1078 the timeframe to take effect in 2010.
- **EO-S-14-08** increased the RPS further to 33% by 2020. PG&E, Cupertino's electricity provider, delivered 23.8% of its electricity from eligible renewable sources in 2013.
- **SB X1-2** codified the 33% RPS requirement established by EO-S-14-08.

2013 Building Energy Efficiency Standards

California's Building Standards Code (California Code of Regulations Title 24) dictates how new buildings and major remodels are constructed in California. The Building Energy Efficiency Standards (Title 24, Part 6), are a subset of the state building code, which detail energy efficiency standards for residential and non-residential development. The standards are updated on an approximately three-year cycle. The state has further increased building energy conservation requirements through adoption of the 2013 standards, which went into effect July 1, 2014. It is estimated that these revisions to the current 2008 Building Energy Efficiency Standards will result in energy consumption reductions of 15-25% over the previous standards.

The California Green Building Standards Code (California Code of Regulations Title 24, Part 11) includes additional requirements for new construction and renovation projects that may also result in emissions reductions. This plan does not include these reductions as a separate measure. However, the impact of these requirements may be accounted for in other statewide or local reduction measures (e.g., construction and demolition waste diversion requirements).

Net Zero Energy New Buildings

In the 2007 Integrated Energy Policy Report, the CEC adopted a goal to achieve net zero energy buildings in new residential construction by 2020 and non-residential construction by 2030. A net zero energy building consumes only as much energy on an annual basis as can be generated with an on-site renewable energy system (e.g., solar, wind, geothermal). While the pathway to realize this goal has not yet been defined, this goal will play a role in the future ability to achieve the state's long-term reduction target. Future reduction estimates associated with this goal may be quantifiable once an implementation pathway for this policy has been identified.

AB 1109 – Lighting Efficiency

AB 1109 was signed into law in 2007. The California Lighting Efficiency and Toxics Reduction Act requires the California Energy Commission to adopt energy efficiency standards for all general purpose lights, reducing lighting energy usage in indoor residences and state facilities by no less than 50%, by 2018, as well as require a 25% reduction in commercial facilities by that same date. To achieve these efficiency levels, the California Energy Commission applied its existing appliance efficiency standards to include lighting products, as well as required minimum lumen/watt standards for different categories of lighting products. In addition, the bill prohibits the manufacturing for sale or the sale of certain general purpose lights that contain hazardous substances.

AB 1493 – Pavley I and II

AB 1493, California's mobile-source GHG emissions regulations for passenger vehicles, or California Clean Car Standards, was signed into law in 2002. AB 1493 requires ARB to develop and adopt regulations that reduce GHG emissions from passenger vehicles, light-duty trucks,

and other non-commercial vehicles for personal transportation. In 2004, ARB approved amendments to the California Code of Regulations adding GHG emissions standards to California's existing standards for motor vehicle emissions.

EO-S-1-07 – Low Carbon Fuel Standard

EO-S-01-07 reduces the carbon intensity of California's transportation fuels by at least 10% by 2020. The Low Carbon Fuel Standard (LCFS) is a performance standard with flexible compliance mechanisms that incentivizes the development of a diverse set of clean, low-carbon transportation fuel options to reduce GHG emissions.

Vehicle Efficiency Regulations

ARB has adopted several additional regulations to reduce emissions through improved vehicle efficiency that will have local GHG emission reduction benefits in Cupertino. The following six regulations were quantified and included as part of this CAP, assuming their ongoing or future implementation, as appropriate.

Tire Inflation Regulation

On September 1, 2010, ARB's Tire Pressure Regulation took effect. The purpose of this regulation is to reduce GHG emissions from vehicles operating with under-inflated tires by inflating them to the recommended tire pressure rating. The regulation applies to vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less. Under this regulation, automotive service providers must meet the following requirements:

- Check and inflate each vehicle's tires to the recommended tire pressure rating, with air or nitrogen, as appropriate, at the time of performing any automotive maintenance or repair service.
- Indicate on the vehicle service invoice that a tire inflation service was completed and the tire pressure measurements after the service were performed.
- Perform the tire pressure service using a tire pressure gauge with a total permissible error no greater than + two (2) pounds per square inch (psi).
- Have access to a tire inflation reference that is current within three years of publication.
- Keep a copy of the service invoice for a minimum of three years, and make the vehicle service invoice available to the ARB, or its authorized representative upon request.

Tire Tread Program

This measure increases vehicle efficiency by creating an energy efficiency standard for automobile tires to reduce rolling resistance. A reduction in GHG emissions results from reduced fuel use. ARB staff estimates that reducing the rolling resistance of tires by 10% results in a 2% increase in fuel efficiency.

Low Friction Engine Oils

This measure increases vehicle efficiency by mandating the use of engine oils that meet certain low friction specifications. The American Petroleum Institute has established "energy conserving designation" for certain oils. These specifications will be used as a starting point for the mandated oils under this measure.

Solar Reflective Automotive Paint and Window Glazing

This measure increases vehicle efficiency by reducing the engine load for cooling the passenger compartment with air conditioning. The use of solar reflective automotive paints and window glazing reduces heating of the automobile passenger compartment from the sun resulting in reduced air conditioning use. The result is both less frequent air conditioning use by drivers and smaller air conditioners specified by manufacturers for new vehicles.

Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency)

This regulation requires existing trucks/trailers to be retrofitted with the best available technology and/or ARB-approved technology to increase vehicle aerodynamics and fuel efficiency that will result in GHG reductions. This measure was identified as a Discrete Early Action in the Scoping Plan, and became enforceable beginning in 2010. Technologies that reduce GHG emissions and improve the fuel efficiency of trucks may include devices that reduce aerodynamic drag and rolling resistance. These requirements apply to both California-registered trucks and out-of-state registered trucks that travel to California.

Medium- and Heavy-Duty Vehicle Hybridization

This measure regulates or incentivizes GHG reductions from medium- and heavy-duty vehicles used in vocational applications such as parcel delivery trucks, garbage trucks, utility trucks, and transit buses. Hybrid electric technology has potential to significantly reduce GHG emissions and improve vehicle efficiency from these vehicles.

Regional Coordination and Actions

In addition to the Scoping Plan and other actions taken at the statewide level, numerous county-wide and other regional efforts have been established to support broad action towards emissions reductions within the Bay Area. The following regional efforts promoting GHG reductions are already in progress:

SANTA CLARA COUNTY-SPECIFIC:

- **Silicon Valley 2.0** – Led by the Santa Clara County office of sustainability, the Silicon Valley 2.0 project includes development of long-term strategies that support climate change mitigation and adaptation within the greater Silicon Valley region. The project aims to identify likely climate change impacts that would negatively affect the economic

vitality of the region or endanger its residents. This CAP was prepared as part of the Silicon Valley 2.0 mitigation strategy, which included regional collaboration on the development of community-wide and municipal operations CAPs for seven participating jurisdictions. The broader adaptation strategy considered local impacts to various facilities (e.g., vehicle infrastructure, buildings, utilities) within the region resulting from several climate risks (e.g., rising sea level, riverine flooding, heat waves).

- **Silicon Valley Energy Watch** – This program is a local government partnership between the City of San José, PG&E, and Ecology Action, to promote energy efficiency in municipal and non-profit buildings in Santa Clara County. Cupertino was the only municipality to receive funding for its GreenBiz and green@schools programs through SVEW's Community Energy Champions Grant program from 2011 to 2014.
- **Energy Upgrade California in Santa Clara County –** This Santa Clara County program aims to help residential consumers make improvements to their homes so they will use less energy, conserve water and other natural resources, and become healthier and more comfortable. The program connects homeowners with participating contractors who can help plan and complete energy efficiency projects and take advantage of rebates. Energy Upgrade California is a partnership among California counties, cities, non-profit organizations, and the state's investor-owned utilities (e.g., PG&E).
- **Congestion Management Agency –** VTA serves as the Congestion Management Agency for Santa Clara County to identify strategies to respond to future transportation needs, develop procedures to alleviate and control congestion, and promote county-wide transportation solutions (i.e., Transit 511).
- **Santa Clara Valley Water District –** The Santa Clara Valley Water District (SCVWD) is the primary water resource agency for Santa Clara County. As such, SCVWD is responsible for long-term water supply planning for the region and has taken steps in response to California's recent drought conditions. Its Board of Directors passed a resolution calling for mandatory measures to reach a water use reduction target equal to 20% of 2013 water use levels. SCVWD also provides rebates to encourage county residents to conserve water in their homes and landscapes. The District provides rebates for landscape conversions to low-water designs, irrigation hardware updates, graywater-to-landscape systems, high-efficiency toilets and clothes washers, and multi-family property submeter installation.

BAY AREA-FOCUSED:

- **Sustainable Communities Strategy/Regional Transportation Plan –** Local governments and regional agencies collaborated to develop a Sustainable Communities Strategy (SCS) in compliance with the requirements of SB 375, titled Plan Bay Area. This long-range integrated transportation and land-use/housing strategy for the Bay Area entirety, was approved by the Association of Bay Area Governments and Metropolitan Transportation Commission in 2013. Plan Bay Area defines the nine-county region's

SCS to accommodate future population growth and reduce emissions from cars and light trucks including initiatives to expand housing and transportation choices, create healthier communities and build a stronger regional economy. The aim of the forthcoming Santa Clara County-focused SCS is to better integrate land use with public transportation in order to reduce GHG emissions within our County specifically.

- **Joint Venture: Silicon Valley Network –** Established in 1993, Joint Venture: Silicon Valley Network provides analysis and action on issues affecting the local economy and quality of life. The organization brings together established and emerging leaders – from business, government, academia, labor, and the broader community – to spotlight issues and work toward innovative solutions. Joint Venture is dedicated to promoting climate-friendly activities that help the local economy and improve quality of life in Silicon Valley, as is realized through its Climate Prosperity Council and Public Sector Climate Task Force, through which Cupertino collaboratively procured its first solar project.
- **Silicon Valley Leadership Group Bay Area Climate Change Compact –** Silicon Valley Leadership Group (SVLG) is an organization consisting of principal officers and senior managers of member companies to work cooperatively with local, regional, state, and federal government officials to address major public policy issues affecting the economic health and quality of life in Silicon Valley. In 2009, SVLG organized the Bay Area Climate Change Compact, which establishes a framework for regional cooperation and setting aggressive goals for reducing greenhouse gas emissions. Cupertino has teamed with SVLG to pursue regional opportunities to procure electric vehicles and charging stations and recently received a "Red Tape to Red Carpet Award" in the category of Sustainable Green Development for its GreenBiz Program.
- **Bay Regional Energy Network –** BayREN is a collaboration of the 9 counties that make up the San Francisco Bay Area. Led by the Association of Bay Area Governments (ABAG), BayREN implements effective energy saving programs on a regional level and draws on the expertise, experience, and proven track record of Bay Area local governments to develop and administer successful climate, resource, and sustainability programs. BayREN is funded by California utility ratepayers under the auspices of the California Public Utilities Commission. One of only two Regional Energy Networks in the state, BayREN represents 20 percent of the state's population.
- **Sustainable Silicon Valley –** In 2004, Sustainable Silicon Valley (SSV) organized a regional voluntary initiative, setting a visionary target of reducing carbon dioxide (CO_2) emissions by 20% below the region's 1990 levels by the year 2010. SSV partners participating in the voluntary CO_2 emissions reduction program determined their own baseline year and a CO_2 percentage reduction goal to reach by 2010. Each pledging partner develops tactics to reach their targets. Options varied from improvements in equipment efficiency to energy conservation, the use of renewable energy sources, and purchase of green power and/or promotion of alternative commute options.

- **City/County Association of Governments of San Mateo County –** The City/County Association of Governments (C/CAG) is a council of governments consisting of the County of San Mateo and its 20 cities. The organization works on topics such as transportation, air quality, stormwater runoff, hazardous waste, solid waste and recycling, land use near airports, abandoned vehicle abatement, and issues that affect quality of life in general. Cupertino partnered with C/CAG through its Regionally Integrated Climate Action Plan Suite (RICAPS) process to develop a cursory Climate Action Plan that provided background information for this document.
- **Joint Policy Committee Bay Area Climate & Energy Resilience Project** – The Bay Area Climate & Energy Resilience Project (BACERP) is a collaborative of more than 100 public, private, and non-profit stakeholders in the nine-county San Francisco Bay Area. The primary purpose of the project is to support and enhance the local climate adaptation efforts of cities, counties, and other organizations. BACERP is focused on specific actions that will help all Bay Area stakeholders to move forward in a more efficient and powerful manner.
- **Sierra Club, Loma Prieta Chapter, Local Government Climate Action Survey** – A report released in 2014 detailing the climate leadership of communities located in Santa Clara and San Mateo Counties to increase awareness of the environmental efforts of local governments in the region, facilitate the exchange of best climate action practices, and advocate for more decisive action worthy of the magnitude of climate change.
- **PG&E's Sustainable Communities Team –** A PG&E Community Energy Manager has been assigned to Santa Clara County to work jointly with each municipality to develop a comprehensive energy management strategy that the City can implement across institutional, residential, business, and industrial sectors. In addition, PG&E can provide city and county energy use data, GHG inventory assistance, and information on innovative pilot grant funding for projects that aim to reduce GHG emissions in each community.

Local Efforts

Though the key tenants of sustainability were only recently formally integrated into the City's hierarchy, the City of Cupertino has long prioritized energy efficiency, water conservation, pollution prevention, materials management, green information technologies (IT) and infrastructure (most recently the award-winning Don Burnett Bicycle Footbridge and Stevens Creek Restoration Project), and alternative transportation technologies and commuting through its municipal operations and community-wide services. Historically, these initiatives were managed as independent projects and have since become integrated into the Sustainability Division's scope of work to broaden into programs and service areas among diverse stakeholder groups and effectively implement the Sustainability Element of the City's General Plan.

Since its formation, the Sustainability Division has worked to bring environmental awareness across departments and engage staff, businesses, students, and residents in activities to grow environmental stewardship, achieve greenhouse gas reductions, and realize resource conservation goals. These goals have since been institutionalized through the City's adoption of diverse policies including an Environmentally Preferable Procurement Policy, Green Building Ordinance, and Water Efficient Landscaping Ordinance, among others. Further, the City's sustainability-linked efforts have led to two new community designations of Tree City USA by the Arbor Day Foundation and silver-certified Bicycle Friendly Community by the American League of Bicyclists.

Program staff's main duties are diverse, and focus primarily on:

- Developing strategic plans,
- establishing quantitative benchmarks and analyses (e.g., cost, utility consumption),
- providing research and technical assistance,
- fostering public agency/public-private partnerships,
- tracking performance,
- formulating municipal policies,
- accessing grants, and
- implementing and engaging stakeholders in innovative pilots and programs.

These actions are achieved through close coordination with City Council, senior management, business leaders, and members of the community to develop a consistent plan to exceed regulatory compliance and reach long- and short-range program goals, established both internally and through regional (e.g., Bay Area Climate Compact) and national initiatives (e.g., Mayor's Climate Protection Agreement).

Cupertino simplifies its quantitative sustainability goals under the following four-phase framework:

Since the Division's formation, this team has benchmarked Cupertino's municipal and community-wide emissions as a means of better understanding the City's impact (goal 1); implemented myriad municipal energy and water efficiency projects (e.g., energy-efficient traffic controller and streetlight retrofits, renewable energy projects, electric vehicle charging stations, interior lighting upgrades, HVAC upgrades, IT energy management software installations, irrigation controller retrofits) to reduce the City's footprint (goal 2); and empowered municipal

employees to follow the City's lead by utilizing a new bicycle fleet, employee commute programs, alternative work schedules, and community-wide energy efficiency programs (goal 3). The Sustainability Division team is now focused on extending internal successes to the broader community by expanding existing residential- and business-focused programs and services (goal 4). Details of these initiatives are shared throughout the measure descriptions in Chapters 3 and 4.

Plan Preparation

Regional Framework

This CAP was prepared as part of a regional effort led by the Santa Clara County Office of Sustainability. Through this effort, local governments within Santa Clara County were invited to participate in the joint preparation of community-wide and/or municipal operations climate action plans to leverage grant funding provided by PG&E, and additional funding provided by the Santa Clara County Office of Sustainability. Participants included the cities of Cupertino, Gilroy, Morgan Hill, Mountain View, Saratoga, and San José, as well as the County of Santa Clara. As part of this process, each of the CAPs were developed from a similar template to provide overall consistency from one CAP to the next and as a means of sourcing future collaboration opportunities to regionally mitigate emissions that know no boundaries.

> "If we are together nothing is impossible. If we are divided all will fail."
>
> – Winston Churchill

Through this regional approach, the participants jointly prepared baseline emissions inventories and forecasts with a consistent methodology that allows direct comparison of one jurisdiction to the next. It also allowed development of common emissions reduction targets and implementation timelines to further support future collaboration towards emissions reductions. Early project meetings among the participants established a local network of colleagues that forms the foundation of this regional collaboration framework.

Public Outreach and Community Engagement

Given that this CAP will serve as a resiliency roadmap for the entire community, the City sought to engage its residents, businesses, and broader stakeholder base in its design to ensure the right approach was taken throughout the plan. The City provided several public engagement opportunities during the CAP development process to present information, gather comments, and begin a community dialogue that will continue through plan implementation. Two public workshops were held at the LEED Platinum Kirsch Center for Environmental Studies at De Anza College, along with supporting online surveys developed to mimic the workshop activities for residents who were unable to attend. The City also held two focus group meetings to collect additional input on specific topic areas. The first focus group meeting addressed the business community through the Cupertino Chamber of Commerce, while the second invited comments from representatives of the local real estate industry. The City also held study sessions with the

Planning Commission and City Council prior to development of the CAP, both of which were open to the public, to ensure the Plan aligned with the expectations of the City's elected and appointed officials. Comments collected from each of these engagement opportunities were used to inform the climate planning approach presented throughout this CAP. See Appendix A for a summary of the public comments collected during plan preparation.

Scope and Content of the Climate Action Plan

The CAP comprises seven chapters: 1) Climate Change and Cupertino; 2) Greenhouse Gas Emissions and Targets; 3) Community-wide Reduction Measures; 4) Local Government Reduction Measures, 5) Personal Actions, 6) Adaptation and Resiliency, and 7) Benchmarks and Next Steps. Appendices A through G provide additional detail on topics covered within the CAP. The contents of each chapter and appendix are briefly described below:

CAP CHAPTERS:

- **Chapter 1: Climate Change and Cupertino** describes the community's rationale for reducing GHG emissions, as well as the goals of the CAP to comply with local Air Quality Management District guidelines, as applicable. This chapter provides an overview of the topics covered in the CAP, presents conventional climate change science findings, and describes statewide actions to address climate change. This chapter also introduces the CAP's relationship to the City's General Plan Amendment, and its ability to enable a CEQA process known as "streamlining," which allows future development projects that are found to be consistent with the CAP to skip certain steps in the traditional CEQA review process.
- **Chapter 2: Greenhouse Gas Emissions and Targets** outlines important first steps taken to develop the CAP, including the 2010 baseline GHG inventories, forecasting

future emissions in 2020, 2035, and 2050, and setting GHG reduction targets for 2020 and longer-range targets for 2035. This chapter also describes the local reductions attributable to implementation of statewide climate change policy, and the resulting emissions reduction gap between the targets and the statewide actions, which will be addressed through local actions developed in Chapters 3 and 4.

- **Chapter 3: Community-wide Reduction Measures** addresses five main reduction strategies: energy, land use and transportation, water conservation, waste reduction, and green infrastructure. The chapter provides a summary of projected reductions and a description of the reduction strategy development process. It also identifies the following information for each reduction strategy: key elements, existing programs and accomplishments, implementation actions, performance metrics against which to measure success, and estimated GHG reductions.
- **Chapter 4: Local Government Reduction Measures** describes the specific efforts that the City of Cupertino has already taken and will take in the future to lead by example in emissions reductions. Similar to Chapter 3, this measure presents emissions reduction opportunities organized into three key strategy areas: (1) Improve Facilities, (2) Convert Vehicle Fleet, and (3) Reduce Solid Waste. The strategy areas include goals, reduction measures, and implementation actions, along with supporting reduction estimates, departmental responsibility, performance tracking information, and implementation timelines.
- **Chapter 5: Personal Actions** describes the steps that Cupertino's residents and local businesses can take starting today to kick-off the implementation phase of the CAP.
- **Chapter 6: Adaptation and Resiliency** leverages state and regional resources that identify the social, economic, and environmental vulnerabilities our changing climate presents. It also offers a resilience framework that will enable our community to plan, adapt, and thrive.
- **Chapter 7: Benchmarks and Next Steps** describes the process to monitor the City's progress toward achieving its GHG reduction targets. This chapter identifies monitoring procedures, plan update processes, and other steps to ensure successful CAP implementation.

CAP APPENDICES:

- **Appendix A: Community Outreach Responses** summarizes the public comments collected during plan preparation, including two community open houses, two focus group meetings, and study sessions with the Planning Commission and City Council.
- **Appendix B: GHG Inventory and Reductions Methodology** provides a technical description of the methodology and data sources used to prepare the 2010 emissions inventories and 2020, 2035, and 2050 emissions forecasts.

- **Appendix C: Implementation Tracking Framework** describes how city staff will implement CAP measures and related actions, and track the performance metrics identified for each measure as part of the larger regional CAP program.
- **Appendix D: Climate Action Planning Best Management Practices** provides the list of GHG reduction best management practices (BMP) developed from a review of regional, national, and international cities, which was presented to City staff for identification of City actions already employed and potential new strategies for consideration in the CAP.
- **Appendix E: Water Conservation and Energy Efficiency Toolkit** presents the Do-It–Yourself home energy efficiency and water conservation Green@Home Toolkit so Cupertino's residents can begin to take climate action.
- **Appendix F: Green Business Certification** provides the checklist to get certified as a green business through GreenBiz Cupertino, which offers free energy, water, and waste assessments, free equipment to help businesses save water, free guidance to help with the certification process, and recognition of business leadership.
- **Appendix G: green@school Certification** shares background on the City's green@school program, created to empower students as environmental change agents on their school campuses, at home and throughout their community. green@school trains K-12 Cupertino students as eco-experts to help shepherd their school through a sustainability certification program to create a cleaner, greener and healthier school site.

Relationship to the General Plan Amendment

Whether by local desire, guidance from the State of California, or both, a growing number of cities and counties are addressing climate change in their General Plans through inclusion of policies and programs that also help reduce GHG emissions. Since GHG emissions are a cross-cutting issue addressed by many General Plan elements, the CAP as a whole is generally considered and defined as an implementation strategy for the General Plan. This structure allows the City to update the CAP on an ongoing, as-needed basis to ensure that its climate protection efforts reflect both current legislation and emerging best practices, without triggering a General Plan Amendment.

In addition, several state agencies have provided guidance and case studies for local governments to address climate change in their General Plans. For example:

- Since 2008, the California Attorney General's office has provided guidance to local governments on addressing climate change and greenhouse gas reduction through General Plan policies. (See: http://oag.ca.gov/environment/climate-change)
- The California Office of Planning and Research (OPR) is preparing an update to the state's *General Plan Guidelines* that will include guidance for GHG emissions reduction and climate adaptation. (See: http://www.opr.ca.gov/s_generalplanguidelines.php)

- The California Natural Resources Agency released a Climate Adaptation Policy Guide for local governments.
  (See: http://resources.ca.gov/climate/safeguarding/adaptation_policy_guide/)
- The California Department of Housing and Community Development released a guidance document on General Plan housing element policies and programs addressing climate change with case study examples.
  (See: http://www.hcd.ca.gov/hpd/HE%20Guidance%20Complete%20package.pdf)
- The Office of Planning and Research prepared guidance documents for addressing complete streets in General Plans as required by AB 1358.
  (See: http://opr.ca.gov/docs/Update_GP_Guidelines_Complete_Streets.pdf)

Cupertino was simultaneously preparing an amendment to its General Plan while developing the Climate Action Plan. Proposed General Plan Amendment growth projections and policies/measures were considered during CAP preparation, and expanded upon, where appropriate. At the time of CAP development, the City's policy commitment included encouraging higher density, mixed-use and infill development in appropriate locations, expanding energy efficiency and renewable energy development in the community, supporting multi-modal transportation options, and continuing resource conservation efforts.

To ensure the CAP was able to provide future CEQA review streamlining benefits, as described below, the community-wide emissions forecasts were developed based on the population, employment, and resulting vehicle miles traveled (VMT) growth estimates resulting from build-out of the General Plan Amendment's Land Use Alternative C scenario. This scenario represented the highest growth scenario under consideration, and therefore, would also result in the highest emissions growth. CAP measures were developed to provide sufficient emissions reduction potential to achieve the City's 2020 emissions target under this highest-growth alternative.

Relationship to the California Environmental Quality Act

Local governments may prepare a Plan for Reduction of Greenhouse Gases that is consistent with AB 32 goals. By preparing such a plan, the City can streamline CEQA review of subsequent plans and projects that are consistent with the GHG reduction strategies and targets in the plan (this is often referred to as "streamlining"). To meet the standards of a qualified GHG reduction plan, Cupertino's CAP must achieve the following criteria (which parallel and elaborate upon criteria established in state CEQA Guidelines Section 15183.5[b][1]):

- Complete a baseline emissions inventory and project future emissions
- Identify a community-wide reduction target

- Prepare a CAP to identify strategies and measures to meet the reduction target
- Monitor effectiveness of reduction measures and adapt the plan to changing conditions
- Adopt the CAP in a public process following environmental review

This approach allows jurisdictions to analyze and mitigate the significant effects of GHGs at a programmatic level, by adopting a plan for the reduction of GHG emissions in a public process following environmental review. Later, as individual projects are proposed, project-specific environmental documents may rely on the GHG emissions reductions measures in the CAP to determine that estimated project-level GHG emissions would be less than significant in their cumulative impacts analysis.

A project-specific environmental document that relies on this CAP for its cumulative impacts analysis must identify specific CAP measures applicable to the project, and how the project incorporates the measures. If the measures are not otherwise binding and enforceable, they must be incorporated as mitigation measures applicable to the project. If substantial evidence indicates that the GHG emissions of a proposed project may be cumulatively considerable, notwithstanding the project's compliance with specific measures in this CAP, an EIR must be prepared for the project. Following adoption of this CAP, the City will develop guidance on how future projects seeking to use this CEQA streamlining benefit will be reviewed to ensure compliance with the CAP's emissions reduction measures. The City's guidance could include the development of a checklist or points-based rating system to evaluate future projects' compliance with the CAP; an approach used by numerous communities throughout the state seeking CAP-tied project-level CEQA streamlining (e.g., Sacramento, Los Altos, Pleasanton).

CHAPTER 2
GREENHOUSE GAS EMISSIONS AND TARGETS

Developing a set of measures and actions that can reduce Cupertino's greenhouse gas emissions requires an understanding of baseline and future emissions-generating activities. Once this information is established, the City can more easily identify areas where it can leverage limited resources to yield the most effective emission reductions. This chapter provides a summary of the 2010 baseline inventories for community-wide and municipal operations emissions, as well as forecasts for 2020, 2035, and 2050. It also describes the considerations for selecting reduction targets that are consistent with and will contribute to the state's ongoing efforts.

Greenhouse Gas Inventories

Emissions inventories provide a snapshot of the amount and source of greenhouse gas emissions in a given year. The baseline inventory serves as a reference point for reduction targets and informs the measure and action selection process. Future inventory updates can demonstrate progress toward the adopted targets and assess the effectiveness of City actions. The City prepared 2010 baseline inventories as part of the multi-jurisdiction climate action planning process led by Santa Clara County. These inventories, in following guidance from the LGOP, BAAQMD, United Nations International Panel on Climate Change, and the Climate Change Action Registry, assessed emissions from a variety of sources. As previously described, Cupertino chose to prepare inventories at both the community-wide and municipal operations levels. Various inventory preparation guidance documents clarify primary and secondary emissions sources, and define the data needs of agency's seeking to conduct an initial or follow-up inventory. The City will continue to follow the prevailing industry standard guidance in the future so that its inventory updates can be compared to other jurisdictions (though this may pose a challenge regarding comparisons to previous local inventory versions).

The baseline emissions inventory was prepared using a combination of empirical and modeled data for the community as a whole, as well as local government operations. Data was collected from a variety of sources, such as PG&E, CalRecycle, City department staff, and the Air Resources Board. It was then converted into greenhouse gas estimates using emission factors provided by PG&E and state and regional agencies to provide a common metric with which to compare emissions sources, referred to as metric tons of carbon dioxide equivalent per year or MT CO_2e/yr. Appendix B shares additional details on the City's GHG inventory methodology and data sources analyzed for further consideration.

Emissions Sectors

The CAP analyzes emissions from two different perspectives (i.e., community-wide and municipal operations), but takes a similar approach in their analysis and reporting. In general, baseline inventories organize emissions into categories, or sectors, based on the source of emissions. These sectors are largely consistent between the community-wide and municipal operations inventories, though naming conventions do differ slightly. Cupertino's community-wide inventory includes emissions from the following sectors:

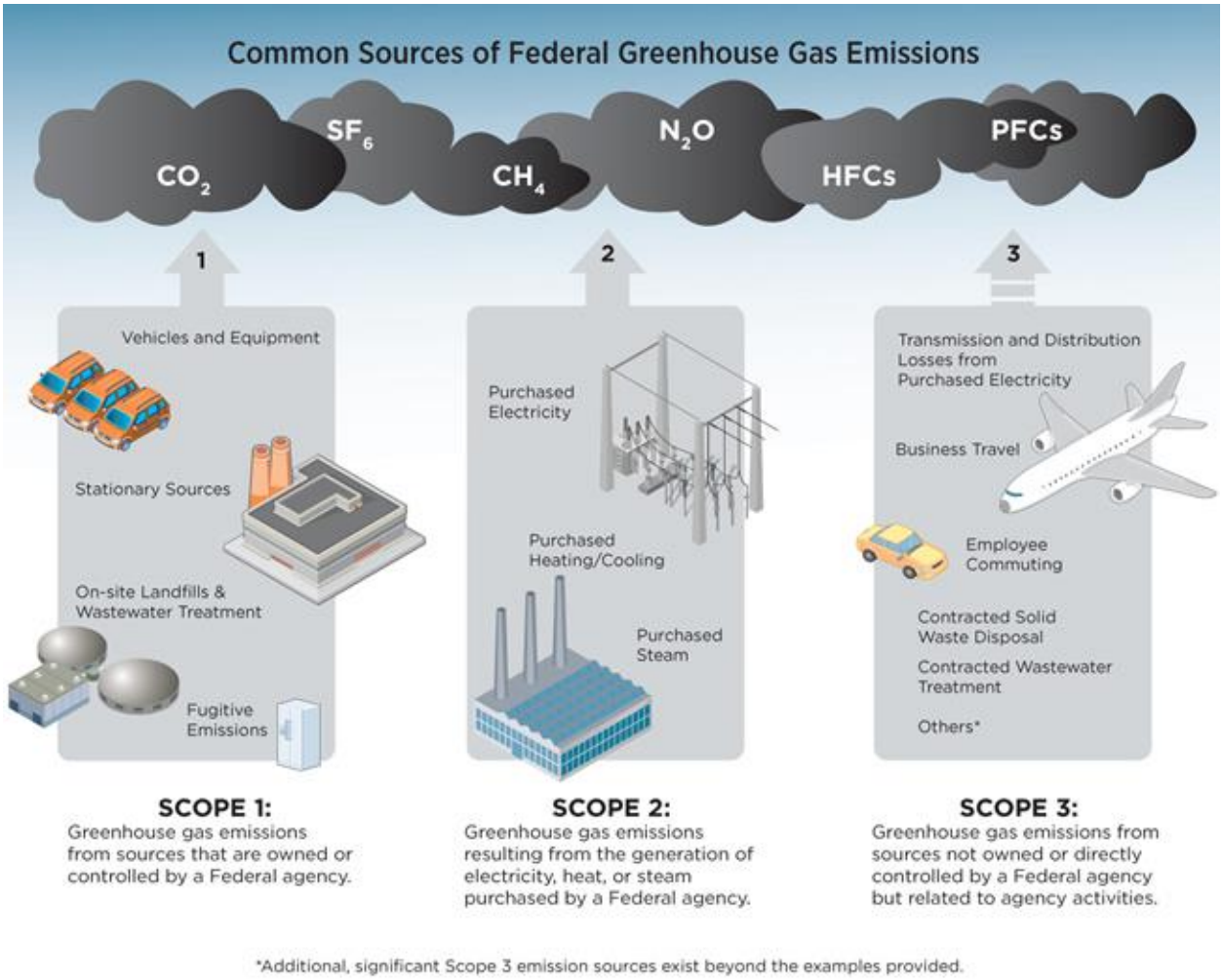
- Energy (i.e., electricity and natural gas)
- Transportation
- Off-Road Equipment (e.g., industrial, commercial, and lawn and garden equipment)
- Solid Waste
- Potable Water
- Wastewater

The municipal operations inventory includes slightly different sectors, which are named to more accurately reflect the departmental sources of the emissions:

- Facilities (electricity and natural gas)
- Vehicle Fleet
- Solid Waste
- Water Services

Emissions are also categorized based upon how they are generated in relation to the scope of the emissions inventory and the jurisdiction's ability to influence their mitigation. Emissions can be classified into three scopes, as illustrated in Figure 2.1 through a federal emissions example.

Figure 2.1 – Common Sources of Federal Greenhouse Gas Emissions



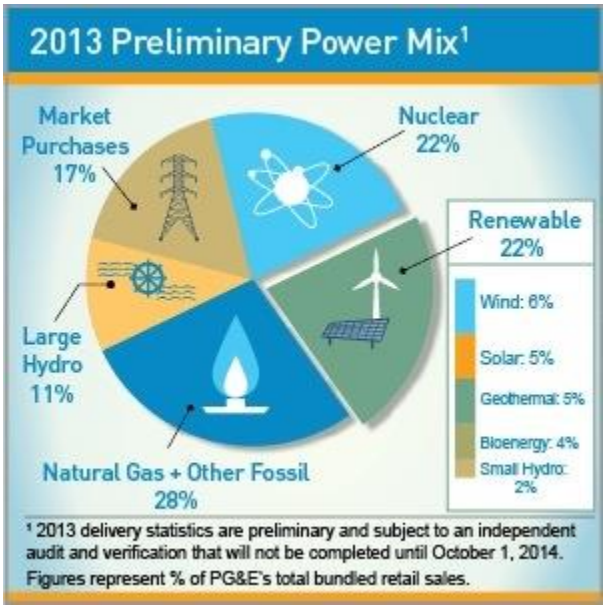
Source: https://www.fedcenter.gov/Photos/index.cfm?id=16810

Scope 1 emissions are those generated from equipment or facilities that are directly owned by the jurisdiction or community members, such as a home's hot water heater or a wastewater

treatment plant. Scope 2 emissions are those resulting from the purchase of energy that is transmitted from outside the jurisdiction's boundaries, such as electricity. Scope 3 emissions result indirectly from a jurisdiction or community's activities and represent emissions sources over which the jurisdiction does not have direct control, such as business-related air travel or employee commutes. Typically, Scope 1 and Scope 2 emissions are included within a municipal operations inventory and Scope 3 emissions are excluded to represent the full emissions over which a jurisdiction has direct control to influence their reduction (though Scope 3 emissions can be voluntarily included for informational purposes). Community-wide inventories often include Scope 1 and 2 emissions as well, but also include some sources that would be considered Scope 3 at the municipal level, such as emissions from community-wide transportation and process emissions from landfills wastewater treatment plants or other large regional facilities. See Appendix B for more information on the sources of emissions included within each of the CAP's baseline inventories.

Energy / Facilities

In general, energy emissions are generated through the combustion of fossil fuels to generate electricity or directly provide power (e.g., natural gas combustion for water heating). The energy sector includes the use of electricity and natural gas in residential, commercial, industrial, and government land uses within the legal boundaries of Cupertino. Although emissions associated with electricity production are likely to occur in a different jurisdiction, the emissions are considered to be measured at the point of use and not the point of generation (this is called "Scope 2" or indirect emissions). Consumers are thus considered accountable for the generation of those emissions. Electricity-related GHG emissions are considered indirect emissions because they are generated as a result of activities occurring within the jurisdiction, but occur in different geographic areas. For example, a Cupertino resident may consume electricity within the city, but that electricity may be generated in a different region of the state. Direct emissions (i.e., Scope 1) are those where the consumption activity directly generates the emissions, such as natural gas combustion for heating or cooling (when this activity occurs on site).



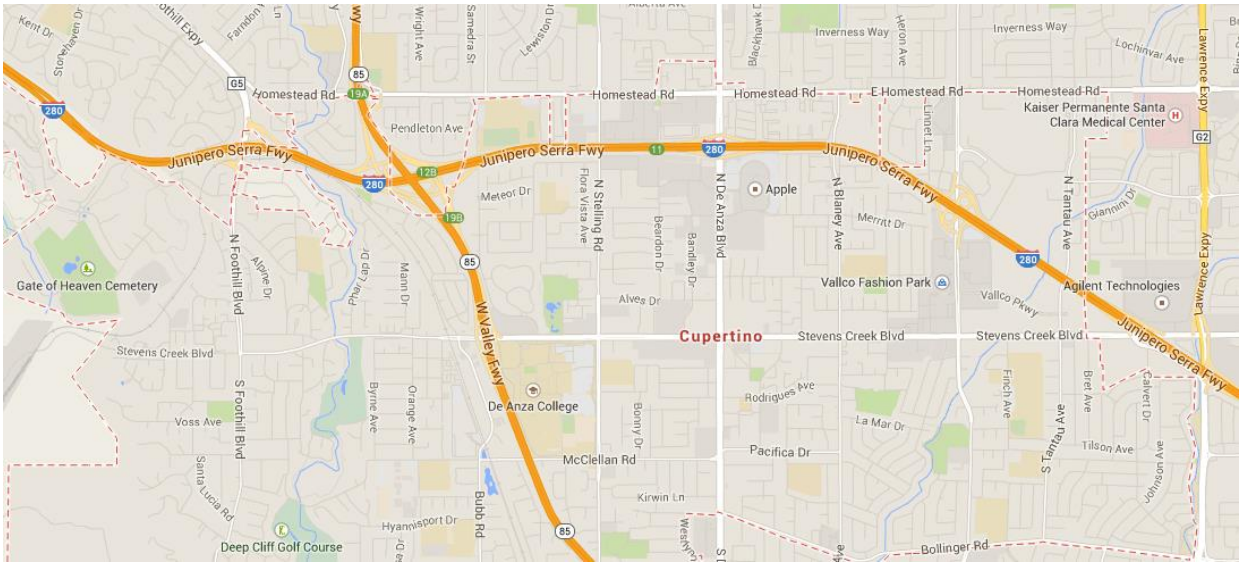
Source: http://www.greentechmedia.com/content/images/articles/PGE-2013-RE.jpg

PG&E provides electricity and natural gas to Cupertino, and provided electricity and natural gas consumption data to develop the baseline inventories. PG&E provided all electricity and natural gas consumption data in the form of kilowatt-hours per year (kWh/yr) and therms per year (therms/yr), respectively. Electricity-related

GHG emissions are quantified using a utility-specific (e.g., PG&E) emission factor that accounts for the utility's electricity production portfolio (e.g., the mix of coal, oil, wind, solar, and other sources of electricity production) in the baseline year of the emissions inventory. Natural gas GHG emissions are also quantified using a utility-specific natural gas emissions factor, though this is less subject to variation than the electricity emissions factor.

Transportation / Vehicle Fleet

Community-wide transportation emissions come from vehicle trips that begin and/or end within Cupertino's boundaries. Pass-through trips (for example, non-local drivers on Interstate 280) are not included within the emissions inventory because the CAP measures would not affect those emissions. This sector includes GHG exhaust emissions from both private vehicles and City-owned vehicles. Unlike most of the other emissions sectors, where activity data is available to more precisely calculate actual resource consumption (e.g., electricity used, wastewater generated, solid waste disposed), the transportation sector relies upon travel models to estimate vehicle use within a community. Travel models estimate the total vehicle miles traveled (VMT) within a community, which are then combined with vehicle fuel emissions factors to estimate transportation-related emissions.



For this CAP, VMT data were acquired from the City's General Plan Amendment transportation consultant to ensure that emissions forecasts in the CAP align with the City's estimated growth resulting from build-out of its General Plan Amendment. This model provided VMT data separated by trip origin and destination. The VMT associated with vehicle trips that would originate or terminate within the city were attributed to the community-wide transportation sector.

Municipal operations vehicle fleet emissions were calculated based on fuel consumption from the City's own vehicle fleet. In this way, vehicle-related emissions in the municipal inventory are based on actual empirical data, and are not modeled as in the community-wide inventory. The

City's vehicle fleet emissions only include those vehicles and fleet equipment that are owned and operated by the City. As previously described, the City contracts with other agencies for the provision of certain services, such as police and fire services, street sweeping, and waste hauling. Therefore, emissions related to use of these vehicles are not included within Cupertino's municipal operations inventory and forecasts.

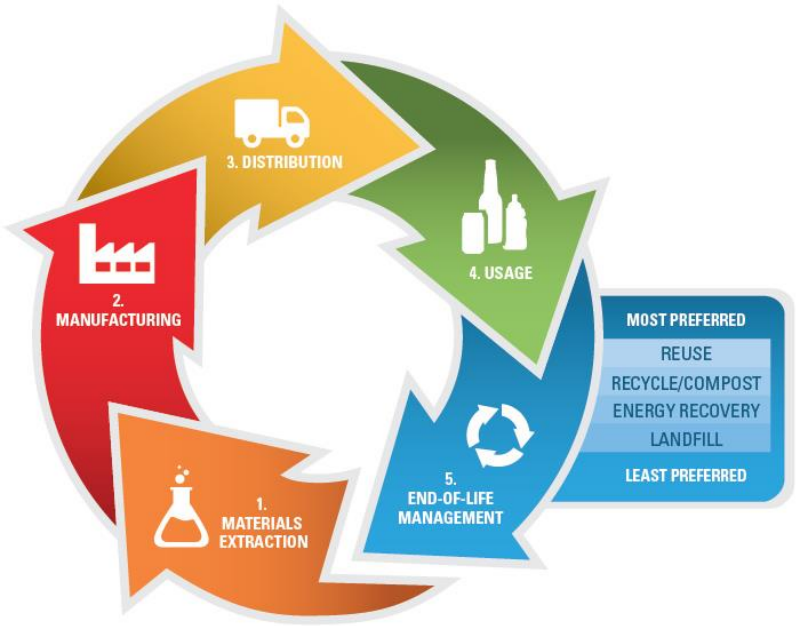
Emission factors for this sector were obtained from the California Air Resources Board's (ARB) vehicle emissions model, EMFAC2011. EMFAC2011 is a mobile source emission model for California that provides vehicle emission factors by both county and vehicle class. Santa Clara County-specific emission factors were used in this emissions inventory.

Off Road Equipment

Off-road equipment emissions can come from local construction and mining activities, operation of lawn and garden equipment (e.g., lawn mowers, leaf blowers), and use of light commercial/industrial equipment (e.g., backhoes, forklifts). Data for construction, mining, light commercial, industrial, and lawn and gardening equipment can be obtained from ARB's OFFROAD2007 model, which provides county-level emissions factors for off-road equipment. OFFROAD2007 provides total off-road equipment emissions by county. Similar to the transportation sector, these emissions are modeled and not based on specific activity data. This emissions sector is also only presented in the community-wide inventory.

Solid Waste

The solid waste sector includes emissions associated with solid waste disposal. During the solid waste decomposition process, only organic (i.e., carbon-based) materials release greenhouse gas emissions. Carbon dioxide (CO_2) emissions are generated under aerobic conditions (i.e., in the presence of oxygen), such as when composting. Methane (CH_4) and CO_2 emissions are generated under anaerobic conditions (i.e., in the absence of oxygen), as in many landfill environments. Waste collection and hauling activities also generate GHG exhaust emissions. However, hauling-related emissions are assumed to be included within the commercial vehicle transportation model and represented within the community-wide



Source: http://epa.gov/climatechange/images/life-cycle-images/lifecycle.jpg

transportation sector. As described above, the City does not own its own waste hauling vehicles, and therefore, emissions associated with solid waste collection are not included within the municipal operations inventory.

Solid waste generated within the city is primarily sent to the Newby Island Sanitary Landfill. Annual tons of community-wide solid waste generated by land uses (i.e., residential and non-residential) and waste categorization data were collected from CalRecycle's online database. Data on municipally-generated waste was provided by the City. The first-order-decay method was used to estimate methane landfill emissions in order to incorporate the time factor of the solid waste degradation process, which can take decades to occur. In future inventories, the City will review opportunities to connect to the EPA Waste Reduction Model (WARM) to more effectively analyze the full lifecycle of its materials management efforts, including source reduction, recycling, combustion, composting, and landfilling (see graphic on previous page). This tool is currently utilized by the City through its award-winning Food Recovery Challenge activities, and should be expanded to be considered within future greenhouse gas emissions inventories, depending upon the prevailing industry practice in inventory methodology.

Wastewater

The wastewater sector includes emissions resulting from wastewater treatment processes and from energy used to power wastewater treatment plants. The 2006 International Panel on Climate Change (IPCC) *Guidelines for National Greenhouse Gas Inventories* is commonly used to quantify CH_4 and nitrous oxide (N_2O) emissions resulting from wastewater treatment processes. Generation of both types of emissions depend on the amount of annual throughput (i.e., volume of wastewater), as well as characteristics of the wastewater itself and treatment plant management processes. Energy-related GHG emissions associated with wastewater treatment facility operation are typically removed from this sector to avoid double counting with the energy sector.

Potable Water / Water Services

The potable water and water services sectors include energy emissions associated with water treatment, distribution, and conveyance. The California Energy Commission's water-energy intensity studies are commonly used to calculate the amount of electricity required to provide potable water. GHG emissions associated with potable water supply are then calculated using statewide electricity intensity factors.

Units of Measurement

Emissions inventories are commonly expressed in metric tons (or tonnes) of carbon dioxide equivalent per year (MT CO_2e/yr) to provide a standard measurement that incorporates the varying global warming potentials (GWP) of different greenhouse gases. GWP describes how much heat a greenhouse gas can trap in the atmosphere relative to carbon dioxide, which has a GWP of 1. For example, methane has a GWP of 25, which means that 1 metric ton of methane

will trap 25 times more heat than 1 metric ton of carbon dioxide, making it a more potent greenhouse gas. Some gases used in industrial applications can have a GWP thousands of times larger than that of CO_2. See Table 2.1 for a sample of common greenhouse gases and their global warming potential.

Table 2.1
Greenhouse Gases and Global Warming Potential

Common Name	Chemical Formula	Global Warming Potential (100-yr)
Carbon Dioxide	CO_2	1
Methane	CH_4	25
Nitrous Oxide	N_20	298
Tetrafluoromethane (PFC-14)	CF_4	7,390
Fluoroform (HFC-23)	CHF_3	14,800
Sulfur Hexafluoride	SF_6	22,800

Source: IPCC Fourth Assessment Report, Climate Change 2007[vii]

Baseline Inventory – 2010

The purpose of a baseline inventory is to provide a snapshot of GHG emissions in a given year. A baseline inventory allows the City to identify major sources of emissions within the community or resulting from its own operations, and then develop meaningful reduction measures that address the major emissions contributors. The City developed its baseline emissions inventories for the 2010 operational year as part of a regional climate action planning effort in 2013, which corresponds to Step 1 of the CAP development process as described in Chapter 1. 2010 represented the most current, full years' worth of data available to participating jurisdictions when the regional CAP project began.

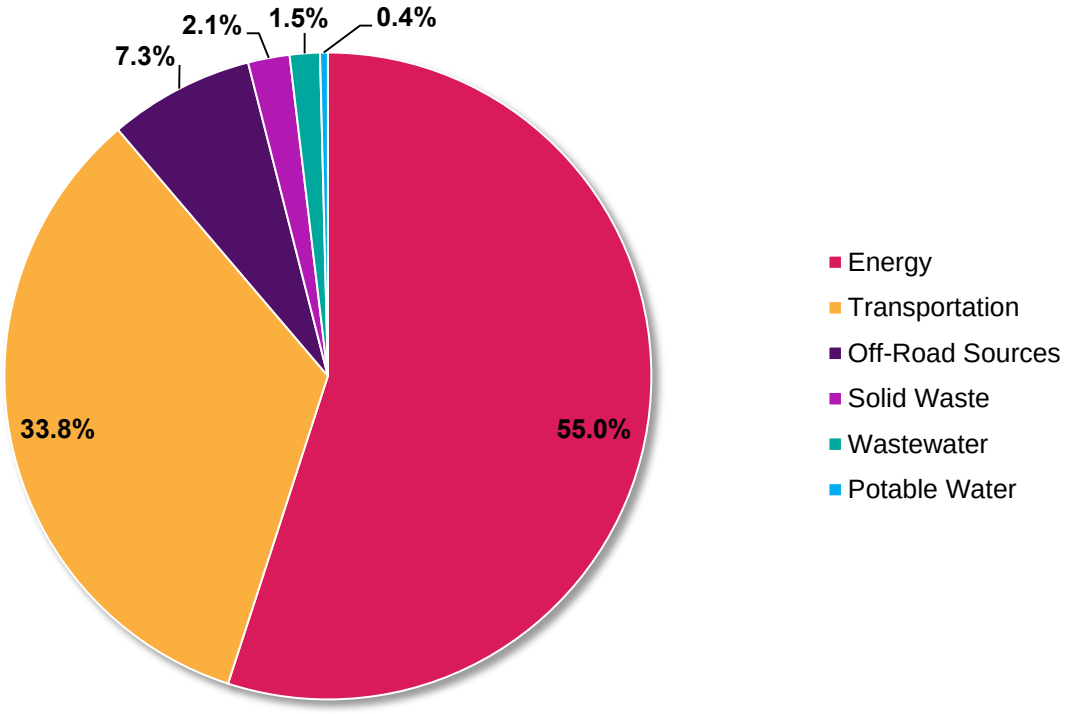
Cupertino, as well as the other participating jurisdictions, is located within the Bay Area Air Quality Management District's (BAAQMD) jurisdictional boundary. Therefore, the City's inventory was calculated to be consistent with BAAQMD's GHG Plan Level Quantification Guidance. This approach allowed all of the jointly-prepared community-wide GHG inventories and CAPs (i.e., Cupertino, Gilroy, Morgan Hill, and unincorporated Santa Clara County) to be developed in a consistent manner.

The following sections separately present the community-wide and municipal operations emissions inventories. These baseline inventories were prepared under a separate project contract from the emissions forecasts and the CAP document itself, and therefore, certain specifics of the baseline inventory methodology are unknown. However, the following section describes how baseline inventories are typically prepared, and provides details related to Cupertino's baseline inventory where known. See Appendix B for the emissions inventory methodology.

COMMUNITY-WIDE 2010 BASELINE INVENTORY

Cupertino's community-wide baseline emissions inventory totals 307,288 MT CO_2e/yr in 2010. As shown in Figure 2.2, energy use is the largest contributor of GHG emissions in the city (55%), with transportation emissions contributing the majority of the remainder (34%). Most community-wide emissions inventories find that energy and transportation emissions account for the overwhelming majority of total emissions. In Cupertino, the energy and transportation sectors account for approximately 89% of total emissions, suggesting that local reduction efforts should focus on these areas. Off-road sources provide 7% of the inventory, and solid waste emissions provide another 2%. Potable water use and wastewater treatment are both small contributors by comparison, making up the remaining 2% of the inventory. See Table 2.2 for the total emissions from each sector.

Figure 2.2 – 2010 Community-wide Baseline Emissions by Sector



Source: AECOM 2014

Table 2.2 2010 Community-wide Emissions		
Emission Sector	Emissions (MT CO_2e/yr)	Communitywide Total (%)
Energy	**169,547**	**55.2%**
Electricity Subtotal	*85,452*	*27.8%*
Residential	25,427	8.3%
Commercial	60,025	19.5%
Natural Gas Subtotal	*84,095*	*27.4%*
Residential	49,986	16.3%
Commercial	34,109	11.1%
Transportation	**104,112**	**33.9%**
Off-Road Sources	**22,390**	**7.3%**
Solid Waste	**5,403**	**1.8%**
Wastewater	**4,640**	**1.5%**
Potable Water	**1,197**	**0.4%**
Total	**307,288**	**100.0%**

Source: AECOM 2014

Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

MUNICIPAL OPERATIONS 2010 BASELINE INVENTORY

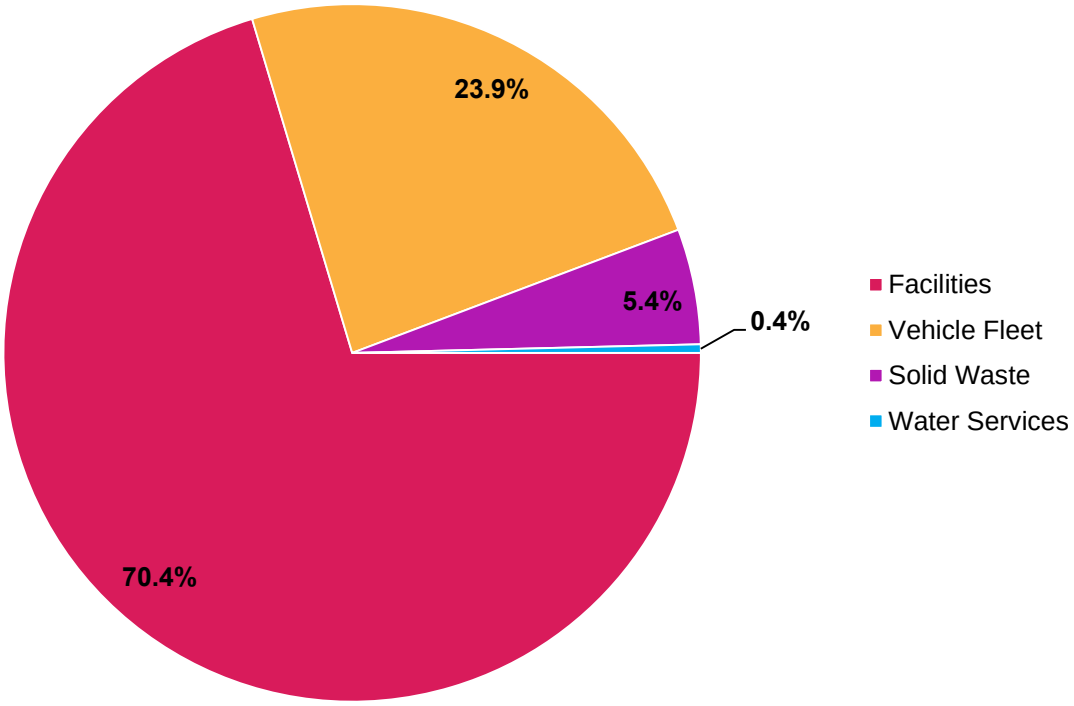
The municipal operations baseline inventory shows that the City's actions generated a total of 1,775 metric tons of carbon dioxide equivalent emissions (MT CO_2e) in 2010. As referenced above, these emissions are a sub-sector of the community-wide inventory (i.e., the community-wide inventory is inclusive of municipal operations emissions), and represent less than 1% of total community-wide emissions. As shown in Table 2.3 and Figure 2.3, emissions from the Facilities sector were the largest contributor of emissions (70.4%), followed by the Vehicle Fleet (23.9%) and Solid Waste (5.4%) sectors. Emissions from the Water Services sector are a small contributor by comparison, making up only 0.4% of the baseline inventory. This sector includes the energy used to operate the City's landscape irrigation system.

Table 2.3 Baseline 2010 Municipal Operations Emissions		
Emission Sector	**Emissions (MT CO_2e/yr)**	**City Total (%)**
Facilities	1,249	70.4%
Building Energy	837	47.2%
Public Lighting	412	23.2%
Vehicle Fleet	424	23.9%
Solid Waste	95	5.4%
Water Services	7	0.4%
Total	**1,775**	**100%**

Source: AECOM 2013

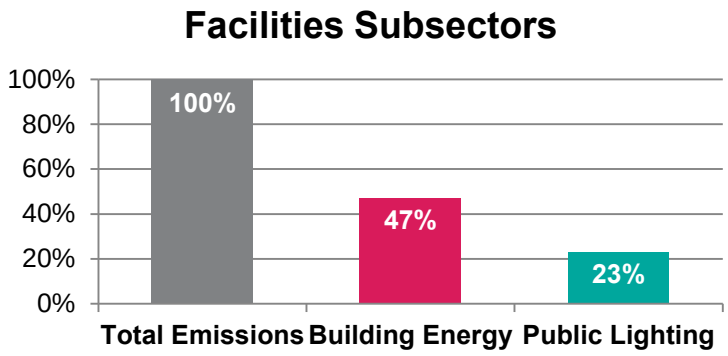
Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

Figure 2.3 – 2010 Municipal Operations Baseline Emissions by Sector



Source: AECOM 2014

As shown in Table 2.3 above, the Facilities sector includes emissions from building energy use as well as public lighting. Within the Building Energy subsector, approximately 69% of emissions come from electricity use (e.g., interior lighting, office equipment), while the remaining 31% are related to natural gas use (e.g., building heating, hot water heating). Building energy use contributes 47% of total municipal emissions. The Public Lighting subsector comprises electricity-related emissions from City-owned lighting sources, including traffic signals, streetlights, park lighting, and other outdoor lighting. Public lighting accounts for nearly one-quarter of total municipal emissions as shown to the right.



Approximately 75% of City vehicle fleet emissions are generated by gasoline vehicles. The Grounds Department uses the largest amount of gasoline (33%) while providing clean and safe recreational areas, followed by the Streets Department (25%) during maintenance of transportation infrastructure and signage. Diesel vehicles contribute the remaining 25% of City fleet emissions. Trucks and equipment operated by the Streets Department, the Building Department, and the Traffic Department generate almost all of these diesel emissions.

Solid Waste sector emissions come from municipally-generated waste that is sent to the landfill where organic waste materials create methane gas during the decomposition process. Examples of municipally-generated organic waste include food scraps; office paper, cardboard, and other compostable paper products; and landscape trimmings that are disposed of in the solid waste stream.

Water sector emissions include the electricity used to pump, treat, and convey water used in City landscape irrigation.

Business-as-Usual (BAU) Emissions Forecasts (2020, 2035, and 2050)

The baseline inventories were used to forecast future community-wide and municipal operations GHG emissions under a business-as-usual (BAU) scenario. Cupertino's GHG emissions were forecast for the future years 2020, 2035, and 2050, assuming that historic trends describing energy and water consumption, travel, and solid waste generation will remain the same in the future, from a per-capita perspective. Therefore, emissions forecasts demonstrate what emissions levels are likely to be under a scenario in which no statewide or local actions are taken to curtail emissions growth.

BAU emission forecasts provide insight regarding the scale of reductions necessary to achieve an emissions target before considering reductions likely to result from statewide actions (e.g., vehicle efficiency standards), inherent technological advancements (e.g., lighting technology), or new voluntary or mandatory conservation efforts (e.g., landscape irrigation restrictions). The BAU emission forecasts do not anticipate new sources of emissions or increased consumption rates in existing sectors. For example, as use of personal electronics (e.g., smart phones, tablets) increases, emissions from electricity plug-load may also increase. Therefore, the only variable influencing the BAU forecasts is projected population and employment growth within the City. The BAU forecasts used the best available population and employment growth assumptions from the City's General Plan Amendment process, which was in progress at the same time that the CAP was under development. The City's General Plan transportation consultant provided future VMT activity levels using assumptions based on build-out of the highest growth land use alternative under consideration for the General Plan Amendment.

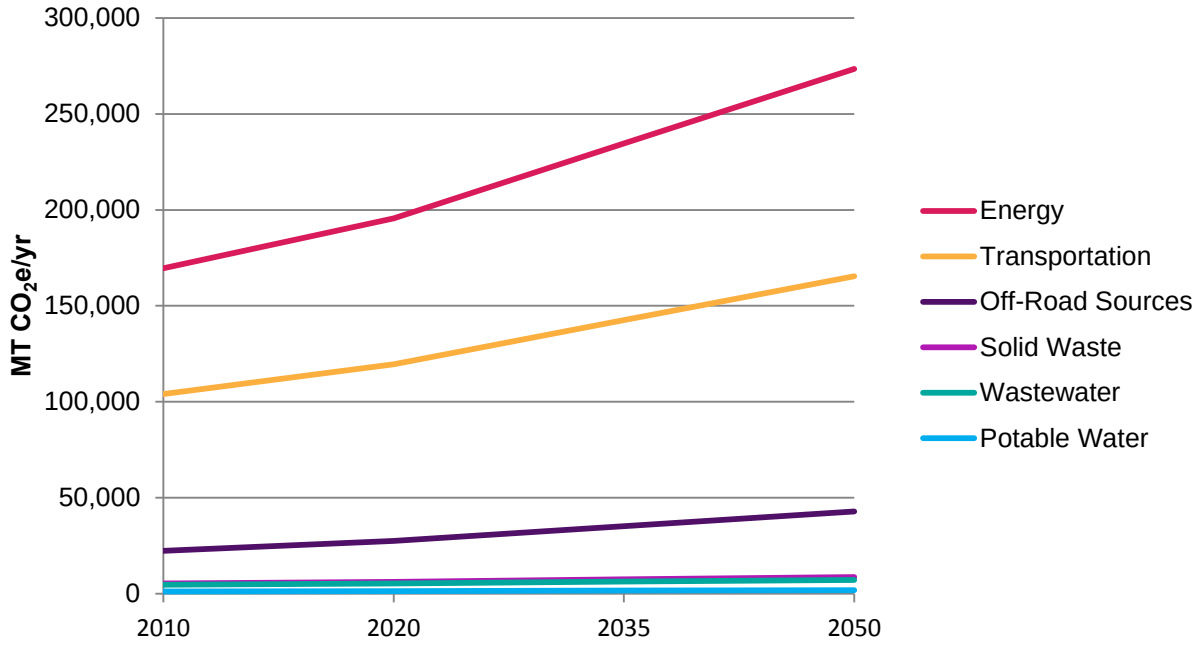
The 2020 emissions forecast year aligns with the AB 32 target year. Similarly, the 2050 forecast year aligns with the state's long-term target year, while the 2035 forecast year provides a mid-point between 2020 and 2050. These forecasts were developed for planning purposes, and due to the complexity of each emissions sector and the uncertainty of future population and employment growth within the City, are subject to change. Therefore, as the 2020, 2035, and 2050 horizon years approach, the City will reevaluate its emissions projections to incorporate additional data points from periodic emissions inventories and revised City growth estimates. Regular emissions inventory updates will also help to assess progress towards the reduction targets, allowing for revisions to CAP measures as necessary. Reduction measures described in Chapters 3 and 4 are applied to BAU emissions forecast levels to determine if the City is on track to achieve its targets. As with the baseline inventories, the following sections separately present the community-wide and municipal operations emissions forecasts. See Appendix B for details on the emission forecast methodology.

COMMUNITY-WIDE BUSINESS-AS-USUAL EMISSION FORECASTS

Figure 2.4 illustrates Cupertino's community-wide emissions forecasts by sector from 2010-2050. As shown in the corresponding Table 2.4, community-wide emissions are forecast to increase in future years under the business-as-usual scenario to approximately:

- 355,610 MT CO_2e/yr by 2020 (15.7% above the 2010 baseline),
- 427,807 MT CO_2e/yr by 2035 (39.2% above the 2010 baseline), and
- 499,659 MT CO_2e/yr by 2050 (62.6% above the 2010 baseline).

Figure 2.4 – Community-wide Emissions Forecasts by Sector – 2020, 2035, 2050



Source: AECOM 2014

Table 2.4
Community-wide Business-as-Usual Emissions (2010 - 2050)

Emission Sector	2010 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	2035 Emissions (MT CO_2e/yr)	2050 Emissions (MT CO_2e/yr)
Energy	**169,547**	**195,535**	**234,518**	**273,500**
Electricity Subtotal	*85,452*	*100,062*	*121,977*	*143,894*
Residential	25,427	27,239	29,958	32,677
Commercial	60,025	72,823	92,020	111,217
Natural Gas Subtotal	*84,095*	*95,473*	*112,540*	*129,607*
Residential	49,986	53,549	58,894	64,238
Commercial	34,109	41,924	53,647	65,369
Transportation	**104,112**	**119,641**	**142,569**	**165,371**
Off-Road Sources	**22,390**	**27,519**	**35,214**	**42,909**
Solid Waste	**5,403**	**6,215**	**7,558**	**8,714**
Wastewater	**4,640**	**5,325**	**6,318**	**7,285**
Potable Water	**1,197**	**1,374**	**1,630**	**1,880**
Total	**307,288**	**355,610**	**427,807**	**499,659**

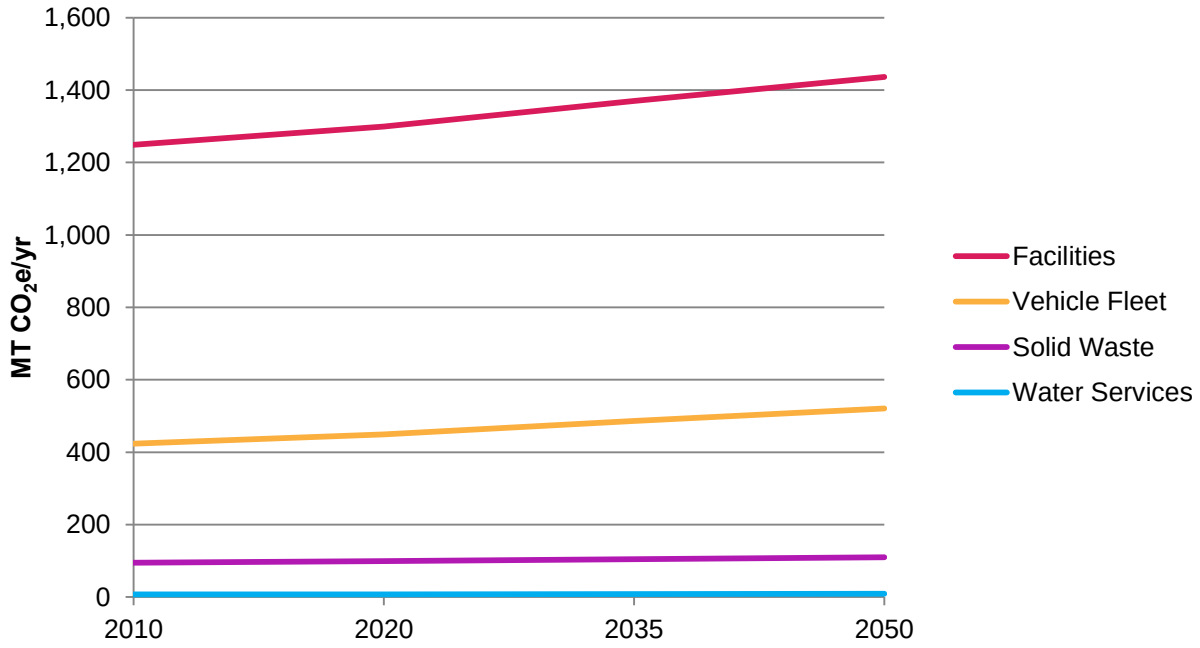
Source: AECOM 2014
Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

Municipal Operations Business-as-Usual Emission Forecasts

Figure 2.5 illustrates the BAU municipal operation emissions forecasts by sector for 2020, 2035, and 2050. As shown in Table 2.5, municipal operations emissions are estimated to increase in future years under the business-as-usual scenario based upon projected population and employment growth within the city, to approximately:

- 1,855 MT CO_2e/year by 2020 (4.5% above the 2010 baseline),
- 1,969 MT CO_2e/year by 2035 (10.9% above the 2010 baseline), and
- 2,076 MT CO_2e/year by 2050 (17.0% above the 2010 baseline).

Figure 2.5 – Municipal Operations Emissions Forecasts by Sector – 2020, 2035, 2050



Source: AECOM 2014

Table 2.5 Municipal Operations Business-as-Usual Emissions (2010 - 2050)				
Emission Sector	2010 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	2035 Emissions (MT CO_2e/yr)	2050 Emissions (MT CO_2e/yr)
Facilities	**1,249**	**1,299**	**1,370**	**1,436**
Building Energy	837	871	918	962
Public Lighting	412	428	452	473
Vehicle Fleet	**424**	**449**	**486**	**521**
Solid Waste	**95**	**99**	**105**	**110**
Water Services	**7**	**7**	**8**	**9**
Total	**1,775**	**1,855**	**1,969**	**2,076**

Source: AECOM 2013

Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

Emissions in each sector are projected to increase under the business-as-usual scenario because the City's population and employment are anticipated to continue growing. As described above, these BAU projections are based on estimated population and employment growth within the City as envisioned in the General Plan Amendment, which would lead to increased demand for government services, which leads to additional emissions resulting from the provision of those services. However, emissions growth across the sectors is estimated to occur at different rates based on the relationship between the types of government services provided within each sector and population and employment growth. The emissions sector growth forecasts are as follows:

- **Facilities**: Emissions from the Facilities sector are projected to grow by 4% in 2020, by 10% in 2035, and by 15% in 2050. Energy use is a function of the number of City-owned buildings/facilities and the number of City staff working in those buildings. It is assumed that as the City's population and employment grows, additional municipal buildings and supporting staff will be necessary to continue providing a high-level of quality government services. The City already anticipates a modest increase in the number of facilities operating to serve the community (i.e., construction of an Environmental Education Center is underway, and the Civic Center Master Planning process may propose additional buildings), along with increased staffing to offer support services for its growing population (estimated to reach 71,300 residents by 2040 based on build-out of the City's General Plan Amendment). The slower growth rate for this sector (relative to Vehicle Fleet and Water sectors) is due to assumed efficiencies of scale that can be realized for future service provision, such that existing City administrative and service buildings and staff can accommodate some portion of future population growth.
- **Vehicle Fleet**: Emissions from the Vehicle Fleet sector are projected to grow by 6% in 2020, by 15% in 2035, and by 23% in 2050. City departments are assumed to experience varied demand for additional vehicles depending upon how closely their provision of services is tied to population and employment growth. For example, the

Streets Department may not need additional vehicles unless new City streets are developed as a result of population growth, whereas the Building Department may require additional vehicles to inspect a higher number of residential and commercial buildings resulting from denser future development.

- **Solid Waste**: As with the Facilities sector, Solid Waste emissions are projected to grow by 4% in 2020, by 10% in 2035, and by 15% in 2050. Emissions in this sector are closely related to the growth in City staff from which the waste included in the municipal operations inventory is generated. Therefore, the same growth estimates used in the Facilities sector were assumed here as well.
- **Water**: Emissions in this sector are estimated to grow at a rate closely correlated to population and employment growth. This assumes that additional park space will be provided to support a growing population, and that landscape irrigation would occur within these new parks comparable to that of parks existing in the baseline year. Emissions from this sector are estimated to increase by 10% in 2020, 25% in 2035, and 40% in 2050.

Adjusted Business-as-Usual Emissions (ABAU) Forecasts (2020, 2035, and 2050)

As described in Chapter 1, the State of California has adopted and implemented numerous policies and programs that will help to achieve the state's long-term emissions reduction target. Adjusted business-as-usual (ABAU) forecasts consider the impact of this legislation to show what a community's emissions will likely be if the state continues to make progress on implementing its high-level actions. ABAU forecasts can be useful in identifying the remaining reductions gap between a community's ABAU forecasts and its reduction targets. Local measures can then be developed to fill any gaps to support target achievement.

Community-wide Emissions Adjusted Business-as-Usual Forecasts

Most of Cupertino's anticipated community-wide emission reductions are estimated to come from statewide actions. This CAP assumes that emissions within the energy and transportation sectors will be reduced through the statewide efforts described in Chapter 1. This includes regulations addressing the use of renewable energy sources, building energy efficiency, and GHG emissions from passenger cars and trucks. When the impact of these statewide actions is applied to Cupertino's BAU emissions forecast, the resulting ABAU emissions levels begin to show the pathway towards achieving future reduction targets. These actions provide important reductions that are applied toward Cupertino's community-wide emissions targets, reducing the total amount of emissions to be addressed through local community actions.

This CAP also considers PG&E's future mix of electricity generation sources as planned through 2020, though this is not specifically a statewide action. In addition to its compliance with the state's Renewable Portfolio Standard (RPS), PG&E also anticipates that the non-RPS compliant portion of its portfolio will become cleaner as their use of natural gas increases and that of coal

decreases. Natural gas releases less CO_2 than coal when burned, which will result in reduced carbon emissions from PG&E's electricity generation portfolio as this shift is implemented.

The City will monitor the effectiveness of state legislation to ensure that the anticipated level of reductions is achieved locally, and to ensure that all applicable statewide reductions are included in future CAP updates. This CAP considers locally-realized emissions reductions from:

- Renewable Portfolio Standard (RPS),
- California 2013 Building Energy Efficiency Standards,
- AB 1109 – Lighting Efficiency
- AB 1493 – Pavley I and II,
- EO-S-1-07 – Low Carbon Fuel Standard, and
- Vehicle Efficiency Regulations

Source: http://extras.mnginteractive.com/live/media/site568/2013/1028/20131028__climate~2.JPG

Including only these statewide initiatives towards the GHG reduction targets is considered a conservative approach because the AB 32 Scoping Plan describes numerous other actions that will likely result in statewide reductions (e.g., High Speed Rail, Million Solar Roofs program). The actions included herein represent those for which a methodology is available to calculate Cupertino's likely share of these reductions. Other actions will provide statewide benefits, but cannot be accurately attributed to Cupertino at this time, and should be carefully tracked for consideration during future year CAP updates

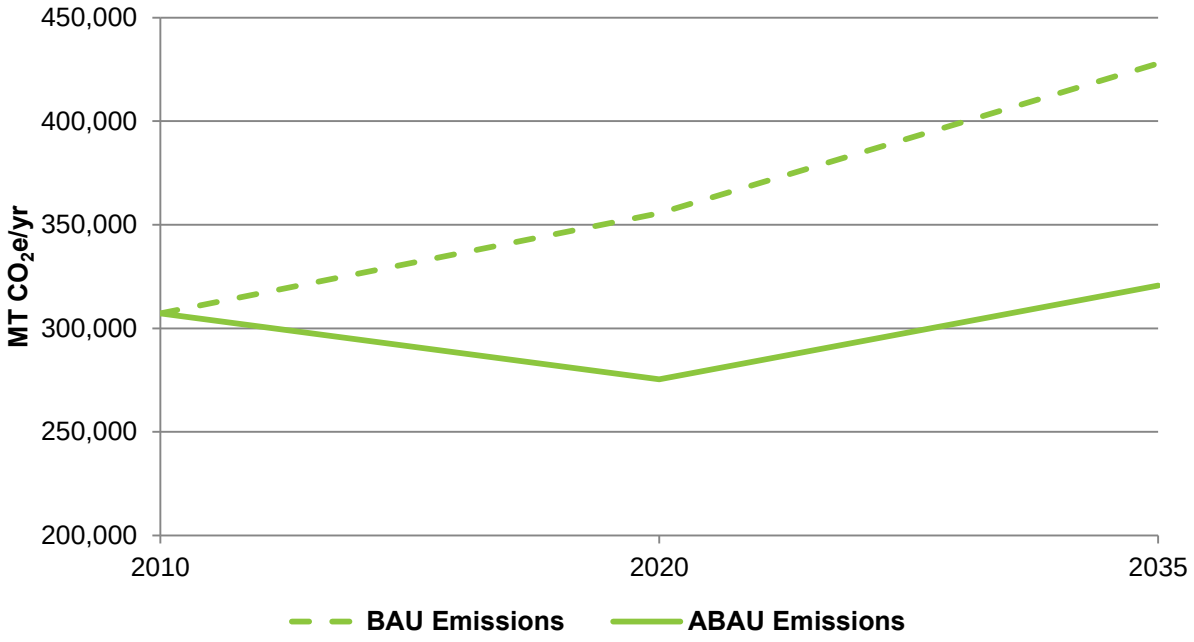
Table 2.6 summarizes the anticipated reductions associated with these statewide actions in years 2020 and 2035. Based on these estimated reductions, Figure 2.6 shows the trajectory of community-wide BAU and ABAU emissions forecasts from baseline year 2010 through 2035.

Table 2.6 2020 and 2035 Community-wide Emission Reductions from Statewide Actions		
State or Federal Action	**2020 Reduction (MT CO_2e/yr)**	**2035 Reduction (MT CO_2e/yr)**
Renewable Portfolio Standard (33% by 2020) + PG&E De-carbonization	34,267	42,117
2013 California Building Energy Efficiency Standards	866	3,063
AB 1109 Lighting Efficiency	5,059	5,253
Pavley I and II and Low Carbon Fuel Standard	36,535	55,535
Vehicle Efficiency Regulations	3,534	4,217
Total	**80,261**	**110,185**

Source: AECOM 2014

Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

Figure 2.6 – Community-wide ABAU Emissions Forecasts



As shown in Figure 2.6, statewide actions set Cupertino's emissions on a downward trajectory by 2020, but begin to trend upward after that. At the time of CAP preparation, ARB only provided statewide reductions estimates through horizon year 2020, though it is likely that additional statewide action will be taken to further reduce emissions in order to achieve the state's 2050 reduction target. While the precise impact of future statewide actions is currently unknown, it could be assumed that they will continue to provide the same level of reduction impact at the community-wide level for local CAP planning purposes. That is, if statewide actions are estimated to provide approximately 85% of reductions needed for local target achievement by 2020 (as is the case in Cupertino), then it could be assumed that statewide actions would provide a comparable proportion of reductions needed in future target years as

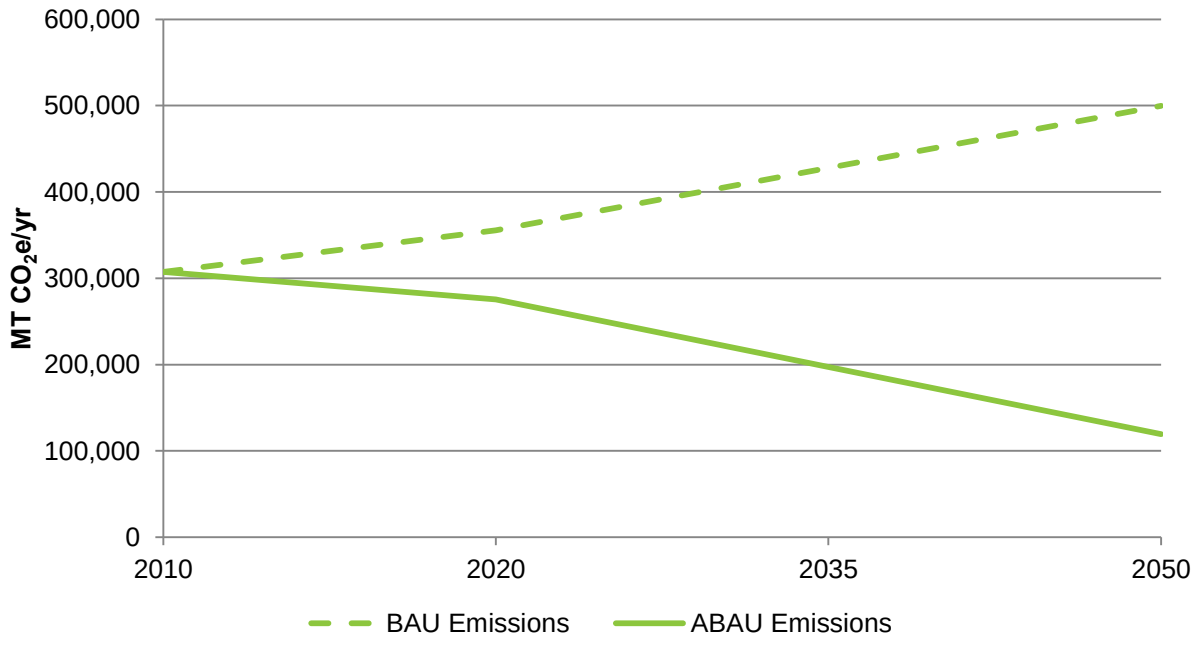
well. Based on that assumption, Table 2.7 shows what statewide actions would achieve in Cupertino in 2035 and 2050 if their level of impact in 2020 is maintained. This table does not attempt to estimate the distribution of statewide reductions among the currently known statewide actions, but instead presents total statewide reduction estimates based on the community-wide BAU forecasts and reduction targets presented in Chapter 1. Figure 2.7 illustrates how these statewide reductions compare to the community-wide BAU forecasts. It will be important for the City to monitor future state-level planning efforts related to these statewide actions and others described in the *Scoping Plan* to determine with more certainty what role state actions will play in target achievement and what the remaining role for local action will be.

Table 2.7
Alternative Emissions Reduction Estimates from Statewide Actions

	2010	2020	2035	2050
BAU Emissions	307,288	355,610	427,807	499,659
Reduction Target	-	15% below 2010	49% below 2010	83% below 2010
	-	261,195	156,717	52,239
Reductions Needed	-	94,415	271,090	447,420
Reductions from Statewide Actions	**-**	**80,261**	**230,427**	**380,307**
Contribution of Statewide Actions to Target	-	85%	85%	85%

Source: AECOM 2014

Figure 2.7 – Revised Community-wide ABAU Forecasts



MUNICIPAL OPERATIONS ADJUSTED BUSINESS-AS-USUAL EMISSION FORECASTS

Within the municipal operations ABAU forecasts developed for the CAP, it is assumed that Facilities and Water sector emissions will be reduced through implementation of the Renewable Portfolio Standard (RPS). As previously described, the standard effectively requires electrical utilities to reduce the carbon intensity of their electricity by obtaining 33% of their generation portfolio from renewable sources by 2020.

This statewide action will help reduce municipal operations emissions and contribute toward achievement of the City's emissions targets. The City will monitor the effectiveness of this legislation to ensure that the anticipated level of reductions is achieved locally, and to ensure that all applicable statewide reductions are included, should additional actions be developed that would apply to the CAP. Unlike the community-wide ABAU forecasts described above, the municipal operations forecasts do not apply reductions from statewide actions related to vehicle emissions, such as Assembly Bill 1493 (Pavley I and II), Executive Order S-1-07 (Low Carbon Fuel Standard), or other vehicle efficiency regulations. These actions were purposefully excluded to avoid double counting between the state's actions and the City's initiatives to reduce emissions from its fleet (as described in Chapter 4).

Table 2.8 identifies municipal operations ABAU forecast emissions for 2020, 2035, and 2050 by subtracting the estimated reductions associated with implementation of the state's RPS. It is possible that the state may increase the requirements associated with the RPS, which would result in greater emissions reductions. However, at the time of CAP preparation, compliance with the standard only required a 33% renewable electricity portfolio by 2020. The calculations in Table 2.8 assume that the standard is achieved by 2020 and is not exceeded (i.e., remains at 33%) in the 2035 and 2050 target years. Therefore, municipal operations emissions are estimated to decrease by 2020 under the adjusted business-as-usual scenario as a result of the RPS, and then begin to increase again through 2050 to approximately:

- 1,490 MT CO_2e/year by 2020 (16.1% below the 2010 baseline),
- 1,584 MT CO_2e/year by 2035 (10.8% below the 2010 baseline), and
- 1,672 MT CO_2e/year by 2050 (5.8% below the 2010 baseline).

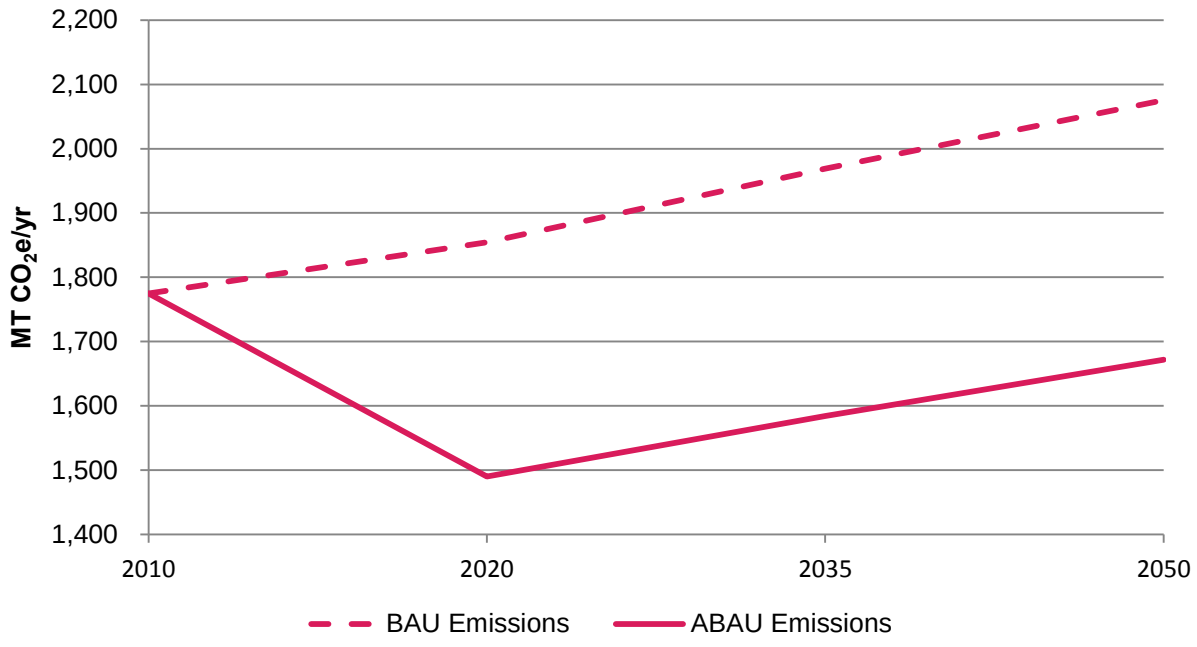
See Figure 2.8 for a graph of the City's BAU and ABAU emissions forecasts.

Table 2.8 Municipal Operations Adjusted Business-as-Usual Emissions (2010 - 2050)				
Emission Sector	2010 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	2035 Emissions (MT CO_2e/yr)	2050 Emissions (MT CO_2e/yr)
Facilities	**1,249**	**1,299**	**1,370**	**1,436**
Building Energy	837	871	918	962
Public Lighting	412	428	452	473
Vehicle Fleet	**424**	**449**	**486**	**521**
Solid Waste	**95**	**99**	**105**	**110**
Water Services	**7**	**7**	**8**	**9**
BAU Total	**1,775**	**1,855**	**1,969**	**2,076**
Statewide Reductions				
Renewable Portfolio Standard	-	(365)	(385)	(404)
ABAU Total	**1,775**	**1,490**	**1,584**	**1,672**
% below 2010 Levels	-	**16.1%**	**10.8%**	**5.8%**

Source: AECOM 2013

Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

Figure 2.8 – Municipal Operations ABAU Emissions Forecasts



GHG Emission Reduction Targets

The first and most essential step in the design of any plan is defining the goal(s) of that plan. As previously described, the second step in the CAP development process is to establish a GHG emissions reduction target. The CAP's singular goal is to reduce emissions, and the reduction target serves as an aspirational metric that will focus City strategies to achieve future emissions reductions. The target is designed to support statewide emissions reduction efforts, and allow use of recently enacted CEQA streamlining benefits. Establishing a clear and attainable target can motivate staff and community members, help drive long-term strategies, and elevate transparency and accountability to achieve the objectives of this CAP.

Mass Emissions and Efficiency Thresholds

In general, an emissions reduction target can be expressed as either mass emissions reductions or efficiency thresholds. Mass emissions targets establish an absolute emissions level to be achieved by a target year, such as 100,000 MT CO_2e/yr by 2020. Typically, mass emissions targets are expressed as a percent below the emissions level of some baseline year, such as 80% below 1990 levels by 2050 (i.e., as outlined in Governor Schwarzenegger's Executive Order S-3-05). Alternatively, efficiency thresholds set a target level of emissions per population or per service population (i.e., population plus local jobs), such as 6.6 MT CO_2e/SP/yr (i.e., as used in Cupertino's 2014 General Plan Amendment). Efficiency thresholds demonstrate a city's ability to grow population and employment, while emissions shrink on a per unit basis; in effect, a city could be growing more efficiently from an emissions standpoint. In this case, total emissions within a city may increase while still achieving an efficiency target, as long as service population is growing faster than emissions. Both types of targets are useful to consider when selecting an appropriate emissions reduction target for a community.

It is anticipated that the Governor's Office of Planning and Research will provide future guidance regarding preparation of plans for the reduction of GHG emissions. This guidance may identify mass emissions reduction targets as preferable to the use of efficiency metrics at the community-wide planning level to ensure that each jurisdiction in California makes progress towards actual mass emissions reductions. However, at the time of this CAP's preparation there was no state-level guidance requiring local governments to adopt specific reduction targets. Similarly, the Bay Area Air Quality Management District is currently in the process of developing regional emissions reduction targets, which can serve as guidance for local climate action

planning in the future. At the time of this CAP's preparation, BAAQMD had not developed this guidance on how to select appropriate local reduction targets for jurisdictions using a baseline year of 2009 or later. For purposes of this CAP, the City selected mass emissions targets as described below.

TARGET SETTING CONSIDERATIONS

The City considered a range of GHG emission reduction targets during plan preparation. In making its target selection, the City weighed numerous factors, such as:

- existing California climate change legislation, direction from ARB, and guidance from California's Air Districts;
- general understanding of the probable range of GHG reduction opportunities from various types of local and statewide measures;
- range of targets and goals set by other area jurisdictions who have completed or begun preparation of CAPs; and
- feasibility of achieving different GHG targets.

State Legislation and Guidance

The underlying purpose of AB 32 is to take state action that will result in an **absolute reduction** in the atmospheric level of carbon dioxide and other greenhouse gases, which contribute to the impacts commonly associated with climate change. Therefore, the state has set mass emissions reduction targets at the statewide level.

As described in Chapter 1, Executive Order S-3-05 identified California's vulnerability to the impacts of GHG emissions. The Executive Order established a long-range GHG reduction target of 80% below 1990 levels by 2050. Subsequently, AB 32, the California Global Warming Solutions Act of 2006 was signed, requiring California to reduce *statewide* GHG emissions to 1990 levels by 2020.

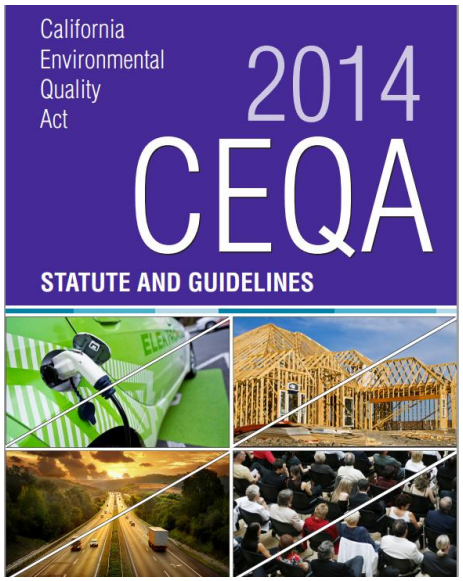
AB 32 also directed ARB to develop and implement regulations that reduce statewide GHG emissions. ARB approved *The Climate Change Scoping Plan* (Scoping Plan) in December 2008, which outlines the state's plan to achieve the GHG reductions required in AB 32. The Scoping Plan does not define the specific role local governments, like the City of Cupertino, will play to contribute toward meeting the state's GHG reduction goals, but does identify cities and counties as "essential partners" within the overall statewide effort.

As such, many cities and counties began to asses local GHG contributions and develop community-focused Climate Action Plans. However, many local governments do not have access to sufficient historical data to prepare a 1990 baseline emissions inventory, which would allow local governments to establish reduction targets that exactly mimic the state's own targets. In the 2008 Scoping Plan, ARB "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's commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020."[viii]

Based on this language, many community-wide CAPs have selected a reduction target of 15% below baseline levels by 2020 to parallel the state's target. Some CAPs also establish a longer-term target to show a trajectory towards the state's 2050 goal of 80% below 1990 levels.

California Environmental Quality Act



As described in Chapter 1, the City of Cupertino intends to use a provision of CEQA that allows communities that have adopted a "… local plan for the reduction or mitigation of GHG emissions" (pursuant to SB 97 and state CEQA Guidelines Section 15183.5) to not require individual, project-level greenhouse gas analysis in CEQA documents for projects that are consistent with the City's CAP. The CAP meets the framework set forth in the CEQA Guidelines so that the City can rely on the GHG analysis and application of GHG reduction measures in the CAP to satisfy the requirements of CEQA. As part of the implementation process, the City will establish the means by which it will determine consistency of future proposed projects (development projects, plans, and other actions subject to CEQA review) with the CAP. State CEQA Guidelines Section 15183.5 establishes the criteria that a GHG reduction plan, such as Cupertino's CAP, should meet in order to provide for streamlining of future development projects consistent with the plan. In general, such plans should:

- Quantify GHG emissions within a defined area,
- Establish a level where GHG emissions are not cumulatively considerable,
- Identify emissions from activities covered by the plan,
- Specify measures to achieve the emissions reduction goal,
- Monitor progress and amend if necessary, and
- Be adopted in a public process following environmental review.

Section 15183.5(b)(1)(B) specifically requires that a GHG reduction target must "Establish a level, below which the contribution to [GHG] emissions from activities covered by the plan would not be cumulatively considerable." To comply with this provision within the guidelines, a reduction target must be based on substantial evidence.

Air Quality Management District Guidance

Several Air Districts and state agencies, including the Bay Area Air Quality Management District (BAAQMD) and ARB, have established the required substantial evidence associated with recommended community-wide emissions reduction targets as described above per the California Environmental Quality Act.

As previously mentioned, the 2008 Scoping Plan presents substantial evidence recommending local agencies seek to reduce community-wide emissions by 15% below current emission levels by 2020. In 2010, BAAQMD also adopted CEQA Air Quality Guidelines that presented substantial evidence for three community-wide emissions reduction targets: 1) 1990 levels by 2020, 2) 15% below current (2008 or earlier) levels by 2020, or 3) use of an efficiency threshold of 6.6 MT CO_2e/yr per service population (i.e., residents plus employees) by 2020. This efficiency threshold is intended to be used only in the context of general or community-wide plans, not individual development projects.

However, BAAQMD's June 2010 adopted thresholds of significance were challenged in a lawsuit, and the Alameda County Superior Court issued a judgment finding in 2012 that the Air District had failed to comply with CEQA when it adopted the thresholds. The court found that the adoption of the thresholds constituted a "project" under CEQA and ordered the Air District to examine whether the thresholds would have a significant impact on the environment under CEQA before recommending their use. The court issued a writ of mandate ordering the Air District to set aside the thresholds and cease dissemination of them until the Air District had complied with CEQA. In view of the trial court's order, which remains in place pending final resolution of the case, the Air District is no longer recommending that the thresholds be used as a generally applicable measure of a project's significant air quality impacts.

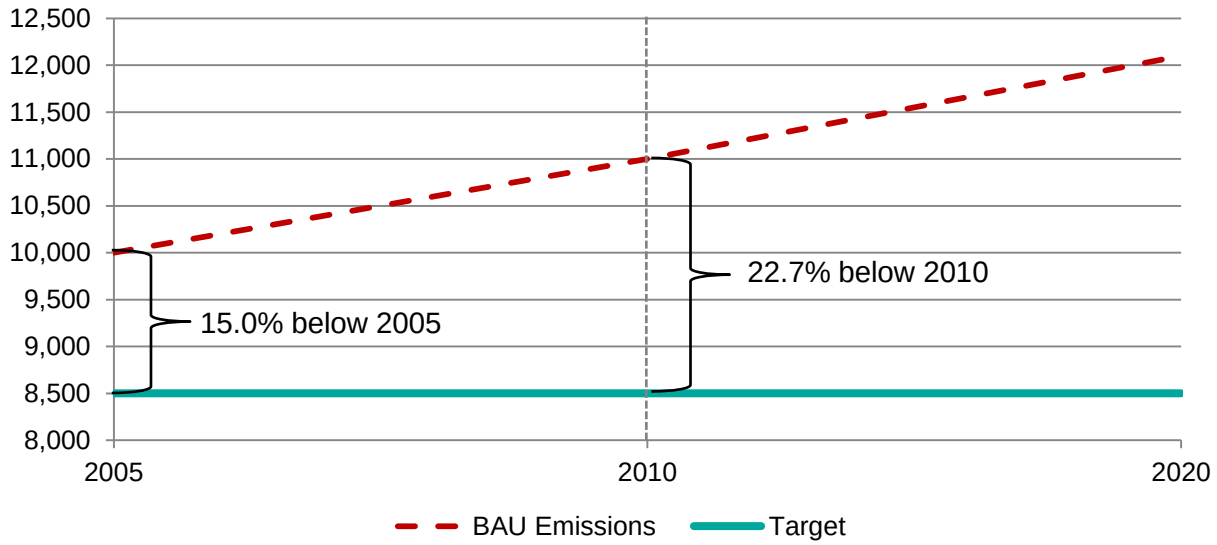
However, the court did not determine whether the thresholds are or are not based on substantial evidence and thus valid on the merits. Therefore, cities could continue to rely on the substantial evidence based on statewide data and analysis relative to AB 32 that underlies the June 2010 BAAQMD thresholds when making an independent determination of significance of plan-level GHG impacts pursuant to state CEQA Guidelines Section 15064.7(c).

In addition, BAAQMD has not yet revised its community-wide emissions reduction target guidance to reflect baseline inventories prepared after 2008. It is increasingly common for jurisdictions to prepare a baseline inventory using the most recent set of annual data available; baseline years of 2009 through 2012 are not uncommon among more recent CAP development projects. However, BAAQMD's original target-setting guidance only identified targets up to a 2008 baseline year. As baseline years progress, cities have more time to implement emissions-reducing measures on their own, such as locally-adopted green building ordinances, local retrofit promotion programs, city-wide streetlight retrofits, or other actions that would serve to reduce community-wide emissions. BAAQMD is in the process of updating its target-setting guidance, and is expected to consider locally-implemented emissions reduction activity that may have occurred since the state's climate change legislation was adopted, as well as the impacts, if any, that the economic recession had upon Bay Area communities' emissions growth.

CUPERTINO'S EMISSIONS REDUCTION TARGETS

As described above, BAAQMD has provided guidance on selecting appropriate community-wide emissions targets for jurisdictions with baseline years of 2005-2008. However, Cupertino prepared its baseline inventories using the most current data available at the time of CAP preparation, which resulted in selection of a 2010 baseline year. Since BAAQMD's previous guidance suggested that a 15% reduction below a 2005-2008 baseline year could approximate a return to 1990 levels, it could be assumed that later baseline years would need to reduce emissions by a greater amount to similarly return to 1990 levels, as shown in Figure 2.9.

Figure 2.9 – Reduction Targets based on Baseline Year



BAAQMD's current guidance was based on ARB's 2007 statewide inventory and forecasts for the 2020 horizon year. Table 2.9 presents this original statewide information expressed as million metric tons of CO_2e. ARB used a baseline year created from the average emissions inventories for 2002-2004, and also provided a 2020 target year emissions forecast. The 2005-2010 BAU emissions values presented here were interpolated based on ARB's baseline year and forecast estimate assuming straight line growth between these two points. The bottom row shows what reduction target below each baseline year would be required to achieve a return to 1990 levels. As shown, a 2008 baseline year would require a target of nearly 15%, while a 2010 baseline year would require a target of 17% to approximate a return to 1990 levels.

Table 2.9
2007 Statewide Emissions Inventory, Forecasts, and Reduction Targets

	1990	2002-2004 Average	2005	2006	2007	2008	2009	2010	2020
Statewide BAU Emissions (MMT CO_2e)	427[1]	469[1]	477	485	493	501	509	517	596[1]
Target Needed to Achieve 1990 Levels	0.0%	9.0%	10.5%	11.9%	13.4%	**14.7%**	16.1%	**17.3%**	28.4%

Source: AECOM 2014

Note: MMT CO2e = million metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

[1] From ARB's Climate Change Scoping Plan, December 2008, pages 12-13

However, since BAAQMD provided its original guidance, ARB has updated the statewide inventory and 2020 forecasts to account for the economic recession that began in 2008. Table 2.10 presents this updated information using a 2008 baseline year. As shown, the 2020 emissions forecasts have been revised lower than those originally estimated in 2007. As a result, reduction targets to approximate a return to 1990 levels are also lower. Under this revised scenario, a 2008 baseline would only need to reduce emissions by 10% to return to 1990 levels, while a 2010 baseline would need reductions of approximately 12%.

Table 2.10
2010 Statewide Emissions Inventory, Forecasts, and Reduction Targets

	1990	2008	2010	2020
Statewide BAU Emissions (MMT CO_2e)	427[1]	475[2]	487	545[3]
% below Baseline to Reach 1990 Levels	0.0%	**10.1%**	**12.3%**	21.7%

Source: AECOM 2014

Note: MMT CO2e = million metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

[1] From ARB's Climate Change Scoping Plan, December 2008, pages 12

[2] From ARB's Greenhouse Gas Inventory – 2020 Emissions Forecast: http://www.arb.ca.gov/cc/inventory/data/tables/2020_ghg_emissions_forecast_2010-10-28.pdf

[3] From ARB's Greenhouse Gas Inventory – 2020 Emissions Forecast: http://www.arb.ca.gov/cc/inventory/data/forecast.htm; includes 2020 forecast value (i.e., 507 MMT CO_2e/yr) plus 38 MMT CO_2e/yr representing reductions anticipated from Pavley I and RPS, for a total 2020 BAU inventory of 545 MMT CO_2e/yr

In light of more current guidance from OPR or BAAQMD at the time of document preparation, Cupertino has selected a reduction target of 15% below 2010 baseline levels by 2020 as a proxy for a return to 1990 levels. This target falls squarely between those shown in Tables 2.9 and 2.10 for 2010 baseline years, and serves to demonstrate the City's commitment to supporting the state's emissions reduction goals by exceeding the reduction target associated with the revised statewide inventory (i.e., 12.3%). During future CAP updates, more refined targets may be available for incorporation into the plan, but at this time the selected target represents the best available data to allow local governments to approximate a return to 1990 levels. This 2020 target was also extrapolated to 2050 to determine what level of reductions the City would need to achieve 80% below 1990 levels, per the state's long-term target. The City

also developed an additional 2035 target to serve as a mid-point check-in between the 2020 and 2050 horizon years.

Based on these target-setting considerations, Cupertino has established the following GHG emissions reduction targets for 2020, 2035, and 2050:

- **2020:** 15% below 2010 emissions levels (approximates a return to 1990 levels)
- **2035:** 49% below 2010 emissions levels (provides a mid-point target)
- **2050:** 83% below 2010 emissions levels (approximates 80% below 1990 levels).

These targets will allow the City to demonstrate contributions toward statewide absolute emissions reductions, and will provide opportunities for future CEQA streamlining benefits based on the substantial evidence supporting these metrics found in the Scoping Plan and BAAQMD's June 2010 thresholds of significance. These targets are also consistent with those selected by the other participating jurisdictions in the CAP development process, which further supports the regional collaboration established during plan development. The 2020 target is directly related to the previously described guidance from ARB and BAAQMD, whereas the 2035 target represents consistency with a linear trajectory towards the state's long-term target of 80% below 1990 levels by 2050.

Tables 2.11 and 2.12 summarize the emissions reduction targets, contributions from statewide actions, and the remaining emissions reduction gaps to be addressed through implementation of local actions at the community-wide and municipal operations levels, respectively. As shown in Table 2.11, the community would face an emissions reduction gap of approximately 14,000 MT CO_2e/yr in 2020 after considering the likely impact of statewide actions. Similar reductions gaps are shown for 2035 and 2050 as well. Additional reductions will likely need to be provided through development and implementation of local CAP measures, as described in Chapter 3.

Table 2.11
Community-wide 2020 and 2035 Emissions Reduction Targets

	2010 (MT CO_2e/yr)	2020 (MT CO_2e/yr)	2035 (MT CO_2e/yr)	2050 (MT CO_2e/yr)
BAU Emissions Inventory and Forecasts	307,288	355,610	427,807	499,659
Reduction Target	-	15% below 2010 levels	49% below 2010 levels	83% below 2010 levels
		261,195	156,717	52,239
Reductions Needed to Achieve Target	-	94,415	271,090	447,420
Assumed Statewide Reductions[1]	-	-80,261	-230,427	-380,307
Local Action Reductions Needed to Achieve Target	**-**	**14,154**	**40,663**	**67,113**

Source: AECOM 2014

Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

[1] Per Table 2.7 alternative statewide reduction estimates

As shown in Table 2.12, Cupertino is projected to achieve its 2020 municipal operations target without need for additional local action. Emissions reductions estimated from statewide actions would exceed the City's reduction target for that year. However, as municipal operations emissions increase through 2035 and 2050, a reductions gap is projected to develop, which can be addressed through implementation of the reduction strategies described in Chapter 4.

Table 2.12
Municipal Operations 2020 and 2035 Emissions Reduction Targets

	2010 (MT CO_2e/yr)	2020 (MT CO_2e/yr)	2035 (MT CO_2e/yr)	2050 (MT CO_2e/yr)
BAU Emissions Inventory and Forecasts	1,775	1,855	1,969	2,076
Reduction Target	-	15% below 2010 levels	49% below 2010 levels	83% below 2010 levels
		1,509	905	302
Reductions Needed to Achieve Target	-	346	1,064	1,774
Assumed Statewide Reductions[1]	-	-365	-385	-404
Local Action Reductions Needed to Achieve Target	**-**	**0**	**679**	**1,370**

Source: AECOM 2014

Note: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

[1] Per Table 2.7

CHAPTER 3
COMMUNITY-WIDE REDUCTION MEASURES

This chapter presents the goals, measures, and actions that the City and community members could implement to reduce greenhouse gas emissions to achieve the community-wide targets. The chapter provides a description of the CAP measure development process, a summary of the emission reductions anticipated from implementation of each proposed measure, a discussion regarding estimated achievement of the community's 2020 emissions reduction target, and recommendations for putting Cupertino on a pathway toward reaching its 2035 and 2050 targets. The remainder of the chapter provides detailed descriptions of the individual measures and implementation actions.

Measure Development

The measures presented within this chapter were developed by considering best management practices in local emissions reduction from jurisdictions throughout the United States and abroad. The project team first considered a comprehensive list of available strategies, and identified those which Cupertino has already implemented. From this much smaller list of potential strategies not yet pursued locally, City staff preliminarily identified new strategies that might be successful options for the community to consider. The City then hosted two community workshops and two focus group meetings to gather public input on these potential options. The workshops presented the City's emissions inventory and forecasts, estimated emissions reduction potential from the proposed measures, and their relationship to the City's proposed reduction targets. Following these workshops and focus group meetings, the project team presented similar information to the Planning Commission and City Council at study sessions open to the public. The project team also conveyed public comments collected to date at these study sessions to help inform additional comments provided by the Planning Commission and City Council. The CAP's final list of reduction measures was developed based on this collection of input from the community, City staff, and elected officials. Figure 3.1 illustrates the process used to refine the community-wide measures into the final version presented in the CAP.

Figure 3.1 – Community-wide Measure Development Process

Reduction Strategies

The community-wide reduction measures are organized topically into strategy areas. Each strategy area comprises an overarching goal, a collection of reduction measures related to a certain topic, and action steps to guide implementation of each measure. The measures identified in this chapter affect issues within the City's direct influence, and were selected to influence emissions reductions within the community (as opposed to emphasizing other potential co-benefits). As described in Chapter 1, this document focuses on achievement of the City's emissions reductions goals. Strategies related to the general principles of sustainability that do not directly reduce GHG emissions were excluded from this document (such as, reducing plastic bag waste), though they may contribute to the City's quality of life and overall environmental well-being and will remain under the implementation purview of the Sustainability Division.

The measures presented here were developed by (a) evaluating existing community conditions, (b) identifying emission reduction opportunities within the community, (c) reviewing best practices from other jurisdictions, (d) incorporating state and regional laws, guidelines, and recommendations, and (e) engaging community members to gather additional ideas and comments, and generate support to lead implementation of the CAP.

Cupertino's emissions reduction measures are organized into the following five goals:

GOAL 1 – REDUCE ENERGY USE:
Increase energy efficiency in existing buildings and increase use of renewable energy community-wide.

GOAL 2 – ENCOURAGE ALTERNATIVE TRANSPORTATION:
Support transit, carpooling, walking, and bicycling as viable transportation modes to decrease the number of single-occupancy vehicle trips within the community.

GOAL 3 – CONSERVE WATER:
Promote the efficient use and conservation of water in buildings and landscapes.

GOAL 4 – REDUCE SOLID WASTE:
Strengthen waste reduction efforts through recycling and organics collection and reduced consumption of materials that otherwise end up in landfills.

GOAL 5 – EXPAND GREEN INFRASTRUCTURE:
Enhance the City's existing urban forest on public and private lands.

COMMUNITY-WIDE REDUCTION MEASURES

Within the framework of the five goals, this chapter presents 20 community-wide reduction measures. The majority of measures are focused on the Energy and Transportation & Land Use strategies because, as was shown in Chapter 2, these represent the greatest emissions sources in the community and therefore provide the best opportunities for deep emissions reductions as well. Figure 3.2 illustrates the interlocking community-wide reduction goals and their corresponding measures. The "C" in the measure numbers indicates it is a community-wide measure (as opposed to "M" for municipal operations as is used in Chapter 4), while the next letter(s) identifies with which goal the measure is associated.

Figure 3.2 – Reduction Goals and Measures

Summary of Reductions

Table 3.1 presents an overview of the 20 community-wide reduction measures that are presented in greater detail later in this chapter. It lists the measure numbers, titles, and estimated 2020 and 2035 reduction potential, organized according to their overarching goals. It also shows the total estimated reductions from implementation of the CAP, including statewide reductions, community-wide measures, and municipal operations measures. At the bottom of the table, these reduction totals are compared to reductions needed to achieve the 2020 and 2035 targets. As shown, this CAP estimates that the City will achieve its 2020 community-wide reduction target with a 15.4% reduction below 2010 levels. It also estimates that implementation of this CAP will set the City on a course towards its 2035 target. Further discussion of near-term target achievement and additional actions to assist in long-term target achievement are presented at the end of this chapter. As a reminder, emissions reductions are not directly associated with "Supporting Measures" (or cannot be accurately quantified at this time), as outlined in the CAP's Executive Summary. However, these supporting measures still play an important role in the implementation of other measures and achievement of the City's reduction targets, which is why they are included in this CAP and tables below.

Table 3.1
Community-wide Measures and Quantified Reductions

	Reduction Goals and Measures	2020 (MT CO_2e/year)	2035 (MT CO_2e/year)
REDUCE ENERGY USE			
C-E-1	Energy Use Data and Analysis	400	850
C-E-2	Retrofit Financing	8,150	10,525
C-E-3	Homes & Commercial Building Retrofit Outreach	Supporting Measure	
C-E-4	Energy Assurance & Resiliency Plan	Supporting Measure	
C-E-5	Community-wide Solar Photovoltaic Development	1,575	4,400
C-E-6	Community-wide Solar Hot Water Development	0	925
C-E-7	Community Choice Energy Option	Supporting Measure[1]	
	Energy Subtotal	*10,125*	*16,700*
ENCOURAGE ALTERNATIVE TRANSPORTATION			
C-T-1	Bicycle & Pedestrian Environment Enhancements	Supporting Measure	
C-T-2	Bikeshare	Supporting Measure	
C-T-3	Transportation Demand Management	925	2,375
C-T-4	Transit Route Expansion	Supporting Measure	
C-T-5	Transit Priority	Supporting Measure	
C-T-6	Transit-Oriented Development	Supporting Measure	
C-T-7	Communitywide Alternative Fuel Vehicles	2,850	10,225
	Transportation Subtotal	*3,775*	*12,600*

Table 3.1
Community-wide Measures and Quantified Reductions

	Reduction Goals and Measures	2020 (MT CO_2e/year)	2035 (MT CO_2e/year)
CONSERVE WATER			
C-W-1	SB-7X-7	325	375
C-W-2	Recycled Water Irrigation Program	Supporting Measure	
	Water Subtotal	*325*	*375*
REDUCE SOLID WASTE			
C-SW-1	Zero Waste Goal	Supporting Measure	
C-SW-2	Food Scrap and Compostable Paper Diversion	150	750
C-SW-3	Construction & Demolition Waste Diversion Program	125	550
	Solid Waste Subtotal	*275*	*1,300*
EXPAND GREEN INFRASTRUCTURE			
C-G-1	Urban Forest Program	200	725
	Green Infrastructure Subtotal	*200*	*725*
MONITOR PROGRESS TOWARD LONG-TERM TARGETS			
C-2035-1	Long-Term Target Monitoring	Supporting Measure	
STATEWIDE REDUCTIONS			
Renewable Portfolio Standard		34,267	-
2013 California Building Energy Efficiency Standards		866	-
AB 1109 – Lighting Efficiency		5,059	-
Pavley I and II and Low Carbon Fuel Standard		36,535	-
Vehicle Efficiency Regulations		3,534	-
	Statewide Reductions Subtotal	*80,261*	*230,427*[2]
	Community-wide Measures Subtotal	*14,700*	*31,700*
	Municipal Operations Measures Subtotal	*700*[3]	*1,200*[3]
TOTAL REDUCTIONS		**95,661**	**263,327**
Reduction Target		15% below baseline	49% below baseline
Reductions Needed		94,415	271,090
Estimated Reduction Level below 2010 Baseline		**15.4%**	**46.5%**

Source: AECOM 2014

Notes: MT CO_2e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

[1] See discussion titled *Progress towards 2035 Target* at end of Chapter 3 for a description of why emissions reductions from this measure are not included in this table

[2] See Chapter 2, Table 2.7 for a discussion of calculating future reductions from statewide actions

[3] Interpolated from municipal operations reduction estimates for 2020 and 2050, as shown in Table 4.6

Reduction Measure Structure

As described above, this chapter is organized according to the five reduction strategy areas: energy, transportation and land use, water, solid waste, and green infrastructure. These strategies represent the primary avenues by which to reduce community-wide GHG emissions in Cupertino. Each strategy area section begins with an introduction to its reduction goal and the overarching concepts that tie that particular strategy to GHG emission generation and potential reductions. This overview is followed by the specific measures and actions that will translate the City's vision into on-the-ground implementation.

Reduction Measures

Measures define the programs, policies, and projects that the City will undertake to accomplish its GHG emission reduction goals. Each measure includes information related to GHG reduction potential, measure co-benefits, and a description of past and future City actions within this area. An implementation table is also provided at the end of each measure to quickly identify the next steps for action. These tables include action steps, the current status of measure implementation, departmental responsibility, implementation timelines, and progress indicators. Figure 3.3 illustrates how each piece of information is presented throughout the chapter.

Measure Title

Each measure begins with a color-coded title bar that relates to the underlying strategy area (e.g., Energy, Solid Waste). The title bar contains the measure number and title, which are used as references in summary tables throughout the CAP.

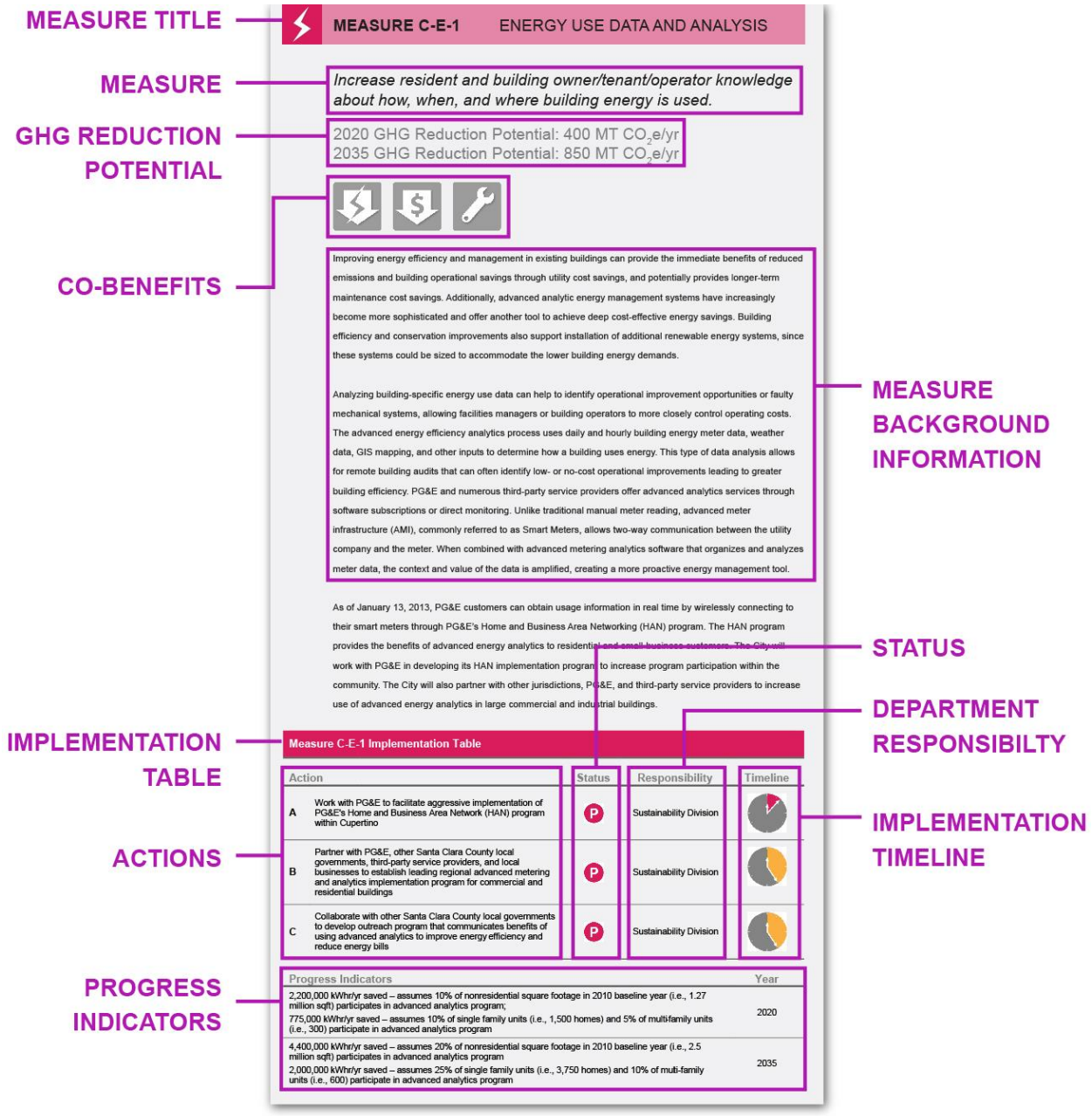
Measure

The measure is a one or two sentence statement about the action to be taken. The statements expand upon the concept indicated in the measure title, but are not as detailed as the action steps presented later.

GHG Reduction Potential

The estimated annual emissions reduction potential of each quantifiable measure is provided for 2020 and 2035 in MT CO_2e/yr. Measures identified as "Supporting Measures" contribute to GHG reductions and are an important component of this CAP, but currently lack a methodology to quantify their individual emissions reduction potential. In the case of Transportation Strategy measures, many of the "Supporting Measures" do provide emissions reductions, which have already been embodied in the CAP through the incorporation of the General Plan Amendment VMT data used to prepare the emissions forecasts, as described in Chapter 2.

Figure 3.3 – Reduction Measure Infographic



Co-Benefits

Co-benefits describe the various additional outcomes that could occur as a result of measure implementation, beyond emissions reductions. Co-benefit icons are used to illustrate these overlapping outcomes. Figure 3.4 shows the co-benefits and their corresponding icons used throughout this chapter, though this list is no way comprehensive of all possible co-benefits.

Figure 3.4 – CAP Measure Co-Benefits

Measure Background Information

The measure background section provides information about the specifics of a measure, including descriptions of various technologies or financing mechanisms. This section also provides information on currently available rebates and other financial incentives related to the measure, and describes any actions the City has taken to date towards implementation of that measure. Additionally, some descriptions provide guidance that will be used in program implementation, such as components of the outreach plan and which segments of the community should be targeted for inclusion.

Actions, Status, and Department Responsibility

Actions identify specific steps that the City will take to implement each measure. The status column indicates whether an action is an existing City priority or a new item proposed by the CAP. Measure status is indicated with the icons shown below:

Existing City Actions **Proposed New Actions**

The implementation table also identifies responsible departments that would be best positioned to lead or provide input for implementation of certain tasks.

Implementation Timeline

The timeline column in the implementation tables indicates when each implementation step should occur based on the following four timeframes:

On-going items are actions the City already performs or programs the City already offers that should be continued in the future.

Near-term items are those that should be pursued immediately, within a 1-2 year timeframe following CAP adoption.

Medium-term items will help to achieve the 2020 reduction target, and should be pursued within 3-5 years following CAP adoption.

Long-term items will help provide broader measure implementation, but are not critical to immediate success; these items include actions that can be started now and will take 5+ years to complete, or can be actions that do not require implementation consideration for at least 5 years.

Progress Indicators

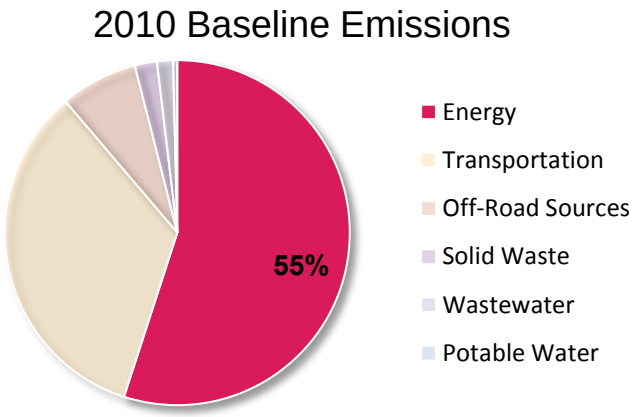
Progress indicators describe the specific action that is being quantified to estimate the reduction potential. These indicators enable City staff, the City Council, and the public to track implementation and monitor overall CAP progress. Progress indicators are provided for both 2020 and 2035, and are specifically described when possible (e.g., 500 single family homes will install a solar hot water heater). Progress indicators are not provided for supporting measures, which do not have quantifiable emissions reductions.

ENERGY STRATEGY

Goal 1 – Reduce Energy Use

Increase energy efficiency in existing homes and buildings and increase use of renewable energy community-wide.

The consumption of electricity for appliances, lighting, and cooling, and combustion of natural gas for heating, cooking, and other processes within residential, commercial, and industrial buildings generated more than half of Cupertino's community-wide GHG emissions in 2010 (see pie chart). These emissions can be reduced by improving energy efficiency in new and existing buildings and increasing the amount of electricity and heat generated from renewable energy sources.



In Cupertino, approximately 68%[ix] of the housing stock was built before California's energy code, Title 24 Part 6, was first adopted in 1978. Consequently, this building stock offers considerable opportunity for cost-effective energy efficiency retrofits to decrease the use of both electricity and natural gas. The City plans to achieve building energy efficiency improvements in both existing and new buildings through a combination of community outreach and education, continuation of existing programs, and regulations.

The Pacific Gas and Electric Company (PG&E) is Cupertino's energy utility, providing both natural gas and electricity for residential, commercial, industrial, and municipal uses. PG&E provides electricity generated at hydroelectric, nuclear, renewable, natural gas, and coal facilities. As of 2012, Renewable Portfolio Standard-compliant renewable energy facilities and contracts provided 19% of the electricity delivered to customers.[x] As PG&E continues to comply with the provisions of the RPS mandate, it will expand its renewable electricity portfolio, making additional GHG-free electricity available to customers in Cupertino.

Source: Amazon News

The City will encourage community-wide installation of rooftop solar photovoltaic (PV) and solar hot water systems to increase the portion of Cupertino's energy portfolio provided from renewable sources, including opportunities for solar PV installations on municipal buildings and facilities.

The total GHG emission reduction potential of the Energy Strategy is 12,150 MT CO_2e/yr in 2020 and 16,700 MT CO_2e/yr in 2035. This represents approximately 75.0% percent of total 2020 reductions anticipated from local CAP measure implementation.

MEASURE C-E-1 ENERGY USE DATA AND ANALYSIS

Increase resident and building owner/tenant/operator knowledge about how, when, and where building energy is used.

2020 GHG Reduction Potential: 400 MT CO_2e/yr
2035 GHG Reduction Potential: 850 MT CO_2e/yr

Improving energy efficiency and management in existing buildings can provide the immediate benefits of reduced emissions and building operational savings through utility cost savings, and potentially provides longer-term maintenance cost savings. Additionally, advanced analytic energy management systems have increasingly become more sophisticated and offer another tool to achieve deep cost-effective energy savings. Building efficiency and conservation improvements also support installation of additional renewable energy systems, since these systems could be sized to accommodate the lower building energy demands.

Analyzing building-specific energy use data can help to identify operational improvement opportunities or faulty mechanical systems, allowing facilities managers or building operators to more closely control operating costs. The advanced energy efficiency analytics process uses daily and hourly building energy meter data, weather data, GIS mapping, and other inputs to determine how a building uses energy. This type of data analysis allows for remote building audits that can often identify low- or no-cost operational improvements leading to greater building efficiency. PG&E and numerous third-party service providers offer advanced analytics services through software subscriptions or direct monitoring. Unlike traditional manual meter reading, advanced meter infrastructure (AMI), commonly referred to as Smart Meters, allows two-way communication between the utility company and the meter. When combined with advanced metering analytics software that organizes and analyzes meter data, the context and value of the data is amplified, creating a more proactive energy management tool.

As of January 13, 2013, PG&E customers can obtain usage information in real time by wirelessly connecting to their smart meters through PG&E's Home and Business Area Networking (HAN) program. The HAN program provides the benefits of advanced energy analytics to residential and small-business customers. The City will work with PG&E in developing its HAN implementation program to increase program participation within the

community. The City will also partner with other jurisdictions, PG&E, and third-party service providers to increase use of advanced energy analytics in large commercial and industrial buildings.

Tracking community-wide energy use savings can be challenging when energy data is aggregated at the zip-code or block level. The City will work with residents and businesses during implementation of this measure to identify strategies for sharing energy use data in a way that illustrates success stories and local energy-saving potential, while still protecting end-users privacy. As with most of the measures in the CAP, the City and community members will need to partner together and leverage information and resources to fully implement the strategies described in this plan.

Source: pge.com

Measure C-E-1 Implementation Table

Action		Status	Responsibility	Timeline
A	Work with PG&E to facilitate aggressive implementation of PG&E's Home and Business Area Network (HAN) program within Cupertino	P	Sustainability Division	
B	Partner with PG&E, other Santa Clara County local governments, third-party service providers, and local businesses to establish leading regional advanced metering and analytics implementation program for commercial and residential buildings	P	Sustainability Division	
C	Collaborate with other Santa Clara County local governments to develop outreach program that communicates benefits of using advanced analytics to improve energy efficiency and reduce energy bills	P	Sustainability Division	

Progress Indicators	Year
2,200,000 kWhr/yr saved – assumes 10% of nonresidential square footage in 2010 baseline year (i.e., 1.27 million sqft) participates in advanced analytics program; 775,000 kWhr/yr saved – assumes 10% of single family units (i.e., 1,500 homes) and 5% of multi-family units (i.e., 300) participate in advanced analytics program	2020
4,400,000 kWhr/yr saved – assumes 20% of nonresidential square footage in 2010 baseline year (i.e., 2.5 million sqft) participates in advanced analytics program 2,000,000 kWhr/yr saved – assumes 25% of single family units (i.e., 3,750 homes) and 10% of multi-family units (i.e., 600) participate in advanced analytics program	2035

MEASURE C-E-2 RETROFIT FINANCING

Promote existing and support development of new private financing options for home and commercial building retrofits and renewable energy development.

2020 GHG Reduction Potential: 8,150 MT CO_2e/yr
2035 GHG Reduction Potential: 10,525 MT CO_2e/yr

Energy efficiency improvements to residential and nonresidential structures can reduce both energy bills and GHG emissions. Many residences (approximately 65 percent[xi]) in Cupertino are owner–occupied, and thus the financial savings of home energy efficiency retrofits are in the long-term economic interest of the homeowner. As such, the City will emphasize voluntary participation in energy efficiency retrofit programs, in lieu of mandatory programs, as guided by feedback collected during the City's CAP community outreach efforts.

Financing typically represents the primary barrier to broad implementation of building retrofits. Inadequate financing options or lack of awareness to existing financing and rebate options can prevent property owners from making energy- and water-conservation improvements. Distribution of information on available programs as well as leveraging programs through partnerships with utility companies, non-profit organizations, and other funding providers can lead to greater community-wide implementation of efficiency retrofits. The City currently provides energy conservation resources on its website such as tools to manage energy use, conservation information, and energy efficient product rebates and tax credits. The website also includes information on the City's Green@Home and GreenBiz programs which provide free energy audits and an energy- and water-saving direct-install program to homeowners and businesses, respectively.

As part of its efforts to encourage voluntary building retrofits, the City will enhance its website by linking to information on existing energy efficiency rebates and other financial incentives, including PG&E programs for residents and businesses, PACE financing districts, and energy service companies. The website could also contain local case studies of residents and businesses that have completed cost-effective energy efficiency improvements. The City will also promote resources such as California Flex Alert, the Department of Energy's (DOE) Weatherization Assistance Program for low-income households, and PG&E's SmartEnergy Analyzer™ program, all of which link residential property owners to educational and financial resources. The City will also finalize it's in-progress Financing Energy Efficiency Guide for Businesses, developed as part of the City's Silicon Valley Energy Watch grant to expand the

GreenBiz suite of services, which is also priortizing the creation of a program-level Property Manager Guide.

PG&E and Energy Upgrade California

Many of PG&E's building retrofit programs are offered through Energy Upgrade California, which provides educational materials and an online platform that provides access to incentives, technical assistance, and qualified contractors. Typical rebates and incentives available to Santa Clara County residents through Energy Upgrade California include PG&E's Basic and Advanced Retrofit Packages; pool pumps and motor rebates; efficient water heaters/blankets; heating, ventilation, and air conditioning (HVAC) upgrades; furnace upgrades; and wall insulation installation. In addition, PG&E is working to a fulfill Goal 2.2 of the CPUC *Long-Term Energy Efficiency Strategic Plan*, which states, "By 2020, 100 percent of eligible and willing customers will have received all cost-effective Low Income Energy Efficiency measures." PG&E also offers an on-bill financing program that provides low-interest loans to non-residential customers for qualified energy efficiency improvements.

Based on data provided by PG&E, participation in PG&E home and building retrofit programs since the 2010 baseline year has provided significant electricity and natural gas savings. Residential programs have resulted in electricity savings totaling nearly 3.8 million kWh/yr and natural gas savings of approximately 12,600 therms/yr. Commercial programs have created annual electricity savings of more than 19 million kWh, and natural gas savings of more than 620,000 therms/yr.[xii] Together these PG&E programs provide emission reductions that contribute approximately 7% of the 2020 target. The City will work with PG&E to identify the

most successful programs to continue their promotion in outreach campaigns, as well as identify less successful programs that would benefit from additional local marketing and promotion.

Property Assessed Clean Energy Districts

Property assessed clean energy (PACE) finance programs provide another source of retrofit and renewable energy development financing. PACE programs were first enabled through AB 811 legislation. This bill allows land-secured loans for homeowners and businesses who install energy efficiency projects and clean-energy generation systems. Senate Bill 555 reinforced implementation opportunities for PACE programs by expanding the scope of activities allowed within a community facilities district, as defined by the Mello-Roos Community Facilities Act of 1982. A PACE program permits property owners within participating districts to finance the installation of energy- and water-efficiency improvements in their home or business through a lien against their property that is repaid through their property tax bill. If the property is sold, payment responsibility transfers to the new owners, allowing building owners to avoid up-front installation costs while at the same time requiring little or no investment of local government general funds. In some instances, the new lender may require repayment of the existing lien, in which case the remaining PACE loan is repaid from the proceeds of the property sale.

Cupertino is a participating member of the CaliforniaFIRST (PACE) program, which allows funding for commercial, industrial, non-profit owned, and multi-family residential projects. CaliforniaFIRST is in the process of expanding this program to provide financing options to smaller (i.e., less than 5 units) residential buildings as well. The City will continue its participation in the CaliforniaFIRST program, and will continue its efforts to work with other regional governments to establish a county-wide PACE program available to residential property owners. The City will also work with PACE program administrators and the local realtor community to develop and share informational materials regarding the availability of this financing mechanism within the community.

Energy Service Companies

Another retrofit financing option is through energy performance contracting (EPC). EPC provides customers with a comprehensive set of energy efficiency and renewable energy generation measures. Energy service companies (ESCOs) often use EPC to provide energy-efficiency-related services in which the ESCO guarantees a level of energy savings (or energy generation, in the case of renewable energy programs), and assumes some performance risk during the project's economic life. ESCOs typically provide building energy audits, improvement recommendations, financing and installation, and performance monitoring. This model removes the barrier of up-front capital investments to encourage additional building retrofits.

The City can support use of ESCOs and EPC by developing a market aggregation program that identifies interested commercial and industrial property owners and assembles them into a market of sufficient scale. To City will also work with local mortgage lenders to reduce or remove limitations that would prevent use of EPC in commercial properties.

Measure C-E-2 Implementation Table

	Action	Status	Responsibility	Timeline
Property Assessed Clean Energy				
A	Continue to participate in California FIRST to make PACE financing available to commercial, industrial, multi-family residential (5+ units), and non-profit-owned buildings	E	Sustainability Division	
B	Continue to participate in effort with other Santa Clara County local governments to establish countywide PACE financing district available for residential property owners (could also provide another source of commercial financing to compliment California FIRST program)	E	Sustainability Division	
C	Work with PACE financing providers to educate local Realtor and contractor community about PACE offerings, process, and benefits to increase participation	P	Sustainability Division	
D	Finalize GreenBiz Financing Guide and create residential-focused guide and companion website to direct interested parties to utility, public agency, and local lending institution resources to advance energy efficiency and water conservation measures	P	Sustainability Division	
Energy Service Company Promotion				
D	Develop business energy performance contracting market aggregation program that identifies interested commercial and industrial properties and aggregates them into markets of sufficient scale to attract energy service companies (ESCOs) or energy service agreement (ESA) providers	P	Sustainability Division	
E	Work with local commercial banks to reduce mortgage lender limitations on external financing that limit use of ESCO and ESA contracts	P	Sustainability Division	

Progress Indicators	Year
750 single-family houses install a comprehensive retrofit package; 450 single-family houses install a basic retrofit package; 300 multi-family units receive a comprehensive retrofit package; 175 multi-family units receive a basic retrofit package; 875,000 square feet of nonresidential space installs a comprehensive retrofit package	2020
1,500 single-family houses install a comprehensive retrofit package; 1,500 single-family houses install a basic retrofit package; 600 multi-family units receive a comprehensive retrofit package; 600 multi-family units receive a basic retrofit package; 1,900,000 square feet of nonresidential space installs a comprehensive retrofit package	2035

MEASURE C-E-3 HOME & COMMERCIAL BUILDING RETROFIT OUTREACH

Develop aggressive outreach program to drive voluntary participation in energy- and water-efficiency retrofits.

Supporting Measure – Reductions included with Measure E-2

In addition to its outreach activities related to building retrofit financing described in Measure C-E-2, the City will also partner with the local realtor community on a targeted building owner outreach campaign. During the measure development phase, several building retrofit regulations were considered for inclusion in the CAP, most of which would have been triggered at a building's point-of-sale. These considerations included residential and commercial energy conservation ordinances (RECO/CECO), commercial lighting retrofit requirements, building energy rating requirements, and a building retro-commissioning requirement. However, these regulations were ultimately removed from further development and consideration due to the City's ability to achieve its near-term (i.e., 2020) target without pursuing additional regulations and the likely minimal reduction potential of these regulations due to the City's low building turnover rates. Based on input from the local Realtor community, Cupertino historically has low turnover of residential properties (estimated to be around 3% of total residential units each year), which would make development of mandatory point-of-sale retrofit programs infeasible as a primary emissions reduction strategy because they would apply to so few buildings each year. Instead, the City will focus on encouraging voluntary building retrofits through collaboration with the City's Housing Division and local Realtors who will have first contact with the City's new residents to achieve its 2020 goals.

First, the City will prioritize access to energy efficiency and water conservation programs to those economically disadvantaged residents who can benefit the most. In addition to the City's 260 current Below Market Rate (BMR) units, the City's Regional Housing Needs Allocation-consistent Housing Element projects the addition of 794 new affordable homes to support extremely low, low, and moderate income community members by 2022. As such, the City's Sustainability Division is discussing opportunities to partner with the Housing Division to develop a program that would connect this population to available financial tools (e.g., California Alternative Rates for Energy (CARE), Family Electric Rate Assistance (FERA), Energy Savings Assistance Programs) and services that can help reduce household energy use, lower monthly utility bills, and also improve occupant comfort and indoor air quality. To achieve 2020 CAP objectives, staff will prioritize this partnership to improve the energy efficiency of approximately 1,000 affordable homes, including attic insulation, weather stripping, minor housing repairs, and related energy conservation measures.

Next, the City will work with the local Realtor community to develop and implement an energy efficiency outreach campaign that targets new residents and businesses. Through this partnership, the City can provide new property owners with information on the benefits of cost-effective building retrofits, direct them to the financial and contractor resources previously described (i.e. Energy Upgrade California, Green@Home, HAN), and share case studies of successful retrofits to similar buildings in the community. The City can also continue to partner with the Cupertino Chamber of Commerce to welcome new businesses with similar types of information (i.e., GreenBiz) or launch a geographic-focused campaign targeting businesses located within the "Heart of the City", the forthcoming Main Street project, or a future Business Improvement District. This approach will be deployed as part of the City's current Green Business Challenge, run in partnership with ICLEI, and lessons learned should be applied to future commercial facility energy and water audit, benchmarking, and financing efforts.

The City will also continue to partner with its Community Development Department, Planning and Building Divisions, to review opportunities to connect with existing home and building owners pursuing retrofit projects. Using the City's updated Community Development software, staff will also track projects that trigger the Green Building Ordinance, CalGreen, or Water Efficient Landscaping Ordinance to gather energy and water conservation data metrics that will inform future CAP-updates. Based upon this information, staff will revisit the effectiveness of its voluntary and incentive-based approach to achieving greenhouse gas emissions reduction goals and reconsider the efficacy of mandatory requirements (i.e. conservation ordinances, lighting retrofit requirements, building benchmarking or rating requirements, etc.) as part of future scheduled CAP reports to Council and the community.

This CAP assumes that a voluntary market- and incentive-based approach to energy conservation will be successful at helping the community to achieve its emissions reduction targets. As part of regular inventory updates and CAP revisions, if the City finds that it is falling short of its targets, building-oriented regulations could be considered to increase energy efficiency improvements within the City's existing building stock. As previously mentioned, these types of regulations were considered during the CAP development process, but were omitted in favor of voluntary market-driven approaches instead based on comments collected during the CAP's outreach activities. See Appendix A for a summary of public comments received during CAP preparation.

Measure C-E-3 Implementation Table

	Action	Status	Responsibility	Timeline
A	Partner with Housing Division to design a low- to moderate-income targeted energy and water conservation pilot program	P	Sustainability Division	

B	Partner with local realtor community to develop and implement a building owner outreach campaign that targets new building owners to provide information on available building energy efficiency audit and retrofit programs, as well as locally-available financing options (including PACE financing)	P	Sustainability Division	
C	Identify ways to streamline permitting process for large non-residential retrofit programs; consider developing checklists, guides and/or a City liaison role in Building Department to assist projects through the permitting process	P	Sustainability Division	
D	During CAP implementation monitoring and updates, determine if voluntary, incentive-based approach to existing building retrofits is achieving desired results regarding energy conservation; if implementation metrics in Measure C-E-2 are not being met, first identify additional outreach strategies or incentives that could increase voluntary participation based on focus group discussions with local contractors, Realtors, business owners, and community leaders; if additional outreach/incentives still fail to produce necessary results, engage community members again regarding potential building regulations that could increase energy savings; benefits from adding new building regulations should first be analyzed with regards to current state building regulations, opportunities to increase reductions from other CAP measures, and cost/benefit analysis or potential new regulations	P	Sustainability Division	

MEASURE C-E-4 ENERGY ASSURANCE & RESILIENCY PLAN

Develop a long-term community-wide energy conservation plan that considers future opportunities to influence building energy efficiency through additional or enhanced building regulations.

Supporting Measure – Not Quantified

To ensure the security of future energy supplies in light of estimated climate change impacts, the City will develop a long-term energy assurance & resiliency plan to guide widespread energy conservation within the community, following the CaLEAP model (see caleap.org). As part of this strategic plan, the City will evaluate the success of locally implemented programs designed to conserve energy, and determine if additional progress can be made. Based on the most current statewide energy conservation legislation at the time of strategic plan preparation, the City will research successful case studies of additional energy conservation programs or regulations from other cities and states. The City will give preference for further consideration to those programs that have shown to be successful at reducing energy use, and are voluntary, incentive-based programs, before considering development of additional energy-related City regulations. The City will work closely with the local Realtor community during strategic plan

preparation, particularly as related to the research of energy-conserving regulations used in other jurisdictions.

Measure C-E-4 Implementation Table

	Action	Status	Responsibility	Timeline
A	Develop overarching energy plan for community that considers energy sources and their reliability with regards to estimated climate change impacts	P	Sustainability Division	
B	Based on most current Statewide legislation (e.g., CalGreen code) and successful case studies in other cities, research additional opportunities for feasible building retrofit regulations that generate long-term energy savings in existing building stock	P	Sustainability Division	
C	Consider emissions reduction potential from additional regulations in context of other available emissions reduction strategies and give preference to voluntary, incentive-based programs that allow City to achieve its emissions reduction targets	P	Sustainability Division	
D	Work closely with local realtor community to identify barriers to implementation and develop strategies to reduce potential burden on building sellers and real estate transaction process	P	Sustainability Division	

MEASURE C-E-5 COMMUNITY-WIDE SOLAR PHOTOVOLTAIC DEVELOPMENT

Encourage voluntary community-wide solar photovoltaic development through regulatory barrier reduction and public outreach campaigns.

2020 GHG Reduction Potential: 3,600 MT CO_2e/yr
2035 GHG Reduction Potential: 4,400 MT CO_2e/yr

Distributed renewable energy systems generate clean, renewable electricity on site, where the energy will be used. Increasing the use of distributed renewable energy systems (e.g., rooftop solar, ground-source heat pumps, solar water heaters) prevents the combustion of fossil fuels to generate electricity, thereby reducing GHG emissions.

Solar photovoltaic (PV) systems generate electrical power by converting solar radiation into direct current electricity. Residential, commercial, and industrial rooftops all provide opportunities for PV installations. Currently, the City's website provides information on the City's Solar Roadmap, developed through the U.S. Department of Energy SunShot Program, and the

California Solar Initiative. Cupertino also offers a heavily subsidized permit fee for residents pursing solar installations on new or existing homes, and the application process can be completed on-line. Other programs available to Cupertino residents and businesses that encourage PV installation include Green@Home Cupertino, GreenBiz Cupertino, and Energy Upgrade California. The PACE financing districts described in Measure C-E-2 also includes renewable energy systems within their finance options.

According to utility grid interconnection data provided by PG&E, Cupertino installed nearly 1.7 megawatts (MW) of residential PV capacity since the 2010 baseline year. An additional 3.8 Mw of PV capacity was installed on commercial properties during the same time period.[xiii] Additionally, the Apple Campus 2 project is expected to incorporate approximately 650,000 square feet of solar panels capable of generating 15,000,000 kilowatt hours per year (kWh/yr).[xiv]

The City has prepared several solar reports to study the viability of municipal buildings and facilities to support solar PV installations. These site-scale solar PV systems could help to offset building or facility-specific energy loads. Combined with energy-efficiency improvements (e.g., lighting retrofits, HVAC maintenance), PV installations could offset the entire electricity load of certain buildings or facilities. Through its most recent solar feasibility study, the City has explored the feasibility of five installation locations: City Hall, Community Hall, the library, the corporation yard, and the parking lots around the Civic Center complex. The study considered the existing electricity demand of these buildings compared to the potential PV electricity generation that could be supported by each site. If all five sites are pursued, the City could install approximately 500 kilowatts (kW) of PV capacity with a generation potential of nearly 820,000 kWh/yr.

While numerous barriers can prevent widespread adoption of solar PV technology, including local regulations, up-front costs, and misinformation or lack of information; new opportunities for financing and collaboration have emerged that reduce these barriers and encourage more Californians to utilize solar energy.

Barriers to PV installation include homeowner's association covenants or design review that prohibit or restrict solar panel installation, or zoning ordinances that restrict the types of districts in which solar facilities are allowed. Other barriers are more subtle, such as height restrictions, lot coverage limitations, or setback requirements that do not allow for the placement of solar panels on existing rooftops or building sites. Screening requirements for rooftop equipment and landscaping requirements that limit access to solar resources can also act as barriers. Each of these barriers is being evaluated as part of the City's participation in the Department of Energy American Solar Transformation Initiative Solar Roadmap process. This program helps local governments, electric utilities and service providers implement global best practices at the local level to make solar energy easier, faster and more cost effective (see: solarroadmap.com).

Solar Service Providers

As with building retrofit programs, financing is also critical to the success of the solar PV program. Financing models, such as power purchase agreements (PPAs), can be used to offset

the initial capital cost. With Solar PPAs, solar service providers install PV systems which they own and maintain, then sell the electricity generated back to the property owner at an established rate. Solar PV rebates may also be available through the investor owned utility-funded California Solar Initiative and its related programs, as well. In partnership with solar service providers, the City can conduct outreach to advertise the availability of such financing options. As part of this promotion work, the City should identify any remaining regulatory barriers to widespread solar PV installations in the community. To date, the City has streamlined its solar permitting process and reduced permitting fees associated with rooftop solar PV installation, so additional regulatory barriers may no longer exist.

Community Shared Solar Promotion

Community shared solar programs allow the purchase of locally-produced solar energy, even if a participants' building is not suitable for installation of its own solar PV systems. Community solar typically includes a solar-electric system that provides power to a group of community members that may collectively own the system. A 2008 study by the National Renewable Energy Laboratory found that only approximately one-quarter of residential rooftop area is suitable for solar PV installation.[xv] Collective PV system ownership allows participation in renewable energy development for those who cannot install PV systems on their own buildings for various reasons (e.g., tenant does not own building, structural issues, poor solar access), but still want to receive the benefits associated with clean electricity. As part of its proposed Green Option Program, PG&E anticipates offering a Community Solar Program that will allow customers to voluntarily purchase electricity from small- and mid-sized solar programs developed nearby in exchange for higher per kilowatt hour electricity costs associated with development of the systems (see: http://www.pge.com/myhome/environment/pge/greenoption/faq).

The City will provide outreach and information regarding various community solar options. The City can also identify interested community partners to develop a community solar pilot program, and assist those partners through the City's permitting process to establish a local model for additional future projects. If permitting barriers are identified during the pilot project, the City would work to reduce or remove those barriers if possible.

Solar Empowerment Zones

The City could prepare an initial solar analysis to identify potential areas of the community that could support large-scale solar PV installations, referred to here as solar empowerment zones. The analysis would consider factors such as existing building orientation, solar access, roof types, and property ownership. As with the other solar PV programs described above, the City might identify regulatory barriers preventing such development, and could work to reduce or remove those obstacles. The Building Department could also perform an initial analysis of building roof systems within the identified areas to generalize building types and estimate their feasibility to accommodate solar PV installations without substantial retrofits. Additional building-specific analysis would be required prior to actual PV system installation, and this initial assessment could remove some of the unknown variables preventing further consideration on

the part of the property owner. Outreach to community members and property owners within any identified solar empowerment zones will be necessary to present the results of the solar analysis and share information on available solar financing options.

Measure C-E-5 Implementation Table

	Action	Status	Responsibility	Timeline
Solar Service Provider PPA Promotion				
A	Conduct outreach program to educate residents and businesses about potential benefits of solar service providers' power purchase agreements (PPA)	P	Sustainability Division	
B	Host workshop with area solar service providers to identify opportunities to streamline installation of solar PV systems	P	Sustainability Division	
C	Pending result of PPA workshop, remove identified barriers to wide-scale solar installation throughout city	P	Sustainability Division	
D	Provide general information on City website describing various solar PV financing / installation options (e.g., PPA, community shared solar, outright purchase)	P	Sustainability Division	
Community Shared Solar Promotion				
E	Conduct outreach program to educate residents and businesses about opportunities for community shared solar PV systems; invite neighborhood groups/organizations to help identify potential interest	P	Sustainability Division	
F	Work with PG&E to share information about PG&E's Community Solar program	P	Sustainability Division	
G	Work closely with identified candidate to develop successful pilot program (e.g., assist group in navigating permitting requirements) that can be replicated by others; share success stories on City's Sustainability website; work to remove regulatory barriers identified during pilot project	P	Sustainability Division	
Solar Empowerment Zones				
H	Conduct analysis to identify areas within City most suited for large-scale photovoltaic system development (e.g., excellent solar access; large, flat rooftop or parking lot expanses; minimal number of property owners); identify potential barriers (e.g., regulatory, ownership, structural / technical) to photovoltaic system development in these areas	P	Sustainability Division	
I	Identify these areas as "priority solar development areas" and work to reduce existing barriers to system development	P	Planning Department	

J	Conduct focused outreach to land owners and tenants regarding photovoltaic system development opportunities; partner with PACE program, PG&E, or other renewable energy funders as appropriate on outreach campaign	P	Sustainability Division	
Building Regulations				
K	Consider including solar pre-wiring / pre-plumbing requirements in future revisions to City's Green Building Ordinance	P	Building Division	
L	Instruct building and plan check officials to provide information to customers on the benefits of pre-wiring / pre-plumbing for solar applications at the time of new construction or substantial retrofits, including lower up-front costs as compared to retrofitting buildings in the future	P	Building Division	

Progress Indicators	Year
1.5 MW of new solar PV capacity installed community-wide (residential and nonresidential combined – excluding Apple Campus 2 project listed below); Apple Campus 2 solar PV systems installed to generate 15 million kWh/yr; 5.5 MW of existing solar PV installed from 2010-2014	2020
5.0 MW of new solar PV capacity installed community-wide (residential and nonresidential combined – excluding Apple Campus 2 project listed below); Apple Campus 2 solar PV systems installed to generate 15 million kWh/yr; 5.5 MW of existing solar PV installed from 2010-2014	2035

MEASURE C-E-6 COMMUNITY-WIDE SOLAR HOT WATER DEVELOPMENT

Encourage communitywide solar hot water development through regulatory barrier reduction and public outreach campaigns.

2020 GHG Reduction Potential: 0 MT CO_2e/yr
2035 GHG Reduction Potential: 925 MT CO_2e/yr

By using the sun's energy to heat or preheat water, solar hot water heaters can complement natural gas or electric systems, reducing usage, utility costs, and carbon emissions. Solar water heating systems include solar collectors, typically placed on roofs, which are attached to an insulated water storage tank. According to the California Solar Initiative (CSI), solar hot water systems can lower energy bills by meeting 50 to 80 percent of hot water needs. The California Solar Water Heating and Efficiency Act of 2007 (AB 1470) created a 10-year program aimed at installing solar water heaters in homes and businesses and was designed to lower system purchase costs, which typically range from $3,000 to $6,000. Similar to solar PV installations,

rebates and utilization of the PACE financing program to amortize remaining costs can help reduce upfront installation costs.

Due to system costs and relatively low prices for natural gas, participation in the CSI-Thermal Program has been less robust than seen in the statewide solar PV program. In the future, installations of solar thermal systems may become more financially viable as technology costs decrease or energy prices increase. The City will partner with PG&E to promote voluntary installation of solar thermal systems through an outreach campaign that targets high-volume hot water users (e.g., Laundromats, multi-family residential buildings). The City could host roundtable discussions that bring together potential customers to discuss barriers to implementation, and identify solutions to overcome those obstacles.

In addition to community-wide application, the City has preliminarily considered opportunity sites for solar thermal systems using a high-level study, which identified several municipal facilities that may be good candidates. However, it was determined that more cost-effective energy improvements should be pursued first. Future analysis of this opportunity may conclude that solar thermal projects are viable for installation at municipal facilities with high hot water heating loads, such as the Sports Center, Blackberry Farm Pool, or new buildings envisioned in the Civic Center Master Plan.

Measure C-E-6 Implementation Table

	Action	Status	Responsibility	Timeline
A	Collaborate with PG&E and California Solar Initiative - Thermal Program to develop local outreach program to maximize installation of solar hot water systems and leverage existing funding opportunities	P	Sustainability Division	
B	Work with PG&E to identify businesses and multi-family residential building owners with high hot water use, and provide targeted outreach with promotional materials for participation in CSI-Thermal Program	P	Sustainability Division	
C	Host roundtable discussion with large hot water users to identify potential City barriers to installation of solar thermal systems; work with City departments to remove or reduce identified barriers, where possible	P	Sustainability Division	

Progress Indicators	Year
750 single-family houses install a solar thermal system capable of providing 70% of the building's hot water heating energy; 300 multi-family buildings install a solar thermal system capable of providing 65% of the building's hot water heating energy; 630,000 square feet of nonresidential space installs a solar thermal system capable of providing 30% of the building's hot water heating energy	2035

MEASURE C-E-7 COMMUNITY CHOICE ENERGY OPTION

Partner with other Santa Clara County jurisdictions to evaluate the development of a regional CCE option, including identification of the geographic scope, potential costs to participating jurisdictions and residents, and potential liabilities.

2020 GHG Reduction Potential: 46,300 MT CO_2e/yr *(Note: Not included in progress toward 2020 target calculations)*
2035 GHG Reduction Potential: 56,875 MT CO_2e/yr *(Note: See Progress towards 2035 Target discussion at end of chapter)*

Assembly Bill 117, which was signed into law in 2002, enables California cities and counties, either individually or collectively, to supply electricity to customers within their borders through the establishment of a community choice aggregation district (refer to here as community choice energy (CCE)). Unlike a municipal utility, a CCE does not own the transmission and delivery systems, but is responsible for providing electricity to its constituent residents and businesses. The CCE may own electric generating facilities, but more often, it purchases electricity from private electricity generators. A key benefit of a CCE is that the participating jurisdictions can determine the amount of renewable energy contained within the generation portfolio. For example, a Santa Clara County CCE could decide to provide 75% of its electricity from renewable sources, which would exceed state requirements directing California's utilities to provide 33% of their electricity from renewable sources by 2020.

Developing a CCE would require a detailed analysis of energy demand, efficiency opportunities, and renewable generation opportunities in the county. Using existing models from other counties (e.g., Marin County) is likely to reduce the initial program design costs. The program would be most effective if the City partnered with other Santa Clara County cities and the county government to jointly pursue a CCE program. While developing this CAP, Cupertino joined the cities of Sunnyvale and Mountain View and the County of Santa Clara to collaboratively pursue an initial CCE feasibility study.

As shown above, a CCE option could provide substantial reductions opportunity by 2020 if implemented in Cupertino. However, for purposes of this CAP it was assumed that a local CCE program in which Cupertino's residents and businesses could voluntarily participate would not be implemented prior to the 2020 target year due to the lead time required for existing CCEs to perform necessary studies, form governing bodies, and complete other administrative tasks. At the statewide level, increasing access to clean electricity has been identified as a primary mechanism for achieving the state's long-term emissions reduction goals. Therefore, this CAP included the CCE measure as an item for early action to lay the foundation for future emissions

reduction opportunities. See the discussion on *Progress towards 2035 Target* at the end of this chapter for an estimate of its long-term emissions reduction potential.

Measure C-E-7 Implementation Table

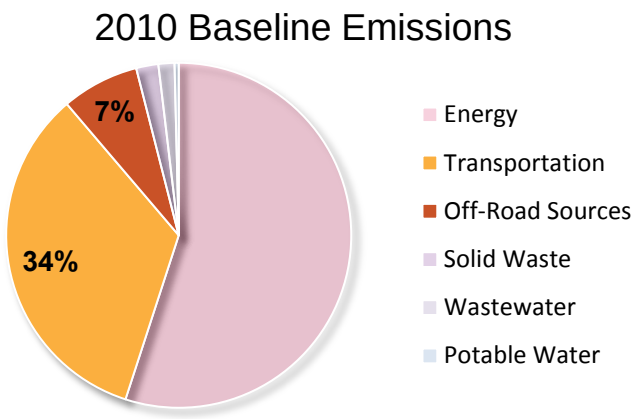
	Action	Status	Responsibility	Timeline
A	Work with other Santa Clara County partners to conduct feasibility study of developing multi-jurisdiction CCA program	P	Sustainability Division	
B	If study determines CCA to be feasible and advantageous to Cupertino residents and businesses, work with Santa Clara County partners to prepare necessary additional study reports, informational materials, and any other supporting research and/or documents to help pursue development of CCA program	P	Sustainability Division	

TRANSPORTATION AND LAND USE STRATEGY

Goal 2 – Encourage Alternative Transportation

Support transit, carpooling, walking, and bicycling as viable transportation modes to decrease the number of single-occupancy vehicle trips within the community.

Transportation-related emissions make up approximately 40% of the community-wide 2010 emissions inventory (see pie chart). Vehicle fuel efficiency, fuel carbon content, and vehicle operations, all influence the amount of transportation emissions generated in a community. However, these emissions are largely generated by the number of vehicle miles traveled (VMT) by residents and employees. Long vehicle trips and high numbers of trips create higher emissions.



While state-mandated technological changes in fuel efficiency and reductions in fuel carbon content are estimated to greatly reduce transportation emissions, additional reductions will require local and regional action. Eliminating or shortening vehicle trips is made possible through increasing alternative transportation options, such as transit, bicycling, or walking, and through the distribution of diverse land uses relative to transportation options.

The Transportation and Land Use Strategy includes efforts to improve pedestrian mobility to encourage walking between nearby destinations and accommodate non-automotive circulation. Enhancing the bicycling network and improving access to transit stops also support multi-modal transportation options. Where people live, work, shop, and play also determines how far they have to travel daily, whether they choose to walk, bike, use public transit, or drive. Measures that support mixed land uses and opportunities for higher density development along existing transit routes are essential to supporting alternative transportation options. Facilitating a transition to alternative fueled vehicles and managing daily traffic demand can also reduce emissions. This includes incorporating alternative fuel vehicles in the municipal fleet, providing charging and refueling stations for alternative fueled vehicles community-wide, and assisting local businesses with single occupancy vehicle travel reduction efforts.

As described in Chapter 2, the CAP's emissions forecasts were based on VMT growth estimates developed as part of the City's General Plan Amendment project. These VMT estimates considered the City's General Plan Amendment land use and circulation policies and the land use distributions associated with the highest VMT land use alternative; therefore, many of the measures presented in this strategy area do not have specific emissions reduction estimates. Instead, their VMT-reduction potential is assumed to be reflected within the General Plan Amendment's VMT data, which was used to prepare the CAP's emissions forecasts. Several measures go above and beyond what was envisioned within the General Plan Amendment policies and have been quantified separately here.

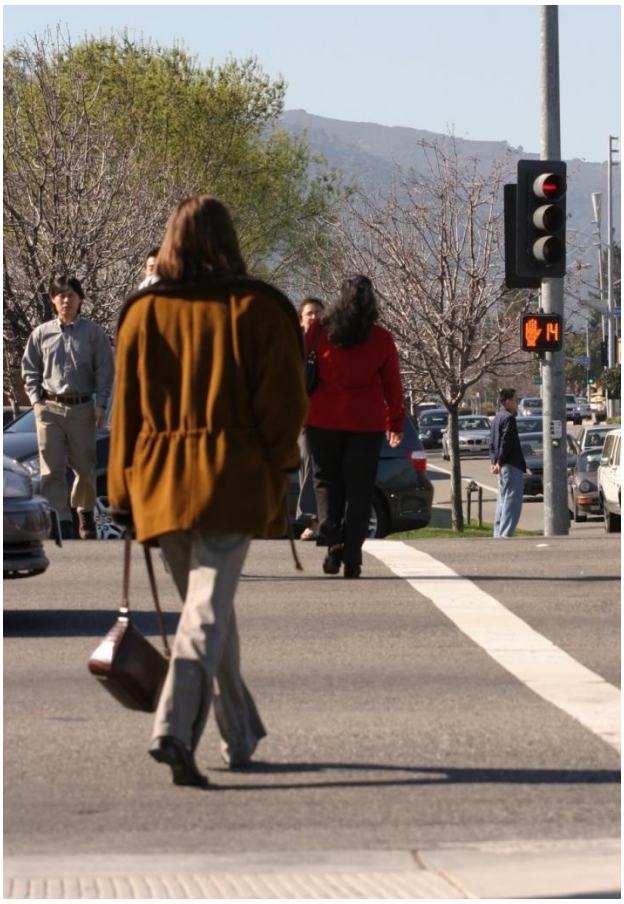
Emissions reductions from the Transportation and Land Use Strategy total 3,350 MT CO_2e/yr in 2020, and 12,600 MT CO_2e/yr in 2035. This represents approximately 21% of total local CAP measure reductions in 2020.

MEASURE C-T-1 BICYCLE & PEDESTRIAN ENVIRONMENT ENHANCEMENTS

Continue to encourage multi-modal transportation, including walking and biking, through safety and comfort enhancements in the bicycle and pedestrian environment.

Supporting Measure – Not Quantified

Bicycle and pedestrian enhancements support safe and comfortable biking and walking environments, potentially increasing local bicycle trips and foot traffic to retail establishments and businesses, while decreasing automobile trips and emissions. Bicycle improvements can include the addition of bike lanes and markings (e.g., green lanes), pursuing "road diets" (i.e., lane reduction or re-channelization), creating bike storage facilities and parking spaces, and developing way-finding signage to points of interest, among other strategies. Pedestrian enhancements can include the provision of seating, shading, way-finding signage, safe crosswalks, and traffic calming measures such as roundabouts and curb extensions. Providing connectivity and convenient, enjoyable bikeways and pedestrian areas is also essential for improving residents' quality of life. A Bicycle or Pedestrian Master Plan provides a framework for local governments to address cyclist and pedestrian safety, identifying important improvements that would increase safety and comfort within a community.

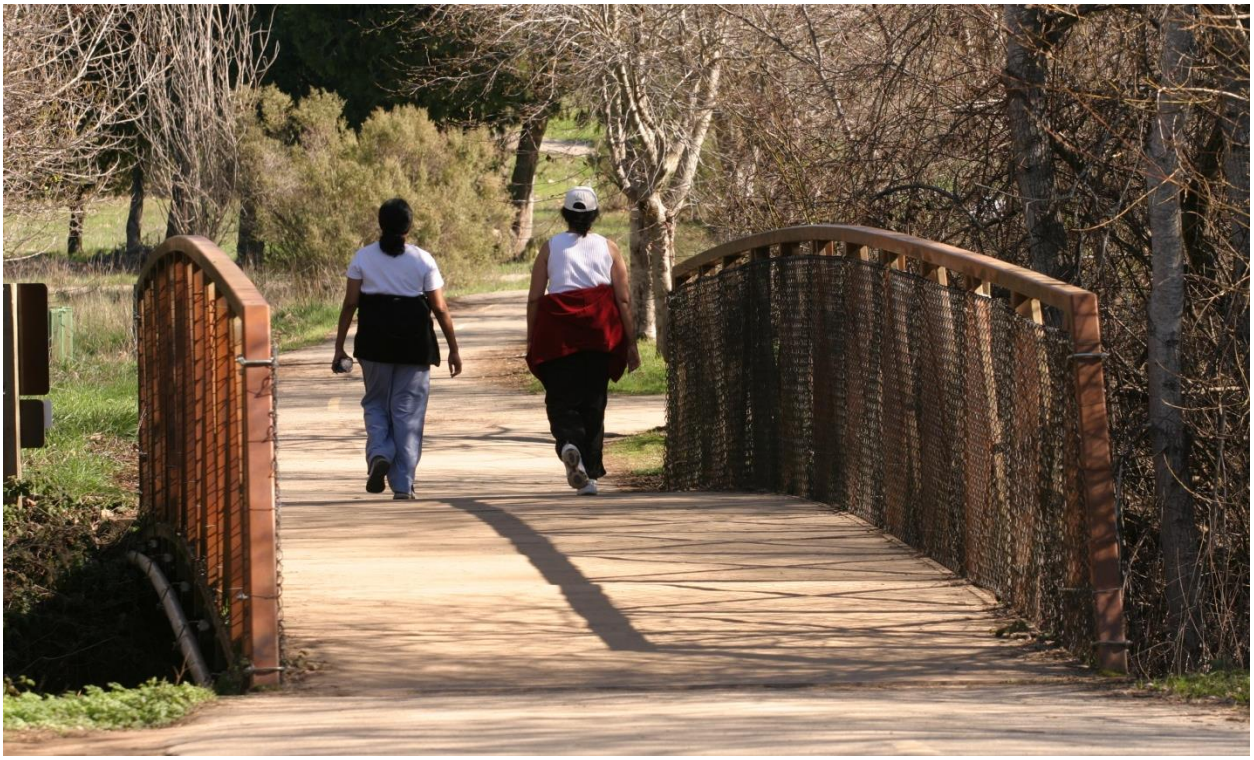


In 2002, Cupertino adopted its Pedestrian Transportation Plan which recommends various capital improvement projects that

would improve pedestrian connectivity and safety throughout the city. These fall into the categories of Pedestrian Circulation/Safety Projects, Improvement to Help Pedestrians Cross Streets, Missing Sidewalks, Short-Cuts/Pathways/Bridges, and Traffic Calming/Bike Lanes. These projects have been prioritized into high, medium and low categories, which help the City focus their efforts on the projects of most importance. The City has also included design aesthetics such as pavers and landscape strips in some pedestrian areas. These improvements increase safety and encourage walking to nearby destinations, thereby reducing vehicle trips.

The City also adopted a Bicycle Transportation Plan in 2011, which describes long-term goals with respect to the creation of a safe, convenient, and comprehensive network of bicycle facilities throughout the City. The Plan is divided into five main chapters to address Environment, Engineering, Encouragement, Education, and Enforcement. The heart of the Plan (Chapter 3) proposes 17 unique bikeways be placed throughout the community to expand Cupertino's already vast bikeways network (see; www.cupertino.org/bikemap). It also shares funding strategies to implement these infrastructure improvements and ensure their use through residential and school-focused education and behavior change-focused campaigns, growing existing Walk-One-Week and Boltage programs (learn more at www.cupertino.org/bicycling).

The City should update its Bicycle and Pedestrian Transportation Plans, and plans to do so in partnership with its Bicycle Pedestrian Commission in the short-term, to identify which priority projects have already been completed and which remain to be implemented, and identify any new projects that should be included for prioritization. The City should also continue to identify internal and external funding sources to support plan implementation.



Measure C-T-1 Implementation Table

	Action	Status	Responsibility	Timeline
A	Update City's Bicycle and Pedestrian Transportation Plans to reflect current bicycle and pedestrian safety and access needs; prioritize new projects identified	P	Transportation Division	
B	Partner with local bicycle advocacy groups / clubs and neighborhood groups to identify dangerous bicycle or pedestrian conditions, and develop strategies to address problem areas	P	Transportation Division	
C	Identify grant-funds to pursue Plan-recommended education, design, and/or construction projects	P	Sustainability Division	
D	Partner with schools, neighborhood groups, and businesses to encourage alternative transportation commute options. Expand alternative commute measures within existing sustainability programs, including Green@Home, GreenBiz, and green@school	P	Sustainability Division	
E	Continue to evaluate City's bike & walkability through use of online and community surveying tools including WalkScore, Bicycle Friendly Community criteria, Safe Routes to School Walkability Checklist, etc.	P	Sustainability & Transportation Divisions	

MEASURE C-T-2 BIKESHARE PROGRAM

Explore feasibility of developing local bikeshare program.

Supporting Measure – Not Quantified

Bicycling can be a healthy and enjoyable alternative to driving that reduces vehicle miles traveled, resulting in lower community-wide emissions and local air quality improvement. Bikeshare programs allow participants to rent bicycles for short periods of time from bicycle kiosks or stations located at nodes of activity within a community, such as schools, retail districts, and civic areas. Bike sharing increases mobility by providing a flexible transportation option, and has the potential to expand long-term practices of urban bicycling as new users become accustomed to riding safely in and around higher-traffic areas.

To encourage the use of bicycles as an alternative mode of transportation, it is essential for a city to provide a network of well-connected bicycle routes, lanes, and paths that link key destinations (e.g., employments centers, transit hubs, commercial districts) with residential areas, and to make bicycles available for use. The Bay Area Bike Share Program launched in August 2013 to make bikes available to riders in the Bay Area. The program now represents a bike sharing system with over 700 bikes and 70 stations across the region, with locations in San Francisco, Redwood City, Mountain View, Palo Alto, and San Jose. In its first three months, riders made more than 80,000 trips, traveling approximately 178,000 miles.

Taking the lead and as a means to encourage other large employers, the City of Cupertino established its own municipal bike share program to provide bicycles for use by City employees. In order to extend the benefits offered by its municipal program to the broader community, the City will evaluate the potential demand for a city-wide bikeshare program, and explore future system expansion opportunities with the Bay Area Bike Share program.

Measure C-T-2 Implementation Table

	Action	Status	Responsibility	Timeline
A	Continue to operate municipal bike fleet for City employee use and encouragement of bike fleets at large employers	E	Sustainability Division	
B	Evaluate potential demand for city-wide bikeshare program; discuss expansion opportunities with Bay Area Bike Share	P	Sustainability Division	
C	If participation in Bay Area Bike Share is deemed infeasible, discuss potential for locally-operated system with that organization to identify likely barriers to successful bike share network in Cupertino (e.g., infrastructure limitations, locational disadvantages, land use concerns, low potential user/destination densities)	P	Sustainability Division	

MEASURE C-T-3 TRANSPORTATION DEMAND MANAGEMENT

Provide informational resources to local businesses subject to SB 1339 transportation demand management program requirements and encourage additional voluntary participation in the program.

2020 GHG Reduction Potential: 925 MT CO_2e/yr
2035 GHG Reduction Potential: 2,375 MT CO_2e/yr

Transportation demand management (TDM) programs apply strategies and policies to reduce travel demand (specifically single-occupancy vehicles) and traffic congestion, particularly at peak commute hours. Instead of increasing capacity by widening or adding roadway, TDMs promote cost-effective strategies, such as carpooling, flexible schedules, and the use of public transit as a means to reduce VMT and transportation-related emissions.

Within the region, several agencies have programs and measures that encourage alternatives to driving alone. The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay area. MTC provides alternative transportation resources on its 511.org website, including a trip planner, maps (e.g., high-occupancy vehicle, park-and-ride lots, bike paths), carpool and car-sharing services, and mobile applications that provide real-time transportation information. The Santa Clara Valley Transportation Authority (VTA) also provides incentives to use public transportation, including a park-and-ride lot that serves several bus lines, and a subsidized employer and multi-family resident transit pass called the Eco Pass. These programs offer an opportunity for the City to develop partnerships that leverage resources, expand incentives, and further support efforts to reduce regional traffic congestion, lower emissions, and improve public health.

Transportation Demand Management Program

Employee commutes represent a substantial portion of total vehicle trips made within the Bay Area. To address that source of vehicle emissions and traffic congestion, SB 1339 authorizes the Bay Area Air Quality Management District (BAAQMD) and Metropolitan Transportation Commission (MTC) to adopt and implement a regional ordinance known as the Bay Area Commuter Benefits Program. The program requires employers with 50 or more employees within MTC's jurisdiction to select one of four commuter benefit options including:

- the option for employees to pay for their transit or vanpool expenses with pre-tax dollars, as allowed by current federal law;

- a transit or vanpool subsidy to reduce, or cover, employees' monthly transit or vanpool costs;
- a low-cost or free shuttle, vanpool, or bus service operated by or for the employer; or
- an alternative method that would be equally as effective as the other options in reducing single-occupant vehicle trips (and/or vehicle emissions).

The City of Cupertino is within MTC's boundaries and therefore, subject to the requirements of SB 1339. The City will support BAAQMD, VTA, and MTC in implementation of the program, and will work locally to encourage voluntary participation in similar TDM actions by smaller businesses that are not subject to the regulation. The City will work with the Cupertino Chamber of Commerce to identify case studies of small, local businesses that offer TDM programs and share these examples with Cupertino businesses.

Parking Cash Out

Another option to support multi-modal commute trips is to provide parking cash out options to employees. In these programs, employees can elect to permanently give up their parking space (often leased by the company) in exchange for a small cash bonus, often a fraction of the parking space leasing cost to the employer. The cash out payments may be spent however the employee chooses, included to purchase transit fares / passes or pay carpool participation fees, or simply saved if the participant has no transportation-related expenses. The City can work with the Cupertino Chamber of Commerce to perform an informal survey of local businesses that lease parking spaces, and provide them with informational materials on parking cash out programs and multi-modal transportation options that would allow their employees to confidently participate.

Carpool / Rideshare Program

As previously mentioned, 511.org provides rideshare opportunities within the Bay Area, including a ride match service to connect riders with existing drivers or facilitate the development of new carpool groups. The City will partner with 511.org to provide informational resources on the benefits and process of carpooling to local businesses, with special focus given to small businesses that are not subject to the requirements of SB 1339 described above.

Guaranteed Ride Home

Another incentive to support voluntary use of multi-modal commute options is the provision of a guaranteed ride home program. A guaranteed ride home program applies to individuals who regularly commute by public transit, carpool/vanpool, walking, or bicycling when personal emergencies arise (e.g., leave work early due to illness, pick up a sick child, work overtime). These programs typically provide free shuttle and taxi services and / or reimbursements for such services. VTA already provides an Emergency Ride Home service to individuals who use its Eco Pass program. To provide a similar service to a wider number of multi-model commuters (e.g., bicyclists, carpoolers, walkers), the City can work with other local governments and

agencies to develop a county-wide Guaranteed Ride Home Program. A county-wide program would further facilitate confidence in multi-modal transportation as a reliable and convenient daily option.

Measure C-T-3 Implementation Table

	Action	Status	Responsibility	Timeline
Transportation Demand Management Program				
A	Support regional efforts to implement SB 1339 commute benefit requirements for employers with more than 50 employees	E	Sustainability Division	
B	Work with VTA and/or 511.org on outreach campaigns targeting employers with fewer than 50 employees to encourage voluntary participation in TDM program activities, including pre-tax deductions for alternative travel mode expenses, transit pass subsidies, and new vanpool development; share best-practices in TDM programs with local businesses to identify options that have been successful at small scale	P	Sustainability Division	
Parking Cash Out				
C	Work with Cupertino Chamber of Commerce to conduct informal survey of businesses that lease employee parking spaces	P	Sustainability & Economic Divisions	
D	Develop program to work with businesses that lease parking spaces to describe benefits of parking cash-out programs for businesses and employees	P	Sustainability & Economic Divisions	
Carpool / Rideshare Program				
E	Partner with 511.org and employers to leverage new ride-matching technologies and promote rideshare among employees	P	Sustainability Division	
Guaranteed Ride Home				
F	Work with other Santa Clara County partners to develop Guaranteed Ride Home program for employees who work in Santa Clara County and commute to work via alternative travel options (e.g., public transit, carpool/vanpool, biking, walking)	P	Sustainability Division	

Progress Indicators	Year
10% of total employees in 2020 participate in TDM program that offers rideshare promotion, telecommuting/ alternative schedules, and subsidized transit fares	2020
20% of total employees in 2020 participate in TDM program that offers rideshare promotion, telecommuting/ alternative schedules, and subsidized transit fares	2035

MEASURE C-T-4 TRANSIT ROUTE EXPANSION

Explore options to develop local community shuttle or community-wide car sharing to fill gaps in existing transit network.

Supporting Measure – Not Quantified

Where people live determines how far they travel to work, to shopping, and to other destinations, and influences whether they choose to walk, bike, use public transit, or drive. If residents live near bus stops, neighborhood-serving commercial centers, or their work places, they are more likely to use multi-modal, lower-emission travel modes than drive single occupancy vehicles. However, when users have difficulty getting from their starting location to a transit network or from a transit network to their final destination (commonly referred to as "the last mile" in transportation planning), they may be more likely to forgo transit use altogether. Solutions that enhance connectivity and convenience can therefore improve transit ridership.

Caltrain provides commuter service along the San Francisco peninsula, through the South Bay to San Jose and Gilroy. However, the closest station to Cupertino is in Sunnyvale, which is approximately five miles away. Currently, VTA provides bus service to the Caltrain station only on specific routes and a specific schedule. Comments made during the CAP's public participation activities indicated a desire for better connections to BART and Caltrain, and possible development of a community shuttle system to connect high-activity areas. Such a shuttle in Cupertino might connect the Civic Center, De Anza College, major retail areas, and higher-density residential neighborhoods. A shuttle could possibly include connections to the Caltrain station in Sunnyvale to further support broad transit options within the Bay Area.

Apple currently provides free shuttle services for its employees to and from work through a shuttle network extending throughout the Bay Area. The City should consider the impacts of Apple's existing shuttle system when evaluating the community-wide demand for a system that would be available to general public. The City should also collect input from other large employers as part of its feasibility assessment. The City can look to other communities for potential funding strategies that could support this program. As an example, the Emeryville Emery-Go-Round and Mountain View shuttle are privately funded by local commercial property owners within the City's business improvement district and a Transportation Management Association (TMA), respectively, but are free of cost to anyone to ride. The City is exploring the creation of several business improvement districts as part of a series of new development projects and should carefully consider this as a source of potential alternative transportation funding, alongside the consideration of creating a Cupertino-focused TMA.

Finally, the City could support private entities introducing car share services, which are becoming increasingly more prevalent in the Bay Area. These types of services include corporate offerings (e.g., ZipCar, City Car Share) and peer-to-peer networks (e.g., RelayRides, Getaround) to serve as transit connectors and single occupancy vehicle substitutes. These staples of the newly-emerging sharing economy are thriving due to growing Generation Y workers dependency, as they often seek lower impact urban, and often car-free, lifestyles.

Measure C-T-4 Implementation Table

	Action	Status	Responsibility	Timeline
A	Conduct feasibility study that evaluates potential for community shuttle between Cal Train, Civic Center, major employment / retail centers in Cupertino, and DeAnza Community College	P	Sustainability & Economic Divisions	
B	Research possible funding strategies with business improvement districts, major employers, community organizations, and other appropriate partners	P	Sustainability Division	
C	Support further development of private car share options for residents and daytime employee population, such as through efforts to identify adequate parking locations for shared vehicles (e.g., ZipCar) or working with local business community to increase knowledge of available options	P	Sustainability Division	

MEASURE C-T-5 TRANSIT PRIORITY

Improve transit service reliability and speed.

Supporting Measure – Not Quantified

Building an efficient transportation system can improve traffic flow and reduce congestion-related transportation emissions. Intelligent transportation systems (ITS) incorporate traffic signal synchronization on major roadways to reduce instances of “stop-and-go” traffic and vehicle idling. Specific types of ITS can help to better facilitate transit service, particularly at congested intersections.

Transit Signal Priority

Transit signal priority (TSP) operational strategies can improve the reliability and efficiency of transit service, especially in areas with heavy traffic congestion, by prioritizing transit vehicles in and around designated intersections. TSP are often incorporated into the design of bus rapid transit (BRT) networks to maintain the faster vehicle travel times associated with those systems. VTA is currently planning for the Stevens Creek BRT project, which would provide bus rapid transit along a nearly 9-mile stretch of Stevens Creek Boulevard from De Anza College to the Transit Mall in downtown San Jose. The project would incorporate TSP to provide faster travel times for the BRT vehicles. The City will continue to work with VTA in developing the Stevens Creek BRT project, and consider land use-related planning opportunities around the designated BRT stops as part of a transit-oriented development strategy (see Measure C-T-6).

Transit Intersection Queue Jumps

Similar to TSP, queue jumps also facilitate the movement of transit vehicles through congested intersections. Transit intersection queue jumps are a type of roadway configuration that gives preference to buses at intersections. The jumps consist of a short stretch of additional travel lane at the approach to a signalized intersection, allowing higher-capacity transit vehicles to jump to the front of the queue, reducing the delay caused by traffic signals, and improving the operational efficiency of the transit system. The lanes are often accompanied by a separate traffic signal allowing transit vehicles a head start through the intersection. Queue jumps can also be incorporated into BRT system design, particularly in areas where a dedicated BRT lane cannot be provided. The City can work with VTA to identify potential opportunities for queue jumps within the City along primary bus corridors.

Measure C-T-5 Implementation Table

	Action	Status	Responsibility	Timeline
Transit Signal Priority				
A	Work with VTA to identify local roadways on which traffic congestion frequently leads to impacted transit reliability or timing	P	Transportation Division	
B	Consider opportunities for transit-priority signal integration along these routes that would not further contribute to congestion problems	P	Transportation Division	
Transit Intersection Queue Jumps				
C	Based on work with VTA to identify congestion problems along primary transit routes, also investigate opportunities for integration of intersection queue jump lanes (in conjunction with priority signals) to further facilitate on-time transit service	P	Transportation Division	

MEASURE C-T-6 TRANSIT-ORIENTED DEVELOPMENT

Continue to encourage development that takes advantage of its location near local transit options (e.g., major bus stops) through higher densities and intensities to increase ridership potential.

Supporting Measure – Not Quantified

Transit-oriented development (TOD) places higher density and intensity development within walking distance of primary transit stops. This approach brings residents and jobs closer to transit opportunities, providing additional ridership for the public transit system. Successful TOD can take various shapes, depending on the character of the community. TOD can focus on increasing employment near transit stops, typically within a ½-mile radius, provided adequate pedestrian connectivity is available for riders to then reach their jobs. It can also focus on increasing residential densities near transit stops, usually within a ¼-mile radius. TOD can also include a mix of uses (e.g., residential, office, retail) when the goal is to develop a more complete neighborhood center.

Community opposition to increased densities or intensities may hinder local efforts to encourage TOD. Local land use and development policies may also pose a barrier. Parking standards that ignore the potential for reduced automobile trips in TOD may inhibit development due to the high cost of providing parking. The City currently considers parking reductions for projects that provide for shared parking in certain TOD or mixed-use developments.

Within Santa Clara County, the Cores, Corridors, and Station Areas Priority Development Area PDA encourages high-density development around important transit areas. This includes portions of De Anza and Stevens Creek Boulevards in Cupertino. In addition, VTA developed a Community Design and Transportation (CDT) Manual with a compilation of transportation and land use "best practices" intended to enhance the way communities are planned, designed, funded, and built. The CDT program provides capital grants intended to help VTA member agencies, cities, towns, and the County of Santa Clara, design and build transit- and pedestrian-friendly projects, and include these elements in capital projects related to transit facilities, streets, and core areas such as downtowns.

As part of its ongoing planning efforts toward transit-oriented and mixed-use development as expressed in the General Plan Amendment, the City will continue to plan for areas that can support a net increase in population or employment and are located within walking distance to major transit stops. The City will also continue to consider the infrastructure capacity of these development areas with respect to their ability to support increased levels of development.

Measure C-T-6 Implementation Table

	Action	Status	Responsibility	Timeline
A	Through City's General Plan process, identify areas that could support net increase in population or employment through land use changes within 1/4 mile walking distance of priority transit stops Planning Department	P	Planning Division	
B	Evaluate infrastructure capacity for higher-density/intensity development in transit areas, and develop prioritization and funding strategies to complete necessary improvements	P	Planning Division	
C	Continue to consider off-street parking requirements for transit-oriented and mixed-use developments, for developments providing shared parking, and for developments that incorporate travel demand management measures	E	Planning Division	

MEASURE C-T-7 COMMUNITY-WIDE ALTERNATIVE FUEL VEHICLES

Encourage community-wide use of alternative fuel vehicles through expansion of alternative vehicle refueling infrastructure.

2020 GHG Reduction Potential: 2,850 MT CO_2e/yr
2035 GHG Reduction Potential: 10,225 MT CO_2e/yr

One of the key challenges to adoption of alternative-fueled vehicles, specifically those powered by natural gas, hydrogen fuel, and electricity, is the limited refueling infrastructure available to support a broad range of vehicles. However, developing the required refueling infrastructure to encourage the use of low- or zero-emissions alternative fuel vehicles will be necessary to support the state's long-term emission reduction efforts.

To advance work in this space, Cupertino is teaming up with four other cities and the Santa Clara County Office of Sustainability to launch its "Driving to Net Zero: Decarbonizing Transportation in Silicon Valley" project, which was recently awarded a $550,000 grant from the California Strategic Growth Council (SGC) for an innovative regional alternative fuel vehicle (AFV) planning effort. This effort, which includes elements of policy, codes and permitting, technical and cost issues, public-private partnerships, and coordination of AFV infrastructure, will be a catalyst for growth in this sector locally and serve as a model for other regions throughout the state and country. Tools and findings from this project will inform Cupertino-

specific activities to expand alternative fuel infrastructure in our community and is anticipated to further accelerate alternative vehicle procurement of personal and fleet vehicles across our City.

Alternative Fuel Vehicle Charging / Refueling Infrastructure

The City of Cupertino provides an EV Charging Station and Alternative Transportation Resources webpage to share information related to alternative fueling infrastructure in the community. The City has already installed a publicly available dual-plug charging station through a contract with ChargePoint and recently received a grant to install four additional public charging stations throughout the City The charging station is located on Rodrigues Avenue adjacent to the Civic Center parking lot entrance. The broader ChargePoint Network allows registered users to review charging station availability and to make reservations. Although Cupertino's station is not available for reservation at this time, this could become an option in the future based on demand. There are nearly 100 private home-based and commercial EV chargers located throughout the city, some of which may be available to the public. The City's webpage provides links to the Silicon Valley Energy Map and Department of Energy EV Station Location Map, charging station planning resources, and alternative vehicle resources including a buying guide.

In addition to EV charging stations, the City is supporting a developer proposal to site a fuel cell refueling station for public use on Stevens Creek Boulevard. Fuel cell vehicles are electric vehicles powered by hydrogen. They provide refill times similar to combustion vehicles (e.g., gasoline and diesel vehicles), with zero emissions and power characteristics of battery electric vehicles. Cupertino's station is expected to be operational by the summer of 2015. While not yet as common as electric vehicles, additional fuel cell passenger vehicle models are being introduced to the market, and broader construction of refueling stations is underway across the state.

Compressed natural gas (CNG) represents another alternative-fuel technology that requires special refueling infrastructure. CNG vehicles are more common in large vehicle fleets, such as municipal bus fleets or delivery vehicle fleets, because they provide significant emissions reductions over diesel engines and currently provide fuel price savings as a result of increased domestic natural gas production. There are also CNG passenger vehicle and light-duty truck models available for use by the general public. PG&E currently operates a CNG refueling station in Cupertino on N. Blaney Avenue that is open for public use with a pre-arranged PG&E

account. The City may also want to consider the role of CNG vehicles in the future within the municipal fleet, to determine if a CNG refueling station at the City's Corporation Yard could support a long-term emissions reduction strategy.

EV Charging Station Pre-wiring Requirements for New Residential Construction

The majority of EV charging occurs at home, where vehicles can be left to charge overnight to take advantage of utility time-of-use pricing discounts. However, most existing construction was developed prior to consideration of vehicles' charging needs in a garage or carport. Depending on the age of the building, its electrical system, and the design of the garage, electrical retrofits to accommodate an at-home EV charging unit could cost several hundred to several thousand dollars. Increasingly, pre-wiring to accommodate the future installation of EV charging systems is being designed into new residential and commercial construction. The City of Cupertino has already adopted EV charging unit pre-wiring requirements for certain types of new construction, such as residential and small businesses, to help support this important infrastructure in the future.

As part of the City's involvement in the Santa Clara County "Driving to Net Zero" SGC Grant project noted above, Cupertino will explore additional building and zoning code revisions that expands electric vehicle supply equipment (EVSE) installations throughout the community. In addition to the existing pre-wiring requirements already adopted in our jurisdiction, this project will evaluate charging station requirements for new or renovated multi-family commercial development, preferential parking requirements for new commercial development, and compliance with other regulations (e.g., Americans with Disabilities Act) and pursue expedited permitting processes for EVSE integration in new and existing development.

Alternative Fuel Vehicle Public Outreach Program

To encourage further adoption of alternative fuel vehicles in the community, the City will continue to share information on local and regional alternative fueling infrastructure, considerations when purchasing an alternative fuel vehicle, the City's EV charging policy, and other relevant information on its website. The City will share information regarding its efforts to reduce emissions from operation of the municipal fleet, including the incorporation of alternative fuel vehicles and plans for additional public refueling infrastructure.

Here also, the "Driving Net Zero" SGC Grant project will enable Cupertino's access to free consulting services to evaluate incentives that facilitate community alternative fuel vehicle (AFV) adoption. Incentives being evaluated through this effort are those often applied in the early stages of the adoption curve, which can be gradually retired after AFVs have achieved market momentum. Local incentives to be reviewed include public parking policies that provide preferential or free parking for AFVs, reduced parking requirements for private developments that implement shared-parking and car-sharing systems in tandem with EVSE integration, and reduced on-street parking permit fees for AFVs (where applicable). In addition, the project will assess the potential for reduced EV charging and CNG fueling prices. It will also share guidance on local jurisdiction financial incentives for AFV purchases by residents and businesses, and offer funding mechanisms to incentivize expansion of charging stations to further open access to private infrastructure.

Measure C-T-7 Implementation Table

	Action	Status	Responsibility	Timeline
	Alternative Fuel Vehicle Charging / Refueling Infrastructure			
A	Continue to explore cost-effective ways to increase alternative vehicle charging / refueling infrastructure within City for public use; review permitting and inspection process to identify potential barriers to installation and define strategies to reduce or remove barriers through SGC grant or other means	E	Transportation Division	
B	Develop Alternative Fuel Infrastructure Siting Plan focused on strategic development of EV charging stations and municipal CNG fueling stations based upon demand analyses and feasibility studies; EV station siting plans will identify appropriate locations for Level 1 (slow charge), Level 2 (fast charge), and Level 3 and DC (rapid charge) charging stations in community and will analyze different models for charging station ownership/management (i.e., public vs. private sector)	P	Sustainability & Transportation Division	
C	Work with MTC and Bay Area local governments to develop informational brochures and technical support for developers / contractors interested in providing public electric vehicle (EV) charging ports in new projects	P	Sustainability Division	
D	Identify regional partners for collaboration on multi-family EV charging station retrofit program to develop strategies for installing EV chargers in existing multi-family buildings/apartment developments	P	Sustainability & Planning Division	

EV Charging Station Pre-wiring Requirements for New Residential Construction (SFR and MFR)				
E	Continue to enforce pre-wiring for at-home/business electric vehicle charging ports in new construction per City's existing ordinance and evaluate additional building code and zoning code revisions recommended through SGC Grant	E	Planning Division	
Alternative Fuel Vehicle Public Outreach Program				
F	Pursue local incentives, partnerships, and funding mechanisms guided by SGC Grant; Provide links on City's website to sources of cash rebates or other financial incentives for purchase and/or lease of alternative fuel vehicles	P	Sustainability Division	
G	Continue to provide links to existing maps identifying Bay Area alternative fuel charging and refueling infrastructure	E	Sustainability Division	
H	Share information regarding City's efforts to transition its municipal fleet towards alternative fuel vehicles, including plans for additional installation of recharging / refueling infrastructure that would be open to public use	P	Sustainability Division	

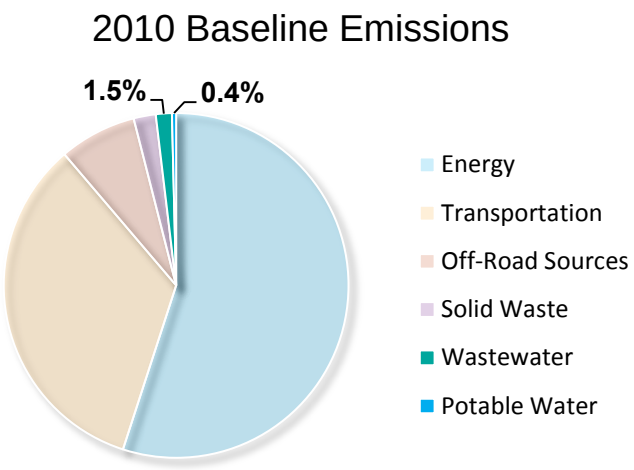
Progress Indicators	Year
Community-wide motor vehicle profile shifts as follows: 5% of gasoline passenger vehicles shift to plug-in hybrid electric (PHEV); 5% of diesel passenger vehicles shift to PHEV; 5% of gasoline light-duty trucks shift to PHEV; 3% of gasoline heavy-duty trucks shift to CNG; 3% of diesel heavy-duty trucks shift to CNG; 40% of diesel buses shift to CNG, 20% shift to PHEV	2020
Community-wide motor vehicle profile shifts as follows: 8% of gasoline passenger vehicles shift to plug-in hybrid electric (PHEV); 2% shift to battery-electric (BEV); 5% shift to CNG 8% of diesel passenger vehicles shift to PHEV; 2% shift to battery-electric (BEV); 5% shift to CNG 8% of gasoline light-duty trucks shift to PHEV; 2% shift to battery-electric (BEV); 5% shift to CNG 25% of gasoline heavy-duty trucks shift to CNG; 25% of diesel heavy-duty trucks shift to CNG; 45% of diesel buses shift to CNG, 30% shift to PHEV	2035

WATER STRATEGY

Goal 3 – Conserve Water

Promote the efficient use and conservation of water in buildings and landscapes.

On September 30, 2014, California ended one of the driest water years on record (note: California's water years run October 1 through September 30). With the recent drought spanning the previous three years, there is no guarantee that the 2015 water year will be any wetter. Given this unpredictability, it is more critical than ever that water conservation efforts be enhanced to sustain this vital resource.



Water-related GHG emissions are primarily a result of energy used to pump, transport, and treat potable water and wastewater. Emissions associated with this sector accounted for approximately 2% of the community-wide GHG inventory (see pie chart), which indicates a relatively small contribution for water conservation in the City's emissions reduction strategy. This is due to the fact that much of Cupertino's water supply is delivered through gravity-fed systems that use relatively less energy than systems relying on industrial pumps to transport water across the state or western United States. However, with water supplies expected to continue declining, water conservation strategies have the additional benefits of aligning demand with future water availability.

This strategy area considers emissions reductions resulting from local implementation of statewide water conservation legislation. It considers opportunities for future recycled water use in irrigation within the community to further conserve potable water supplies as well.

The total GHG emissions reduction potential of the Water Strategy is 325 MT CO_2e/yr in 2020 and 375 MT CO_2e/yr in 2035. This represents approximately 2% of total local CAP measure reductions.

MEASURE C-W-1 SB-X7-7

2020 GHG Reduction Potential: 325 MT CO_2e/yr
2035 GHG Reduction Potential: 375 MT CO_2e/yr

Implement water conservation policies contained within Cupertino's Urban Water Management Plan to achieve 20 percent per capita water reductions by 2020.

The state has made water conservation a priority through adoption of SB X7-7 in 2009, which requires California to achieve a 20% reduction in urban per capita water use by December 31, 2020. The state is required to make incremental progress toward this goal by reducing per capita water use by at least 10% by December 31, 2015. SB X7-7 requires each urban retail water supplier to develop both long-term urban water use targets and an interim urban water use target. This law creates a framework for future planning and actions for urban and agricultural users to reduce per capita water consumption 20% by 2020.

The San Jose Water Company and California Water Service Company are the major water suppliers within the city's boundaries. Both have adopted UWMP's that identify best management practices in water conservation, which are being implemented to achieve the state's water conservation goals. These conservation strategies include:

- Residential water surveys
- Customer rebates, vouchers, retrofits, and conservation kits
- Customer water loss audits
- Residential landscape surveys, large landscape conservation programs, and irrigation retrofits
- Metering and residential conservation pricing
- Public information and education programs
- Full-time water conservation supervisor

In addition to these water-conserving activities led by the water suppliers, the City has also shown initiative in incorporating conservation strategies into municipal landscaping practices and building operations. The City highlights its myriad efforts on its website (see: Cupertino.org/savewater), including use of drought tolerant plants, adjustments to lawn mower blade heights, reduced water schedules and installation of climate-sensitive irrigation systems, installation of water-efficient fixtures in major City facilities, and active monitoring of fixtures and

water bills to support early leak detection. In addition to municipal water conservation practices, the City also offers its GreenBiz and Green@Home programs, which provide free indoor and outdoor water assessments and equipment upgrades (e.g., faucets, showerheads, toilets) to residents and local businesses. These highly successful programs have saved 5.5 million gallons of water to date, and saved participants $100,000 from water and energy savings.

While the City already highlights these accomplishments on its website, community participants in the CAP's public outreach activities expressed a desire for more publicity regarding the City's sustainability program successes, such as online walking tour maps to visit xeriscape projects or other water-conserving landscape installations. The City will continue to promote its own water conservation activities as well as programs available for community participation.

Measure C-W-1 Implementation Table

Action		Status	Responsibility	Timeline
A	Develop public information campaign that highlights/advertises City projects and landscaping practices that conserve water (e.g., drought-tolerant landscaping, efficient irrigations systems)	P	Sustainability Division	
B	Work with local water providers to identify opportunities for water use data tracking and reporting at community-wide level; if successful, share this information through CAP's annual progress reporting procedures, aligned with required General Plan implementation annual reports	P	Sustainability Division	
C	Partner with community/neighborhood groups to promote existing water conservation programs and participation in voluntary turf-removal programs	P	Sustainability Division	

Progress Indicators	Year
15% per capita water use reduction of 2010 baseline use	2020
15% per capita water use reduction of 2010 baseline use	2035

MEASURE C-W-2 RECYCLED WATER IRRIGATION PROGRAM

Supporting Measure – Not Quantified

Explore opportunities to use recycled water for irrigation purposes to reduce potable water demands.

The City currently does not have access to recycled water, which could offset potable water use in large, irrigated landscapes. There have been discussions of a possible connection between the San Jose and Sunnyvale recycled water systems, which could bring necessary infrastructure inside of Cupertino's boundary to service Apple's campus[xvi]. However, expanding this infrastructure for broader residential, commercial, and municipal use has not yet been prioritized. As an initial step to developing a recycled water use plan, the City could prepare a feasibility study to identify potential recycled water users within the City, including their location and potential recycled water demand. The City should continue to monitor regional discussions for expansion of existing recycled water systems, and include recycled water as a priority within forthcoming revised service agreements with its two water retailers.

Given the process of producing and transporting recycled water that is safe for landscape application, it is possible that replacing potable water with recycled water for irrigation in Cupertino could result in a net emissions increase. As an alternative to recycled water use (since Cupertino currently has no access), small-scale, on-site rainwater catchment systems could be installed to better utilize natural precipitation for irrigation purposes, as opposed to use of scarce potable water resources. The City will develop a demonstration project on municipal property to promote voluntary adoption of such landscaping techniques community-wide. The project should be designed as an educational tool to show-case water-efficient landscaping design and alternative irrigation strategies. The project could include a rain barrel catchment system connected to a climate-appropriate demonstration garden to show how drought-tolerant plant options can be supported without use of traditional irrigation systems. Alternatively, the City could identify a high-visibility location to install a rain garden connected to a building's downspout, or construction of a bioswale adjacent to a parking lot or roadway. Both of these options can incorporate drought-tolerant plants, and contribute to natural stormwater management to improve water quality.

The environmental benefits associated with conserving potable water sources would undoubtedly outweigh a relatively minor emissions increase associated with potential future recycled water use. However, in the meantime, other options are available to reduce potable water use in irrigation, which could be applied broadly in the community. If the City decides to

pursue recycled water infrastructure development in the future, it will need to include these additional emissions in future emissions inventory updates.

Measure C-W-2 Implementation Table

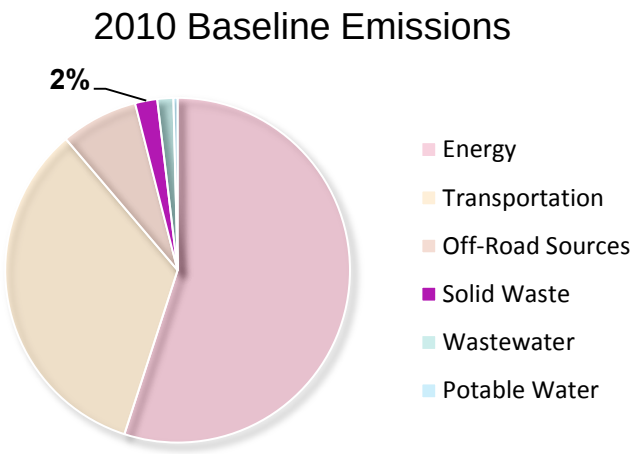
	Action	Status	Responsibility	Timeline
A	Conduct feasibility analysis to determine potential for recycled water systems in Cupertino; map locations of large irrigation water users (now and likely future users) to identify feasible extent of new system	P	Grounds & Fleet Division	
B	Continue to monitor regional discussions regarding expansion of existing recycled water systems in neighboring jurisdictions	P	Sustainability Division	
C	Identify City-owned site to install educational demonstration project that showcases water-efficient landscaping strategies, alternative irrigation options, and/or low-impact landscape design techniques	P	Sustainability, Grounds & Fleet Divisions	

SOLID WASTE STRATEGY

Goal 4 – Reduce Solid Waste

Strengthen waste reduction efforts through recycling and organics collection and reduced consumption of materials that otherwise end up in landfills.

Waste disposal creates emissions when organic waste (e.g., food scraps, yard clippings, paper and wood products) is buried in landfills and anaerobic digestion takes place, emitting methane. Additionally, extracting and processing raw materials for consumer products, distributing them to consumers and disposing them creates GHG emissions. In Cupertino, approximately 2% of GHG emissions are associated with solid waste generation and disposal in landfills (see pie chart).



Recent efforts to reduce long-term waste generation have incorporated the principle of zero-waste, with the goal of being able to recycle, reuse, or compost all waste products. Implementation programs to achieve zero-waste can include community-wide recycling, organics collection (e.g., food scraps, compostable paper), and green design to minimize construction-related waste. Business procurement policies can also be developed to give preference to materials that support a zero-waste goal. Paperless office policies can incorporate technological hardware and software to minimize office paper waste. Manufacturing processes can be designed to eliminate supply stream waste and reduce operating expenses.

A combination of these practices can potentially lead to lower landfill-related emissions, and help to extend the useful operating life of local landfills. The measures included within the Solid Waste Strategy provide total GHG emission reduction potential of 275 MT CO_2e/yr in 2020, and 1,300 MT CO_2e/yr in 2035. This represents approximately 2.0% of total local CAP measure reductions.

It should be noted that a growing number of public agencies are supplementing sector-based emissions inventories, the tool used to conduct Cupertino's inventory that is described in detail in Chapter 1, with a "consumption-based" approach to estimate those emissions that arise from the lifecycle of goods and services utilized within a community. This lifecycle greenhouse gas emissions accounting evaluates and reports the full lifecycle of emission associated with the raw materials extraction, manufacturing or processing, transportation, use, and end-of-life management of a good or service, regardless of which sector produces these emissions.[xvii] The Environmental Protection Agency has developed the Waste Reduction Model (WARM) to help solid waste planners and organizations track and voluntarily report greenhouse gas emissions reductions from several different materials management practices (see: http://epa.gov/epawaste/conserve/tools/warm/). While this lifecycle inventorying approach is not yet the industry standard practice, the City will continue to monitor the evolution of climate change planning and emissions inventory methodologies as part of its on-going CAP revisions process. If in the future it becomes standard practice to assess total lifecycle emissions (as

opposed to annualized emissions inventories that are currently industry standard), then the City will incorporate this practice into its future inventory updates. Cupertino will consider using the WARM tool, paired with the EPA's Re-Trac, which was deployed as part of the City's award-winning Food Recovery Challenge launched to help local grocery stores and markets reduce food waste through effective inventory management, new donation agency partnerships, and expanded composting services (learn more at: https://connect.re-trac.com/register/epafrc).

MEASURE C-SW-1 ZERO WASTE GOAL

Maximize solid waste diversion community-wide through preparation of a zero-waste strategic plan.

Supporting Measure – Not Quantified

Zero waste is a philosophy that reimagines the resource cycle to allow reuse of all products by diverting materials from the landfill or incinerators. The purpose of a zero waste strategic plan is to shift consumption patterns, manage purchases more carefully, and establish the infrastructure and informational resources necessary to achieve broad community support. In 2001, California was the first state to adopt a zero-waste policy, noting that the public, industry, and government will work together to reduce, reuse, or recycle all solid waste materials.

AB 939 mandates local jurisdictions to meet numerical diversion goals. Although landfill capacity is no longer considered the statewide crisis it once was, waste diversion from landfills protects public health and safety and the environment by reducing landfill methane emissions and groundwater contamination associated with faulty landfill membranes, as well as conserving natural resources. In its efforts to exceed the diversion goals established in AB 939, the City incorporated a zero-waste goal into its waste-hauling contract with Recology South Bay. The City's contract provides curbside recycling and garbage services to all businesses and residents in Cupertino, as well as curbside organic waste services for residents and relevant businesses.

To gauge progress toward its zero-waste goal and identify additional material diversion opportunities, the City should prepare residential and commercial waste characterization studies. These studies, which could be offered as a GreenBiz Cupertino service, are conducted to determine the types and amounts of materials in a community's waste stream, which can be used to support development of an overarching strategic plan to reduce waste.

It is widely understood that achieving “zero waste’ in our communities will require a dramatic shift away from our current “end of life” focus on recycling, composting, and landfilling to one based upon the modern-era materials management hiearchy: first prevent waste, next reduce and reuse, and finally recycle and compost. To that end, Cupertino will expand it’s current outreach and educational efforts through green@schools, GreenBiz and Green@Home to help residents and businesses prevent waste in the first place by supporting their efforts to buy less and reuse what they already do have. One emerging tool to faciliate this is the growing sharing economy, which enables consumer access to products and services via peer-to-peer networks versus the traditional ownership model. Cupertino can accelerate interest in this “collaborative consumption” model by sharing resources through its civic media assets. In addition, the City will work to grow extended producer responsibility to manage materials efficiently and expand take-back materials (packaging and products) from consumers after they have reached the end of their useful life to reincorporate these materials into the manufacturing cycle. Finally, the agency will continue its work to offer effective and widely understood and utilized composting and recycling services. The City will continue sharing informational resources and presenting these programs through its neighborhood leader-focused Growing Greener Blocks initaitive, which will also ensure residents’ understand how to safely handle toxic products, such as batteries, paints, pesticides, and other hazardous materials.

Measure C-SW-1 Implementation Table

	Action	Status	Responsibility	Timeline
A	Continue to implement City's goal to divert 75% of community-wide solid waste through franchise waste hauling contract	E	Environmental Division	
B	Prepare residential and commercial waste characterization studies to identify Cupertino-specific opportunities for additional waste diversion; use study results to develop outreach campaigns that increase participation in City's existing waste management programs, targeting specific waste types and/or sources	P	Environmental Division	
C	Establish timeline and funding mechanism to perform periodic Waste Characterization Study updates to evaluate efficacy of new outreach programs	P	Environmental Division	
D	Develop robust outreach campaign to ensure community-wide understanding of materials management service offerings, drive behavior change focused on lifecycle of materials (i.e., source reduction, materials reuse, end-of-life), and facilitate access to emerging materials management support tools (i.e., those focused on sharing economy and collaborative consumption)	P	Environmental Division	

MEASURE C-SW-2 FOOD SCRAP AND COMPOSTABLE PAPER DIVERSION

Continue to promote the collection of food scraps and compostable paper through the City's organics collection program.

2020 GHG Reduction Potential: 150 MT CO_2e/yr
2035 GHG Reduction Potential: 750 MT CO_2e/yr

Food scraps are unwanted cooking preparation and table scraps, such as banana peels, apple cores, vegetable trimmings, bones, eggshells, meat, and pizza crusts. Compostable paper, sometimes called food-soiled paper, usually comes from the kitchen and is not appropriate for paper recycling due to contamination. Materials such as stained pizza boxes, paper cups and plates, waxed cardboard, used coffee filters, paper food cartons, napkins and paper towels are all compostable paper. Diverting these organic items from the landfill helps to reduce methane gas generation from anaerobic decomposition, and helps to prolong the operable life of a

landfill. Composting of organic materials, such as food, is one method of managing these materials and diverting them from landfills.

Recology South Bay provides residential food scrap collection services, providing Cupertino households with a single food waste and yard waste bin to collect yard clippings; food scraps such as bones, fruits, and seafood; and other organics including soiled paper products, coffee grounds, and pizza boxes. Free compost, made from this collected yard and food waste, is available for any Cupertino resident to pick up at the Stevens Creek Quarry from March through October each year (learn more at www.cupertino.org/compost). Cupertino also distributes food scrap recycling information via the City website and newsletter, and provides links to the County of Santa Clara Recycling & Waste Reduction Commission composting workshops. In 2013, Cupertino received the U.S. EPA national award for innovative food waste reduction efforts for its three-year effort to work with grocers, residents, and businesses to divert food from landfills. Their efforts included providing workshops for local grocers and markets on ways to reduce waste, and helping businesses develop better food recovery methods. Currently the City also conducts outreach to food businesses such as grocers and restaurants in order to encourage the expansion of commercial organics collection in the community.

Moving forward, the City will leverage outreach channels available through its GreenBiz program and partner with the Cupertino Chamber of Commerce and Recolgy South Bay to encourage additional voluntary participation in organic waste collection from local businesses. This partnership could focus on providing technical assistance based on best practices to overcome challenges posed by organic collection bin storage and management. The City will use the results of the waste characterization studies described in Measures SW-1 to assess the efficacy of its residential organics collection program, and develop program alterations if additional food waste diversion opportunities are identified. The City can also expand its green@schools work with local elementary schools to incorporate food waste composting into their existing recycling programs and curriculum. By building this knowledge base with children first, Cupertino households will gain a stronger understanding of the existing program's services.

Measure C-SW-2 Implementation Table

	Action	Status	Responsibility	Timeline
A	Continue to implement the City's organics collection program outreach campaign, including outreach to Cupertino's business community regarding upcoming commercial food waste ordinance	E	Environmental Division	
B	Provide information to local elementary schools on existing organics collection program for incorporation into on-going recycling program curriculum	P	Environmental Division	
C	Work with franchise waste haulers, the Cupertino Chamber of Commerce, and other local business organizations to increase voluntary participation in City's organics collection program; provide technical assistance based on best practice examples to overcome collection bin storage / placement barriers	P	Environmental Division	

Progress Indicators	Year
Households divert 40% of food scraps and compostable paper; 10% of businesses divert 20% of food scraps and compostable paper; Households and businesses divert 85% of yard waste	2020
Households divert 60% of food scraps and compostable paper; 30% of businesses divert 20% of food scraps and compostable paper; Households and businesses divert 90% of yard waste	2035

MEASURE C-SW-3 CONSTRUCTION & DEMOLITION WASTE DIVERSION PROGRAM

Continue to enforce diversion requirements in City's Construction & Demolition Debris Diversion and Green Building Ordinances.

2020 GHG Reduction Potential: 125 MT CO_2e/yr
2035 GHG Reduction Potential: 550 MT CO_2e/yr

According to California Department of Resources Recycling and Recovery's (CalRecycle's) 2008 Statewide Waste Characterization Study, construction and demolition (C&D) materials account for almost 29 percent of the waste stream in California. Many of these materials can be diverted from landfills for reuse and recycling, including concrete, bricks, metal, drywall, and lumber. Lumber is an organic material, and therefore generates methane emissions through anaerobic decomposition in a landfill. Reusing and recycling C&D materials conserves natural resources and diverts material from landfills, while also reducing greenhouse gasses and conserving landfill capacity.

The California Green Building Code, effective January 1, 2011 and subsequently amended, requires the diversion of at least 50 percent of construction waste materials generated during most new construction, including all new residential and commercial projects, with few exceptions. The City has exceeded this statewide requirement through adoption of its own Construction and Demolition Debris Diversion Ordinance, which requires applicable construction projects to divert 60% of construction waste. This ordinance applies to all construction, demolition, and renovation projects that are 3,000 square feet or larger. Prior to receiving a final building inspection, a construction recycling report must be submitted to show the tons recycled and disposed by material type.

Implementation and monitoring challenges can limit full participation in the City's C&D diversion efforts, even though the requirements are codified in the Cupertino Municipal Code. Some communities have addressed the issue of compliance through development of a C&D diversion

deposit program, in which the project applicant pays a deposit (as a percentage of total project costs or on a square foot basis) in exchange for a building permit. The deposit is reimbursed to the applicant upon submittal of appropriate documentation that outlines what level of diversion was achieved by the contractor or waste hauler. The program could also be structured to forgo deposit requirements if applicants provide a signed contract with an authorized C&D collector that clearly states the level of diversion to be achieved.

The City will continue to implement its Construction and Demolition Debris Diversion Ordinance, and work with franchise waste haulers to evaluate opportunities for increased C&D diversion capabilities. The City could consider increasing its C&D diversion requirements in the future as green building practices continue to evolve and as area landfill operators and waste haulers become accustomed to higher diversion rates. The City could consider developing a C&D debris deposit program if it identifies opportunities for improving compliance with the existing diversion ordinance as well.

Measure C-SW-3 Implementation Table

	Action	Status	Responsibility	Timeline
A	Continue to implement City's 60% C&D diversion requirement for applicable projects as defined in City's Construction and Demolition Debris Diversion Ordinance	E	Environmental Division	
B	Work with franchise waste haulers to evaluate capability of area landfill operators to maximize C&D waste diversion (e.g., 75% diversion)	P	Environmental Division	
C	Consider increasing City's diversion requirements to 75% diversion to support zero-waste goal (see SW-1); alternatively, only target scrap lumber with 75% diversion requirement, if found to be feasible	P	Environmental Division	
D	Consider developing Construction and Demolition Debris Diversion Deposit Program to help enforce C&D ordinance, in which deposit is paid to City prior to issuance of building permit and refunded to applicant following submittal / approval of applicable waste diversion documentation	P	Environmental Division	

Progress Indicators	Year
60% of construction and demolition waste diverted, per City's ordinance – approximately 2,600 tons/yr	2020
75% of construction and demolition waste diverted – approximately 3,500 tons/yr	2035

GREEN INFRASTRUCTURE STRATEGY

Goal 5 – Expand Green Infrastructure

Enhance the City's existing urban forest on public and private lands.

Green space consists of a variety of places that, when integrated within an urban environment, provide valuable recreation, ecological, and public health services to the community. In Cupertino, green space includes the urban forest, parks, landscaped medians and parkways, and natural stormwater-absorbing landscapes. Healthy and robust green infrastructure systems can mitigate the urban heat island effect, lower building energy use, provide natural stormwater management and wildlife habitat, improve local air quality, and increase community pride.

As one component of the green infrastructure network, urban forests provide shade and can reduce the heat island effect, which causes temperatures to increase in areas with concentrations of exposed pavement and rooftops. These higher temperatures can lead to increased air conditioner use, which increases energy consumption and can strain utility infrastructure at peak hours of the day. Urban forests also provide a visual amenity for residents and habitat value for wildlife.

The City also recognizes other beneficial aspects of trees. Trees beautify neighborhoods, increase property values, reduce noise and air pollution, and create privacy. Additionally, trees gain carbon-sequestering biomass in their trunks and roots as they absorb carbon dioxide from the air to grow. The measure in this section seeks to enhance Cupertino's already well-established urban forest through partnerships with residents, businesses, and community and neighborhood groups.

The total GHG emission reduction potential of the Green Infrastructure Strategy is 200 MT CO_2e/yr in 2020 and 725 in 2035. This represents about 1.4% percent of total 2020 reductions anticipated from local CAP measure implementation.

MEASURE C-G-1 URBAN FOREST PROGRAM

Support development and maintenance of a healthy, vibrant urban forest through outreach, incentives, and strategic leadership.

2020 GHG Reduction Potential: 200 MT CO_2e/yr
2035 GHG Reduction Potential: 725 MT CO_2e/yr

The urban forest contributes to Cupertino's quality of life and attractiveness as a place to live, work, and visit. Trees are a valuable role in the identity of a city because they strengthen a community's image, encourage pedestrian activity, and develop inviting public and private spaces. Trees also perform important environmental functions such as removing air and water pollutants, providing wildlife habitat, and capturing carbon dioxide from the atmosphere.

Approximately 2,400 net new trees will be planted as part of the Apple Campus 2 project to further enhance the City's urban forest. The City can partner with other local businesses, neighborhood groups and residents, and other community organizations to encourage additional voluntary tree planting on private property within Cupertino. The City could request technical support from PG&E to provide basic tree planting guidelines, so when the trees are full grown, they will provide shade to homes and businesses and help to lower air conditioner use during peak periods.

Management of an urban forest can sometimes require the support of more than just the City's Public Works staff. There may be opportunities for community partners to assist the City in the management and maintenance of street trees planted within the public right-of-way. The City should consider developing a long-range forestry plan to identify policies and strategies that proactively manage the City's urban forest for future generations while minimizing maintenance conflicts with overhead and underground utility infrastructure.

This urban forest should also expand to the City's parks and medians, both in terms of expanding the City's urban canopy, but also by prioritizing drought-tolerant native plants and demonstration gardens (noted both as a General Plan policy and among the Local Government strategies described in Chapter 4) as well as community-wide rooftops. The City should incentivize Green roofs for their role in "protecting water resources adversely impacted by climate change by reducing electricity usage and improving air quality."[xviii]

Staff will also consider opportunities to stretch its current ordinances and codes to prioritize cool roofs and cool pavements to reduce local impacts from the urban heat island effect. Over 60% of urban surfaces are covered by roofs or pavement,[xix] which are typically dark and absorb 80%

of sunlight, thereby exacerbating the warming effects of climate change. Though not technically a green infrastructure item, cool roofs and cool pavement can further support the beneficial outcomes provided by a healthy, robust urban forest.

In addition to trees, other types of landscaping and vegetation can help to enhance ecological functions of the City's green infrastructure. Community and school gardens can help to build a personal connection to, and ultimately ownership of, the places we seek to protect. These local spaces offer a retreat from the noise and commotion of our daily lives, and can impart a stewardship ethic among gardeners and adjacent property owners alike. They also allow families and individuals without land of their own to produce food, build skills, and share knowledge. Further, community gardens can provide access to fresh, nutrient-rich produce that localizes the traditional commodity chain, reducing associated transportation emissions and eliminating packaging lifecycle impacts. School gardens further these gains by serving as outdoor classrooms where learning happens through hands-on trial and error, and students are empowered as food and plant scientists to apply lessons learned indoors.

Cupertino is currently home to one over-subscribed 60 acre organic garden located at McClellan Ranch Preserve, a recently opened small working garden at the adjacent Blackberry Farm that supplies produce to the café, and a 5.1 acre orchard on its Stocklmeir Ranch. Each of these sites is part of the Stevens Creek Corridor, a natural park setting with extensive creek restoration projects and a host of trail and park amenities, which are the current focus of a Master Planning Project that will define its future use (e.g., "legacy farm" creation, garden expansion). Beyond City properties, local schools host a variety of edible schoolyards, butterfly, or native plant gardens, and complimentary compost programs, many of which have launched or expanded in partnership with the City's green@school program or via funding made available through the Rotary Club of Cupertino. To foster a deeper connection to these natural community assets and strengthen our environmental legacy, which in turn can transform other climate-tied emissions reductions activities among those engaged, these urban green spaces should be expanded throughout the City and across our school campuses and coupled with ancillary naturalist education and volunteer opportunities, such as the City's current GreenFingers habitat restoration program.

Measure C-G-1 Implementation Table

	Action	Status	Responsibility	Timeline
A	Continue implementing landscaping requirements in City's Development Standards, Design Guidelines, and other regulatory documents	E	Planning Division	
B	Partner with neighborhood groups, community organizations, and business community to encourage voluntary tree planting on private property within Cupertino; identify opportunities for such organizations to assist City with maintenance of street trees planted within public rights-of-way	P	Sustainability Division	

C	Consider developing strategic, long-range plan to identify policies and strategies to proactively manage and grow the City's street tree population	P	Trees & Right of Way Division	
D	Evaluate opportunities to expand current ordinances and codes to prioritize expansion of City's green and cool roofs, as well as pervious and cool pavement	P	Sustainability Division; Planning Division	
E	Assess opportunities to expand Cupertino's network of community gardens, demonstration gardens, and edible schoolyards through Stevens Creek Corridor Maser Plan process, targeted Green@Home or Green@School campaign, and strengthened Rotary Club partnership	P	Recreation and Community Services Department	
F	Expand community and school gardens, and evaluate opportunities to develop prevalent demonstration garden that incorporates water-sensitive design and advanced irrigation control technology (if irrigation system is necessary)	P	Recreation and Community Services Department	
G	Pair expanded garden network with new naturalist and education programs and trainings to build community knowledge of gardening techniques and associated health, environmental, and financial benefits	P	Recreation and Community Services Department	
H	Install informational placards or signs at new gardens that quantify emissions reductions from local food sources and water saving potential from native plants and refer public to additional informational resources	P	Recreation and Community Services Department	

Progress Indicators	Year
2,500 net new trees planted in the city from 2015 onward	2020
2,800 net new trees planted in the city from 2015 onward	2035

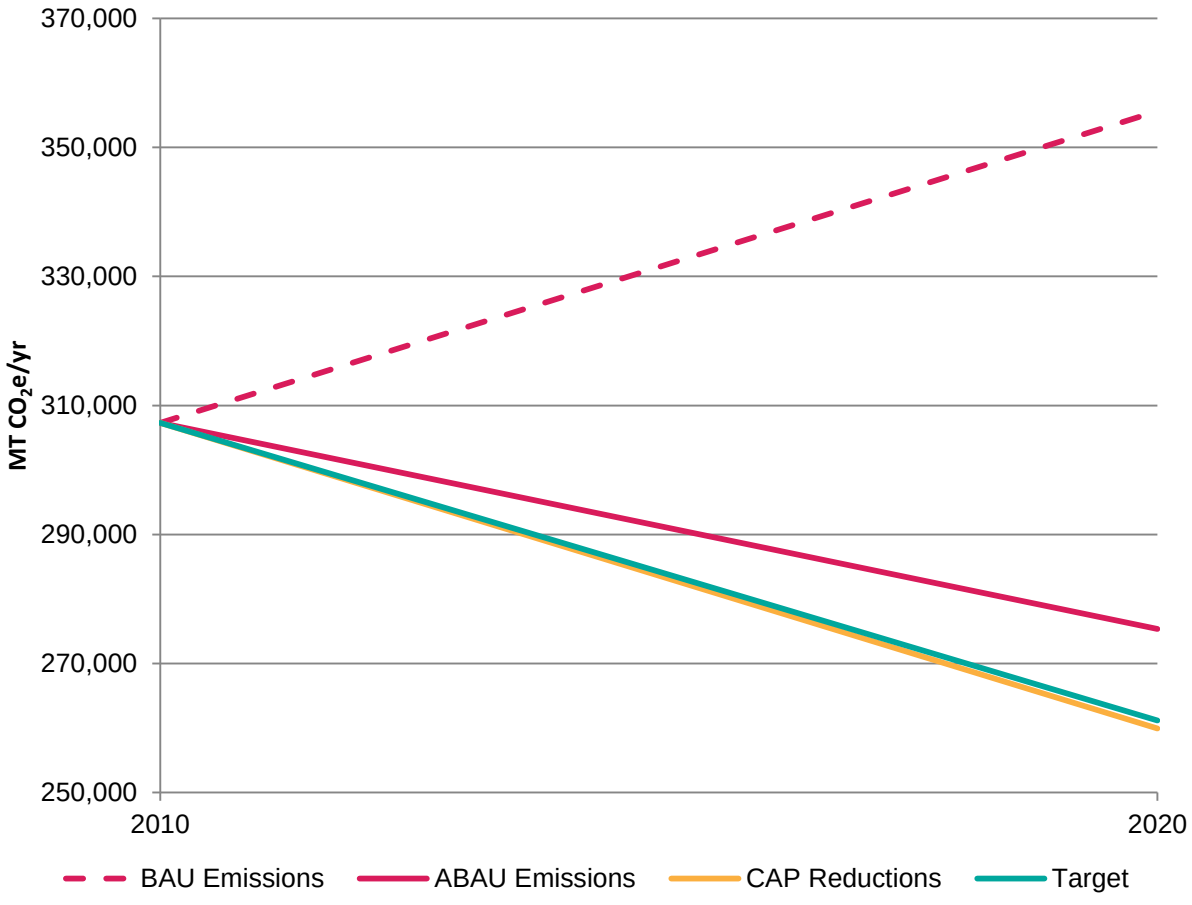
Target Achievement

Progress toward 2020 Target

The reduction measures described above combined with the statewide actions described in Chapter 2 and the municipal operations reduction measures included in Chapter 4 have the potential to reduce community-wide emissions by 95,661 MT CO_2e/yr from projected 2020 levels. This progress **exceeds** the City's 2020 reduction target of 15% below 2010 levels, representing a 15.4% reduction in baseline emissions.

Figure 3.5 shows the additive impact of statewide actions and local actions that will achieve the City's 2020 target. The dashed red line illustrates community-wide BAU emissions, with the gray line showing ABAU emissions (i.e., BAU emissions minus statewide reductions). The teal line shows a trajectory towards the 2020 target from the 2010 baseline level, and the pink link appearing just beneath the teal target line represents the level of emissions reductions that could be achieved following implementation of the CAP measures presented in this chapter.

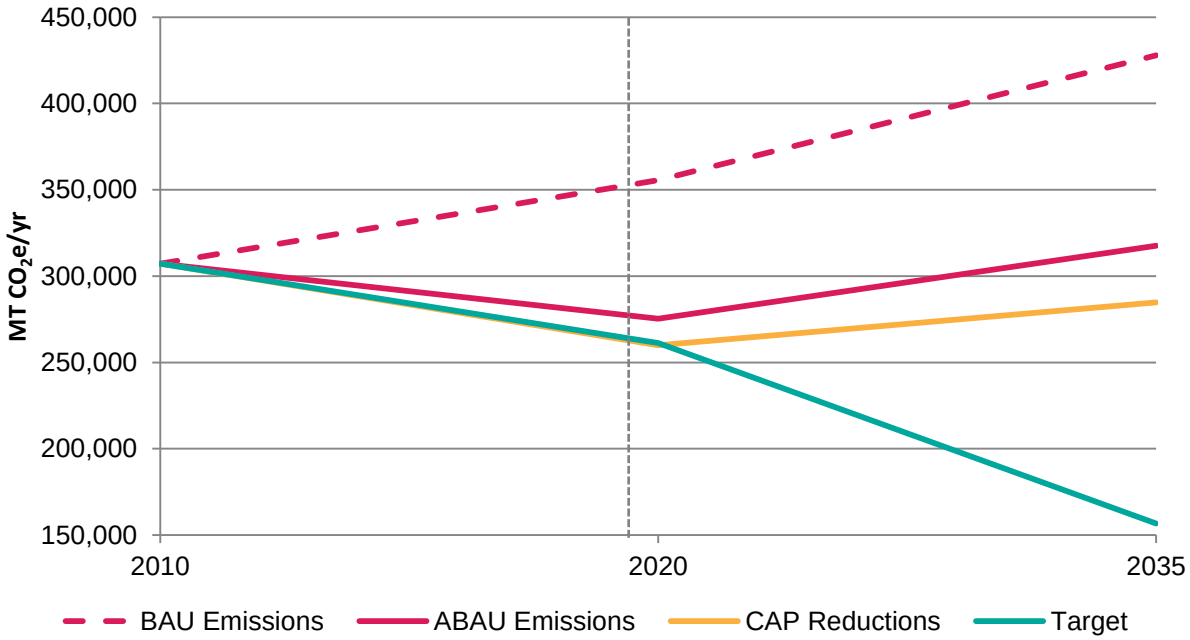
Figure 3.5 – 2020 Community-wide Target Achievement



PROGRESS TOWARD 2035 TARGET

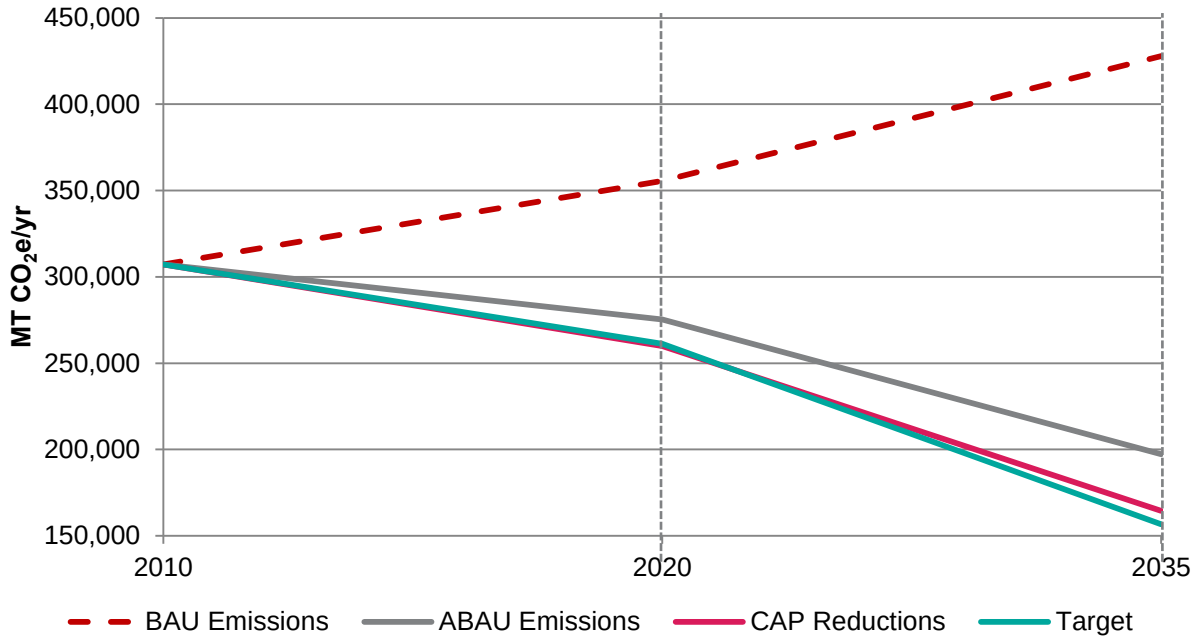
As shown in Figures 3.6 and 3.7, the most important driver for long-term target achievement is statewide action. As described in Chapter 2, the future impact of statewide actions is currently difficult to predict because the Scoping Plan only quantifies emissions reductions through the 2020 horizon year. This CAP estimated the future impact of statewide actions in two different ways. The first method, illustrated in Figure 3.6, is more conservative in its scope and is based on continued implementation of the known statewide actions (as described in Chapter 1) as they are applied to future growth in Cupertino. For example, as more houses are built, these homes will be subject to the 2013 Building Energy Efficiency Standards. As more employees move to Cupertino, these drivers will be using vehicles with higher fuel efficiency and cleaner fuels as a result of Pavley I and II and the Low Carbon Fuel Standard. Under this estimation method, there is no *expansion* of the scope of statewide actions to make them more stringent in the future, they are simply applied to a larger population group (i.e., community-wide population and employment growth). Based on these estimates, Cupertino would achieve community-wide emissions levels of 284,722 MT CO_2e/yr by 2035, representing a 7.3% reduction below baseline levels; far short of the City's target of 49% below baseline levels.

Figure 3.6 – 2035 Community-wide Target Progress



The second method for estimating future reductions (beyond 2020) from statewide actions assumes that the level of reductions from statewide actions in 2020 would remain constant through the future horizon years. In 2020, statewide actions provided 85% of the reductions needed to achieve the City's target. If statewide actions continued to provide this level of reductions in 2035, the City would achieve an emissions level of 164,480 MT CO_2e/yr, or 46.5% below baseline levels. As shown in Figure 3.7, this is much closer to the City's target of 49% below 2010 levels.

Figure 3.7 – 2035 Target Progress with Alternative Statewide Reduction Estimates



The following measure commits the City to regularly monitoring the actual reductions attributed to these statewide actions in the future to ensure that the reductions scenario shown in Figure 3.7 is realized and that the CAP's actions are modified in response to any potential shortcomings that are identified.

MEASURE 2035-1 LONG-TERM TARGET MONITORING

Regularly monitor progress made towards City's 2035 and 2050 targets through inventory updates and review of implementation success related to statewide actions.

Supporting Measure – Not Quantified

It is likely that the state will continue to develop actions and programs that will support achievement of its 2050 statewide reduction target, such as development and implementation of zero-net energy building requirements. However, at this time the potential future impact of those actions is unknown. Therefore, the City will continue to monitor the state's efforts designed to achieve its long-term 2050 reduction target. Should additional statewide actions be developed, or existing actions enhanced, that would have local application to Cupertino, then the City will analyze their local reduction potential and incorporate those reductions into future CAP updates.

The uncertainty regarding the future impact of statewide actions is only one of several variables that could influence the City's ability to achieve its longer-term targets. New technologies that further reduce energy or transportation-related emissions (e.g., more efficient appliance standards, fuel-efficient vehicles) may be developed between now and 2035. Further, existing

technologies may also become more effective or financially viable, which could accelerate their purchase and use within the community. One example is the cost and ubiquity of solar photovoltaic panels, which have experienced exponential market growth during the last few decades. To that end, increased residential and commercial renewable energy deployment could be a large source of future emissions reductions when compared to current conventional grid-sourced energy resources.

Additional local CAP measures may also be developed during future plan updates, or CAP measures may be implemented at higher rates than previously estimated. The 2035 reduction estimates are based on the best available data and assumptions, but the future is difficult to predict accurately. Regular emissions inventory updates will be the best predictor of future target achievement, and will help the City to identify emissions sectors that need additional attention. They will also help to maintain future CEQA streamlining benefits by demonstrating that the City remains on a trajectory towards the CAP's long-term emissions reduction targets.

Similarly, future target achievement is based on numerous growth estimates, including future year population and employment levels envisioned in the General Plan Amendment, which may or may not be accurate. If the City grows faster than anticipated in the emissions inventories, it will become harder to achieve long-term targets without deeper implementation of CAP measures. However, if the City grows more slowly, so too will its emissions; potentially making future targets easier to achieve through implementation of this CAP. All of these uncertainties illustrate the need for regular monitoring and revisions to the CAP, the City's emissions inventories, and reduction strategies. See Chapter 7 for further discussion of how the City should ensure the CAP's relevance in the future.

Measure 2035-1 Implementation Table

	Action	Status	Responsibility	Timeline
A	Prepare emissions inventory updates on 2-3 year cycle to ensure real progress is being made towards reduction targets; prepare updates in 2020, 2035, and 2050 to correspond directly with target years; during each inventory update year, consider need for implementation of long-term reduction opportunities described in following section (future statewide actions may make some of these strategies redundant)	P	Sustainability Division	
B	Develop process for updating statewide reduction estimates as part of future inventory updates to show actual BAU and ABAU emissions levels achieved, which can be compared to estimates described in Chapter 2 of this CAP	P	Sustainability Division	
C	If discrepancy is discovered between actual reduction results and estimated levels due to fewer reductions from statewide actions, identify which statewide actions are not performing optimally and strengthen related local CAP measures or develop new local actions to close reductions gap	P	Sustainability Division	
D	Incorporate updated BAU and ABAU inventories into regular CAP implementation progress reports to ensure most current information is considered during these status meetings when developing future courses of action	P	Sustainability Division	

LONG-TERM REDUCTION OPPORTUNITIES

As part of the CAP development process, several measure options were considered that would provide long-term reduction opportunities and would require regional collaboration for successful implementation. These additional measures could be applied to the estimated statewide and local actions included in this CAP to demonstrate a pathway towards future target achievement. However, these options were not developed with the same level of detail as the local CAP measures included in this chapter and are provided here for informational purposes only for future CAP update consideration. Rough estimates of future emissions reduction potential were calculated using readily-available data and studies. Additional analysis will be required to ensure their feasibility for local implementation, and should be developed during future CAP updates.

These measures are included here so that conversations with regional partners and local residents can begin early, with the hope that some or all of the measures are ready to begin implementation by 2020.

PG&E Green Option

2035 Reduction Potential (Municipal participation at 100%): 869 MT CO_2e/yr
2035 Reduction Potential (10% community-wide participation): 4,750 MT CO_2e/yr

PG&E is in the process of finalizing its proposed Green Option Program, which will allow customers to voluntarily purchase up to 100% renewable electricity (learn more at: http://www.pge.com/greenoption/). The California Public Utilities Commission (CPUC) still needs to respond to PG&E's proposed program before implementation can occur. If approved, PG&E expects the program to be available for subscription within a few months following approval. The program is currently expected to be capped at 272 MW of demand and for a five-year pilot program. It is currently unknown how participation will be granted should the program become fully-subscribed.

The City could consider participating in this program so that 100% of municipal electricity is generated from renewable sources. Though municipal emissions only represent a fraction of total community-wide emissions, this program provides an opportunity to demonstrate regional leadership in renewable energy procurement and emissions reductions. Residents and local businesses will be able to voluntarily participate in this program. A similar program offered by the Sacramento Municipal Utility District currently has an approximately 10% voluntary participation rate.

City Actions to Consider

- Conduct feasibility study of PG&E Green Option financial costs (per kilowatt hour (kWh) costs have not been finalized yet as part of program development) for City to purchase part or all of its electricity from renewable sources
- Evaluate benefits to City participation

- Develop resolution to opt into PG&E Green Option program for municipal electricity purchases (Note: program is currently capped at 272 MW and as 5 year pilot program; it is currently unknown how enrollment decisions will be made should program become fully subscribed
- If pursued, advertise the City's voluntary participation to encourage local residents and businesses participation

Community Choice Energy Option

2035 Reduction Potential (75% community-wide participation): 56,875 MT CO_2e/yr

This option is included above as a stand-alone measure to highlight its importance for long-term target achievement. As described in Measure C-E-7, community choice energy allows a city or cities to supply electricity to customers within their borders through the establishment of a CCE. CCE's are typically designed as an opt-out program, meaning that all residents and businesses within its boundaries are automatically enrolled in its service with the ability to opt out and remain with PG&E as their utility provider. This type of enrollment is one reason that CCE programs enjoy high participation rates. For example, Marin Clean Energy began serving customers in May 2010, and currently procures electricity for 75% of electric customers in Marin County. The City could consider participating in regional conversations regarding opportunities and challenges to establishing a regional CCE district.

Strategies that decrease electricity-related emissions, such as a CCE or the PG&E Green Option program will have a direct impact on the reductions associated with energy-conservation measures described throughout this CAP. For example, if Cupertino were to purchase 100% clean electricity for municipal operations, then there would be no additional emissions reductions associated with high-efficiency lighting retrofits. The electricity used by the lighting would already be emissions-free, so using that electricity in a more efficient manner would have no additional impact on the City's emissions. The City could see reductions in operation and maintenance costs related to reduced electricity use though, which might substantiate additional energy-conservation projects under that type of scenario. Because these clean electricity-related strategies have such overlap with other CAP strategies, the reduction estimate presented for the CCE option cannot simply be added to the other 2035 reduction estimates presented in this chapter. Additional analysis would be required to determine the level of overlap among CAP strategies, and what continued role, if any, the state's RPS would play in achieving Cupertino's reduction targets.

City Actions to Consider

- Collaborate with regional partners to evaluate feasibility for CCE development (e.g., start-up costs, funding sources, legal considerations, participation estimates)
- If deemed viable, create or join a CCE development program to expand grid-tied renewable energy options for municipal facilities, homes, schools, and businesses

Alternative Fuel Vehicles

2035 Reduction Potential: 15,850 MT CO_2e/yr (*Note: this is in addition to reductions estimated from Measure C-T-7)*

Advancements in alternative fuel vehicle technologies make long-term market adoption seem likely. As described in Measure C-T-7 above, there are actions the City can take to facilitate this market transition, including pre-wiring requirements in new construction for electric vehicle charging stations, additional installation of public charging/refueling infrastructure, and dissemination of information on alternative fuel vehicles. The reduction potential shown above is dependent upon decreasing vehicle costs resulting from further technological advancement and increasing market adoption that brings to bear economies of scale in automotive manufacturing. This estimate includes a transition away from gasoline and diesel vehicles to plug-in hybrid electric vehicles, battery-electric vehicles, and compressed natural gas vehicles throughout the range of vehicle class categories (e.g., passenger cars, light duty trucks, buses).

As the use of electric vehicles increases, it will become more important to clean the electricity grid in order to maximize the emissions reductions associated with this type of alternative fuel vehicle.

City Actions to Consider

- Research best-practices in facilitating market shift towards alternative fuel vehicles through local policies
- Participate in regional collaboration on alternative fueling infrastructure procurement and policy-setting
- Explore opportunities to transition municipal fleet vehicles to alternative fuel vehicles

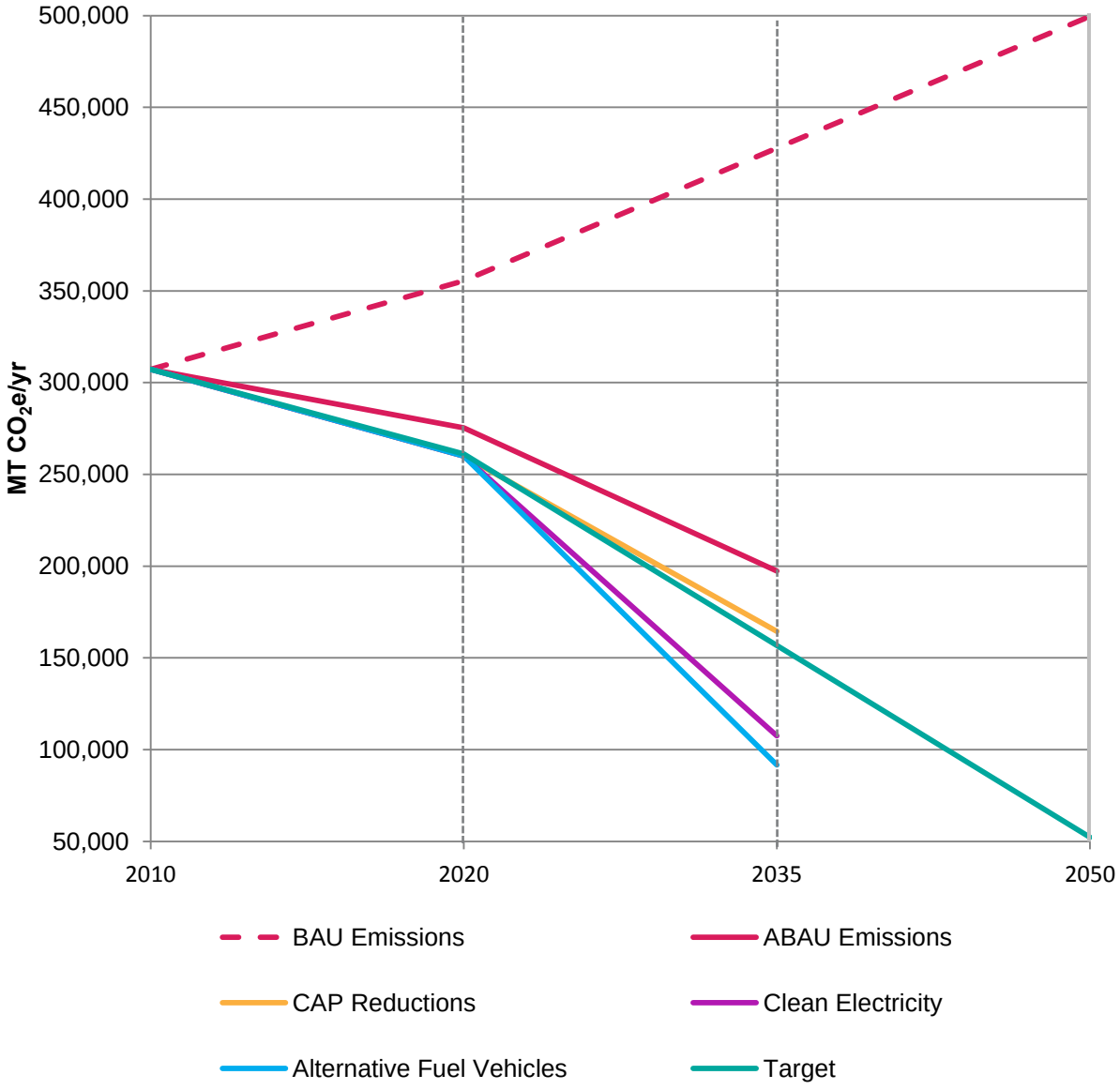
Figure 3.8 shows that development and implementation of these measures (excluding the PG&E Green Option to avoid double-counting with the CCE program) would **exceed** the 2035 target. Combined with the reduction estimates in Table 3.1, these additional measures would achieve an emissions level of 91,755 MT CO_2e/yr, or approximately 70% below baseline levels. As shown in Figure 3.8, this would put the City's emissions on a downward trajectory towards the 2050 target, though the overlapping impact of the reduction estimates was not forecasted through 2050 as part of this project, and would be highly speculative at this point. Figure 3.8 incorporates the more aggressive statewide reduction estimates described above. It is likely that there will be substantial overlap between the state's enhanced actions to achieve such reduction levels and the two additional reduction opportunities described in this section. When planning for deep emissions reductions, as would be required to achieve the 2050 reduction target, strategies need to focus on the energy and transportation sectors by necessity, as they represent 88% of the community's total emissions. It is likely that in pursuit of its long-term targets, the state will increase the requirements of the RPS or develop additional policies or programs that achieve the same result: zero emissions in the electricity grid. Similarly, no long-term target can be achieved without aggressively addressing vehicle-related emissions, either

through substantial efficiency improvements, broad shifts towards emissions-free technologies, or both. The state is likely to pursue these types of strategies in the future, which would have an overlapping effect on the reduction estimates presented here from implementing a CCE and supporting widespread community shifts towards alternative fuel vehicles.

The City will need to monitor the status of future state-level efforts and their impact on the City's reduction strategies as part of the CAP's ongoing maintenance. As the direction of new state action becomes clear, the City can identify any remaining local reduction opportunities for consideration. Alternatively, the state may make significant strides toward its long-term target (i.e., through enhanced actions/programs or development of new ones) such that local emissions reduction planning becomes less important.

At the very least, Figure 3.8 provides a framework to demonstrate what it will take to mirror the state's aggressive long-range targets at the local level. The largest reduction opportunities, known at this time, are likely to come from cleaner electricity sources and a large-scale shift towards alternative-fuel vehicles, which couples well with these long-term measures provided here for the City to track during future CAP updates.

Figure 3.8 – Long-Term Reduction Options



CHAPTER 4
LOCAL GOVERNMENT REDUCTION MEASURES

This chapter describes the measures and actions that the City could implement to reduce greenhouse gas emissions to achieve its municipal operations targets. The chapter provides a description of the CAP measure development process, a summary of the emission reductions anticipated from implementation of each proposed measure, a discussion regarding estimated achievement of the City's 2020 emissions reduction target, and recommendations for putting the City on a pathway toward reaching its 2035 and 2050 targets. The remainder of the chapter provides detailed descriptions of the individual measures and implementation actions.

Purpose of the Municipal Operations Strategy

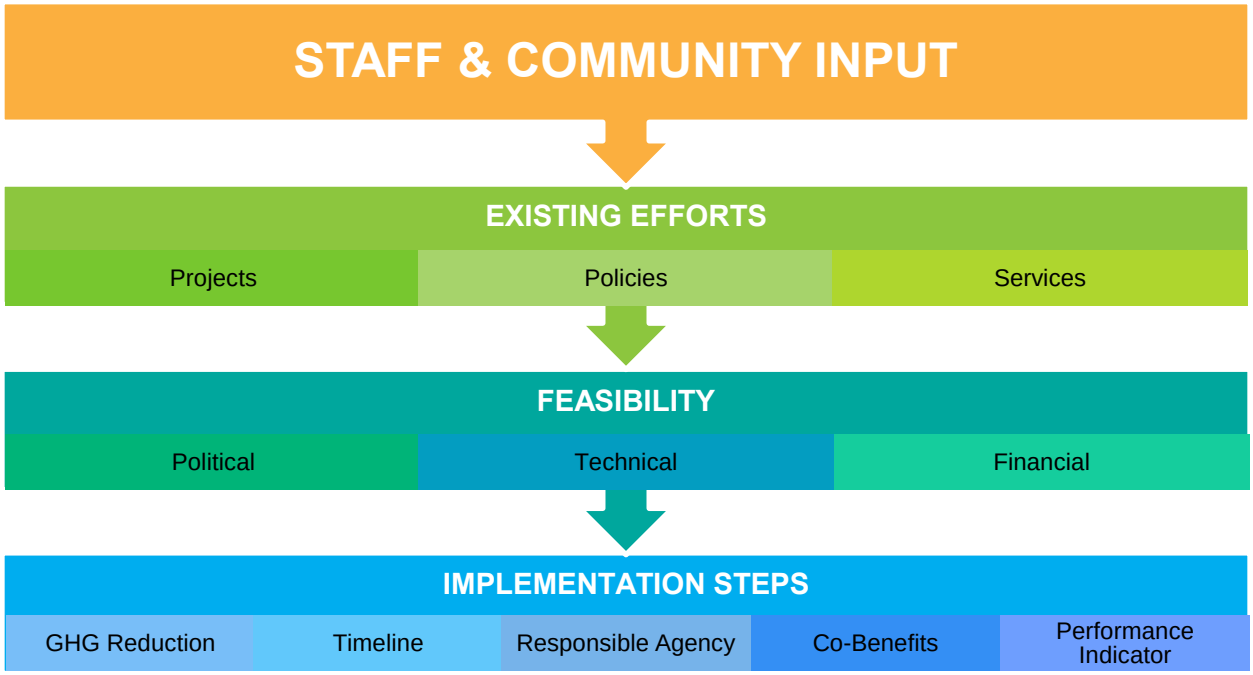
The City of Cupertino has a long tradition of leading by example. This section presents municipal operations strategies that define actions for City leaders, department managers, and staff to reduce greenhouse gas emissions resulting from internal operations (i.e., government buildings, facilities, and vehicle fleet). In addition to the emission reduction benefits, implementation of the measures contained within this chapter will lower energy, water, and fuel costs; reduce exposure to future energy cost increases; and improve government service delivery. City staff assisted in development of the CAP to identify priority actions and implementation steps, key performance targets, and departmental responsibility for its implementation.

Measure Development Process

The purpose of the municipal operations measures is to define future actions and implementation steps that the City could take to reduce its own emissions. The City conducted the following steps to develop the measures and actions contained within this chapter:

As part of the Santa Clara County-led regional climate planning project, City staff were provided a list of GHG reduction best management practices (BMP) developed from a review of regional, national, and international cities (see Appendix D). Staff first identified which projects, policies, or practices from the BMP list were already in place and/or planned for near-term implementation in Cupertino. Measures were also reviewed with residential and business stakeholders as part of the City's community-wide CAP planning efforts, to gauge their priorities for future agency operations. Preliminary measures were then refined based on perceived political, technical, and financial feasibility (see Figure 4.1). Finally, each selected measure was evaluated to gauge its relative effectiveness by calculating GHG emissions reduction benefits, and developing implementation timelines, departmental responsibility, and additional benefits (i.e., "co-benefits") that will arise from implementing the measures.

Figure 4.1 – Municipal Operations Measure Development Considerations



During the development of the CAP, staff identified a wide range of efforts the City has already implemented to reduce energy and water use, improve vehicle efficiency, and reduce solid waste. These existing and past efforts provide a foundation for the development of additional future actions, and were reviewed to identify opportunities for expanded implementation and development of new actions. Some existing actions have the potential for expansion or increased adoption within the City's operational framework, and are included in the CAP's measure discussion below, such as shifting the municipal fleet towards alternative vehicles. Some past actions may not be candidates for expansion at this time, but are still briefly described in the CAP text and have been quantified to take credit for their ongoing emissions reduction contributions, such as the City's initiative to retrofit its streetlights to high-efficiency technologies. And finally, some past actions were taken prior to the CAP's 2010 baseline year and cannot be included as reductions for purposes of this plan, such as the retrofit of traffic signals. However, these pre-2010 actions led to lower 2010 baseline emissions than would otherwise have been possible without their implementation. Therefore, while this CAP and the City's emissions reduction targets are based on the most current municipal operations inventory for 2010, the City's past actions have already set it on a path towards mirroring California's statewide reduction targets. This CAP can capture the reduction potential of City actions taken since 2010 and those estimated for future implementation, but falls short of documenting the full impact of the City's efforts towards reducing emissions through improved operational services prior to 2010. Table 4.1 lists the City's past and existing actions that were considered during CAP development.

Table 4.1
Existing City Emissions Reduction Initiatives

FACILITIES

Existing Building Energy and Water Retrofits

- Green Building Standards
- Building Energy Benchmarking
- Building Energy Audits
- Indoor Building Lighting Retrofits
- Exterior Building Lighting Retrofits
- Advanced Lighting Controls / Monitoring Systems
- Building Systems Retrofits (e.g., HVAC)
- Building Envelope Retrofits
- Low-Flow Fixtures / Low-Flow Toilets at Public Facilities

New Building Energy Performance

- Green Building Standards
- Building Energy Use Benchmarking

Conservation / Energy Management through Behavior

- Energy Efficient Procurement Policy – ENERGY STAR Appliances
- Energy Management Systems – Office Equipment
- Energy Consumption Data Collected per Building / Facility
- Employee Information / Education

Public Realm Lighting Efficiency

- Traffic Signal Retrofits
- Street Light Retrofits
- Parking Lot Lighting Retrofits
- Park Facility Lighting Retrofits

Landscape Water Conservation

- Water Conservation Plan for Public Parks
- Climate-Sensitive and Water Efficient Irrigation Technology
- Advanced Irrigation Training for Parks Staff
- Green Grounds Policy (e.g., Watering Schedules, Plant Selection)

VEHICLE FLEET

Efficient and Alternative Fuel Vehicles

- Fuel Efficient Vehicle Procurement Policy
- Hybrid and Electric Vehicles
- Electric Vehicle Charging Stations

Behavior / Fuel Conservation

- Anti-Idling Driver Policy

SOLID WASTE

Waste Reduction

- Green Procurement Specifications
- Waste Reduction and Diversion Goals
- Paperless Office Policy / Program
- Zero Waste Strategy
- Waste Audits / Surveys and Diversion Tracking at Municipal Facilities

Food Scrap and Compostable Paper Diversion

- Municipal Collection and Composting Program

Landscape Waste Diversion

- On-Site Landscape Waste Reduction Program
- Municipal Landscape Waste Composting Program
- Waste Management Training for Park Department Staff / Groundskeepers

Construction and Demolition (C&D) Waste Diversion

- C&D Waste Diversion Ordinance – 50% Diversion

Reduction Strategies

The municipal reduction strategy is designed to achieve the City's 2020 target for emissions reductions 15% below its 2010 baseline level, as described in Chapter 2. As with the community-wide strategy presented in Chapter 3, the municipal operations strategy is organized into strategy areas with goals, measures, and actions. In this chapter, the high-level goals correlate to three reduction sectors: Facilities, Vehicle Fleet, and Solid Waste. It should be noted that no separate Water goal is included due to the relatively low emissions reduction potential associated with water conservation and the fact that the primary purpose of a CAP is to identify emissions reduction opportunities. However, a measure that addresses water use in landscaping is included within the Facilities sector (see Measure M-F-7). Within the three strategy areas, reduction measures define a pathway for achieving the overarching goals. Actions then describe the specific steps the City will take to implement each measure.

Cupertino's **BOLD** municipal operations reduction goals are:

GOAL 1 –IMPROVE FACILITIES:

Transform facilities into models of technology demonstration and conservation.

GOAL 2 –CONVERT VEHICLE FLEET:

Pursue employee commute and fleet alternatives to encourage multi-modal mobility and support a community-wide shift toward alternative fuel vehicles.

GOAL 3 – REDUCE SOLID WASTE:

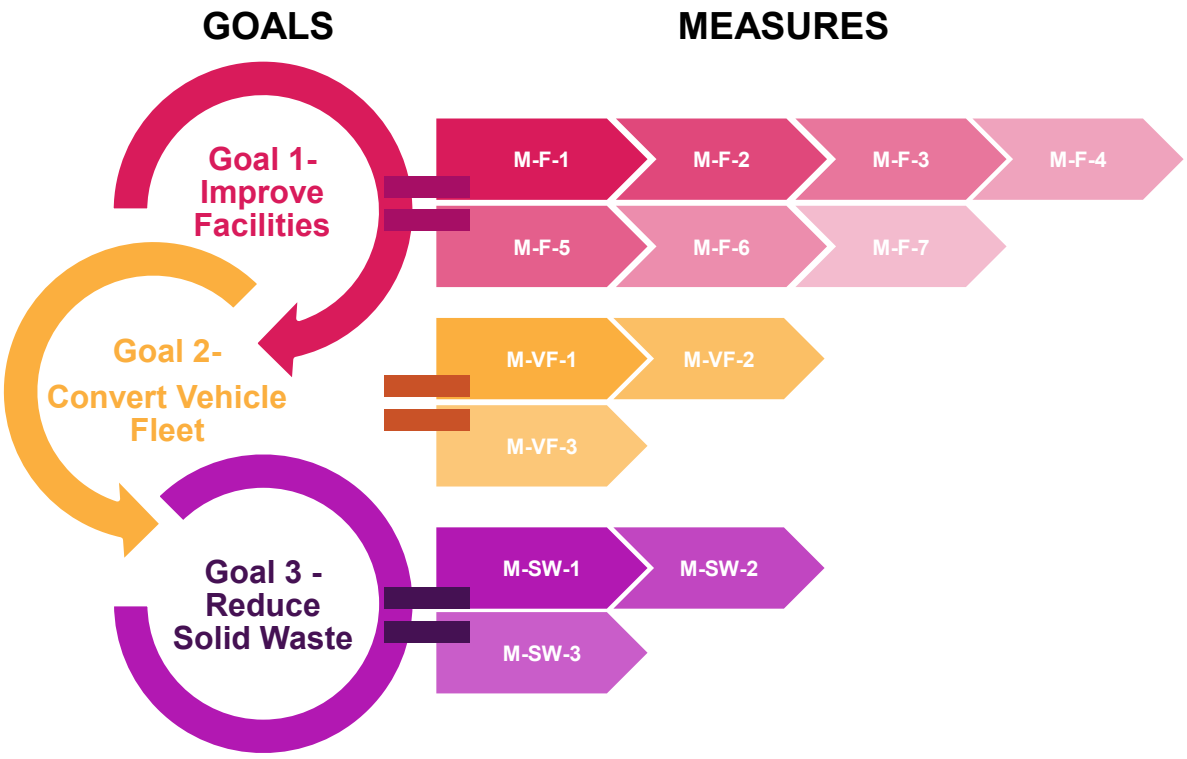
Effectively manage materials to shift behavior, consumption, and lifecycle impacts.

Municipal Operations Reduction Measures

This chapter presents 15 municipal operations reduction measures, which are grouped according to the three municipal operations goals. As with the community-wide strategy, the majority of the City's measures are focused on the energy and transportation via the Facility and Vehicle Fleet strategies because, as shown in Chapter 2, as these represent the greatest emissions sources in the City and therefore provide the best opportunities for deep emissions reductions. Figure 4.2 illustrates the interlocking municipal operations reduction goals and their corresponding measures. The "M" in the measure numbers indicates it is a municipal operations

measure (as opposed to “C” for community-wide as is used in Chapter 3), while the next letter(s) identifies with which goal the measure is associated.

Figure 4.2 – Hierarchy of Goals, Measure, and Actions



Summary of Reductions

Figure 4.3 illustrates the relative magnitude of each goal in terms of its emissions reduction potential by 2020. As shown, Facilities measures contribute nearly 80% of the total reductions estimated to occur by 2020 as a result of CAP implementation. The Vehicle Fleet and Solid Waste measures each contribute approximately 10% of total reductions. This breakdown corresponds with the City’s emissions inventory that shows energy-related emissions contributing nearly 70% of total municipal emissions, as well as with the technological and financial realities inherent in attempting to shift towards cleaner vehicle fleet options in the near term.

Figure 4.3 – Municipal Reduction Measures Contribution by 2020

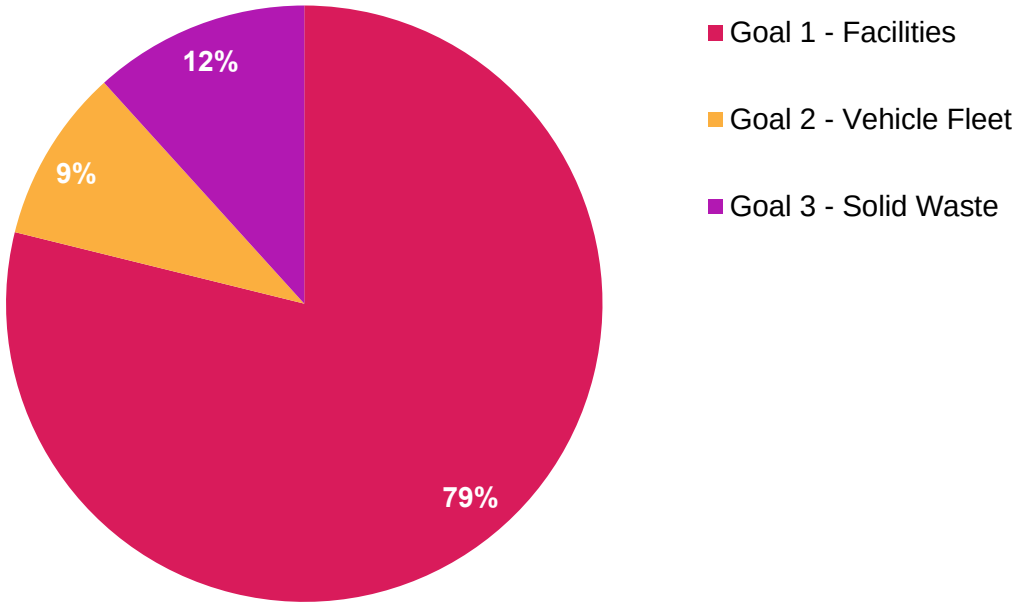


Table 4.2 presents an overview of the 14 proposed municipal CAP measures (including one statewide measure) that are presented in greater detail later in this chapter. Where possible, emissions reduction estimates have been provided. In some instances, it was not possible to calculate the specific impact of implementing certain measures, even though those measures are important to the overall success of the City's CAP. These measures have been identified as "*Supporting Measures*" in Table 4.2 and throughout this chapter (sometimes referred to as *Supporting Actions* depending on the context), and are treated with the same level of detail and importance as the quantifiable actions within this chapter. To illustrate the measures' relative contribution towards the City's target, the column titled *Contribution to 2020 Target* was calculated based on the City's BAU emissions forecasts and targets described in Chapter 2. At the bottom of the table, the identified reductions are compared to the amount needed to achieve the City's 2020 target. As shown, this CAP estimates that the City will achieve its 2020 municipal operations reduction target with a 34.9% reduction below 2010 levels. Further discussion of near-term target achievement and the pathway towards long-term target achievement are presented at the end of this chapter.

Table 4.2
Municipal Operations Measures and Quantified Reductions

Reduction Goals and Measures	2020 Reductions (MT CO_2e/year)	Contribution to 2020 Target
IMPROVE FACILITIES	**552**	**160%**
M-F-1 Sustainable Energy Portfolio	-[1]	
M-F-2 Renewable or Low-Carbon Electricity Generation	108	31%
M-F-3 Advanced Energy Management	91	26%
M-F-4 Existing Building Energy Retrofit	41	12%
M-F-5 New Building Energy Performance	Supporting Measure	
M-F-6 Public Realm Lighting Efficiency	125	36%
M-F-7 Landscape Water Conservation	1	0%
Statewide Actions	186[2]	54%
CONVERT VEHICLE FLEET	**66**	**19%**
M-VF-1 Low Emission and Alternative Fuel Vehicles	48	14%
M-VF-2 Alternative Fuel Infrastructure	Supporting Measure	
M-VF-3 Behavior / Fuel Conservation	19	5%
REDUCE SOLID WASTE	**82**	**24%**
M-SW-1 Waste Reduction	64	18%
M-SW-2 Food Scrap and Compostable Paper Diversion	16	4%
M-SW-3 Construction and Demolition Waste Diversion	2	1%
TOTAL 2020 CAP REDUCTIONS	**700**	**202%**
Reduction Target	15% below baseline	
Reductions Needed in 2020	346	
Estimated Reduction Level below 2010 Baseline	34.9%	

Notes: Columns may not total to values shown due to rounding

[1] Emissions reductions associated with implementation of Measure M-F-1 were omitted from the Facilities Sector subtotal for 2020; See the Measure M-F-1 discussion for more information on its role in future target achievement.

[2] The Renewable Portfolio Standard requires California's utilities to provide 33% of their electricity from renewable sources by 2020. Several CAP measures, if implemented, would result in lower municipal electricity use in 2020 than that estimated in the emissions forecasts shown in Chapter 2. To avoid double-counting the cumulative effects of each measure, this table presents the RPS reductions assuming full implementation of Measures M-F-2 through M-F-7 by 2020. If any of these measures are not fully implemented by 2020, then reductions associated with the RPS would increase as a greater amount of electricity demand would be subject to the effects of this regulation. This table further assumes that Measure M-F-1 is not implemented prior to 2020. If Measure M-F-1 is implemented prior to 2020, then reductions associated with the RPS would decrease based on the level of clean electricity purchased as part of Measure M-F-1.

Impact of Past City Actions

Some of the existing City initiatives shown in Table 4.1 appear in Table 4.2 as well. These include the actions implemented after the CAP's 2010 baseline year. Since future year emissions forecasts are based on the baseline inventory, the emissions-reducing impact of these past actions would not be represented in the baseline inventory or emissions forecasts, and can therefore be counted towards achievement of the 2020 reduction target. The City has monitored the results from several of these actions, and was able to quantify their associated reductions. Incorporation of these reductions helps to provide a comprehensive representation of what additional actions will be required of the City to achieve its 2020 target.

Table 4.3 presents the reductions and contribution towards the 2020 target for those past City actions that have sufficient implementation data and a methodology for calculation. The most significant past action to achieve municipal emissions reductions was the City's upgrade of municipally-owned streetlights to higher efficiency technologies. This action provided one-third of all reductions needed to achieve the 2020 municipal operations target. Other actions included retrofitting parking lot and park path lighting, installing weather-based irrigation controllers, replacing older municipal vehicles with hybrid-electric models, and implementing the state's construction and demolition diversion requirements. The total impact of these past actions contributes nearly 50% of reductions needed to achieve the 2020 emissions target.

Table 4.3
Impact of Past City Actions 2010-2014

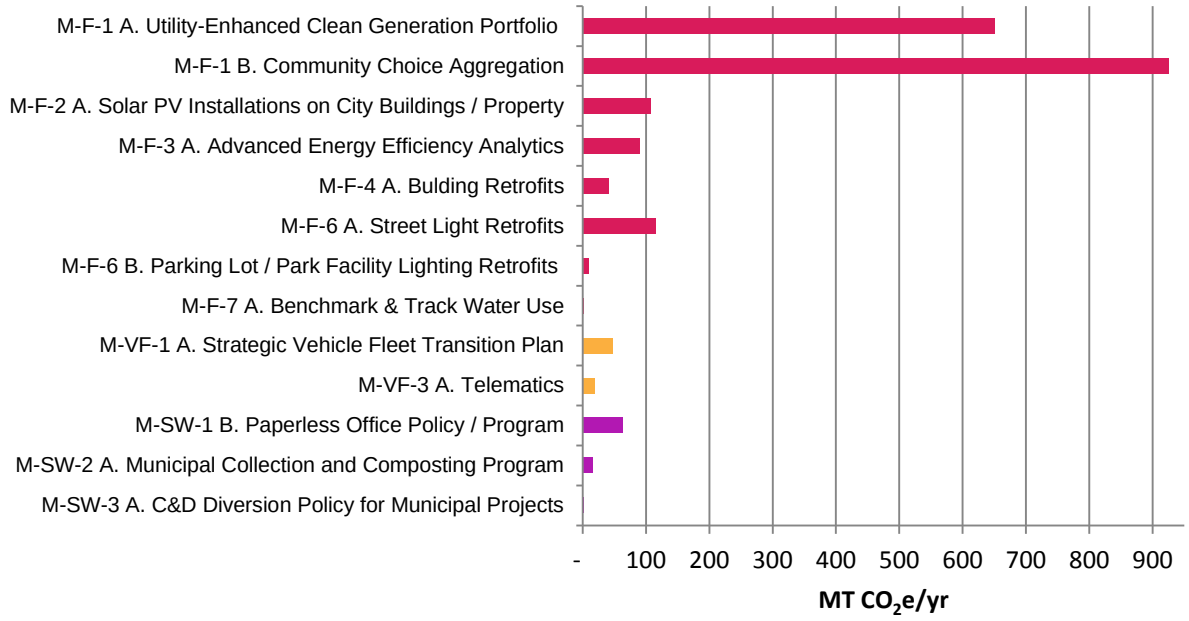
Reduction Measure / Action	2020 Reductions (MT CO_2e/year)	Contribution to 2020 Target
IMPROVE FACILITIES	**167**	**48%**
M-F-4 Existing Building Energy Retrofit		
A. Building Retrofits	*41*	*12%*
M-F-6 Public Realm Lighting Efficiency		
A. Street Light Retrofits	*115*	*33%*
B. Parking Lot and Park Facility Lighting Retrofits	*10*	*3%*
M-F-7 Landscape Water Conservation		
A. Irrigation System Improvements	*1*	*0%*
CONVERT VEHICLE FLEET	**5**	**1%**
M-VF-1 Low Emission and Alternative Fuel Vehicles		
A. Strategic Vehicle Fleet Transition Plan	*5*	*1%*
REDUCE SOLID WASTE	**1**	**0%**
M-SW-3 Construction and Demolition Waste Diversion		
A. C&D Diversion Policy for Municipal Projects	*1*	*0%*
TOTAL REDUCTIONS from PAST CITY ACTIONS	**173**	**49%**

As previously mentioned, the City has long been a leader in resource efficiency and has taken many actions beyond the few that are shown in Table 4.3. Some of these actions were undertaken prior to the 2010 baseline year, and their results are reflected in the CAP's baseline inventory. Others lack data to be accurately quantified or their results cannot be separated from the broader municipal emissions trends in the inventory, such as the City's energy efficient procurement policy or advanced irrigation training for Park Department staff. In any case, the most efficient way to track the success of the City's actions is to regularly update its municipal inventory to verify that emissions are, in fact, trending lower in the future, and collect metrics on its program and project achievements to further inform this effort.

Impact of New Municipal Reduction Actions

Table 4.2 and Figure 4.3 both show that the Facilities measures have the largest emissions reduction potential for 2020, which corresponds to its share of the emissions inventory (e.g., 70% of total emissions in 2010). Figure 4.4 below shows the relative impact of the specific quantified actions presented later in this chapter. Facilities sector measures are anticipated to reduce emissions by approximately 550 MT CO_2e/year. This estimate surpasses the 2020 target, and represents nearly one-third of reductions needed to achieve the City's 2050 target. Though not included in the 2020 total reduction estimate, the actions associated with Measure M-F-1 would result in cleaner electricity used in municipal operations, and provide the greatest opportunity for large-scale emissions reductions. The Solid Waste measures contribute approximately 90 MT CO_2e/year, or one-quarter of the 2020 target. The Vehicle Fleet sector measures are anticipated to reduce emissions by approximately 50 MT CO_2e/year, or 13.0% of total reductions needed by 2020.

Figure 4.4 – Comparative Emission Reduction Potential of CAP Actions (2020)



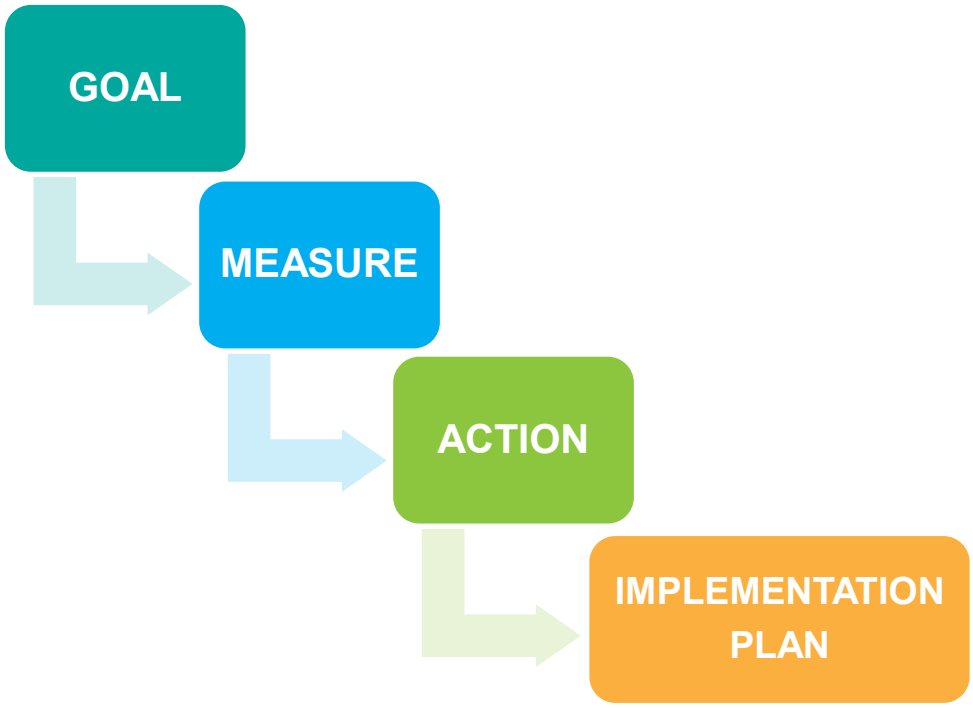
Emissions Reduction Measures

The remainder of this chapter presents the municipal operations goals, measures, and actions organized by strategy area (i.e., Facilities, Vehicle Fleet, Solid Waste). Each strategy area section begins with an overview of the corresponding measures and actions. Then, each measure is presented individually, with a narrative describing the details of the measure and supporting action(s), including related past actions taken by the City. Each measure concludes with a detailed implementation table that:

- lists the implementation steps and their current implementation status,
- identifies the City department responsible for implementation,
- provides the emissions reduction potential and performance indicator upon which the emissions reductions were calculated (where applicable),
- highlights co-benefits related to the action's implementation, and
- suggests an implementation timeframe for the action.

Figure 4.5 illustrates the relationship of the goals, measures, actions, and implementation plans. Several of these implementation table features are described in more detail below to introduce the icons and terminology used throughout this chapter.

Figure 4.5 – Reduction Strategy Hierarchy



Implementation Steps, Status, and Department Responsibility

Implementation steps identify how the City will advance each action. The implementation table also identifies responsible departments that would be best positioned to lead or provide essential input for implementation of certain tasks. Key implementing departments and divisions include the following (highlighted in green below):

Department	Division					
City Manager	Sustainability	Economic Development	Public Affairs	City Clerk		
Community Development	Planning	Building	Housing Services			
Public Works	Capital Improvement Program	Facilities	Grounds & Fleet	Streets	Transportation	Trees & Right of Way
Recreation & Community Services	Facility & Community Events	Neighborhood Services	Senior Programs	Sports & Fitness	Youth & Teen Programs	
Admin Services	Human Resources	Finance				

The status column indicates whether an implementation step is an existing City priority or a new item proposed by the CAP. Measure status is indicated with the icons shown below:

Existing City Actions

Proposed New Actions

GHG Reduction Potential

The estimated annual emissions reduction potential of each quantifiable action is provided for 2020 in MT CO_2e/yr. Measures or actions identified as "Supporting" contribute to GHG reductions and are an important component of this CAP, but currently lack a methodology to quantify their individual emissions reduction potential.

PROGRESS INDICATORS

Progress indicators describe the specific action that is being quantified to estimate the reduction potential. These indicators enable City staff, the City Council, and the public to track implementation and monitor overall CAP progress. Progress indicators are provided for 2020, and are specifically described when possible (e.g., 100% of municipal electricity comes from a portfolio of 75% renewable sources). Progress indicators are not provided for supporting measures, which do not have quantifiable emissions reductions.

CO-BENEFITS

As previously described in Chapter 3, the co-benefits identified in this CAP highlight the various additional outcomes that could occur as a result of measure implementation, beyond emissions reductions. The same co-benefit icons from Chapter 3 are used here to illustrate these overlapping outcomes. Figure 4.6 shows the co-benefits and their corresponding icons used throughout this chapter.

Figure 4.6 – Municipal Operations Measure Co-Benefits

IMPLEMENTATION TIMELINE

Timeline icons used in the implementation tables indicate when each implementation step should occur based on the following four timeframes:

On-going items are actions the City already performs or programs the City already offers that should be continued in the future.

Near-term items are those that should be pursued immediately, within a 1-2 year timeframe following CAP adoption.

Medium-term items will help to achieve the 2020 reduction target, and should be pursued within 3-5 years following CAP adoption.

Long-term items will help provide broader measure implementation, but are not critical to immediate success; these items include actions that can be started now and will take 5+ years to complete, or can be actions that do not require implementation consideration for at least 5 years.

FACILITIES STRATEGY

GOAL 1 – IMPROVE FACILITIES:

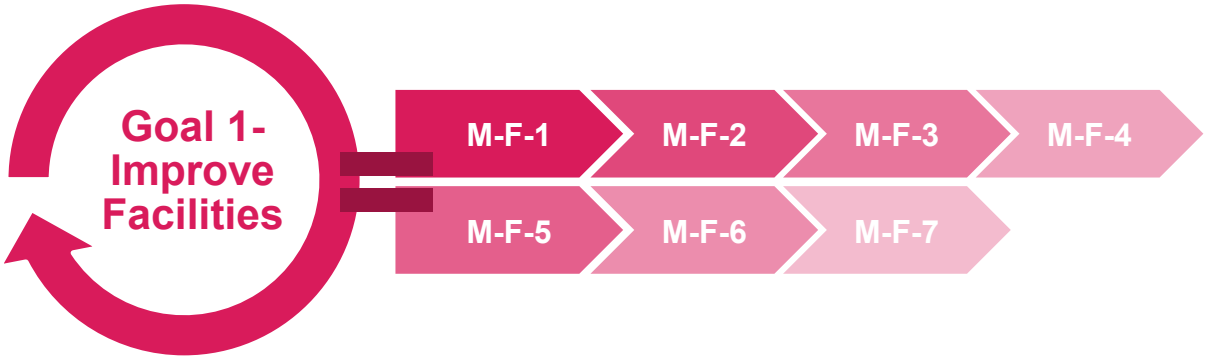
Transform facilities into models of technology demonstration and conservation.

Facility sector emissions represented approximately 70% of total municipal emissions in 2010. Energy emissions arise from the electricity and natural gas used to power the City's buildings and facilities. Electricity from the public utility grid is generated from a variety of sources, including natural gas and coal power plants, hydro-electric generators, wind farms, and large-scale solar facilities. The mix of energy sources used to supply the grid is one factor used to calculate the City's energy-related emissions. Electricity powers the City's building and facility lighting, air conditioning, computers, and other office equipment that support daily operations. Electricity is also used to power the City's public lighting, including streetlights, traffic lights, municipal parking lot lights, and park and recreational lighting. Energy-related emissions also include natural gas used for indoor space heating and hot water use, heating public pool water, and other operations.

The City has already taken a number of steps to reduce energy emissions through energy-efficiency improvements. Existing buildings and facilities have been made more energy-efficient with indoor lighting retrofits, lighting occupancy sensors, office equipment energy management systems, and streetlight and traffic signal retrofits. The City has also reduced landscape irrigation water use with the installation of weather-based sprinkler systems, which help prevent the overwatering of parks, medians, and other public landscape areas if the soil is already wet or rain is expected. Ongoing planning for municipal solar photovoltaic systems could provide opportunities to meet a portion of the City's electricity demand from clean, renewable, and local sources.

The City has also demonstrated a leadership role through policy and operational guidance, including adoption of its Green Building Ordinance, which requires new construction and significant retrofits in the City (including municipal buildings) to meet established green building standards. A municipal purchasing policy directs use of ENERGY STAR-rated appliances and equipment to increase operational efficiency.

This sector includes seven measures that expand upon the City's previous successes in energy efficiency improvements to help achieve its 2020 target, and establish a framework for achieving its 2035 and 2050 targets. The following measures will provide emission reductions through cleaner grid electricity; renewable energy development; additional existing building retrofits; enhanced standards for new building energy performance; operational improvements; lighting retrofits; and enhanced landscape irrigation.



Implementation of several Facilities measures would have overlapping influence on the City's emissions reduction potential. Measure M-F-1 describes two approaches to achieve the same goal of reducing electricity-related emissions (i.e., low-carbon electricity options), and it is assumed that the City would not pursue both of these actions simultaneously (see Measure M-F-1 discussion next). Similarly, implementation of actions that would result in cleaner electricity sources would have the dual effect of lowering the emissions reduction potential of other actions that reduce municipal electricity use. The result of using cleaner electricity in City operations means that electricity-conserving measures, such as lighting efficiency improvements, contribute relatively less to emissions reductions because these measures would result in lower consumption of already low-emissions or zero-emissions electricity. For purposes of this CAP, it was assumed that the City would not pursue implementation of the low-carbon electricity option described in Measure M-F-1A prior to 2020 because the sum of past and anticipated future City actions, combined with the state's Renewable Portfolio Standard, will achieve the near-term 2020 reduction target. However, PG&E's Green Option Program is expected to be approved and implemented prior to 2020. If the City chooses to voluntarily participate in this program to purchase clean electricity for municipal use, the emissions reductions identified for M-F-1A could be realized and included in support of the City's 2020 target achievement. Conversely, it is unlikely that a local community choice energy district would be developed and fully implemented by the 2020 target year, preventing the City from achieving the reductions estimated for Measures M-F-1B. Should this assumption prove incorrect, the City could achieve greater emissions reductions in 2020 than conservatively estimated here.

If the City pursues Measure M-F-1 to purchase 100% of municipal electricity from clean sources, it would reduce emissions by approximately 875 MT CO_2e/yr. If Measures M-F-2 through M-F-7 are pursued instead, their total reduction potential would be approximately 550 MT CO_2e per year (including reductions from the Renewable Portfolio Standard).

MEASURE M-F-1 SUSTAINABLE ENERGY PORTFOLIO

Procure low-carbon electricity through utility-based programs or participation in a Community Choice Energy District.

2020 GHG Reduction Potential: Up to 869 MT CO_2e/yr *(Note: Not included in progress toward 2020 target calculations)*

The greenhouse gas emissions attributed to electricity use are a direct result of the energy-generating sources contained within the electricity grid's portfolio. Shifting the grid's portfolio to cleaner energy sources (e.g. wind, solar, geothermal) will reduce emissions related to building energy use, such as lighting, mechanical systems, and office equipment. The Pacific Gas and Electric Company (PG&E) currently provides electricity and natural gas to all City buildings and

facilities, and is responsible for determining the grid's energy portfolio (note: The City also participates in ABAG POWER to purchase natural gas). This measure presents the City's opportunities to influence the portfolio mix of energy sourced and consumed to meet municipal energy demands.

There are two options to implement this measure, described as Actions A and B below, including purchasing cleaner electricity directly from PG&E through its forthcoming Green Option Program (i.e., Action A) or partnering with other area jurisdictions to develop a community power-purchasing energy district that can independently buy cleaner electricity (i.e., Action B). These actions are not necessarily mutually exclusive; though it is likely the City would not opt to pursue both. A potential third option would be for the City to develop its own grid-scale renewable energy projects (e.g., 5 megawatt (MW) solar PV system). However, this alternative was omitted during the CAP development process due to limited City-owned space for such a large installation, the feasibility of which was analyzed during Cupertino's recent involvement in two regional renewable energy procurement projects.

Measure M-F-1 would be further supported by other CAP measures and existing City actions that reduce electricity demand, either through energy-efficiency improvements or educational programs that promote energy conservation. Total reductions in electricity demand would lower the cost to participate in Actions A or B since the City would be purchasing less electricity at a premium price (e.g., the additional cost to purchase cleaner electricity from PG&E). Implementation of this measure could reduce emissions by as much as 869 MT CO_2e/year in 2020, depending on which measure the City selects and what proportion of clean electricity it chooses to buy. However, since the City's past actions combined with the Renewable Portfolio Standard are estimated to provide reduction levels that achieve the 2020 target it is assumed the City will not pursue implementation of Measure M-F-1 prior to 2020. However, a phased approach could be taken in which the City pursues M-F-1 Action A (i.e., participation in PG&E's Green Option program) in the near-term, while working on the longer-term implementation of M-F-1 Action B (i.e., development of a local Community Choice Energy program). The emissions reduction potential of the two actions is provided for informational purposes, and illustrates how effective clean electricity sources are at achieving reduction targets.

While emissions reduction associated with this measure are not needed to achieve the City's near-term reduction target, access to clean electricity will play a primary role in the City's ability to achieve its longer-term reduction targets. In addition, pursuit of Community Choice Energy (CCE) could be a lengthy process (i.e., approximately 8 years to study, form JPA, procure energy, offer service to customers in Marin County). If the City selects this approach to help achieve its longer-term reduction targets, there are early implementation steps that could be taken between now and 2020 to lay the foundation for this as a future option. It should also be noted that the CCE action has the potential to provide significant energy sector reductions at the community-wide level as well, which could help the City to achieve its long-term community-wide emissions reduction goals. The implications of pursuing this measure by 2050 are described at the end of this chapter in the section title *Trajectory towards 2035 and 2050 Targets*.

Action A. Support Utility-Enhanced Clean Generation Portfolio

PG&E is in the process of finalizing its proposed Green Option Program (see: http://www.pge.com/greenoption/), which would allow customers to voluntarily purchase 100% renewable electricity. If approved, PG&E expects the program to be available for subscription in 2015, within a few months following approval. The program is currently expected to be capped at 272 MW of demand and for a five-year pilot program. It is currently unknown how participation will be granted should the program become fully subscribed. The City should begin to explore the potential feasibility of this program, including cost implications, as information becomes available from PG&E, so that a decision to participate can be made shortly following CPUC approval.

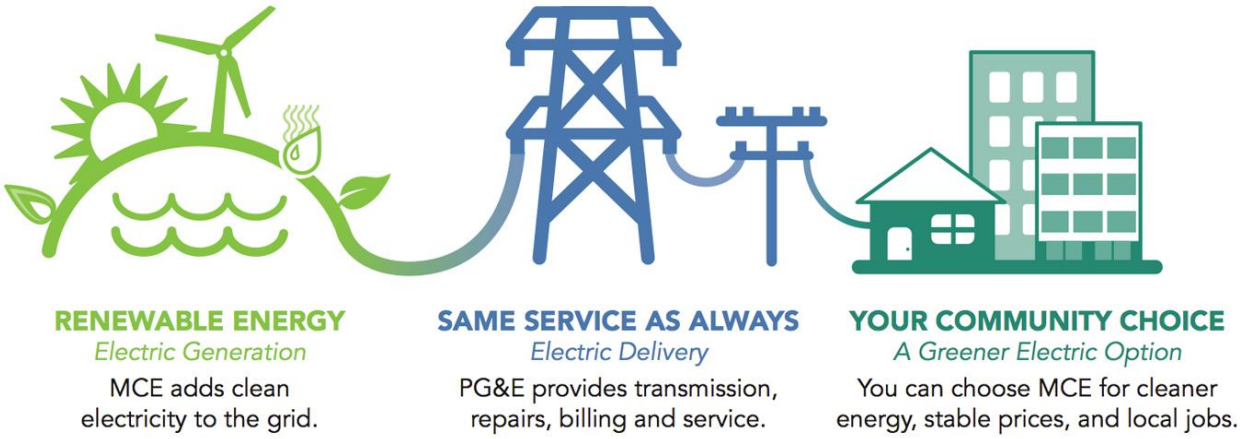
M-F-1 Action A. Support Utility-Enhanced Clean Generation Portfolio		
Implementation Steps	**Status**	**Responsibility**
• Conduct feasibility study of PG&E Green Option financial costs (per kilowatt hour (kWh) costs have not been finalized yet as part of program development) for City to purchase part or all of its electricity from renewable sources • Develop resolution to opt into PG&E Green Option program for municipal electricity purchases (Note: program is currently capped at 272 MW and as 5 year pilot program; it is currently unknown how enrollment decisions will be made should program become fully subscribed)	P P	Sustainability Division
Progress Indicator (2020) Assumes 100% of municipal electricity use in 2020 comes from 75% renewable (or zero carbon) sources via PG&E Green Option	**Reduction Potential** (MT CO_2e/yr) **651**	
Co-Benefits	**Implementation Timeline**	

Action B. Create Community Choice Energy Option

Assembly Bill 117, which was signed into law in 2002, enables California cities and counties to individually or collectively supply electricity to customers within their borders through the establishment of a Community Choice Energy District. Unlike a municipal utility, a CCE does not own the transmission and delivery systems, but is responsible for providing electricity to its constituent residents and businesses. The CCE may own electric generating facilities, but more often, it purchases electricity from private electricity generators.

A key benefit of a CCE is that the participating jurisdictions can determine the amount of renewable energy procured for its generation portfolio, allowing a CCE to exceed current state requirements directing California's utilities to provide 33% of their electricity from renewable sources by 2020. The program would be most effective if the City partnered with other Santa Clara County cities and the county government to jointly pursue a regional CCE program. The

cities of Sunnyvale and Mountain View are currently cooperating on an initial CCE feasibility study. The image below illustrates the Marin Clean Energy program.



Source: http://www.mcecleanenergy.org/about-us/how-mce-works/

M-F-1 Action B. Create Community Choice Energy Option		
Implementation Steps	**Status**	**Responsibility**
• Continue to monitor CCE efforts within Santa Clara County, City of San Francisco, and East San Francisco Bay cities; if local support exists to further consider CCE options within Cupertino, pursue the following steps: ○ Identify potential jurisdictional partners for development of CCE (e.g., Sunnyvale, Mountain View) ○ Conduct feasibility study to assess viability of CCE program in Cupertino (can be conducted jointly with other jurisdictional partners) ○ Based on results of feasibility study, pursue development of (or participation in) CCE per state requirements ○ Adopt resolution for City to participate in CCE ○ Determine feasibility of City to purchase electricity for municipal operations from CCE, based on approved CCE rate structure; CCE may provide options for level of participation (e.g., 50% clean electricity, 100% clean electricity)	P	Sustainability Division
Progress Indicator (2020) Assumes 100% of municipal electricity use in 2020 comes from 100% renewable (or zero carbon) sources via CCE program		**Reduction Potential** (MT CO_2e/yr) **869**
Co-Benefits		**Implementation Timeline**

MEASURE M-F-2 RENEWABLE / LOW-CARBON ELECTRICITY GENERATION

Develop renewable energy facilities at municipal buildings and facilities.

2020 GHG Reduction Potential: 108 MT CO_2e/yr

The City has prepared several solar reports to study the viability of municipal buildings and facilities to host solar photovoltaic (PV) installations. These site-scale solar PV systems could help to offset building or facility-specific energy loads with locally-sourced renewable energy. Combined with energy-efficiency improvements (e.g., lighting retrofits, HVAC maintenance), appropriately-sized PV installations have the potential to offset the entire electricity load of certain buildings or facilities. Significant savings from solar installations have already been realized by varied members of Cupertino's community including De Anza College, the Cupertino Union School District, and the Fremont Union High School District.

Through its most recent solar feasibility study, the City explored five installation locations: City Hall, Community Hall, Library, Service Yard, and the parking lots surrounding the Civic Center complex. The study considered the existing electricity demand of these buildings compared to the potential PV electricity generation that could be sited within each site. If all five sites are pursued, the City could install approximately 500 kilowatts (kW) of PV capacity with a generation potential of nearly 820,000 kWh/yr. This represents 17% of the City's 2010 electricity use. In pursuit of these renewable energy installations, the City has, and will need to continue to, considered the availability of financing options, including utility or government rebates, direct purchase with municipal funds, or use of power purchase agreements (PPA) through a solar service provider (PPA's allow a third-party developer to own, operate, and maintain the PV system, while the City would agree to host the system on its property and purchase the system's electric output from the solar service provider for a predetermined period). Cupertino's first solar installation, pursued through an Alameda County-led Regional Renewable Energy Procurement (R-REP) project, is advancing through direct purchase and is scheduled to offset all energy demands at its Service Yard beginning in the spring of 2015.

This project represents a first step of the City "leading by example" to further encourage residential and commercial solar installations across our jurisdiction, which was ranked 18th in the Environment California *Solar Cities 2012 Report* for per capita installed solar capacity among cities with a population of 50,000 or more, over the cities of Santa Barbara, Santa Clara, Davis, and Palo Alto. With 576 solar permits issued in Cupertino as of July 2014, the Service Center project will enable the City to join its community as a participant in achieving the more systemic sustainability and targeted renewable energy objectives defined in Council's Work Program, as a signatory to both the Mayor's Climate Protection Agreement and the Bay Area Climate Compact, and as a participant in the California Green Business Program and Network.

The City also prepared a detailed energy audit as part of a Department of Energy (DOE) Energy Efficiency and Conservation Block Grant-funded energy service contract with Siemens. The audit considered the viability of solar thermal systems to offset the energy demand associated with hot water use at various municipal facilities, as well as other facility improvement measures (FIMs). The audit studied five locations for potential solar thermal system installations: City Hall Complex, Quinlan Community Center, Sports Center, Senior Center, and Blackberry Farm Pool. Of the five potential sites, the Sports Center and the Blackberry Farm Pool complex were identified as promising candidates. However, the audit did not recommend pursuit of solar thermal systems at that time, as other more promising, lower-cost improvement options were underway and will support the City's ultimate implementation. In the future, various factors could influence the cost-benefit analysis associated with pursuit of solar thermal systems at City sites, such as the cost of natural gas, the cost of solar thermal systems, or the City's volume of hot water use. To that end, the City should continue to monitor its expenditure on hot water heating at municipal facilities and the state of solar thermal rebates and financing to determine the future viability of this action. This CAP assumes that no solar thermal systems are pursued prior to 2020, but that this technology remains an option to support future target achievement.

The following two actions help to outline a pathway towards increased use of building-scale renewable energy systems. Implementation of this measure could reduce emissions nearly 110 MT CO_2e/year by 2020.

Photo Credit: http://www.ratcliffarch.com/content/projects/DeAnzaMLC/DeAnza_MLC_6.jpg

Action A. Install Solar PV Installations on City Buildings / Property

As noted in the measure introduction, the City has already identified five potential sites for near-term solar PV systems. The City will continue to evaluate the best funding and least-risk mechanism to pursue these projects, including through future regional procurement efforts (see: jointventure.org/regionalenergyprocurement). Additional installation sites may become viable in the future, particularly after implementation of the City's Civic Center Master Plan. Build-out of this plan could result in several new buildings at the Civic Center, including a Teen Center, Sherriff's Office, and a new City Hall. Construction of additional buildings will lead to increased energy use (as estimated in the emissions forecasts shown in Chapter 2). According to the City's Green Building Ordinance, Water Efficient Landscape Ordinance, and new pre-wiring requirements these new buildings will be designed to achieve high levels of energy and water efficiency and support the installation of electric vehicle charging stations. These facilities should also be designed to support installation of renewable energy systems that can offset their electricity demand.

M-F-2 Action A. Install Solar PV Installations on City Buildings / Property		
Implementation Steps	**Status**	**Responsibility**
• Based on results of City's previous solar feasibility study, pursue PV installations at City Hall complex, Quinlan Community Center, Cupertino Library, Corporation Yard, and Civic Center carports through Santa Clara County Regional PPA or other financing option (e.g., City procurement, lease-to-own) • Review future potential for additional PV installations at sites associated with implementation of Civic Center Master Plan (e.g., Teen Center, new City Hall, Sheriff's Office)	E P	Capital Improvement Program Division
Progress Indicator (2020) Assumes five solar sites are developed for total installed capacity of 508 kW generating 818,000 kWh/yr	**Reduction Potential** (MT CO_2e/yr) **108**	
Co-Benefits	**Implementation Timeline**	

Action B. Install Solar Thermal Installations on City Facilities

Solar water systems collect the heat generated from the sun to heat water, thereby replacing the more conventional use of natural gas or electric heaters. Solar thermal systems tend to be most cost-effective for large hot water consumers (e.g., shower facilities, public pools, laundry facilities) because the systems are currently expensive compared to the relatively inexpensive cost of natural gas. Through this high-level study and subsequent site visits by PG&E and PG&E direct installers, the City has considered all relevant sites, which identified several facilities that may be good candidates. However, as is common with most commercial and municipal property owners, it was determined that more cost-effective energy improvements should be pursued first. Future analysis of this opportunity may conclude that solar thermal projects are viable for installation at municipal facilities with high hot water heating loads, such as the Sports Center, Blackberry Farm Pool, or one of the new buildings envisioned in the Civic Center Master Plan.

M-F-2 Action B. Install Solar Thermal Installations on City Facilities		
Implementation Steps	**Status**	**Responsibility**
• Following implementation of other energy audit improvement opportunities, conduct further feasibility analysis for primary solar thermal systems identified in audit (i.e., Blackberry Farm Pool and Sports Center) • Identify funding / financing source to implement cost-effective solar thermal options at opportunity sites, either through ESCO contract or direct City install • As part of the Capital Improvement Program (CIP), annually review hot water usage at City buildings and facilities to identify additional cost-effective opportunities for solar thermal installations; City could additionally consider developing a Green CIP that aggregates findings and recommendations from this CAP into one document mirroring existing CIP process	E P P	Facilities, Capital Improvement Program, and Sustainability Divisions
Progress Indicator (2020) Assumes no solar thermal systems are pursued prior to 2020	**Reduction Potential** (MT CO_2e/yr) **0**	
Co-Benefits	**Implementation Timeline**	
		

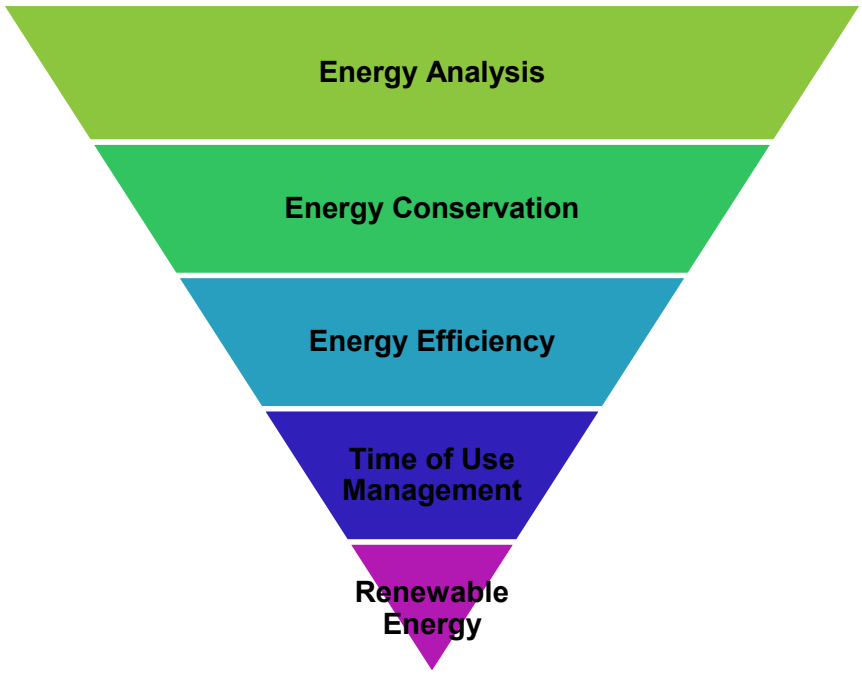
MEASURE M-F-3 ADVANCE ENERGY MANAGEMENT ACTIVITIES

Reduce energy consumption in existing municipal buildings through data analysis, interactive management systems, employee education, and building operation and maintenance policies.

2020 GHG Reduction Potential: 91 MT CO_2e/yr

Improving energy efficiency and management in existing buildings can provide the immediate benefits of reduced emissions and operational savings through utility cost savings, and potentially provide longer-term maintenance cost savings. Additionally, advanced analytic energy management systems offer another tool to achieve deep cost-effective energy savings across municipal facilities. Building efficiency and conservation improvements also support the City's plans for additional renewable energy generation. Energy efficiency has been identified by the state as the first enabling strategy in the "loading order" of energy improvement approaches, first adopted by California's energy agencies in the 2003 Energy Action Plan and reaffirmed by the energy sector provisions of CARB's AB 32 Scoping Plan. The order allows for accuracy and optimal effectiveness in energy use, and the right-sizing of solar PV systems to offset remaining electricity use. See Figure 4.7 for an illustration of the loading order model.

Figure 4.7 – Energy Strategy Loading Order



The City already uses building energy benchmarking and energy audits to track and compare energy use and identify operational or mechanical problems and opportunities for system improvements. The actions included within this measure are intended to reinforce the City's previous energy efficiency activities, identify the next candidates for retrofit programs (see Measure M-F-4), facilitate scheduled collection of energy use data at a building or facility level, provide policy guidance for regular building system commissioning, and elevate energy conservation awareness across all levels of City employees. As with the previous measures, project financing is a primary consideration. Implementation of this measure could reduce emissions by approximately 90 MT CO_2e/year by 2020.

Action A. Develop Advanced Energy Efficiency Analytics

Analyzing building-specific energy use data can help to identify operational improvement opportunities or faulty mechanical systems, allowing facilities managers to more closely control operating costs. The advanced energy efficiency analytics process uses daily and hourly building energy meter data, weather data, GIS mapping, and other inputs to determine how a building uses energy. This type of data analysis allows for remote building audits that can often identify low- or no-cost operational improvements leading to greater building efficiency. Numerous third-party service providers offer advanced analytics services through software subscriptions or direct monitoring. The City should consider using an advanced analytics service to monitor its building energy use more conveniently, to identify and correct operational issues more quickly, and to track and quantify post-installation, measure-specific impacts. The City could pursue such a service on its own, or consider aggregating its building portfolio with other neighboring jurisdictions to negotiate a group rate. Results from an advanced analytics program could also inform the types of additional building retrofits the City should pursue (see Measure F-4). This approach has worked particularly well for the Cupertino Union School District, who utilizes the Cenergistic energy management tool to reduce and control utility costs across its 20 elementary and 5 middle schools. This tool has served as a platform to enable the District to achieve EPA ENERGY STAR Leaders Top Performer recognition for achieving a portfolio-wide ENERGY STAR energy performance score of 95 and reducing energy use across its portfolio of buildings. This represents an ongoing savings of $600,000 per year in avoided electricity, natural gas, sewer, and water costs for the District.

M-F-3 Action A. Advance Energy Management Activities		
Implementation Steps	**Status**	**Responsibility**
• Identify appropriate energy analytics firm with which to partner; this could be regional implementation opportunity to secure discounted large group rate - consult other area jurisdictions when pursuing this option • Create operating framework that allows facilities managers to implement findings into building operations • Use high-resolution data from analytics (e.g., appliance end-use) to inform development of targeted energy efficiency retrofit programs [see M-F-4]	P P P	Facilities & Sustainability Divisions
Progress Indicator (2020)	**Reduction Potential** (MT CO_2e/yr)	
Assumes 14.5% reduction in 2010 baseline building electricity use (i.e., 410,000 kWh/yr saved) and 14.3% reduction in 2010 baseline building natural gas use (i.e., 6,900 therms/yr saved)	**91**	
Co-Benefits	**Implementation Timeline**	

Action B. Benchmark & Track Consumption Data Collected per Facility

The ability to monitor and analyze energy use in City buildings and facilities is largely a function of the number and location of utility meters. For example, without dedicated meters, electricity used for a park's lights is not measureable if the park lights are on the same meter as an adjacent City building. Cross-metering is common, and makes it difficult to isolate opportunities for improvement or monitor the results of any installed retrofit programs. The City should partner with PG&E to install additional utility meters, or sub-meters, at City buildings and facilities to the extent that Facilities staff would be able to effectively monitor and analyze energy use trends at the building- or facility-level. This ability to disaggregate utility consumption at a finer-grain of detail would support the City's existing benchmarking program and help to remotely identify efficiency improvement opportunities (as described in Action A), without the need to physically audit each individual building.

As a preliminary step, it is recommended that the City pursue ENERGY STAR certification for its facilities (see: http://www.energystar.gov/buildings/about-us/energy-star-certification) to determine the current energy performance of its spaces and achieve AB1103 compliance (Nonresidential Building Energy Use Disclosure Program, see: energy.ca.gov/ab1103). Staff have evaluated the agency's operational practices using the California Green Business Program criteria, through which the City certified the energy, water, and materials conservation efforts across its eight major facilities (see: greenbusinessca.org). Cupertino has also previously worked with the Silicon Valley Energy Watch to benchmark all of its large and small facilities, allowing the agency to measure meter-level energy use, water use, and greenhouse gas emissions, but has not engaged a professional engineer or registered architect to verify its findings. This step would enable the City to capture metrics that assess the current performance of its buildings in advance of implementing future improvements and, perhaps, a next-step goal

of achieving Leadership in Energy and Environmental Design (LEED) certification through the US Green Building Council.

M-F-3 Action B. Benchmark & Track Consumption Data Collected per Facility		
Implementation Steps	**Status**	**Responsibility**
• Work with PG&E to install additional electricity and gas meters (where applicable) to allow improved facility-level energy use analysis; when feasible, combine similar end uses into one meter (e.g., park unit's lighting combined into one meter, park unit's buildings provided on separate meters) to allow monitoring of specific energy efficiency improvements or comparison of annual energy benchmarking • After installation of additional meters, organize PG&E data by facility and City department (e.g., Meters 1, 2 and 3 represent Memorial Park) • Benchmark all eligible municipal facilities using ENERGY STAR Portfolio Manager • Implement process to track and report municipal energy usage through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system	P P P P	Facilities & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**
		

Action C. Install Energy Management Systems

Energy management systems (EMS) can help conserve energy by automatically turning off building systems, equipment, or appliances after normal business hours or a period of inactivity. Automatic lighting controls are increasingly common, in which motion sensors detect activity within a room and automatically turn the lights off when a room is not in use. Installing an EMS in office environments can help reduce plug load electricity use associated with computers and monitors, personal space heaters, speakers, printers, fax machines, and other office equipment. The City has already worked with its Information Technology (IT) department to identify opportunities for workstation energy management systems, and has deployed a CASE application power setting on all desktops, and has deployed advanced plug-load controlling power strips across municipal offices. As these were early-stage technologies, implemented in 2011/2012, staff should revisit these systems' opportunities to increase employee comfort/use of the applications and further evaluate current technology effectiveness as compared to newer options. If the City pursues an advanced analytics service (see Action A), it could be used to help monitor the proper function of the City's existing advanced lighting control systems.

M-F-3 Action C. Install Energy Management Systems		
Implementation Steps	**Status**	**Responsibility**
• Work with energy analytics firm and City IT department to identify additional opportunities for office system EMS to automate control and monitoring of office equipment (e.g., computers, monitors, printers), beyond those already installed, including strategy for advanced power strip purchases and use in City buildings • Work with energy analytics firm to review existing advanced lighting controls/ monitoring systems (e.g., automatic dimmers), ensure proper operation, and identify opportunities for additional installations in other City buildings/facilities	P P	Facilities & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits 		**Implementation Timeline** 

Action D. Introduce Retro-Commissioning Program

Commissioning and retro-commissioning are the processes of verifying that building systems are operating at optimal efficiency as intended by building architects and engineers. The state's building code already requires commissioning in new construction, as do current LEED rating systems, through which the City would need to comply if building a new facility per its Green Building Ordinance. Development of a City policy that requires all major building systems (e.g., mechanical, electrical, ventilation) to be retro-commissioned at five-year intervals will help ensure optimal facility operations. This policy could also help extend the life of existing systems, defer expensive upgrades, and ensure timely identification of energy efficiency opportunities. This policy should be developed in a way to provide efficiencies and/or cost savings associated with the City's existing service agreements for regular maintenance of various City buildings. The policy and practice of retro-commissioning will be further informed if the City pursues Actions A, B, and C above, as a means of benchmarking the efficiencies achieved through this new practice over current efforts.

M-F-3 Action D. Introduce Retro-Commissioning Program		
Implementation Steps	**Status**	**Responsibility**
• Formalize program that requires all major systems (e.g., HVAC) in existing buildings / facilities to be retro-commissioned at 5-year intervals • Sync regular retro-commissioning efforts with services provided by existing building systems maintenance contracts	P P	Facilities & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

Action E. Design / Implement Facilities & Equipment Energy Management Policy

Cupertino's facilities represent over 70% of the City's municipal greenhouse gas emissions, resulting from the burning of fossil fuels to generate electricity. Therefore, this CAP must prioritize reducing energy use across the City's building portfolio to achieve the stated emissions reduction targets. Measures to achieve this objective, thus far, focus on data collection and analysis and equipment installation and service schedules, which serve as critical first steps to setting more ambitious municipal facility-oriented energy conservation goals. As stated in the 2011 Environmental Protection Agency's Energy Efficiency in Local Government Operations Guide, "saving energy through energy efficiency improvements can cost less than generating, transmitting, and distributing energy from power plants, and provides immediate economic and environmental benefits". Recognizing this fact, Cupertino will formalize energy conservation goals, activities, and procedures for maintenance staff and building occupants alike through the implementation of this measure. The development of such a policy is a growing practice among leading environmental cities locally and throughout the United States (e.g., San Jose, Seattle, Durham), and is often paired with a municipal energy efficiency revolving loan fund to prioritize future efficiency investments, as is suggested in this plan.

ENERGY CONSUMPTION IN LOCAL GOVERNMENT BUILDINGS

This table presents average annual energy use by local government-owned commercial buildings (any building that is not residential, manufacturing or industrial, or agricultural).*

End Use	Consumption (Trillion Btu)**	As percentage of Whole
Space heating	333	42
Lighting	120	15
Cooling	88	11
Ventilation	83	10
Water heating	61	8
Miscellaneous	56	7
Refrigeration	23	3
Computers	21	3
Office equipment	5	1
Cooking	11	1
Total	800	100

* Data from the 2003 Commercial Buildings Energy Consumption Survey (CBECS) conducted by the Energy Information Administration (EIA). The CBECS is conducted every four years.

**Figures are rounded to the nearest trillion Btu.

Source: EIA, 2008.

The City's Utility Conservation Policy and Procedure will define opportunities to reduce energy and water use and hedge against rising energy costs of existing buildings, lighting, and

equipment while maintaining service to the public and comfort for City employees. To ensure these aims are met, staff will define employee responsibilities, equipment, and building automation system operating procedures (including temperature set-points), and purchasing guidelines within the Procedure, which will systematize efforts to retrofit existing buildings and define future efficiency-focused capital improvement projects. It is anticipated that adopting this policy will kick start a pathway for the City to achieve energy and water conservation targets aligned with both this Climate Action Plan, as well as third-party certification programs (e.g., LEED Building Operations & Maintenance Rating System, GBI's Green Globes, EPA ENERGY STAR) to acknowledge the City's leadership in this space.

M-F-3 Action E. Design / Implement Facilities & Equipment Energy Management Policy		
Implementation Steps	**Status**	**Responsibility**
• Research and collect facility-related energy conservation policies and procedures from cities locally and nationally • Develop draft Policy and Procedure that outlines facility energy and water conservation goals, employee responsibilities, operating equipment procedures, and purchasing guidelines, to ensure consistency with City's Environmentally Preferable Procurement Policy • Implement Procedure and track progress to achieve utility cost and resource savings on periodic basis • Adjust Procedure as best practices evolve and new technologies are introduced to achieve larger financial and utility conservation gains over time • Identify third-party certification programs and rating criteria to recognize Cupertino's utility conservation efforts	P P P P P	Facilities & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

Action F. Bolster Employee Behavior Change through Information / Education

Providing employees with information about energy efficient policies and practices, as well as energy use within their buildings, can promote a culture of conservation within various departments. The City could leverage energy analytics tools (Action A) to host employee-focused dashboards on its intranet and consider using gaming techniques (i.e., applying game-design thinking to non-game applications) to engage employees in utility savings competitions across facilities or departments, a practice that has worked well in Palo Alto and San Francisco. This could include setting departmental energy use reduction targets and hosting staff training on day-to-day energy conservation practices and use of existing equipment's energy-saving settings. Additionally facilities staff will receive training on how to optimize building energy components through use of the City's building management systems.

Public-facing opportunities to share the City's energy information and savings include, installing energy use dashboards in public areas of the City's primary buildings (e.g., City Hall, Library)

and connect the dashboards to its website for more visible tracking of energy use in specific buildings. This data should also be shared on the City's open data platform and integrated into its Geographic Information Systems (GIS) mapping applications. Different City departments or buildings (depending on the distribution of utility meters) could also set energy use reduction targets and encourage staff to help achieve them. This could include training on day-to-day energy conservation practices and use of existing equipment's energy-saving settings. Additionally Facilities staff will receive training on how to optimize building energy components through use of the City's building management systems.

M-F-3 Action F. Bolster Employee Behavior Change through Information / Education		
Implementation Steps	**Status**	**Responsibility**
• Install energy use dashboards in City Hall and primary municipal buildings (e.g., public-facing and high energy use); work with PG&E to install individual building meters, as necessary, to allow building-specific energy use reporting (see M-F-3 B) • Provide facility managers with training on advanced building operations systems in order to maximize effectiveness of City's building systems • Set specific department-level energy use targets and encourage employees in the buildings to participate in energy efficiency achievement (may need additional PG&E meters installed, per M-F-3 B, to accurately track this) • Continue to distribute and refer staff to City's handbook with instructional guides to help implement ENERGY STAR purchasing requirements; existing handbook also serves as user-friendly resource to guide City purchases of "green" products, such as furniture, carpeting / flooring, paints, packaging materials, etc., which further supports Measure M-SW-1 C	P P P E	Sustainability Division
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

MEASURE M-F-4 GROW EXISTING BUILDING ENERGY RETROFIT EFFORTS

Reduce energy consumption in existing municipal buildings through energy efficiency improvements.

2020 GHG Reduction Potential: 41 MT CO_2e/yr

As stated in Measure M-F-3, improving energy efficiency in existing buildings can reduce emissions and provide operational savings through reduced utility cost and maintenance needs. Prioritizing funding is often a challenge when pursuing building retrofit programs, as resources

are often limited and agencies must prioritize essential services first. As a means of identifying capital resources for CAP-aligned utility conservation efforts, the City will consider establishing a revolving loan fund for municipal retrofits or efficiency improvements. The City will also continue to discuss municipal efficiency opportunities and funding strategies with their PG&E account representative to ensure the City is taking advantage of all available financial resources.

Prior to the CAP's baseline year of 2010, the City performed numerous facility-related retrofits, including low-flow toilet, faucet, showerhead and spray-valve installations at public facilities, mechanical building system retrofits (e.g., HVAC), citywide traffic light retrofits, and interior building lighting retrofits paired with advanced lighting control systems. In 2010, the City received a $526,200 Energy Efficiency and Conservation Block Grant through the American Recovery and Reinvestment Act that was used to initiate a competitively-bid energy savings performance contract with Siemens to identify additional energy efficiency improvement opportunities across seven City facilities, the citywide irrigation and street light system, and renewable energy generation opportunities. As a result of that contract, Siemens prepared a detailed energy audit that presented two packages of energy improvements. The packages analyzed energy savings from:

- additional interior and exterior building lighting upgrades,
- streetlight retrofits,
- parking lot and pathway lighting retrofits at six City parks,
- solar PV development,
- irrigation efficiency improvements,
- network power management, and
- plug load controllers.

The findings of the study were presented to City Council, who prioritized the upgrade of citywide irrigation controllers to evapotranspirative technology, which uses weather (e.g., precipitation, relative humidity) and plant data to determine watering needs and schedules. Council also prioritizes streetlight upgrades to induction technology in 2011. Findings from this project are being calculated and will be shared via future CAP reporting cycles. In addition, the City started to implement recommendations from the energy audit as funding allows, including interior building lighting upgrades and control systems, parking lot and pathway lighting upgrades at City parks, additional irrigation efficiency improvements, and plug load management within City buildings.

Measure M-F-4 is closely associated with Measures M-F-1, M-F-2, and M-F-3, with each influencing implementation of the others. Building retrofits should be informed based on an analysis of existing building energy use to identify the most cost-effective opportunities, as described in Measure M-F-3. The successful implementation of retrofits will reduce building energy use, allowing for a greater share of that energy use to come from roof-mounted (or

carport mounted) solar PV systems or supporting the design of smaller PV systems, as in Measure M-F-2. And finally, the emissions from any remaining municipal electricity demand after building retrofits and solar PV systems are installed could be addressed through implementation of Measure M-F-1 to achieve zero net energy-related emissions from municipal operations.

As previously stated, this CAP only quantifies the reductions associated with actions taken after the 2010 baseline year. The City's previous retrofit actions have certainly contributed to a lower baseline energy emissions inventory level than would have otherwise occurred, though their specific reductions are not identified in this plan. The City also implemented several policies that will result in lower building energy use in the future, such as the Green Building Ordinance, which went into effect July 1, 2013, that applies to new construction and building retrofits, as well as the City's Environmentally Preferred Purchasing Policy, adopted by Council in 2008. The impact of these actions is challenging to individually measure, but should continue to contribute additional reductions that will be reflected in future emissions inventory updates.

The following four actions support implementation of this measure and build upon the City's past successes in building retrofits. This measure would contribute reductions of approximately 41 MT CO_2e/yr by 2020.

Action A. Complete Building Retrofits

Based on recommendations and analysis included in the City's Detailed Energy Audit, the City should continue to pursue implementation of the remaining retrofit opportunities. The City has already upgraded its irrigation system, retrofitted streetlights citywide, and retrofitted the majority of City park lights in parking lots and along walking paths. The City also installed PC power management software and plug load controller hardware in City buildings, as well made additional interior lighting retrofits combined with the installation of lighting control systems. These opportunities (along with the solar PV recommendations) represent the majority of emissions reductions identified in the energy audit. The remaining items will provide relatively lower emissions reductions, but nonetheless will help to support the City's goals for energy conservation and associated cost savings.

The audit provided general recommendations based on observations made during the study phase that suggest potential savings from efficient motor upgrades or replacements and hot water boiler operation improvements. These opportunities were not quantified as part of the energy audit, but could become retrofit opportunities in the future. These two suggestions would likely also arise if the City were to pursue and advanced analytics program as described in Measure M-F-3. The City has made great progress in implementing recommendations included within the audit, and should plan to prepare another audit (or update the existing one) within the next five years to help identify additional efficiency opportunities.

M-F-4 Action A. Complete Building Retrofits		
Implementation Steps	**Status**	**Responsibility**
• Use results from advanced analytics program (see M-F-3 A) to identify appliances and building systems that are underperforming from energy use perspective, and develop prioritization plan for equipment replacement / building retrofits; work with PG&E to identify available rebates, incentives, or on-bill financing opportunities for various improvements • Continue to make progress on implementing efficiency opportunity findings from City's Detailed Energy Audit; establish budget priority for Energy Audit update in next five years	P E	Facilities & Sustainability Divisions
Progress Indicator (2020) Assumes 254,000 kWh/yr saved as result of interior lighting retrofits and occupancy sensors, and 59,000 kWh/yr saved as a result of plug load controllers (assumed 200 controllers installed)		**Reduction Potential** (MT CO_2e/yr) **41**
Co-Benefits		**Implementation Timeline**

Action B. Establish Energy Efficiency Fund

The establishment of an energy efficiency fund could provide a self-sustaining source of funding to support additional future retrofit programs. This type of revolving loan fund can often leverage matching funds from utilities or other sources to help offset total startup costs. The City of San José has such a fund that could be used as a model to establish a similar program in Cupertino. To ensure the fund's longevity, loan repayment parameters should be established that capture efficiency project utility cost savings and/or project rebates, depending on its goals, for a set number of years, after which additional costs savings accrue to the project's managing department. The *Municipal Energy Efficiency and Greenhouse Gas Emissions Reduction: Financing and Implementing Energy Efficiency Retrofits in City-Owned Facilities Report,* drafted for the Environmental Protection agency, offers guidance on how to start this process.

M-F-4 Action B. Establish Energy Efficiency Fund		
Implementation Steps	**Status**	**Responsibility**
• Evaluate the potential for and requirements (e.g., size, terms, etc.) of a self-sustaining City energy efficiency revolving loan fund to implement findings of various City energy efficiency and renewable energy development opportunity studies; City of San José used this approach as one source of multiple project financing sources • Develop fund parameters that support continual replenishment of funding pool (e.g., 80% of cost savings resulting from project implementation are returned to fund for 5 years after which additional savings accrue to project's implementing department) • Allocate or secure funding for long-term energy efficiency fund (from EECBG program, municipal bond, etc.) • Assign manager to support and coordinate fund and its projects • Discuss opportunities and potential program structure for regional revolving loan fund with neighboring jurisdictions, which could provide access to additional seed funding sources	P P P P P	Sustainability Division
Progress Indicator (2020) Supports implementation of Action A	**Reduction Potential** (MT CO_2e/yr) -	
Co-Benefits	**Implementation Timeline**	

Action C. Set Standards and Targets

The City Council approved a citywide Green Building Ordinance that applies to new construction and retrofits, including municipal projects (see: Cupertino.org/greenbuilding). The ordinance directs minor renovations to comply with the CalGreen Building Code's minimum thresholds. Major renovations need to achieve Leadership in Energy and Environmental Design (LEED) certification, LEED Existing Building Operations and Maintenance (EBOM) certification, or an alternative reference standard. While the LEED certification program identifies minimum thresholds for various aspects of building design (e.g., energy and water use, indoor air quality, solid waste generation), its minimum energy requirements, in some certification programs, may currently be less stringent than those found in the CalGreen Code. To ensure that building energy and water conservation remain a priority in new City construction, the City could voluntarily strive to focus their LEED design points within the energy and water strategy areas, possibly by identifying a minimum number of energy and water points that municipal projects need to achieve.

M-F-4 Action C. Set Standards and Targets		
Implementation Steps	**Status**	**Responsibility**
• Continue to implement City's Green Building Ordinance as it relates to municipal building retrofits • Consider developing additional guidance for municipal building retrofits that encourages pursuit of energy- or water conservation-related points towards achievement of required LEED certification to prioritize these building efficiency outcomes; alternatively, City could define explicit energy efficiency performance levels or design feature expectations for new projects	E P	Facilities & Planning Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits 		**Implementation Timeline** 

Action D. Adopt a Demonstration Policy

Serving as the cornerstone of the world's innovation center, Cupertino is home to start-ups and Fortune 500 companies alike, each working to design next-generation technologies that outperform current equipment and achieve dramatic efficiency increases. Often, these companies seek partners to test, evaluate, and/or demonstrate pre-market innovative solutions and the City may consider enabling their temporary use of City-owned land, facilities, equipment, rights-of-way, and data as an alternative form of local business support. To achieve that end, the City of San José, adopted a Demonstration Partnership Policy to facilitate these goals, and also provide financial assistance and/or absorb some costs for local technology project implementation, require agreement to non-disclosure statements, and request City Council to exempt the project from certain City policies (see: sanjoseca.gov). Cupertino will consider adopting a similar policy, which will enable access to new technology resources and aligned funding opportunities, as is currently available through the California Public Utilities Commission Electric Program Investment Charge (EPIC)(see: energy.ca.gov/research/epic/). This may also be considered as part of a Local and Small Business Preference Policy, if prioritized by the City's Economic Development Department.

M-F-4 Action D. Adopt Demonstration Policy		
Implementation Steps	**Status**	**Responsibility**
• Draft City Technology Demonstration Policy to assist local businesses with testing and demonstrating functionality of emerging technologies • Implement the policy and revise based on industry best practices and trends as they arise • Pursue grant opportunities that expand technology demonstration opportunities in municipal facilities and through local business partnerships, coordinated with the City's Economic Development Office (e.g., CEC Electric Power Investment Charge Grants (EPIC) - http://www.energy.ca.gov/research/epic/)	P	Facilities & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

MEASURE M-F-5 EXPAND NEW BUILDING ENERGY PERFORMANCE

Establish energy efficiency targets for new municipal buildings.

Supporting Measure – Not Quantified

The City already adopted a Green Building Ordinance that requires all new medium and large municipal buildings to achieve LEED certification (LEED Silver for large buildings) or use of an alternative reference standard (e.g., ENERGY STAR, Living Building Challenge, Green Globes; see: http://www.wbdg.org/resources/gbs.php). However, there are multiple pathways to achieve this certification, some of which emphasize indoor air quality, construction material reuse, energy and water conservation, or a blend of strategies. As with Measure M-F-4, Action C above, the City could informally pursue greater energy and water efficiency in its new buildings by placing an emphasis on those criteria, or "points", within the LEED rating system that achieve those objectives. While implementation of this measure supports the City's long-term emissions reduction goals by ensuring new construction is highly efficient, the exact emissions reduction potential is currently unknown because the size and design of future buildings are not yet known.

Action A. Update Green Building Standard – Energy Performance Guidance

The City will continue to implement its Green Building Ordinance and the state's CalGreen Code across municipal projects. The City should also consider prioritizing solar access, roof load capacity, and solar pre-wiring in its future building designs to allow optimal solar PV

installations. As new buildings are constructed to be increasingly efficient, the size of solar PV systems needed to meet their energy demands will decrease.

New City buildings that are primarily designed for public use, such as the Teen Center envisioned in the City's Civic Center Master Plan, should also include an educational component that highlights the building's green design features. Public comments made at the community-wide CAP workshops identified a role for better advertisement of the City's sustainability-related actions. Public buildings provide a real opportunity to showcase new technologies or design strategies that community members can incorporate in their own homes and businesses.

M-F-5 Action A. Expand New Building Energy Performance

Implementation Steps	Status	Responsibility
• Continue to implement City's Green Building Ordinance as it relates to new municipal building construction	E	Facilities, Capital Improvement Program & Sustainability Divisions
• Consider developing additional guidance for new municipal building projects that encourages pursuit of energy- or water conservation-related points towards achievement of required LEED certification to prioritize these building efficiency outcomes; alternatively, City could define explicit energy efficiency performance levels or design feature expectations for new projects	P	
• Build recommendations into City's Capital Improvement Program	P	
• Identify opportunities for passive solar design and consider solar orientation for active solar installments in new construction	P	
• Consider including solar-ready construction requirements for new municipal buildings with appropriate solar orientation, roof size, etc.	P	

Progress Indicator (2020)	Reduction Potential (MT CO_2e/yr)
All new municipal construction complies with the City's Green Building Ordinance	-

Co-Benefits	Implementation Timeline
	

MEASURE M-F-6 COMPLETE CITYWIDE PUBLIC REALM LIGHTING EFFICIENCY

Upgrade public realm lighting to more efficient technology.

2020 GHG Reduction Potential: 125 MT CO_2e/yr

Lighting efficiency upgrades typically represent one of the most cost-effective solutions for energy conservation, providing lower utility costs and, often, lower maintenance costs due to less frequent lamp replacements. Public realm lighting in Cupertino includes traffic and streetlights, municipally-owned parking lot lights, and public park lights. The City has already upgraded its traffic signal lights from incandescent bulbs to LEDs and retrofitted its streetlights to high-efficiency induction technology. The City also initiated parking lot and pathway lighting retrofits in various City parks. The actions implementing this measure take credit for past successes in lighting upgrades, and address the remaining opportunities in City-owned parking lots and public parks. Implementation of this measure would reduce emissions by 125 MT CO_2e/year by 2020.

Action A. Complete Street Light Retrofits

As part of its energy performance contract with Siemens, City-owned streetlights were upgraded to high-efficiency induction technology between December 2010 and March 2011. The project retrofitted more than 2,900 streetlights, representing 99% of all City-owned streetlights, for electricity savings of 872,000 kWh/yr. An additional 400 streetlights in the City's jurisdiction are owned and/or maintained by PG&E. The City has inquired with PG&E about their purchase and/or retrofit, and should continue to prioritize this opportunity with the utility, as the agency is paying a cost premium to retain and use these outdated fixtures.

M-F-6 Action A. Complete Public Realm Lighting Efficiency		
Implementation Steps	**Status**	**Responsibility**
• Consider best practices in lighting technology at time of bulb and / or fixture replacement or repair • Ensure that new street light installations achieve comparable or better efficiency level as achieved through previous street light retrofit program	P P	Streets Division
Progress Indicator (2020) **Achieved!** – 872,000 kWh/yr saved through street light retrofit program		**Reduction Potential** (MT CO_2e/yr) **115**
Co-Benefits		**Implementation Timeline**

Action B. Retrofit Remaining Parking Lot and Park Facility Lighting

The City's Detailed Energy Audit identified electricity savings opportunities from lighting retrofits at the City's parks, specifically from parking lot and pathway lighting. The audit analyzed the savings potential from lights at nine of the City's fourteen parks. Since 2012, the City has been implementing these lighting retrofits, coupled with dimmers and motion sensor controls. To date, the City has made improvements to outdoor lights at seven City parks, as well as City Hall, the Quinlan Community Center, and the Senior Center. These improvements will save approximately 75,000 kWh/yr.

Photo credit: http://migoertz.zenfolio.com/img/v2/p975314228-4.jpg

The City's remaining seven parks may present a future opportunity for additional parking lot and pathway lighting retrofits, similar to those identified in the energy audit. There may also be opportunities for retrofits to athletic field and tennis court lighting; provided a high-efficiency option is available that still achieves the lighting requirements for sports play. Additionally, there may be retrofit opportunities at other City-owned parking lots (beyond the park units and City buildings described here). These additional lighting retrofit opportunities could also be pursued through an ESCO, as with the street light retrofits, or pursued independently as funding permits. To support future energy conservation in public lighting, the City could also update its Standard Provisions for new public lighting to specify that new lights should be LED, induction, or an equivalent technology.

M-F-6 Action B. Complete Parking Lot and Park Facility Lighting Retrofits		
Implementation Steps	**Status**	**Responsibility**
• Identify City-owned parking lot lighting that has not yet been converted to LED, magnetic induction, or similar highly-efficient technology • Identify park lighting (e.g., pathways, restroom facilities, area lighting, sport field lighting) that has not yet been converted to LED, magnetic induction, or similar high-efficiency technology • Identify appropriate energy-efficient lighting technologies for sports fields / courts that still provide lighting levels required for applicable sporting use • Develop implementation timeline and funding program; contact City's PG&E account representative regarding availability of rebate programs and / or on-bill financing options to cover retrofit program • Consider updating City's Standard Provisions or other lighting guidance documents to specify efficiency levels to be achieved in new installations or lighting retrofit projects	P P P P P	Streets Division
Progress Indicator (2020) **Achieved!** – 75,000 kWh/yr saved through park unit parking lot and pathway light retrofit program		**Reduction Potential** (MT CO_2e/yr) **10**
Co-Benefits		**Implementation Timeline**

MEASURE M-F-7 CONSERVE WATER THROUGH EFFICIENT LANDSCAPING

Implement best management practices in landscaping design and share City successes community-wide to lead by example in water conservation action.

2020 GHG Reduction Potential: 1 MT CO_2e/yr

Treating, pumping and distributing water throughout cities is often an energy intensive activity. However, the majority of Cupertino's water comes from the gravity-fed Hetch Hetchy Reservoir system, and therefore has lower embodied energy related to its transport than other water sources. Regardless of the energy savings related to water conservation, the City believes water as a precious and finite natural resource should be conserved, which is highlighted to be of particular importance in light of recent drought

conditions statewide. The City has already made advances in landscape water conservation, achieving a 27% water use reduction in 2014 in response to Governor Brown's declaration of a Drought State of Emergency. The City now uses climate-sensitive and water-efficient irrigation technology to continually adjust landscape watering schedules and quantities based on data collected from local weather stations. In support of this technology, Grounds and Median Divisions staff are trained to adjust irrigation according to weather conditions, as well as trained in other landscape water conservation best management practices.

The following actions describe a framework to support the City's water conservation practices and help identify additional opportunities. Implementation of this measure could reduce emissions by approximately 1 MT CO_2e/year, though as previously stated, the real benefit will arise through the conservation of this limited resource.

Action A. Utilize Weather-Track System to Reduce Park & Median Water Use

As part of its ESCO contract with Siemens, the City installed 92 irrigation controllers from September 2010 to March 2011. The project replaced existing irrigation controllers in most City parks, landscaped areas, and landscaped medians with new state-of-the-art weather-based controllers. The replacement controllers use weather-based evapotranspiration and moisture sensor technology along with centralized web-based software to optimize for weather, moisture, planting type, sun exposure, soil type, slope, and other variables. The software is easy to use, and allows for remote monitoring and control, and saves staff time by reducing field visits. Grounds and Median Divisions staff was also trained on the proper use of the new irrigation controller system. This project is anticipated to conserve approximately 19 million gallons of water per year; savings data will be shared with the community through future CAP reports.

M-F-7 Action A. Utilize Weather-Track System to Reduce Park & Median Water Use		
Implementation Steps	**Status**	**Responsibility**
• Continue to use weather-based irrigation technology in City irrigation practices to prevent unnecessary or excessive water in public spaces • Continue to provide training on the City's irrigation technology to existing and new staff to ensure proper use of the system	P P	Grounds & Fleet Division
Progress Indicator (2020) Achieve Bay Area Climate Compact's goal for 20% water savings by 2018 over 2008 baseline Assumes 27.5 million gallons of water saved per year over 2008 baseline of 138 million gallons		**Reduction Potential** (MT CO_2e/yr) **1**
Co-Benefits		**Implementation Timeline**

Action B. Benchmark & Track Water Use per Meter

Much like the process pursued to develop this Climate Action Plan; the City must also benchmark its municipal water use, establish water conservation targets, and develop water conservation measures to achieve those reduction goals over time. In realizing the importance of monitoring water use and costs for municipal facilities, medians, parks, and sports fields, staff recently developed a database to store water utility information collected from historic billing statements beginning in July 2008. Historic water use and cost-per-meter data can be used as a benchmark to measure against current use to demonstrate measureable improvements, as well as identify deficiencies in the City's water management strategies. This will allow for targeted strategy adjustments in the near- and long-term. This database can also be used to determine strategies to not only save water, but also hedge against rising utility costs associated with the City's water consumption. With appropriate and accurate record keeping, the City will have pertinent information readily available to review the efficacy of current water conservation strategies and efficiently identify meters in need of improvement; a critical tool during times of drought and foreseeable utility-focused budget constraints.

M-F-7 Action B. Benchmark & Track Water Use per Meter		
Implementation Steps	**Status**	**Responsibility**
• Establish operational framework for tracking and reviewing water use at the meter level to allow identification of improper irrigation system use, leaks, or other wasteful water activities • Incorporate water use reporting into overarching annual CAP reporting procedure described in Chapter 7	P P	Sustainability, Grounds & Fleet Divisions
Progress Indicator (2020) Supports implementation of Action A	**Reduction Potential** (MT CO_2e/yr) -	
Co-Benefits	**Implementation Timeline**	

Action C. Adopt Water Budget & Green Grounds Policy

A Green Grounds Policy would enhance the previously adopted Parks & Recreation Green Policies, adopted in June 2009, and allow the City to formalize its existing water conservation practices to ensure broad and consistent application across all City-maintained and/or owned assets. If pursued, the policy will address items such as planting palettes, passive and active landscapes, irrigation system maintenance and training, water budgets, organic waste management, and community education and outreach.

The City will also consider developing water budgets for each of its park units to ensure future landscaping practices consider water conservation in park design and operation. The City of Mountain View currently uses water budgets in many of its public parks, and could serve as a local example for program development. The Green Grounds Policy could incorporate the City's

existing strategies related to green waste collection in parks, medians, and other City-owned property to ensure this waste is either composted on-site for future City use or properly disposed of through the City's compostable collection program. Public education and outreach regarding the City's landscaping practices can help to disseminate these practices throughout the community.

M-F-7 Action C. Adopt Water Budget & Green Grounds Policy		
Implementation Steps	**Status**	**Responsibility**
• Develop landscaping policy that promotes efficient watering schedules, high- and low-priority water zones (for use during pre-drought conditions), water-efficient and climate-sensitive plant selection, and compost-friendly landscape maintenance • Evaluate alternative or maintain existing water-efficient irrigation technology systems, particularly in areas of high irrigation use (e.g., turf playing fields), with ET sensors and integration with weather station data streams to automate watering schedules based on current and near-term environmental conditions • Train maintenance crews in use and maintenance of irrigation systems and implementation of Green Grounds policy • Consider use of water budgets for irrigated landscape areas Create education stations or post information to City's website that describe City's green grounds practices	P E E P	Sustainability, Trees & Right of Way, and Grounds & Fleet Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

Action D. Use Bay-Friendly Landscaping Techniques across Parks & Medians; Install Demonstration Gardens

Though only a small portion of the City's municipal greenhouse gas emissions arise from its water use, as California's drought continues to persist and as water utility rates continue to rise, efforts to foster a reliable water supply need to be prioritized by everyone, including our agency. Cupertino already has a rich history of operational and community-focused water conservation efforts, coordinated in partnership with its two water suppliers (San Jose Water and California Water Service Company). However, there is more that our City can do, starting with our point of highest use: irrigating our parks, medians, and fields. Measures in this Chapter focus on data collection and irrigation improvements to curb the City's consumption, but plant selection and placement can dramatically reduce site water use, maintenance, and pest-control demands, offering even greater environmental and financial gains. As such, the City will take advantage of Santa Clara Valley Water District rebates to convert water-intensive landscaping or turf with

native, drought-tolerant, Bay-Friendly landscaping to accelerate water conservation across our public spaces and serve as a model for residents and businesses to make similar conversions.

M-F-7 Action D. Use Native, Drought-Tolerant, Bay-Friendly Landscaping Techniques Across Parks, Medians & Fields		
Implementation Steps	**Status**	**Responsibility**
• Adopt city-wide policy that requires specification of Bay-Friendly, drought-tolerant landscapes in any new City project or private project receiving City funds to include landscaped areas as project element	P	Sustainability, Grounds & Fleet Divisions
• Expand Parks & Recreation Green Policies, which focus on water-efficient landscaping, across all departments to prioritize Bay-friendly and efficient irrigation practices and technologies to maintain City's landscaped facilities, parks, medians, and streetscapes, and to become more resilient to water shortages; Couple implementation of these goals with projects that also minimize impervious surfaces and ensure adequate soil drainage	E	
• Develop implementation and funding schedule to update public landscapes, including turf conversion and hydrozoning projects, to designs that more closely align with Bay-friendly landscaping techniques	P	
• Provide maintenance specifications and procedures to support staff's pruning, pest-control, irrigation, and general oversight of these new plant materials	P	
• Pursue project third-party certification through Bay-Friendly Rated Landscapes, where applicable, or build landscaping water conservation initiatives into future site-wide comprehensive rating program applications (e.g., LEED, California Green Business Program)	P	
• Install informational placards or signs at new landscaping installations that quantify water saving potential from new designs and refer public to additional informational resources	P	
• Develop informational materials based upon City's practices and lessons learned to support effective implementation of City's Water Efficient Landscaping Ordinance	P	
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

Action E. Install Graywater and Rainwater Catchment Systems in New Construction and Major Retrofit Projects

In the absence of access to utility-supplied recycled water in our community, Cupertino will strive to lead by example by installing graywater and rainwater catchment systems in new municipal construction and major retrofit projects. Graywater or rainwater can replace tap water for non-potable indoor or outdoor water needs, such as irrigation, thereby reducing the City's water expenditures and dependency on imported water in the future. These projects can also

serve as models for community members and businesses seeking to achieve the same environmental and financial benefits, and should be showcased to reconnect Cupertino's suburban residents to their backyard gardens and the natural water cycle.

M-F-7 Action E. Install Graywater and Rainwater Catchment Systems in New Construction and Major Retrofit Projects		
Implementation Steps	**Status**	**Responsibility**
• Incorporate graywater plumbing and/or rainwater catchment systems in new municipal buildings, where appropriate • Develop public-facing informational placards/signs that explain these systems and quantify their potable water-savings potential	P P	Facilities, Capital Improvement Program & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

Action F. Recognize Staff "Water Wise" Practices

Every employee contributes to the City's overall water use, whether they serve on a maintenance crew responsible for irrigation schedules or simply use office restroom facilities during regular business hours. In order to effectively promote water conservation as a collective and collaborative effort across all job classifications, the City will focus conservation efforts beyond data analysis and infrastructure upgrades to engage all employees in goal-setting, behavior change opportunities, and water use tracking efforts. The City will develop an incentive-based "Water Wise" rewards program to celebrate the accomplishments of City staff to conserve water across municipal facilities and grounds, which closely mirrors an energy conservation measure described earlier in this chapter. To launch this initiative, staff will research programs offered in adjacent jurisdictions and evaluate the following suite of ideas to motivate employee water use reduction, including, but not limited to:

- a rewards day on World Water Day (March 22) in which staff members are nominated for their outstanding dedication and novel ideas to save water,
- a competition between departments or facilities to save the most water indoors, and
- a unified water conservation challenge where employees work towards an overall water reduction goal at work or in their homes.

Each of these initiatives will require careful design to ensure that staff have the knowledge (both of water conservation practices and baseline water consumption data) and tools (including water use reduction measures and consumption tracking checklists) to effectively engage and become champions of this water savings campaign in the office and within their personal lives.

M-F-7 Action F. Recognize Staff "Water Wise" Practices		
Implementation Steps	**Status**	**Responsibility**
• Research municipal operations-oriented behavior change and utility conservation incentives programs to create model for Cupertino • Develop outreach and engagement tools to notify employees of campaign and support their program enrollment and continued involvement • Educate and train staff by sharing strategies to save water indoors and out so they may effectively participate in program • Launch "Water Wise" program and offer ongoing coaching and support • Accept "Water Wise" nominations for leading practices and employees; Collect user-generated data (e.g., checklists) and City water utility data to inform awardee selection • Recognize leaders and efforts through civic media assets, intranet, and through Council Proclamation • Survey staff following distribution of rewards to determine what worked best and where improvements can be made; This could also serve to assess what conservation measures were most frequently taken	P P P P P P P	Sustainability Division
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

VEHICLE FLEET STRATEGY

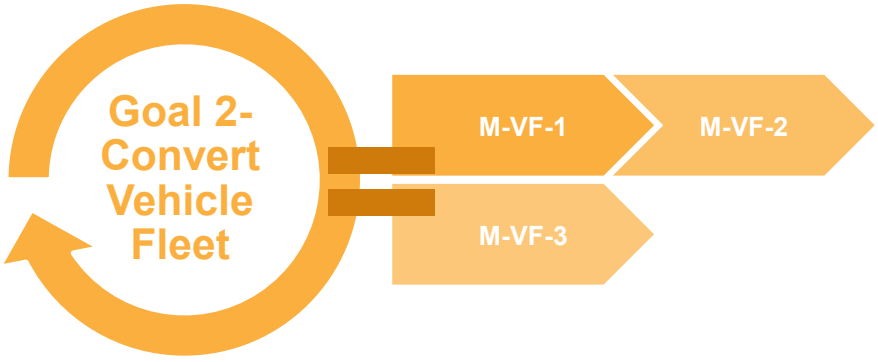
GOAL 2 – CONVERT VEHICLE FLEET:

Pursue employee commute and fleet alternatives to encourage multi-modal mobility and support a broad shift toward alternative fuel vehicles.

The City vehicle fleet sector is responsible for nearly one quarter of the City's greenhouse gas emissions. Emissions from this sector are generated through the combustion of diesel and gasoline used to fuel the City's vehicle fleet. The fleet is used to perform a wide range of City services, such as, facilities and park maintenance, streetlight and traffic signal services, and community building inspections and code enforcement.

The City has begun converting a portion of its fleet to more efficient, lower emission vehicle models. The City currently has five plug-in and hybrid-electric models, representing approximately 7% of its fleet. The City has also begun installing and planning for alternative fuel infrastructure, including a dual-port electric vehicle (EV) charging station currently installed at City Hall, with four more dual-port stations planned for installation through a recent California Energy Commission grant. During the procurement process, the City also looks for the most fuel-efficient vehicle available for a specific task and down-sizes vehicles when feasible. While the City's Vehicle Replacement Schedule allows flexibility in vehicle purchase options, older vehicles will prioritize electric or hybrid-electric models based on a lifecycle cost assessment as directed by the City's Environmentally Preferable Procurement Policy, adopted in 2008. In addition to City-owned vehicles and equipment, Cupertino can leverage its contracting power to encourage partner companies to improve their vehicle fleets as well. The City's current waste collection agreement involves a fleet of 22 trucks working in Cupertino, and requires the replacement of one truck per year with a CNG model beginning in January 2015.

This sector includes three measures that build upon the City's preliminary efforts to develop a more efficient, cleaner vehicle fleet. Measures address vehicle fleet efficiency, fuel types and refueling infrastructure, and fleet operational behavior. As with the Facilities sector measures, implementation of Measure M-F-1 will influence the reduction potential of Vehicle Fleet sector measures that include shifting portions of the municipal fleet towards electric or hybrid-electric vehicle models. Providing cleaner electricity as a fuel source for electric vehicles will improve the emissions reduction potential of Vehicle Fleet sector measures. Measures in this sector have the ability to reduce greenhouse gas emissions by approximately 58 MT CO_2e/year.

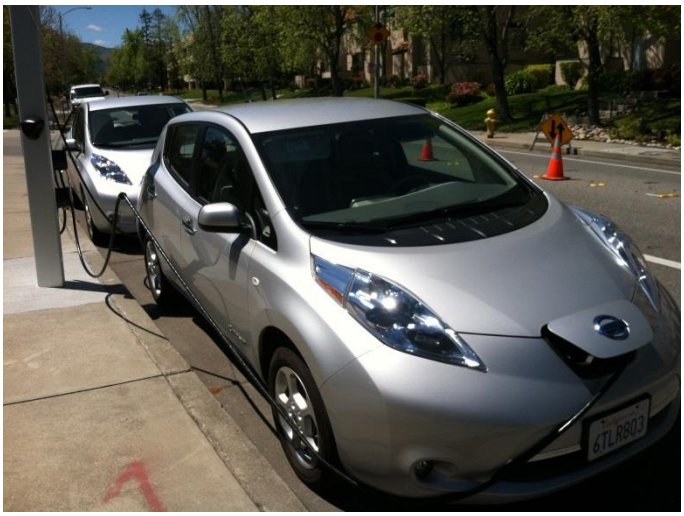


MEASURE M-VF-1 LOW EMISSION AND ALTERNATIVE FUEL VEHICLES

Transition City vehicle fleet to fuel-efficient and alternative-fuel vehicle models.

2020 GHG Reduction Potential: 48 MT CO_2e/yr

This measure aims to reduce vehicle fleet fuel consumption through replacement of older, less-efficient models with zero-emission or low-emission models, and to increase the proportion of alternative fuel vehicles in the fleet. As a signatory of the Bay Area Climate Compact (BACC), the City is aiming to achieve the BACC's Action Area Goal #10 to "increase the number of zero emission and other advanced ultra-low emission light duty vehicles to 10% of municipal fleets by the end of 2013, and to 25% by the end of 2018." The City is actively working to institutionalize the vehicle lifecycle cost of ownership through its vehicle replacement process, and could make that a standard consideration as part the City's Vehicle Replacement Schedule and Policy. Santa Clara County adopted a similar policy (Santa Clara County Policy 352) that requires preference be given to the lowest emission vehicles available. Development of a strategic vehicle fleet transition plan could also assist the City to achieve the BACC goal in a more cost-effective manner. Though the City maintains a list of all fleet vehicles, including their model, adding the purchase date age, annual mileage, and fuel consumption will help to prioritize vehicles for replacement and identify opportunities to retire underutilized vehicles. There are currently models of battery electric, hybrid electric, compressed natural gas (CNG), and fuel cell vehicles that can perform many of the functions required of municipal fleet vehicles. While electric and hybrid models of heavy-duty trucks are not yet widely available, CNG options are available that could be used as a bridge technology in the meantime to provide emissions reductions. The City is already investing in electric vehicle charging infrastructure and has plans for additional installations. It is also exploring the possibility of a fuel cell charging station.



The action associated with this measure develops a framework to transition the City's fleet towards higher efficiency and lower emissions vehicles in the future. Implementation of this measure could reduce emissions by approximately 48 MT CO_2e/year.

Action A. Update Green Purchasing Policy and Vehicle Replacement Schedule to Prioritize Alternative Fuel Vehicles and Infrastructure

The City should establish a long-term target for its municipal fleet that promotes an overall reduction in petroleum fuel consumption. Fuel-based reduction goals can be achieved with investments in alternative fuel vehicles and refueling technology, depending upon technological advancements and City budget considerations. The target will focus future fleet procurement objectives and guide long-term public infrastructure investments. Like other measures in this CAP, this measure can also be used to support a broad based, community-wide market shift that supports the City's long-range community emissions reduction targets if alternative fueling infrastructure is publicly accessible. The City of San José has adopted a similar fleet target, which promotes a shift to a public fleet with 100% alternative fuel vehicles by 2022. This will require the City to more consistently evaluate the quantity of fuel procured and consumed across the agency and each unique vehicle, an opportunity currently available through its fleet management and fueling station software (i.e., AssetWorks).

Following establishment of a fuel reduction target, the City should create a strategic plan to achieve the target through replacement of non-emergency passenger vehicles and light duty trucks with alternative fuel vehicles, assuming they meet the operational needs of the organization. This assessment and resulting replacement criteria must be based upon vehicle age, mileage, service, reliability, maintenance and repair costs, and fueling costs to institutionalize future fleet lifecycle cost analyses to inform vehicle selection, leverage industry technological advancements, and mitigate vehicle-related environmental impacts. Success in implementing a vehicle fleet plan will depend on the City's ability to implement other actions described in this section.

Assuming that refueling infrastructure can be installed, the City should develop specific vehicle fleet targets for various types of alternative fueled vehicles. For example, the City could establish a long-term target to replace all passenger vehicles with EV or hybrid-electric models at the time of replacement. The City could also establish targets to transition light-duty trucks from gasoline to hybrid, electric, and/or CNG models, gradually increasing targets as achievements are made. As described above, CNG vehicles can be used as a bridge technology to help transition the City's diesel heavy-duty trucks, which currently account for nearly one quarter of vehicle fleet fuel consumption. Incorporating CNG vehicles typically requires the installation of a CNG refueling station at a municipal corporation yard. The City currently has no plans for CNG refueling infrastructure, though has initiated conversations with PG&E who maintains local CNG refueling infrastructure to see if an opportunity for a joint-use agreement may be feasible. For purposes of this CAP, a transition to CNG vehicles is considered a long-term opportunity. The strategic fleet plan should be reviewed and revised annually to account for progress made, operating budgets, and emerging and evolving technologies.

In addition, to ensure staff amenability to this proposal, it is recommended that this effort include the revision of the City's Vehicle Replacement Schedule to include vehicle features or design specifications (e.g., special storage for tools, body type). These specifications would be related

to each vehicle's necessary tasks by surveying all City drivers to identify the vehicles best suited to relevant job functions. This information will enable the right-sizing of vehicles for each task at hand. The absence of these specifications is predicted to serve as a barrier if not performed in unison. This should include criteria for permanent vehicle assignments among these positions to ensure pooling options are maximized, and evaluate if other transportation alternatives could be pursued (e.g., biking, walking).

M-VF-1 Action A. Update Green Purchasing Policy and Vehicle Replacement Schedule to Prioritize Alternative Fuel Vehicles and Infrastructure

Implementation Steps	Status	Responsibility
• Develop municipal fleet low-carbon target; defined as A) Total vehicle fleet composed of X% zero- or lower-carbon vehicles; or, B) Total vehicle fleet emissions reduction target (can be achieved through combination of reduced VMT, vehicle technology, mode shift, etc.)	P	Grounds & Fleet Division
• Define vehicle fleet transition pathway to achieve Bay Area Climate Compact's Action Area Goal #10 to increase the number of zero emission and other advanced ultra-low emission light duty vehicles to 10% of municipal fleets by the end of 2013, and to 25% by the end of 2018; extend goal to 28% of municipal fleet by 2020	P	
• Review existing vehicle fleet lifespan to identify number and type of vehicles to be replaced by 2020, and which could be replaced with existing models of zero- or low-emissions vehicles	P	
• At time of replacement, shift passenger vehicle purchases toward EV, hybrid-electric, hydrogen fuel cell, or CNG models; consider new vehicles' carbon emissions and fuel efficiency as regular procurement criterion	P	
• Fully implement fleet management software to: ○ benchmark agency fleet size and composition; ○ track fleet vehicle fuel usage, mileage, location, maintenance schedule; ○ provide maintenance diagnostic data; and ○ activate online reservation system to expand pool opportunities.	P	
• Develop vocational specifications to pair with revised Vehicle Replacement Schedule and Policy	P	
• Perform staff training needs assessment to support driver and mechanic transition to alternative fuel vehicles	P	
• Prioritize funding for mechanic training in advanced fuel automotive technologies and offer trainings for drivers and first responders	P	
• Confirm fleet-parking designations to mitigate staff concerns and maximize public parking opportunities in areas with high parking congestion; Designating locations for parking, as well as fleet vehicle charging, will create further staff-level efficiencies by enabling quick facility access upon returning from fieldwork	P	
• Explore joint procurement options with other area jurisdictions to leverage regional shift towards cleaner municipal fleets into lower per vehicle costs; To facilitate this, reconnect with Public Fleet Supervisors Association as access point for piggybacking opportunities, competitive vendor pricing, and industry best management practices *Note: Implementation of this action is budget- and technology-dependent; emergency vehicles could be excluded from fleet target calculations and progress monitoring*	P	

Progress Indicator (2020)	Reduction Potential (MT CO_2e/yr)
Achieve Bay Area Climate Compact's goal for 25% of vehicle fleet to comprise zero- or low-emissions light duty vehicles by 2018. Assumes the following vehicle replacements: 5 passenger vehicles replaced with hybrid-electric models; 12 light-duty trucks replaced with hybrid-electric SUV models; 2 heavy-duty trucks replaced with more fuel-efficient heavy-duty truck models; In addition to existing 3 hybrid-electric passenger vehicles, and 2 hybrid-electric SUVs	**48**
Co-Benefits	**Implementation Timeline**
	

Action B. Expand City Bike Fleet, Training, and Promotion

In addition to increasing use of alternative-fuel and/or fuel efficient vehicles, the City will also continue to promote its existing municipal bike share program, which could allow the City to downsize part of its municipal fleet in the future. Approximately 80% of all City staff has attended the required Bicycle Safety Training, hosted in partnership with the County Sheriff's Office, allowing them to check out one of the City's five fleet bicycles at any time.

M-VF-1 Action B. Expand City Bike Fleet, Training, and Promotion		
Implementation Steps	**Status**	**Responsibility**
• Continue to pursue implementation of municipal bike fleet in instances where vehicle trips can safely and easily be replaced with trips via bicycle; comprehensive bike fleet could result in opportunities to downsize municipal vehicle fleet or reduce VMT to help achieve fleet emissions target	E	Sustainability Division
Progress Indicator (2020)	**Reduction Potential** (MT CO_2e/yr)	
Supports implementation of Action A	-	
Co-Benefits	**Implementation Timeline**	
		

Action C. Promote Vehicle Alternatives to Reduce Car-Travel to City-Sponsored Events

As part of the community-wide measures, the City will evaluate opportunities to expand VTA's Cupertino's bus service network by creating "last mile" bike and free or low-cost shuttle connectors. This study may also include the use of feeder busses, bicycle sharing programs and infrastructure, and car sharing programs from existing transit hubs (i.e. VTA Light Rail and Caltrain Commuter Train Stations in Mountain View and Sunnyvale) into the City to support daily commutes and mitigate traffic impacts during city-sponsored special events (i.e. 4th of July Fireworks, Black Berry Farm Opening Day). Further, the City will continue to actively promote walking and biking to these events through its marketing channels and by embedding these goals into its Green Indoor and Outdoor Events Policies, relevant both for city-organized events and those hosted in city property by outside organizations.

M-VF-1 Action C. Promote Vehicle Alternatives to Reduce Car-Travel to City-Sponsored Events

Implementation Steps	Status	Responsibility
• Continue to pursue implementation of municipal car share program, which like municipal bike fleet could allow City to downsize its municipal vehicle fleet	E	Sustainability, Grounds & Fleet Divisions
• Consider opportunities to expand municipal bike fleet and / or car share program as part of municipal fleet transition strategy and at time of regular vehicle replacement (e.g., could tasks performed by retired vehicle be performed with shared vehicle?)	P	
• Ensure that commmunity-wide shuttle, car share, bike share assessment includes considertion of City staff commutes and special-event opportunities	P	

Progress Indicator (2020)	Reduction Potential (MT CO_2e/yr)
Supports implementation of Action A	-

Co-Benefits	Implementation Timeline
	

MEASURE M-VF-2 INCREASE ALTERNATIVE FUEL INFRASTRUCTURE

Increase availability of alternative refueling infrastructure to support municipal fleet transition.

Supporting Measure – Not Quantified

This measure supports Measure M-VF-1 by providing the alternative fueling infrastructure necessary to transition the municipal fleet towards zero- or low-emissions vehicles. To support the incorporation of alternative fuel vehicles in its fleet, the City will need to further develop its charging and alternative refueling infrastructure, including electric vehicle charging stations, and possibly a fuel cell and CNG refueling station. The City has already installed one dual-port electric vehicle charging station, with plans for four additional stations in the near-term. Cupertino could possibly host ten municipally-owned charging stations by 2020, if the Civic Center Master Plan is developed as currently envisioned. It is critical that the City consider this increased electricity load demand as part of this planning process, which is also reviewing solar energy installation opportunities that have the potential to offset this demand if accurately sized.

The City is also exploring options for utilization of a fuel cell charging station proposed to be sited within the City boundaries. While fuel cell vehicles produce no emissions through their operations, life-cycle emissions for this technology depend on how the fuel is developed. There are currently limited selections in terms of fuel-cell vehicle (FCV) options, but as the technology is further developed and additional refueling infrastructure is developed FCVs could play a role in the City's fleet transition. Similarly, CNG vehicles can often perform the same tasks as diesel vehicles, with lower emissions. While CNG is still a carbon-based fuel, it can be used as a bridge technology to help cities transition from gasoline and diesel to alternative fuels. Low domestic CNG prices present an opportunity to reduce operating costs and fleet emissions simultaneously, provided access to a refueling station is available. To further enhance the emissions-reducing potential of electric and hybrid electric vehicle purchases, the City could implement Measure M-F-1 to provide cleaner electricity through refueling infrastructure. It should be noted that under the current scope, each of these measures will be achieved as part of the City's partnership with Santa Clara County to implement its proposed "Decarbonizing Transportation in Silicon Valley" grant through the Strategic Growth Council.

Action A. Install Electric Vehicle Charging Stations

As previously noted, the City has one electric vehicle charging station, with four more stations planned for installation as part of a recent California Energy Commission-awarded grant through the Bay Area Climate Collaborative. However, these five unique locations do not include the Cupertino Service Center, where the majority of the city's fleet vehicles are housed overnight. As such, this location should be evaluated as part of the City's Capital Improvement Program and/or future grant opportunities, which could enable access to funding to locate the station

adjacent to the Service Center on Mary Avenue, as these grants most often prioritize publically accessible stations.

While the City anticipates incorporating primarily hybrid electric vehicles in the near-term, certain City functions may allow for the purchase of 100% electric models, such as in Parks Department applications. Properly functioning and accessible recharging infrastructure will be required to support use of these vehicles and mitigate staff concerns about procuring fully electric vehicles, as current public charging station demands are extremely high. Publicly accessible electric vehicle charging stations can also support the City's longer-term community-wide emissions reduction goals by allowing community members to transition their personal vehicles to electric or hybrid-electric options. Given this proposed infrastructure expansion, the City recently developed an electric vehicle charging station policy and procedure to guide future charging station installation, but will expand this narrow scope to also include siting criteria to be defined through the "Driving Net Zero" Strategic Growth Council grant awarded to Santa Clara County to support its cities as described in Chapter 3.

M-VF-2 Action A. Install Electric Vehicle Charging Stations

Implementation Steps	Status	Responsibility
• Develop City-owned EV Charging Station Procedure to ensure proper finance, training, maintenance, and reporting functions are established for effective staff oversight	P	Transportation, Grounds & Fleet, and Sustainability Divisions
• Develop Alternative Vehicle Fueling Infrastructure (AVFI) standards and plan to define prospective locations and siting criteria (e.g., design guidelines, standard drawings, specifications) to facilitate on-street and off-street applications	P	
• Install additional electric vehicle charging stations for municipal fleet use; as share of electric vehicles in fleet increases, ensure adequate access to charging stations for municipal vehicles through additional installations or controlled access	E	
• Install portion of electric vehicle charging stations in areas accessible to community members, such as Civic Center parking lots; consider new electricity load created from EV charging stations during building design phase of Civic Center Master Plan to provide opportunities to offset this increased load through additional installation of rooftop PV systems	P	

Progress Indicator (2020)	Reduction Potential (MT CO_2e/yr)
Assumes 10 dual-port electric vehicle charging stations installed	-

Co-Benefits

Implementation Timeline

Action B. Evaluate Fuel Cell Fueling Station

The City has begun exploring options to both promote and utilize a proposed fuel cell station. There are currently limited options in the passenger or light-duty truck fuel cell vehicle market, though hybrid fuel cell models are more common to help overcome the challenges presented by limited fueling infrastructure. Fuel cell vehicles also tend to be relatively more expensive than gasoline or even hybrid-electric vehicles. However, they do provide a good long-term opportunity for vehicle emissions reductions, depending on how the hydrogen fuel is produced. The City should continue to investigate costs and benefits associated with installing fuel cell fueling stations, track private-developer efforts to locate a station in the community (see: California Fuel Cell Partnership), and, in tandem, consider what role fuel cell vehicles might play in its municipal fleet in the future. As with CNG vehicles discussed below, the transition to or incorporation of fuel cell vehicles is likely to occur outside of the CAP's 2020 planning timeline. However, fuel cells do present a potential action to help achieve the City's longer-term reduction targets.

M-VF-2 Action B. Evaluate Fuel Cell Fueling Station

Implementation Steps	Status	Responsibility
• Continue exploring opportunities to develop local fuel cell fueling station for municipal and community use	E	Transportation & Sustainability Divisions
• Share information with neighboring jurisdictions to determine interest and feasibility of joint procurement through local vendors	P	
• Due to current limited vehicle model availability, consider model types and cost when estimating fuel cell vehicles' future role in municipal fleet transition strategy (see M-VF-1 A)	P	
• Pending feasibility analysis, construct fuel cell fueling station for municipal and / or community-wide use	P	

Progress Indicator (2020)	Reduction Potential (MT CO_2e/yr)
Assumes no fuel cell fueling stations installed prior to 2020	-

Co-Benefits	Implementation Timeline
	

Action C. Evaluate CNG Fueling Station

The City is not yet considering near-term opportunities to convert diesel vehicles to CNG models. While there are currently five CNG refueling stations in the county, and a sixth in the planning phase, the City could consider developing its own station for convenient, local access. As with the electric charging stations, a publicly accessible CNG station could also help support a communitywide shift towards CNG vehicles in the long-term. Opportunities may exist for funding partnerships with other local governments, regional agencies, or local businesses that operate their own vehicle fleets.

M-VF-2 Action C. Evaluate CNG Fueling Station		
Implementation Steps	**Status**	**Responsibility**
• Research opportunities for development of municipal CNG refueling station; look for partnerships with neighboring cities or local employers with large vehicle fleets for cost-share opportunities of joint-use facility • Pending results of CNG feasibility study, identify funding and pursue development of CNG refueling station for municipal and public use; transition municipal fleet diesel vehicles to CNG, as appropriate, as bridge technology until cleaner heavy-duty vehicle models become widely available for integration into fleet; if better heavy-duty vehicle options become available before development of CNG station, reconsider if there is long-term role for CNG vehicles in municipal fleet	P P	Transportation & Sustainability Divisions
Progress Indicator (2020) Assumes no CNG fueling stations installed prior to 2020		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

MEASURE M-VF-3 PROMOTE BEHAVIOR / FUEL OPTIMIZATION

Encourage and promote fuel efficient driving.

2020 GHG Reduction Potential: 19 MT CO_2e/yr

Reducing vehicle fleet fuel use translates directly into emissions reductions. To accurately strategize and implement policies for promoting fleet efficiency, it is important to have accurate data about the fuel efficiency of vehicles and driver behaviors. Telematics systems installed on fleet vehicles can help optimize routes, enable managers to accurately track and monitor fuel efficiency, and positively influence driver behavior. Honoring department managers and operators who model fuel-efficient practices can raise awareness of positive behaviors and encourage more widespread fuel savings. Similarly, while the City performs regular maintenance on all vehicles, it will need to consider formalizing these practices. According to the Federal Energy Management Program (FEMP), a regularly maintained fleet can save 12-18% in long-term maintenance costs compared to reactive maintenance programs.[xx] Operational and maintenance behaviors, such as proper tire pressure inflation, regular vehicle inspections, timely repairs, and fuel-efficient driving techniques can extend the operating life of fleet vehicles and improve fuel efficiency by approximately 19% (FEMP).

The following actions would further support the City's goal to reduce vehicle fleet emissions by ensuring that the necessary use of municipal vehicles occurs in a safe and efficient manner. Implementation of this measure could reduce emissions by up to 19 MT CO_2e/year.

Action A. Implement Telematics to Improve Route and Fuel Optimization

Telematics systems can empower fleet managers and operators to quickly identify fuel-consumptive maintenance issues and inefficient driving patterns or excessive vehicle idling. Accurate telematics data provide documentation to enable confident decision-making when identifying potential vehicles for replacement and transitions to more fuel-efficient and alternative fuel vehicles. The system also enables staff to dispatch help more promptly to stranded vehicles. The City already employs telematics practices to optimize routes for Building Department inspections and reduce vehicle miles traveled, and could potentially further expand this program to other departments. Telematics program examples from other cities have shown to produce fuel savings of 10-20% per year.

M-VF-3 Action A. Implement Telematics to Improve Route and Fuel Optimization

Implementation Steps	Status	Responsibility
• Continue use of route optimization practices by Building Department for inspections	E	Grounds & Fleet, Sustainability Division
• Evaluate opportunities for additional route optimization of municipal vehicles that have standard operating routes (e.g., Parks Department landscaping crews); identify VMT reduction potential through new routes	P	
• Develop telematics program (e.g., vehicle tracking) for City fleet to optimize vehicle operations	P	

Progress Indicator (2020)	Reduction Potential (MT CO_2e/yr)
Assumes 10% fuel savings over 2010 baseline for all passenger and light-duty trucks (i.e., 2,100 gallons of gasoline saved per year); assumes full implementation of Measure VF-1, Action A assumptions	19

Co-Benefits

Implementation Timeline

Action B. Update Vehicle Use Policy to Prioritize Fuel-Efficient Operations and Maintenance

The City currently adheres to an informal set of fuel-efficient driving and maintenance practices, including an anti-idling policy and regularly scheduled preventative maintenance. Formalizing these practices by embedding it within the City's Vehicle Use Policy could help prioritize these actions for the City's maintenance staff and vehicle operators. The policy could be developed to document existing maintenance activities and tune-up schedules, require fuel-efficient driver training, and raise awareness among all City employees about fuel-saving priorities. Training sessions should engage fleet staff, maintenance shop managers and staff, and City vehicle operators and drivers.

M-VF-3 Action B. Update Vehicle Use Policy to Prioritize Fuel-Efficient Operations and Maintenance		
Implementation Steps	**Status**	**Responsibility**
• Establish vehicle fleet efficiency policy (i.e., operation and maintenance) that includes formal vehicle maintenance check-list targeting fuel efficiency tune-ups and fuel-efficient driving training (e.g., no speeding, idling, excessive tools/gear in vehicles); fuel-efficient driving could be monitored through vehicle fleet telematics program • Continue implementation of City's anti-idling policy (with exemptions for emergency vehicles) • Provide anti-idling outreach city-wide through partnership with neighborhood and community groups, with specific campaigns targeting idling in School Zones; partner with Cupertino Chamber of Commerce on anti-idling campaign in commercial districts	P E P	Grounds & Fleet, Sustainability Division
Progress Indicator (2020) Supports implementation of Action A		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

Action C. Expand Commuter Benefits Program

Typically, employee commute emissions are excluded from a municipal emissions inventory, as was the case in Cupertino. This is due to the fact that they are designated as a Scope 3 emissions source in the LGOP guidance used to develop the baseline inventory (see Chapter 2 for further description on the City's emissions sources). Scope 3 emissions can be optionally included, although the City does not have direct financial or operational control over these vehicles, so they are not included within the City's municipal fleet emissions calculations. Some jurisdictions voluntarily report these emissions, though it is understood that the accuracy of Scope 3 emissions is typically lower than that for Scope 1 or Scope 2 emissions because data availability and reliability are diminished (i.e., cities have greater access to emissions data for sources over which they have operational or financial control, like energy use or annual municipal fleet mileage).

According to a 2012 survey, 83% of Cupertino employees drive alone to work. Additionally, nearly the same amount of emissions comes from the City's municipal fleet as are estimated to result from City employee commutes (i.e., 424 and 463 MT CO_2e/yr, respectively). This presents an opportunity for the City to demonstrate another leadership role in emissions reductions, even if those reductions are not counted towards the City's target achievement since employee commute emissions are not included in the municipal operations inventory. The City can influence this source of emissions by expanding existing commuter benefits in a way that encourages employees to commute using alternative modes other than single occupancy vehicles. In accordance with SB 1339 requirements, Cupertino already provides a suite of alternative commute benefits to its employees, marketed through a flyer and benefits trainings,

and has a designated Human Resources Department Commuter Benefits Coordinator. The most widely used City benefit is the Alternative Work Schedule, or the 9/80 schedule, that affords many full-time employees two Fridays off per month, avoiding commutes on those days. In 2013, Cupertino instituted a pre-tax transit benefit, up to the allowable IRS limit, to incentivize and financially reward employees that commute by transit. Cupertino also provides bikes for employee use during the work day as an alternative to fleet vehicles.

This action proposes the City create additional benefits to further encourage employees to pursue alternative commuting, and unites these benefits under a formalized commuter benefits program. The following elements are recommended as additions to the existing program, and were selected from numerous options as the most cost-effective and applicable to Cupertino:

1. "Last mile Connector" or Carpool Van: This van would establish one of the City's underutilized pool vans as a bridge to transit services that are difficult for employees to reach without a vehicle.
2. Carpool Matching: Cupertino can promote matching services through 511.org and other no-cost avenues so that employees can easily find convenient carpool-to-work options. Cash incentives for carpooling could also be offered.
3. Walk/bike Matching: Cupertino can promote free walk/bike matching services through 511.org and other no-cost avenues so that employees can easily find walking or biking partners to join on commutes to work. Pre-tax incentives for walking and biking to work are also permitted by law.
4. Guaranteed Ride Home: This service provides employees that do not drive to work with a ride home in an emergency. Typically the employer will open an account with a rental car or taxi company, which is charged when employees use the service.
5. Flexible/Alternative Work Schedule: In addition to the 9/80 schedule that many Cupertino employees currently follow, other alternative schedules could be proposed where appropriate, as well as flexibility to accommodate carpooling and avoid traffic at peak times.
6. Telecommuting/Telework: New IT advancements can facilitate a formalized telecommuting policy, where employees forgo the commute on days agreed upon with their supervisors and according to the policies set forth by the City.

The City may choose to expand the aforementioned short-term proposed commuter benefit offerings to include additional benefits in the future, such as shuttle services, parking cash-out, reduced cost transit passes, preferred parking for ride sharers, and achieving a bike-friendly workplace certification.

M-VF-3 Action C. Expand Commuter Benefits Program		
Implementation Steps	**Status**	**Responsibility**
• Conduct employee commuter benefits survey to evaluate areas of priority and highest use • Develop commuter benefits program expansion options, budget, and resource needs; Evaluate vendor proposals if applicable • Create outreach plan and materials for communicating new unified program and benefits to employees; Develop carpool/bike/walk matching activities; Design additional incentives (e.g., recognition program) • Launch program, implement outreach plan, and track participation/employee feedback; Adjust as needed	P E P	Sustainability & Human Resources Division
Progress Indicator (2020) Supports implementation of Actions A, B, and D		**Reduction Potential** (MT CO_2e/yr) -
Co-Benefits		**Implementation Timeline**

Action D. Introduce Fuel Saving Recognition Program for Employees/Departments

Establishing a program for recognizing employees and departments for reducing fuel usage and/or reducing vehicle miles traveled can raise awareness of exemplary behavior throughout departments. Identification of key performance indicators such as annual fuel use reduction compared to a historical baseline or a per employee efficiency average can promote engagement from all departments (Typically, emergency services are excluded from these types of programs). In addition, any opportunity to engage staff in fleet procurement efforts is strongly advised. Establishing vocational specifications, recommended above, will ensure vehicle designations match job functions moving ahead, but this is just a first step to ensure staff engagement in this new prioritization. The City should continue activities to involve departments in purchasing decisions and evaluations of vehicle replacement models, as was practiced during the FY13/14 Vehicle Replacement Schedule. The Sustainability Division hosted a ride-and-drive event for all employees to take electric and plug-in-electric hybrid vehicles for a test drive, since this fleet technology was new to the City. Staff was then surveyed to learn their preferences and concerns, which informed the Fleet Division's selection. This type of practice should be continued to increase driver comfort with transition from conventional to alternative vehicles.

M-VF-3 Action C. Introduce Fuel Saving Recognition Program for Employees/Departments		
Implementation Steps	**Status**	**Responsibility**
• Establish inter-departmental fuel savings recognition program (excluding emergency vehicles) that tracks annual fuel use by department and provides departmental employee rewards for annual improvement (either total reduction compared to a department historic average or per employee efficiency) • Implement process to track and report municipal vehicle fuel usage through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system	P	Sustainability Division
Progress Indicator (2020) Supports implementation of Action A	**Reduction Potential** (MT CO_2e/yr) -	
Co-Benefits	**Implementation Timeline**	
		

SOLID WASTE STRATEGY

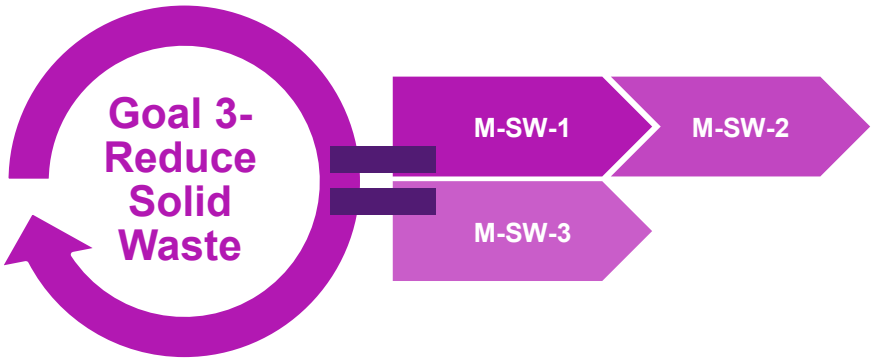
GOAL 3 – REDUCE SOLID WASTE:

Effectively manage materials to shift behavior, consumption, and life-cycle impacts.

The Solid Waste sector emissions are relatively small compared to Facilities and Vehicle Fleet, contributing approximately 5% of total emissions. The City's solid waste emissions are based on the disposal of waste generated from municipal activities, such as facility operations, park landscaping and maintenance, and other City activities. Waste disposal creates emissions when organic waste (e.g., food scraps, yard clippings, paper and wood products) is buried in landfills and anaerobic digestion takes place, emitting methane. Additionally, the extraction and processing of raw materials for consumer products, distribution to consumers, and eventual disposal of the products, creates emissions as well.

A number of actions have been either planned or implemented to reduce City generated waste. The City has developed a zero-waste strategy with diversion goals and descriptions of diversion programs. Zero-waste strategies typically strive for 90% or greater diversion of waste from the landfill waste stream through recycling, material reuse, or composting. The Bay Area Climate Compact includes a solid waste diversion goal, which instructs signatories to "increase solid waste diversion from landfills to 75% by the end of 2013, and achieve zero waste by the end of 2020." One diversion strategy to that end has been implementation of the City's green procurement policy that encourages the purchase of recycled, recyclable, or compostable materials whenever possible. The City also administers a citywide residential and commercial compostable collection program, paperless office practices, on-site landscape waste reduction, and construction and demolition diversion at municipal project sites. Finally, the City has adopted a green indoor and outdoor events policy that defines materials management requirements (e.g., banning use of polystyrene and distribution of single-use bags) and goals for events hosted on city property by the agency or external partners.

The City will continue its efforts to reduce the amount of waste generated from municipal operations, while diverting waste from landfills through composting, recycling, and reuse. This sector includes three measures that expand upon the City's existing efforts, including establishment of policies, goals, and audits to reduce waste; continuing organic waste diversion activities; and increasing construction and demolition waste diversion. When implemented, the Solid Waste sector measures have the ability to reduce emissions by approximately 80 MT CO_2e/year.



MEASURE M-SW-1 WASTE REDUCTION

Reduce municipal waste through procurement policies, waste diversion goals, and waste stream monitoring and analysis.

2020 GHG Reduction Potential: 64 MT CO_2e/yr

Cities can reduce their contribution of solid waste sent to landfills through careful consideration at the procurement phase of a product's recyclability, re-use opportunities, useful life expectancy, and comparable substitutes. Green procurement specifications can be enforced through incorporation of Citywide or departmental diversion goals that elevate these considerations during decision-making processes. Similarly, monitoring the implementation of these policies and goals is necessary to evaluate the success of a waste reduction program. This measure includes implementation of existing procurement guidance documents and paperless office strategies, departmental waste diversion goals, and waste monitoring and tracking mechanisms to help the City achieve its zero-waste goal by 2020. Implementation of this measure could reduce emissions by 64 MT CO_2e/year.

Source: West Coast Climate and Material Forum - http://yosemite.epa.gov/R10/ECOCOMM.NSF/climate+change/wccmmf

Action A. Establish Stretch Waste Reduction and Diversion Goals

As a signatory to the BACC, the City has already established a zero-waste goal for itself, and has taken several implementation steps towards that goal including development of a Zero-Waste Strategy. The City (with input from its waste diversion staff) could also establish building or department-specific goals that would allow each department to determine the most efficient strategies for goal achievement. Implementation of this action would be enhanced with accurate municipal waste stream data as described in Action D, so building- or department-specific strategies can be developed based on the types of waste present in the dumpsters. To assist in emissions reductions, the Zero-Waste Strategy should include programs to address the remaining organic waste content of the municipal waste stream, including office paper and cardboard, food scraps and compostable paper (e.g., pizza boxed, soiled napkins), yard waste clippings, and lumber from construction projects. In particular, this effort should continue to develop employee training and outreach programs to increase participation in the City's existing organics collection service.

M-SW-1 Action A. Establish Stretch Waste Reduction and Diversion Goals		
Implementation Steps	**Status**	**Responsibility**
• Establish specific zero-waste goal for municipal operations (target to be included in Zero Waste Strategy update) that achieves Bay Area Climate Compact's Action Area Goal #9 to increase solid waste diversion from landfills to 75% by end of 2013 and achieve zero waste by end of 2020; City's goal is to achieve 75% diversion by 2016	P	Environmental Division
• In conjunction with municipal waste audits (see M-SW-1 D), establish waste reduction / diversion goals by building or department (whichever is easier to track) as means to achieving overarching zero-waste goal; re-evaluate building or department goals as part of regular waste audits	P	
• Implement process to track and report municipal solid waste generation through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system	P	
Progress Indicator (2020)		**Reduction Potential** ($MT CO_2e/yr$)
Assumes 80% reduction in organic waste (e.g., food scraps and compostable paper, landscape debris/trimmings, scrap lumber, paper/cardboard) from 2010 baseline; emissions reductions are shown next to actions that address specific organic waste sources (i.e., M-SW-1 B, M-SW-2 A, M-SW-3 A)		-
Co-Benefits		**Implementation Timeline**

Action B. Create Paperless Office Policy/Program

Office environments typically generate substantial waste from white paper, mixed office paper, newspaper, and corrugated cardboard. Approximately 90% of all office waste is paper. Enhanced office paper recycling can help reduce emissions associated with organic landfill waste, and help to conserve raw materials. In addition to fully implemented recycling programs, "paperless office" policies can further reduce office waste and lower operating costs by reducing unnecessary printing, minimizing space needed for paper file storage, and improving file management efficiency. As a city in the heart of Silicon Valley, Cupertino should maximize its application of computer technology and digital systems in areas where it can lead to operational cost savings and resource efficiency. The City currently uses paperless practices in the Building Department for building permits and other forms and paperless agendas for its Council and Commissions, an effort led by the City Clerk. Expansion of paperless office practices will require Sustainability Division and IT staff to: investigate print-tracking software compliance problems, establish paper use reduction goals, and develop employee education programs about file management processes and paper use tracking. Paper reduction goals can be tracked through reduced procurement costs for paper, ink, and other printer-related costs, or through municipal waste audits. To ensure that recycled paper and cardboard can be re-used for their highest and best purpose, the City should maintain a "dry" recycling stream to avoid paper-product contamination from liquids and food scraps.

M-SW-1 Action B. Create Paperless Office Policy/Program		
Implementation Steps	**Status**	**Responsibility**
• Continue to implement and monitor success of office paper reduction strategies	E	Sustainability & Environmental Division
• Work with IT Department to install printer-tracking software that allows printer analytics	P	
• Conduct analysis of paper use per department to establish data trends (e.g., reams used per year, pages printed per month)	P	
• Establish City-wide paper use reduction goals based on printing analysis	P	
• Meet with individual departments to discuss results of analysis and identify additional opportunities for printing reduction and / or conversion of some file types from hard copy forms to electronic	P	
• Establish "dry" recycling collection for paper and cardboard products, as opposed to co-mingled collection for these items, to ensure highest value during recycling	P	
Progress Indicator (2020) Assumes 80% diversion of municipal office paper over 2010 baseline levels		**Reduction Potential** (MT CO_2e/yr) **64**
Co-Benefits		**Implementation Timeline**

Action C. Revise Green Procurement & Event Specifications, Pair with Implementation Handbook

Green procurement specifications are often developed to prioritize City purchases that generate lower waste across a product's lifecycle, allow local recycling or composting, incorporate recycled or re-used content, and support healthy working environments (e.g., low VOC paints and carpets). The City already has an Environmentally Preferable Procurement Policy, adopted in 2008 and currently being revised to mirror industry advancements, and has developed a draft user-friendly handbook to support staff procurement decisions. The handbook incorporates previous research efforts on preferred products for use in daily operations or at City-sponsored events, with an emphasis on preference for recycled/recyclable products, compostable products, minimal packaging, and other low-waste options. Given that the agency does not have a single office or individual overseeing purchasing, this handbook can serve as a clearinghouse document for all City procurement policies related to resource conservation. As the City approaches its zero-waste goal, municipal waste audits (see Action D below) may provide insight into the types of materials that are most difficult to eliminate from the waste stream. Specific green procurement alternatives could be added to the handbook to target these specific types of waste.

M-SW-1 Action C. Revise Green Procurement & Event Specifications, Pair with Implementation Handbook		
Implementation Steps	**Status**	**Responsibility**
• Continue to implement City's Environmentally Preferable Procurement Policy and refinement of staff handbook to serve as user-friendly resource to guide City purchases of "green" products, such as furniture, carpeting / flooring, paints, packaging materials, energy-efficient appliances, etc. • Design purchasing specifications that give preference to recycled products, recyclable and compostable products, products derived from renewable materials, and other products that produce lower waste across the product's lifecycle • Include reference to City's ENERGY STAR appliance procurement policy, or include as part of new Green Purchasing Guide to provide one comprehensive guidance document	E P P	Sustainability and Environmental Division
Progress Indicator (2020) Supports implementation of Action A	**Reduction Potential** (MT CO_2e/yr) -	
Co-Benefits	**Implementation Timeline**	

Action D. Conduct Waste Characterization Audits and Track Materials/Diversion

Analysis of municipal waste volume and composition can provide important data about diversion target feasibility and waste reduction opportunities, as well as provide measurement and verification to track progress of waste reduction/diversion goals described in Action A above. Waste audits and surveys at municipal facilities also provide opportunities to engage

department managers and employees regarding recycling and diversion efforts, potentially leading to higher participation rates and development of new strategies. The City already performs waste audits at municipal buildings and facilities as part of its Green Business Certification, but should increase the regularity and tracking of these efforts moving forward. Audit results could be used to develop a tracking/reporting mechanism to measure diversion target achievements per building or department, as described in Action A, or to help identify problematic waste materials as described in Action C. In order to monitor, track and evaluate effectiveness within each department, a central purchasing coordinator or analyst may be needed in the future.

M-SW-1 Action D. Conduct Waste Characterization Audits and Track Materials/Diversion		
Implementation Steps	**Status**	**Responsibility**

• Continue to perform waste audits at various City facilities to:
  ○ determine type / quantity of waste being produced,
  ○ measure effectiveness of existing waste diversion practices,
  ○ identify opportunities for new waste diversion practices,
  ○ establish baseline data for measuring progress towards waste reduction and diversion goals using CalRecycle data or EPA ReTrac Tool
• Establish regular waste audit cycle to track implementation of various waste reduction practices
	E
	
	P
		Environmental Division

Progress Indicator (2020) Supports implementation of Action A	**Reduction Potential** (MT CO_2e/yr) -	
Co-Benefits	**Implementation Timeline**	

MEASURE M-SW-2 FOOD SCRAP AND COMPOSTABLE PAPER DIVERSION

Continue to divert food scraps and compostable paper from municipal waste stream.

2020 GHG Reduction Potential: 16 MT CO_2e/yr

Food scraps account for approximately 16% of the overall solid waste stream, according to the state's most recent waste characterization survey.[xxi] The City already provides food scrap and compostable paper collection at all municipal facilities as part of its citywide organics collection program. Diverting these waste materials from landfills helps to reduce methane emissions

created when organic material decomposes in landfill environments. Expansion of this measure could contribute reductions of approximately 16 MT CO_2e/yr by 2020.

Action A. Expand Municipal Collection and Composting Program

The City currently collects organic waste at all municipal facilities, with the most effectively implemented models at City Hall and Blackberry Farm. Expanding this collection service and staff engagement program to other municipal facilities, particularly public buildings with high visitation rates, would help to capture more of the organic waste stream, and support the City's zero-waste goal (see M-SW-1). The City could review its facility waste audits to identify the best candidates to further prioritize organics collection. If audits reveal that significant portions of organic waste are still being discarded at facilities with organics collection, the City could focus its efforts on educating City staff and the public on how the diversion program works. Publicly-oriented education campaigns could also serve to increase participation in community-wide organics collection at homes and businesses.

M-SW-2 Action A. Expand Municipal Collection and Composting Program		
Implementation Steps	**Status**	**Responsibility**
• Continue implementation of food scrap / compostable paper collection program at municipal buildings	E	Environmental Division
• As part of municipal waste audits (see M-SW-1 D), identify City buildings or facilities (e.g., parks) where substantial amount of compostable waste is still disposed of in general waste bins; develop additional employee educational materials (or community materials in case of public facilities) explaining how composting program works, what items can be collected, and benefits of City action in this area	P	
• If participation within City buildings indicates room for improvement, consider holding annual competitions (by building or department) to achieve lowest amount of compostable waste in landfill waste bins; competition could be timed with waste audits	P	
Progress Indicator (2020) Assumes 90% diversion of municipal food waste and plant waste over 2010 baseline levels	**Reduction Potential** (MT CO_2e/yr) **16**	
Co-Benefits	**Implementation Timeline**	

MEASURE M-SW-3 CONSTRUCTION AND DEMOLITION WASTE DIVERSION

Enhance construction and demolition waste diversion rates for municipal projects.

2020 GHG Reduction Potential: 2 MT CO_2e/yr

The California Green Building Code currently requires 50% diversion of construction and demolition (C&D) materials for all new projects, with few exceptions. Many construction materials can be diverted from the waste stream for reuse or recycling, including scrap lumber, concrete and asphalt, bricks, scrap metal, and drywall. As green building practices become more common in the region, landfill operators and contractors will improve their abilities to divert higher percentages of C&D waste in support of project documentation requirements for various green building certification programs (e.g., LEED, Green Point Rated). This measure quantifies the City's existing requirements to exceed the state's C&D diversion requirements. Implementation of this measure could reduce emissions by 2 MT CO_2e/year.

Action A. Set C&D Diversion Policy for Municipal Projects

The City already exceeds the state's C&D diversion requirements for applicable municipal construction projections through Municipal Code 16.72, which requires 60% diversion. As a longer-term strategy (e.g., by 2035), the City could consider increasing its C&D diversion target even further for municipal projects from 60% to 75%. Cupertino's Green Building Ordinance also requires achievement of LEED certification in most new municipal construction projects and major remodels. Similar to Measure M-F-4, which suggests specific energy-efficiency goals be established for new construction or substantial retrofits, this action could be implemented as part of the Green Building Ordinance as well, through voluntary pursuit of waste diversion-related design points. Both measures expand upon existing City actions with a focus on emissions reduction opportunities in construction projects. Prior to revising the City's existing 60% C&D diversion target, City staff should research opportunities and constraints to more stringent requirements, such as the ability of landfill operators to achieve higher diversion rates. The City currently has an agreement with Newby Island Landfill for the sorting and diversion of construction and demolition debris boxes. As of 2010, the facility was reporting diversion rates between 70-80% for C&D debris boxes from Cupertino. The City of San Francisco has required 65% diversion from C&D projects since 2006, also indicating feasibility in the Bay Area to further exceed current statewide requirements.

M-SW-3 Action A. Set C&D Diversion Policy for Municipal Projects		
Implementation Steps	**Status**	**Responsibility**
• Consider amending Green Building Ordinance to require 75% diversion of C&D waste in all municipal construction projects and major retrofits (this would exceed state requirements of 50% diversion, and Cupertino's existing requirements for 60% diversion); discuss implementation feasibility with landfill operator	P	Environmental Division
Progress Indicator (2020) Assumes City continues to achieve 60% diversion of construction and demolition waste from municipal projects	**Reduction Potential** (MT CO_2e/yr) **2**	
Co-Benefits 	**Implementation Timeline** 	

Reduction Target Achievement

2020 Target Achievement

The purpose of the CAP is to identify measures and actions that the City could take to reduce municipal operation greenhouse gas emissions. This chapter has presented various measures the City could pursue (including continuation and expansion of existing City actions) to reduce its emissions through 2020. As shown in Table 4.4, the City could exceed its 2020 target through implementation of these CAP measures, and achieve reductions of approximately 700 MT CO_2e/yr compared to its target of 346 MT CO_2e/yr. This would represent an emissions level 35% below the 2010 baseline year. This achievement would put Cupertino on a trajectory towards its long-term emissions reduction targets for 2035 and 2050, though additional reductions would still be needed in the future. Figure 4.8 illustrates the City's 2020 business-as-usual (BAU) emissions forecast, reduction target, and estimated reduction level assuming implementation of these CAP measures.

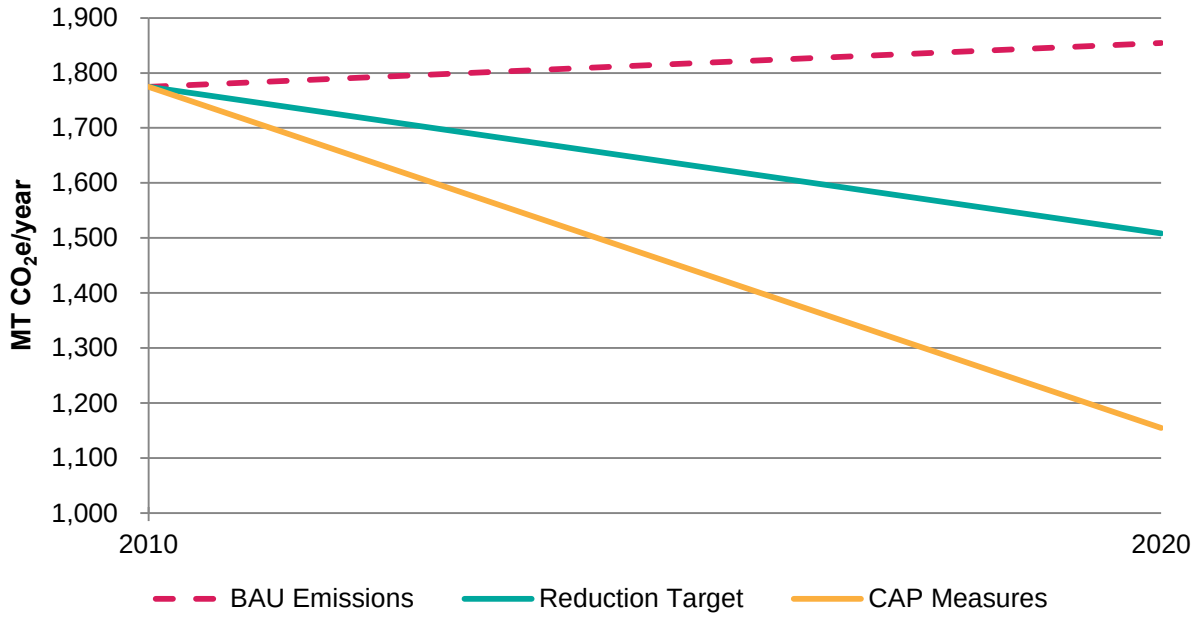
Table 4.4
Summary of Municipal Operations Reductions

Reduction Strategies	2020 Reductions (MT CO2e/year)	Contribution to 2020 Target
Facilities Strategy	552[1]	160%
Vehicle Fleet Strategy	66	19%
Solid Waste Strategy	82	24%
TOTAL 2020 MUNICIPAL OPERATIONS REDUCTIONS	**700**	**202%**
Reduction Target	15% below baseline	
Reductions Needed in 2020	346	
Estimated Reduction Level below 2010 Baseline	34.9%	

Notes: Columns may not total to values shown due to rounding

[1] Emissions reductions associated with implementation of Measure M-F-1 were omitted from the Facilities Sector subtotal for 2020; See the Measure M-F-1 discussion for more information on its role in future target achievement.

Figure 4.8 – CAP Measure Emission Reduction Potential 2010 to 2020



TRAJECTORY TOWARDS 2035 AND 2050 TARGETS

This CAP was primarily developed to identify strategies to help the City achieve its near-term 2020 reduction target. Numerous assumptions go into preparing emissions forecasts and plausible reduction measure participation rates, which make it difficult to accurately predict the City's ability to achieve longer-term reduction targets. For example, if building-related energy emissions grow faster than estimated, additional reductions will be needed to achieve the targets. Similarly, if the City is successful at converting its entire municipal fleet to low-emissions vehicles, other reduction measures may become less important. It is also difficult to predict new technologies and their impact on municipal operations. Despite these various assumptions and unknowns, it is possible to conservatively estimate progress towards the 2035 and 2050 targets, and identify the general measures that would be required to support target achievement in the future.

As shown in Table 4.5, if only the measures described in this chapter are pursued (and are not expanded beyond the implementation levels assumed by 2020), the City would achieve 66% of its 2035 target and 39% of its 2050 target. However, it is likely that additional implementation of these measures would occur after 2020, leading to greater emissions reductions. For example, this CAP assumes the installation of approximately 500 kW of solar PV by 2020. After build out of the Civic Center Master Plan, there may be opportunity to install additional PV systems on new City buildings and parking lots.

Table 4.5
Impact of 2020 Municipal Operations Reductions on Future Target Achievement

Reduction Strategies	2020 (MT CO_2e/year)	2035 (MT CO_2e/year)	2050 (MT CO_2e/year)
Total Municipal Operations Reductions	700	700	700
Reduction Target	15% below baseline	49% below baseline	83% below baseline
Reductions Needed	346	1,064	1,774
Portion of Target Achieved	202%	66%	39%

Notes: Columns may not total to values shown due to rounding

The measures and reduction estimates presented in this chapter are based on reasonable assumptions for what is possible and likely to occur between plan adoption and 2020, and have been vetted by City staff to refine their feasibility. However, as mentioned above, the accuracy of emissions projections and reduction estimates becomes less certain the farther into the future they are projected. This section presents a scenario demonstrating what level of City effort would be required in order to achieve the 2050 reduction target (i.e., 83% below 2010 levels).

As shown in Table 4.6, actions that result in cleaner electricity would play an important role in long-term target achievement. Energy-related emissions are estimated to account for nearly 70% of the City's emissions in 2050, the majority of which are related to electricity use. This means that long-term target achievement will not be possible without significant reductions from the Facilities sector. Similarly, water-related emissions and solid waste-related emissions contribute relatively fewer emissions to the City's inventory; forecasted to be less than 6% of total emissions in 2050. This indicates that actions that address water conservation and solid waste diversion, while important for other ecological or financial reasons, cannot be the primary strategy for long-term emissions target achievement.

The City's path to future target achievement is estimated to focus on the use of clean energy sources for building, facility, and vehicle needs. Table 4.6 presents one possible scenario for emissions reductions by 2050 that would achieve the City's long-term target. The table is organized similarly to Table 4.2 presented earlier in this chapter, though the scope of actual measures may differ as technologies change.

Table 4.6
Municipal Operations Measures and Quantified Reductions

Reduction Measures	2020 Reductions (MT CO_2e/year)	2050 Reductions (MT CO_2e/year)	Contribution to 2050 Target
FACILITIES STRATEGY	**552**	**1,203**	**68%**
M-F-1 Sustainable Energy Portfolio	-[1]	979	55%
M-F-2 Renewable or Low-Carbon Electricity Generation	108	173	10%
M-F-3 Advanced Energy Management	91	51	3%
M-F-4 Existing Building Energy Retrofit	41	Replaced by reductions estimated in Measures M-F-1 through M-F-3	
M-F-5 New Building Energy Performance	Supporting Measure		
M-F-6 Public Realm Lighting Efficiency	125		
M-F-7 Landscape Water Conservation	1		
Statewide Actions	186[2]		
VEHICLE FLEET STRATEGY	**66**	**459**	**26%**
M-VF-1 Low Emission and Alternative Fuel Vehicles	48	459	26%
M-VF-2 Alternative Fuel Infrastructure	Supporting Measure	Replaced by reductions estimated in Measure M-T-1	
M-VF-3 Behavior / Fuel Conservation	19		
SOLID WASTE STRATEGY	**82**	**110**	**6%**
M-SW-1 Waste Reduction	64	89	5%
M-SW-2 Food Scrap and Compostable Paper Diversion	16	17	1%
M-SW-3 Construction and Demolition Waste Diversion	2	4	<1%
TOTAL CAP REDUCTIONS	**700**	**1,772**	**100%**
Reduction Target	15% below baseline	83% below baseline	-
Reductions Needed	346	1,774	
Estimated Reduction Level below 2010 Baseline	**34.9%**	**82.9%**	

Notes: Columns may not total to values shown due to rounding

[1] Emissions reductions associated with implementation of Measure M-F-1 were omitted from the Facilities Sector subtotal for 2020; See the Measure M-F-1 discussion for more information on its role in future target achievement.

[2] The Renewable Portfolio Standard requires California's utilities to provide 33% of their electricity from renewable sources by 2020. Several CAP measures, if implemented, would result in lower municipal electricity use in 2020 than that estimated in the emissions forecasts shown in Chapter 2. To avoid double-counting the cumulative effects of each measure, this table presents the RPS reductions assuming full implementation of Measures M-F-2 through M-F-7 by 2020. If any of these measures are not fully implemented by 2020, then reductions associated with the RPS would increase as a greater amount of electricity demand would be subject to the effects of this regulation. This table further assumes that Measure M-F-1 is not implemented prior to 2020. If Measure M-F-1 is implemented prior to 2020, then reductions associated with the RPS would decrease based on the level of clean electricity purchased as part of Measure M-F-1.

This scenario presented in Table 4.6 assumes that 100% of the City's electricity use will come from emissions-free sources by 2050, and that existing solar PV installations on municipal buildings and facilities will be maintained for ongoing future use. If all electricity comes from clean sources, then building retrofits that conserve electricity no longer have emissions reductions associated with them (i.e., the electricity they save is already emissions free, so there is no net reduction in emissions). Therefore, Table 4.6 shows that emissions reductions associated with Measures M-F-4 through M-F-7 and the statewide reductions from the Renewable Portfolio Standard are supplanted by energy-related reductions in Measures M-F-1 through M-F-3.

The 2050 reduction estimates are based on the same 2020 CAP measures described in this chapter, with increased implementation performance assumptions occurring between 2020 and 2050. Approximately 70% of the City's building-related energy use in 2010 was attributed to electricity use, while the remaining 30% was natural gas. Under the business-as-usual emissions forecast scenario described in Chapter 2, this ratio of energy use is assumed to continue in the future. That means that the 30% of future building energy use attributed to natural gas consumption will not be affected by clean electricity purchases or generation. Therefore, this scenario assumes the future installation of solar thermal systems at the Blackberry Farm Pool and Sports Center, as previously identified in the City's Detailed Energy Audit (see Measure M-F-2 Action B).

In addition to significant emissions reductions from the Facilities sector, this scenario depends upon a widespread transformation of the City's municipal fleet towards alternative-fuel and low-emissions vehicles. This scenario expands upon the assumptions described in Measure M-VF-1 above, and demonstrates potential reductions resulting from a fleet that comprises 100% electric passenger vehicles and light-duty trucks, as well as a shift in heavy-duty trucks towards CNG and electric models. This scenario is dependent upon additional advancements in the vehicle market to provide alternative fuel vehicle models that can perform the tasks required of the municipal fleet.

The remaining emissions reductions are based on an assumption that the City can achieve its zero-waste goal, such that no organic materials are sent to area landfills. This scenario assumes 100% diversion of office paper and paper materials, food scraps and green waste from landscaping activities, and organic components of construction and demolition debris.

It is difficult to establish performance assumptions for horizon years far in the future given unknown budgetary conditions, emergence of new and evolving technologies, and potential state and federal actions. For this reason the CAP does not attempt to define specific municipal operations actions for 2035 or 2050. However, because the CAP is a living document that should be reviewed and revised on a regular basis, possibly in coordination with future General Plan revisions, performance indicators that align with the long-term emissions reduction strategies described here can developed gradually over time.

Given the pathway described above for achievement of the City's 2050 reduction target, emissions reduction progress by 2035 will require implementation of actions at a level somewhere between what is described for 2020 in the measure descriptions earlier in this chapter and this general scenario described for 2050. Due to the numerous variables and unknowns of the future state of the City's emissions, these 2050 reduction estimates are provided for demonstrative purposes only. As described further in Chapter 4, the City will need to regularly assess the effectiveness of CAP measures to ensure future emissions levels are on track to achieve the 2050 target, as well as monitor any new future guidance from the Office of Planning and Research, BAAQMD, or other agencies on the role of local government action in supporting the state's reduction targets.

CHAPTER 5
CLIMATE ACTION: WHAT'S MY ROLE?

This chapter describes the myriad ways in which Cupertino's residents can take action to begin implementing the emissions-reducing concepts described throughout this CAP. It presents these opportunities within the framework of a Learn, Leverage, Lead approach to engagement, and provides examples of immediate action opportunities related to the City's Green@Home, Green@Work, and Green@School programs. Cupertino cannot achieve its ambitious emissions reduction targets without the support and enthusiasm of its residents and businesses. This chapter provides direction to the tools and resources available to take action today!

Unmitigated climate change poses great risks to both Cupertino and our entire globe. It jeopardizes extensive, and often costly, efforts to enable food access and security, protect public health and safety, promote economic development and stability, and safeguard natural resources upon which our prosperity depends. Local changes in precipitation and temperatures will awaken new vulnerabilities for our residents and businesses. To abate these anticipated climate risks, predicted to intensify in the coming decades, requires initiative, imagination and ingenuity. It requires confident leadership and common-sense, crowd-sourced solutions. Most importantly, it requires collective action.

This Plan focuses primarily on the emissions over which your City government has direct control and the greatest influence, whether through education and outreach channels, infrastructure projects, community programs, or codes and ordinances. At workshops held to collaboratively develop this CAP with the community, the City received feedback that many residents were not aware of City programs and services already available to assist them in growing greener; this chapter is included here to address that gap. Moreover, it seeks to emphasize that everyday choices we make matter. Actions each of us takes at home, at work, at school, and in our community will not only help reduce our community's total emissions, but also make Cupertino a healthier, more resilient place to live, work, and play for current and future generations. This section shares a variety of ways you, as both a global and Cupertino citizen, can individually take climate action. The more we do as individuals, the greater our collective emissions reductions will be, and the stronger our community will be in the face of climate change.

"Since mitigation reduces the rate as well as the magnitude of warming, it also increases the time available for adaptation to a particular level of climate change, potentially by several decades. Delaying mitigation actions may reduce options for climate-resilient pathways in the future."

– Intergovernmental Panel on Climate Change Working Group 2, 2014 Report

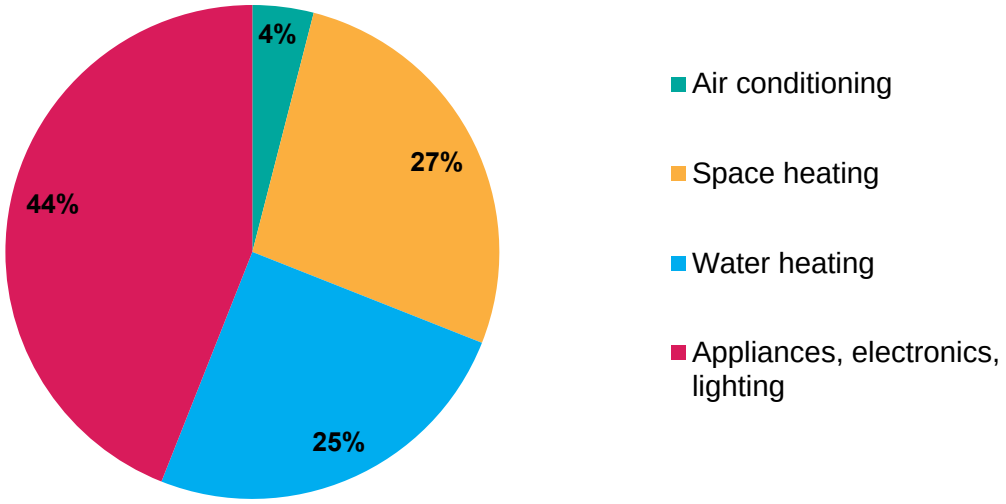
How Do I Contribute?

Before introducing a sampling of direct climate actions each of us can take to support our shared environment, let's learn which of our daily activities have associated greenhouse gas emissions, and so, have a climate impact. Any time we use electricity or fuel for an activity, we are creating greenhouse gases. Driving to work or school, watching TV, charging a cell phone, powering a refrigerator or air conditioner, or taking a hot shower, are just a few of the countless things we do that support our lives, and all result in emissions. As you've learned in previous chapters, we even produce emissions indirectly as a result of waste disposal (through collection and landfill gas), water use (through pumping and treatment), and purchasing choices (through production, shipping, and disposal). We can reduce these emissions by thinking about how we get where we need to go, how well our homes and facilities function, and what kinds of goods and services we purchase.

For example, take a look at the typical household energy expenditure in California (see Figure 5.1) – this can give us an idea of areas of opportunity to reduce energy consumption,

and thus greenhouse gas emissions. (Note: household energy use varies greatly by a number of factors, including geographic location, home size and age, and number and habits of family members).

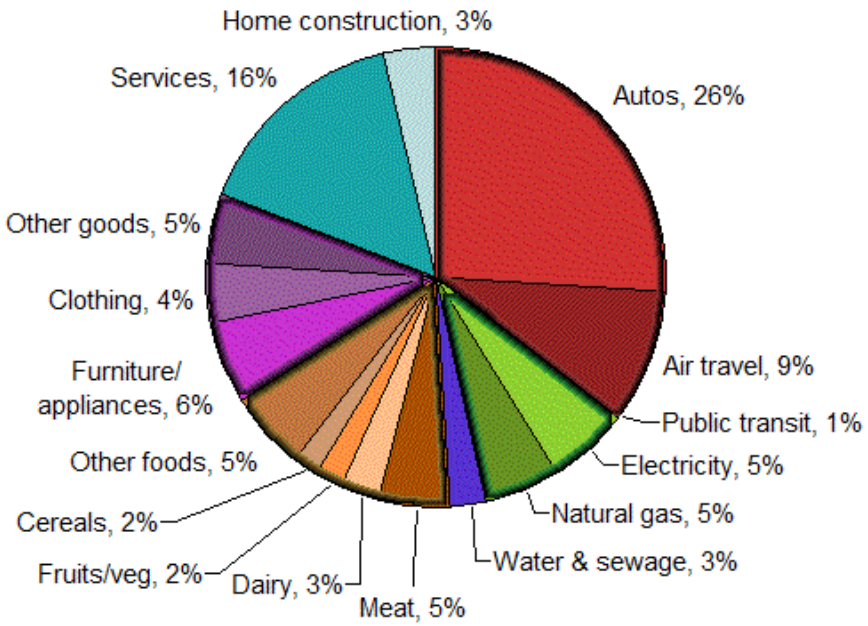
Figure 5.1 – Energy Consumption in California Homes



Source: EIA, 2009

In California, we have a milder climate than in other parts of the country, so we expend less energy on heating and cooling than homes elsewhere in the US (*lucky us!*). So comparatively, the largest portion of our energy use goes toward electricity use for appliances, electronics, and lighting. This indicates that reducing plug load in our homes by installing efficient lighting, buying energy efficient appliances, turning off electronics and appliances when not in use, and other actions can especially reduce our home's emissions. This picture does not capture, however, energy use and emissions associated with personal transportation, waste we create, and items we buy. Figure 5.2 (on the following page) seeks to shift the conversation to also include the impacts of our daily choices, activities, and habits. To get a more complete estimate of your own personal emissions, and to see where the most important areas for action are, check out the CoolCalifornia Carbon Footprint Calculator.

Figure 5.2 – Average California Household GHG Emissions (CO_2e)



Source: CoolCalifornia

What Can I Do to Help?

Given that each of our daily activities result in emissions (*i.e., the average emissions of a Cupertino resident is 5.27 MT CO2e/yr*), the City needs your help to meet its climate action goals. There are innumerable actions small and large that you can take to help our community become more resilient and reduce emissions. This section provides resources to **Learn** more about climate change, shares a few recommended actions to **Leverage** in your own life to help, and connects you to tools to help you **Lead** by example to inspire others to act. Take a look below and decide which actions are feasible for you or your family to take. Remember this is just a sampling of the many things you can do. It is okay to start small: pick one action to take today, two to prioritize next year, and/or a suite of actions to make happen five years from now, and create your own personal climate action plan!

Learn

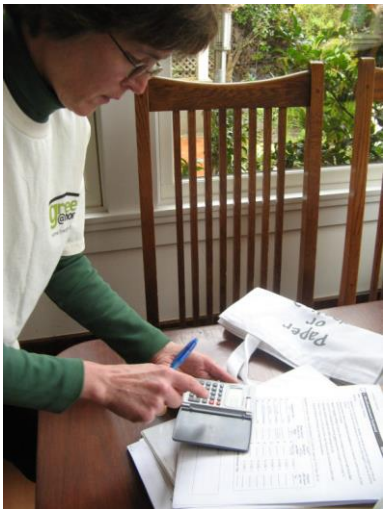
The following list of resources can help you to become a climate change guru! Arm yourself with background knowledge on the causes of changes to our climate, the potential risks to our planet and people, and additional tips you can share with family and neighbors.

- ☐ ICLEI, Local Governments for Sustainability
- ☐ Get Involved
- ☐ Intergovernmental Panel on Climate Change (IPCC)
- ☐ United Nations Framework Convention on Climate Change
- ☐ NASA
- ☐ United States Environmental Protection Agency
- ☐ California Climate Change Portal
- ☐ Union of Concerned Scientists
- ☐ Actions to Adapt
- ☐ Solutions
- ☐ What You Can Do
- ☐ Sustainable Steps
- ☐ Action Center

Leverage

Take advantage of the City's existing programs designed to ensure our community is a sustainable place to live, learn, work, and play by providing tools to encourage action among all of our residents! This section presents information on the City's **Green@Home**, **Green@Work**, and **Green@School** programs. Learn more about our environmental work, or source additional ideas for small changes that make a big difference, by visiting www.cupertino.org/green.

> *"Treat the Earth well. It is not inherited from your parents; it is borrowed from your children."*
>
> – Kenyan proverb



Source: Cupertino Patch, 2013

Green@Home

Save Energy!

- ☐ **Go Green@Home** – check out a Do-It-Yourself home energy efficiency and water conservation Toolkit at the Cupertino Library or build your own (see Appendix E).
- ☐ **Grow Greener Blocks** – schedule a neighborhood energy sweep and/or a presentation by the City's Sustainability Office at your next block party.
- ☐ **Energy Upgrade**! Source experts to help expand your home's efficiency, cost savings, and comfort. Get started with PG&E's income-qualified Energy Saving Assistance Program or the Rebate/Incentive Finder.
- ☐ **Check your Thermo…STAT!** Install a programmable thermostat. Set it no lower than 76°F for cooling. No higher than 68°F for heating (sweaters work wonders in the winter!).
- ☐ **Ward off Vampires –** Control phantom plug loads (*appliances/electronics that use energy when "off" but still plugged in*) by unplugging chargers, microwaves, computers and other electronics that are not in use. Use a smart power strip to help control plug loads.
- ☐ **Low Lights –** Turn off lights when not needed. Consider task lights vs. overhead lights.

- [ ] **Freezer Burn –** Unplug or get rid of an extra refrigerator or freezer if you don't really need the extra storage space. Plug it in only when you need the overflow space.
- [ ] **Turn *down* the heat –** Set hot water heater no higher than 120°F and insulate the hot water tank and pipes (*be mindful of insulating gas water heaters*).
- [ ] **Out with the Old…**Replace incandescent light bulbs CFLs or LEDs.
- [ ] **Lucky Stars –** Purchase ENERGY STAR® rated appliances and save loads of energy on washer, dryer, TV and other appliance use. If your refrigerator is more than 10 years old, it's time to replace it with an ENERGY STAR model.
- [ ] **Remodeling?** Make sure you're up to speed with the City's Green Building Ordinance. Use blinds and shades to let the sun's heat in or to keep it out to help heat or cool your home without changing your thermostat. Access PG&E Rebates to offset your cost!
- [ ] **Cool Suds –** Avoid hot water use by purchasing cold water detergent. Wash only full loads, and wear clothes more than once. Replace furnace filter regularly.
- [ ] **Seal it Up –** Air seal gaps, cracks, ducts in unconditioned spaces.
- [ ] **Soak Up the Rays –** Heat your water using a solar water heater instead of gas.
- [ ] **Air it Out –** Air dry your laundry on a clothes line instead of using a dryer (*how eco-retro!*).
- [ ] **Sun Power!** Assess the potential for solar energy at your home & pursue PVs (after ensuring your home is as energy efficient as possible, so you can "right size" your system!). Learn more about Cupertino's solar efforts by visiting our Solar Roadmap.

Transform Transportation!

- [ ] **Bike Cupertino** – Use Cupertino's Bikeways Map to safely bike around town via dedicated bike lanes vs. driving.
- [ ] **Travel Light –** Walk, take public transit, or ride a bike instead of driving a car whenever feasible.
- [ ] **Trip Link** – Consolidate errands to make fewer car trips, saving time AND gas!
- [ ] **Car-free Challenge!** Challenge yourself to one car-free day each week, or to take an alternative form of transportation for any destination one mile or less away.
- [ ] **Together is Better** – Carpool to work or school to save money on gas and reduce your driving. Purchase a more fuel-efficient or electric vehicle.
- [ ] **Travel Light** – Hotels use a lot of water, energy, and resources. Consider traveling lighter with Air B&B or other homestay networks or share your own home.
- [ ] **What's Our WalkScore –** Cupertino has a vast network of bike lanes, bike racks, sidewalks, and alternative transportation options to encourage car-free trips (read more here). Where can we expand these tools? Check out our walkscore or conduct your own neighborhood walkability assessment. Share your findings: sustainability@cupertino.org.

Get Water Wise!

- ☐ **Get Water-Wise!** Receive a free WaterWise House Call from the Santa Clara Valley Water District to help identify new ways to save water in your home with great rebates.
- ☐ **Slow Your Flow –** Install low-flow water fixtures (faucets, toilets, shower heads, etc.).
- ☐ **Five-Minute Limit –** Take shorter showers. Use a shower timer (*your teen will thank you*).
- ☐ **Smart Water –** Install a weather-based irrigation controller if you have irrigation. Set it to water at night or pre-dawn, and use shorter, repeated cycles rather than one long cycle. Use drip irrigation instead of sprinklers where possible.
- ☐ **Desert Beauty –** Replace your lawn with drought tolerant landscaping.
- ☐ **Natural Sponge –** Apply backyard or purchased compost to help soil hold more water.

Cut Waste & Conserve Materials!

- ☐ **Share!** Offer to share items like tools, large appliances like lawn mowers or leaf blowers, and other items you use infrequently among neighbors. Use services like Yerdle or Craigslist to facilitate the sharing or exchange of items of all shapes and sizes.
- ☐ **Stop Junk Mail** from reaching your home by registering with the Direct Marketing Association's Mail Preference Service or by utilizing this junk mail kit.
- ☐ **Waste Not –** Prevent food waste by composting food scraps in your yard waste bin.
- ☐ **Single Stream –** Recycle ALL plastics, clean paper and cardboard, glass, and metal in your single stream recycling cart.
- ☐ **Compost Right at Home!** Take a free class on backyard composting and get a free soil saver bin from the City. You'll make your own rich compost for a healthy garden and soil.
- ☐ **Get Creative –** Reuse leftover materials for new projects and support upcycling by shopping at used goods stores and at Cupertino's Citywide Garage Sale in September.
- ☐ **Don't Give Up, Give Away!** Donate clothes and unwanted items to your local thrift store. Participate in the City's Garage Sale instead of sending usable items to the landfill.
- ☐ **Reduce @ the Source –** Purchase products with less packaging or send it back.
- ☐ **Buy Recycled –** Choose paper, plastic, and other products produced with recycled content to reduce demand for and your use of new materials.

Build Community!

- ☐ **Support local!** Shop at markets, restaurants, and food trucks that serve local food, or participate in community supported agriculture for fresh, healthy food that supports local businesses and doesn't have to travel far to reach your plate.
- ☐ **Volunteer** with organizations performing sustainability work. A few local places to start include Acterra, Sierra Club, Cool Cities.
- ☐ **Find your neighborhood leader or become one** and discover which of your neighbors is working to build safer, greener, more harmonious neighborhoods!
- ☐ **Coordinate a garage sale** and inform your neighbors about Cupertino's own event.
- ☐ **Organize!** Find an issue of importance to your neighborhood and develop a roadmap for change! Apply for a Community Improvement Grant, start a petition, conduct a neighborhood needs assessment, visit City Council or a relevant Commission meeting, get in touch with City Staff – find an action and start a movement!

> *"Never doubt that a small group of thoughtful, committed citizens can change the world."*
>
> – Margaret Mead

Green@Work

Save Energy!

- ☐ **Performance Review!** Encourage your workplace to get an energy audit to understand which cost-effective opportunities are feasible for your facility. May utilities offer this service for free, or seek an auditor with access to rebates and financing information to fast-track major upgrades.
- ☐ **People First –** Work on operational or behavioral changes first, since they are often no cost or low cost options: institute a shut-off policy for workstations and lights, close off unused rooms, unplug workstation electronics, etc.
- ☐ **Bright Lights, Green City –** Upgrade lighting for energy and cost savings, and better working light levels. Check for available rebates. Use task lighting instead of lighting an entire area with overhead lighting.
- ☐ **Prioritize PACE –** Asses facilities & access this new financing tool to make upgrades.
- ☐ **Head Count –** Use occupancy sensors for lighting and for heating/cooling.
- ☐ **Work Flow –** Regularly maintain HVAC system: look for leaks/efficiency improvements.
- ☐ **Head in the Cloud –** Consider switching some IT systems to cloud-based systems and applications to reduce need for energy-hogging servers (access EPA resources here).
- ☐ **Rising Stars –** Purchase ENERGY STAR® rated or EPEAT-certified office equipment to save big on plug loads. Assess solar feasibility at your workplace and install cost-

effective PV. Better yet, benchmark your facility or office using ENERGY STAR® Portfolio Manager to compare your energy use to others with similar operational and infrastructure characteristics, receive an energy rating, and learn new ways to save.

- ☐ **Common-Area Conservation! –** If you own a building, don't forget to prioritize energy conservation projects in common spaces. Parking lot and pathway lighting expenses can really add up! Contact Right Lights for a lighting assessment and cut costs today!

- ☐ **Build Beyond Compliance –** New construction and retrofit projects follow the City's Green Building Ordinance (based on Leadership in Energy & Environmental Design (LEED) criteria) and the California Energy Code, among other requirements. As of January 2014, buildings over 5,000 square feet also follow the state's AB1103 Building Benchmarking Requirements. Shoot for the stars for your space by setting zero net energy goals and/or consider joining the Living Building Challenge.

Transform Transportation!

- ☐ **Cool your Commute!** Offer your employees alternative commuting benefits like VTA's EcoPass, or pre-tax dollars for transit expenses to cut travel-related emissions.

- ☐ **Turnover Time –** Use EDF's Guide to replace fleet vehicles with fuel efficient/electric vehicles.

- ☐ **Telework –** Use teleconferencing and adopt a telecommuting policy to save miles.

- ☐ **Bike to Work –** Provide and maintain a bike fleet, and offer bicycle safety and maintenance trainings. Provide safe onsite bike storage. Employees: follow this bike commuting checklist!

- ☐ **Charge it Up –** Install an electric vehicle charging station for employees.

- ☐ **Play Favorites –** Offer preferential parking for carpools to facilitate employee carpooling.

Get Water Wise!

- ☐ **Be an H20 Pro!** Install low-flow water devices (faucets, toilets, urinals, shower heads, etc.) to minimize your water usage.

- ☐ **Dry Spell –** Replace landscaping with drought tolerant landscaping for great-looking facilities that don't use a lot of water to maintain. Check for rebates.

- ☐ **Water it Down –** Install a weather-based irrigation controller and set it to water at night or pre-dawn, and use shorter, repeated cycles rather than one long cycle. Use drip irrigation instead of sprinklers where possible to reduce water use and cut your utility bill.

- ☐ **Writing on the Wall –** Post signs asking employees to conserve water near bathroom and kitchen sinks and report leaks if encountered here too.

- ☐ **Common-Area Conservation! –** If you own a building, don't forget to prioritize water conservation indoors and outdoors. Be mindful of watering in common landscaped areas.

Cut Waste & Conserve Materials!

- ☐ **Two-time it –** Print double-sided and make it the default printer setting. Keep a stack of draft paper near the printer for reuse.
- ☐ **Job Duties –** Make recycling and composting mandatory for your workplace. Make sure each space has adequate bins for proper disposal and provide employee training to ensure everyone's onboard.
- ☐ **Go Zero –** Provide reusable dishware in the break room for employees and for events. Make zero waste events policy for company meetings and events and say no to foam!
- ☐ **Buy Green –** Adopt an environmentally preferable purchasing policy that prioritizes recycled content products, reduced packaging, and recyclable/compostable products.

> *"It's not a choice between our environment and our economy; it's a choice between prosperity and decline."*
>
> – President Barack Obama (2009)

Build Community!

- ☐ **Get Certified!** Join GreenBiz Cupertino to get certified as a green business: receive free energy, water, and waste assessments, free equipment to help your business save water, free guidance to help you with the certification process, and recognition for your leadership. Checkout Appendix F to get started.
- ☐ **Go Local!** Prioritize restaurants and caterers that offer locally-sourced food.
- ☐ **Prioritize Green –** Choose certified green businesses when purchasing products and services.
- ☐ **Promote Health –** Expand health and wellness to employees, such as gym passes, weight loss workshops, etc. Host a Community Supported Agriculture pickup site.
- ☐ **Green Dream Team –** Start a green team in your organization to assess your workplace's operations and engage coworkers in ways they can take action @ work and @ home.
- ☐ **Take Stock –** Complete a greenhouse gas inventory or carbon footprint calculator for your business or organization and identify ways to reduce identified emissions.
- ☐ **Ready…Set…Green!** Create a green competition and award program that rewards environmental champions, energy or carbon savers in your organization.

Green@School

Save Energy!

- ☐ **Test Time!** Encourage your school to get an energy audit to understand which opportunities to save energy are feasible for your school.
- ☐ **Class Rules –** Institute behavioral change focused school policies first: shut-off policy for computers and lights, close off unused rooms, unplug electronics, etc.
- ☐ **Bright Lights –** Upgrade lighting for energy and cost savings, and better light levels for more productive (*zombie-free!*) students.
- ☐ **Fresh Air –** Regularly maintain HVAC system for good air quality. Have your HVAC equipment check for leaks and opportunities to increase efficiency.
- ☐ **Sunny Days –** Assess feasibility for solar at your school.

Transform Transportation!

- ☐ **WOW!** Expand walking and biking programs for kids @ your school by joining the growing number of Cupertino schools participating in Walk One Week (WOW!) and the Boltage rewards programs.
- ☐ **Safe Routes to School –** Grow existing walk/bike to school programs: Start with a walkability assessment, encourage your school to adopt a Safe Routes Policy, etc.
- ☐ **Safety in Numbers –** Establish a "walking school bus" that can travel together to and from school for increased safety.
- ☐ **Bike Party –** Encourage your school to hold bike safety training and/or a maintenance workshop. Ensure your school provides safe and adequate bike storage onsite.
- ☐ **Co-Commute –** Make transit and carpool information available to students and families to encouraging alternative (and perhaps more convenient!) ways of getting to school.

SafeRoutes
National Center for Safe Routes to School

Get Water Wise!

- ☐ **Every Drop Counts –** Identify opportunities at your school to conserve water. Campaign to eliminate plastic water bottles or to install a water-bottle refill station! Access free water conservation tools such as low-flow aerators to install in school bathrooms!
- ☐ **Grow Greener –** Replace landscaping with drought tolerant landscaping. Check for cost-saving rebates.
- ☐ **Smart Water –** Install a weather-based irrigation controller and set it to water at night or pre-dawn, and use shorter, repeated cycles rather than one long cycle. Use drip irrigation instead of sprinklers where possible.

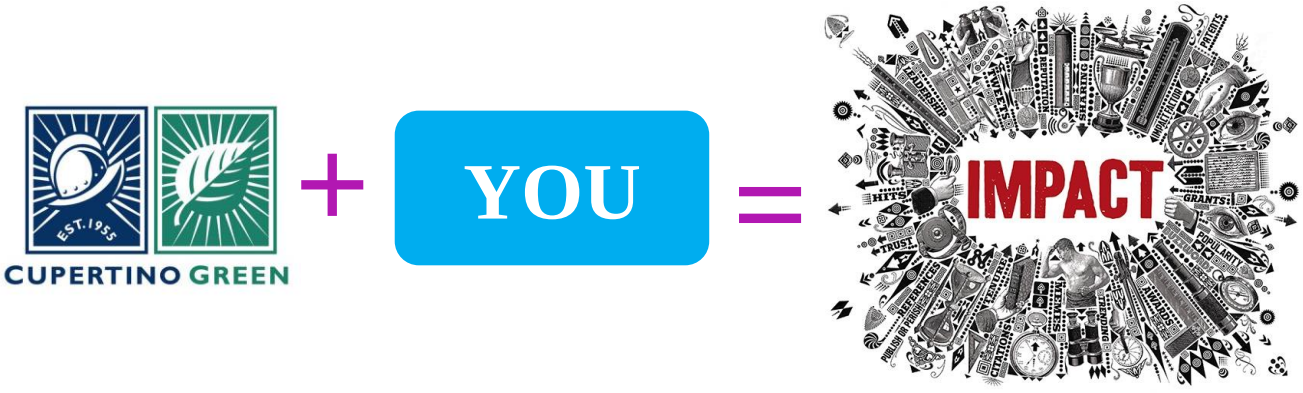
Cut Waste & Conserve Materials!

- ☐ **Double Duty –** Change your printer's settings to always print double-sided. Have a bin of draft paper on-hand to use for notes, printing or doodles!
- ☐ **Become a Zero Waste School!** Organize a recycling and composting program for your school if you don't already have both. Engage students in learning how to properly separate material, reduce waste, and make sure each area of the school has adequate bins for proper disposal.
- ☐ **Shop Sustainable –** Adopt an environmentally preferable purchasing policy for the school that prioritizes environmentally responsible products to encourage a healthy, vibrant environment at school.

Build Community!

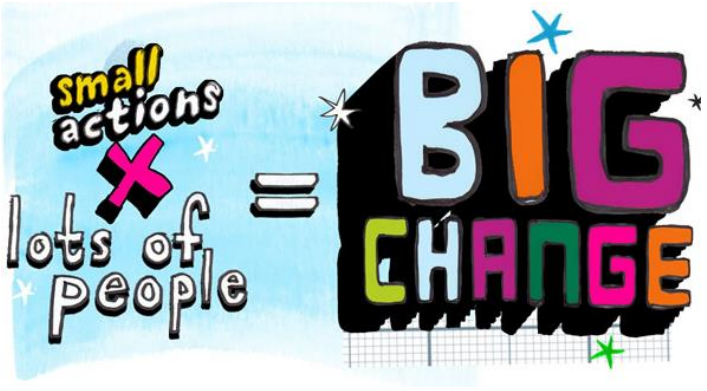
- ☐ **Go green@school!** Join the City's green@school program to help educate peers about sustainability and become a certified green school. Contact sustainability@cupertino.org to enroll your school! Check out our program's checklist, to get started (Appendix G).
- ☐ **Lunch Green –** Start a school garden to provide healthy foods for school cafeteria and teach students about growing food and eating healthily.
- ☐ **Eco Heroes –** Create a green competition and award program that rewards environmental champions at your school.
- ☐ **Enhance Your Performance –** Learn how to become a California High Performing School (CHPS) to improve the learning and natural environment!
- ☐ **Tag-Team It –** Form a school green team to assess your school's operations and educate peers about projects proposed for your school. Learn how these projects can turn into grant opportunities!
- ☐ **LEED the Way!** Go above and beyond and strive for your school to pursue LEED certification to showcase the school's commitment to energy and environmental design.

Always keep in mind that the City is your partner in climate action, as represented by the vast measures in this Plan that we'll be pursuing to protect our shared environment! Learn more about on actions to take, visit www.cupertino.org/green.



Source: Nature.com

Even without the threat of climate change, many, if not all, of the personal actions presented here have additional (co)benefits for our health and our economy. It is often the case that when we implement a practice that reduces our environmental impact, we might also save money, improve efficiency, get more exercise, eat healthier, and so on. A truly sustainable community is one that preserves our environment, supports public health, addresses issues of equity, and supports economic development. The City of Cupertino embeds these values in all programs and services it designs and offers to our residents and businesses as a means of expanding these benefits to each group. For example, bringing farmers markets to the community provides better access to fresh, local, healthy foods for residents, and allows residents to choose foods produced with fewer emissions than other food choices. Pedestrian and bikeways planning at the city level, in addition to maintaining open space and recreation facilities, supports an active lifestyle and carbon-free transportation. Consider how your personal climate actions can benefit your home, your family, your pocketbook, and your broader community as you plan your roadmap for change.



Source: http://runkle-consulting.com

With all these programs, services, and ideas for action at your disposal, you are well-equipped to be a climate leader in our community. Stretch your climate actions to your family, neighborhood and community-at-large by using the tools below to make sure your voice is heard, connect with others on issues of shared importance, and access useful City information. Remember that these are just a few of the resources available to help you bring environmental change forward (*checkout Collaborative Consumption to learn more about the growing shared economy and Code for America to find new civic engagement and technology tools*).

- ☐ **Access Cupertino –** Need to contact City Hall but don't know where to start? This web and Application-based tool allows 24/7 access to City staff, services, and information.
- ☐ **Why shop, when you can swap**! Use Yerdle to trade goods online, from kids toys, to clothing, to home goods, and pickup locally. Consider craigslist and freecycle as well!
- ☐ **Skillshare!** Help your community not just by swapping ideas and goods, but also sharing skills with neighbors, friends and strangers alike.
- ☐ **See. click. fix! –** Find a pot hole, cracked sidewalk, broken fire hydrant? Report these issues for quick repairs and to create safer neighborhoods.
- ☐ **Community Power –** What's your community vision? Neighborland is a collaboration tool to help residents voice concerns and prioritize actions to address local issues.
- ☐ **Connect to your Neighbors –** Nextdoor is a private social network for neighbors to communicate online. It could be a forum for neighbors to connect on community issues, events, and more. Have efforts already underway, share your story with neighbors and become an ambassador of change (learn more at www.cupertino.org/greenerblocks).
- ☐ **Power in the Palm of your Hand.** Find local restaurants and street tree care guides using these two City Apps.

Whether you use these tools, or advance your personal, family or neighborhood's efforts the old fashioned way, three cheers for you for committing to change for the betterment of our community, environment and climate!

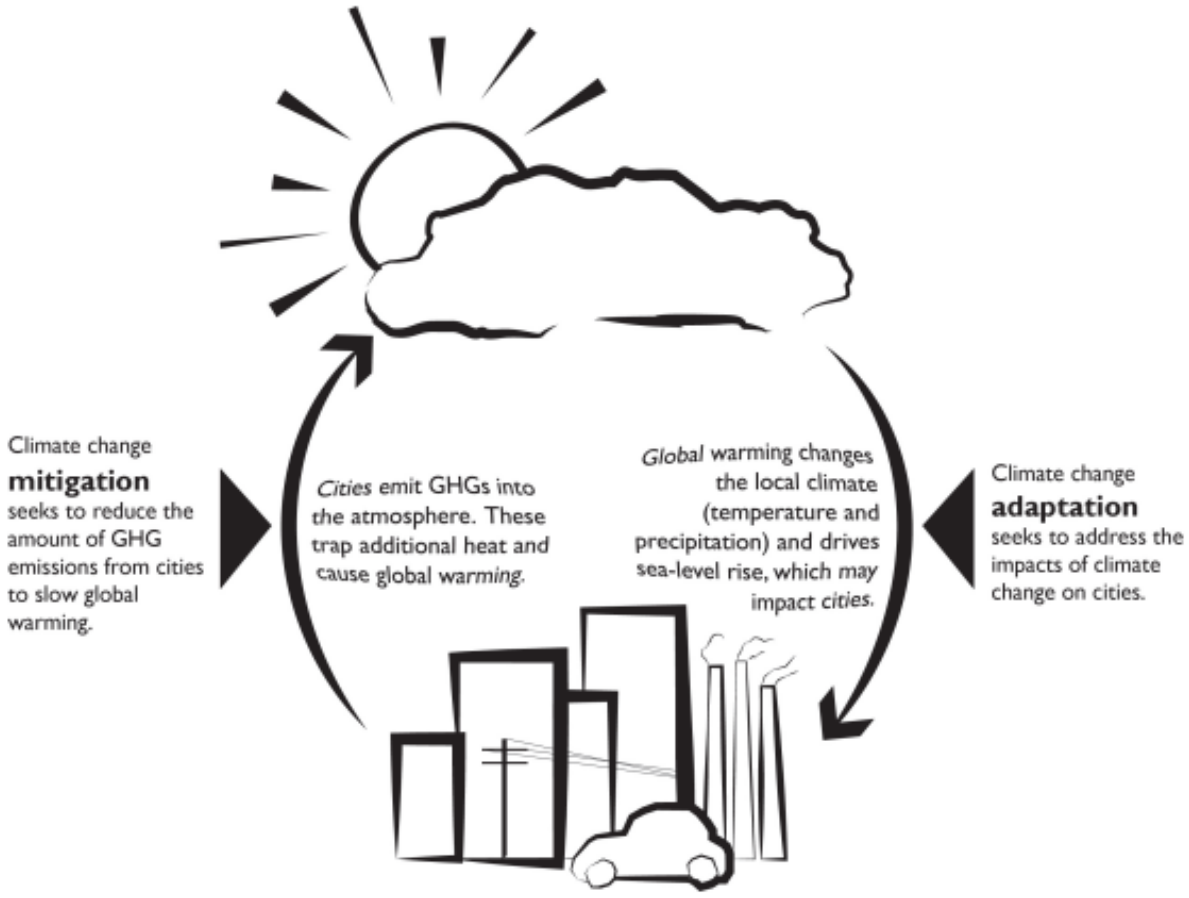
Now, let's get started!

Source: www.imgarcade.com

CHAPTER 6
ADAPTATION AND RESILIENCY

This chapter describes the role of climate change adaptation and resiliency planning in the context of Cupertino and other Bay Areas communities. Adaptation and resiliency describe the ways in which humans can survive and continue to thrive in spite of climate change-related impacts, such as increasing average annual temperatures, rising sea levels, riverine flooding, and reduced snowpack, among others. This is in contrast to the aims of the CAP to mitigate, or reduce, these potential impacts by reducing the GHG emissions that cause them. Mitigation and adaptation approaches each have a role to play in providing for a safe and healthy future.

The City's Climate Action Plan thus far has focused exclusively upon steps our agency and community can take to reduce the *sources* of greenhouse gasses, termed *mitigation* (see graphic right).[xxii] Acknowledging that climate change is happening, and will continue to happen for the foreseeable future despite efforts to mitigate emissions,[xxiii] our community needs to adapt to a warming planet. We must anticipate and minimize the risks associated with increasing temperatures and extreme weather events, shared in detail below, rather than focusing solely on curbing global warming in the first place.[xxiv] As noted in a 2001 Intergovernmental Panel on Climate Change report, "adaptation is a necessary strategy at all scales to complement mitigation efforts."



Source: CA Office of Planning & Research

> *"There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction."*
>
> – John F. Kennedy

Extreme weather events are not unfamiliar to Californians, who have historically combated wildfires, floods, droughts, mudslides, crop failures and other disasters that threatened our communities. Still today, these events take lives, destroy land and property, and cost residents and businesses billions of dollars. Informed by strong scientific research and consensus, communities are working to safeguard our collective future, economy, and civil society threatened by climate change-driven extreme weather events. Recognizing that the increasing impacts of climate change are coming requires our community to answer this critical question: "how can we strengthen our planning and preparedness efforts to ensure our City is safe and resilient to these emerging climate-driven vulnerabilities?"[xxv]

Source: Nickolay Lamm

This chapter initiates Cupertino's answer to that question by following the 3L's framework of the subsequent chapter, detailing approaches the City can take to **Learn**, **Leverage** and **Lead** its efforts to define an inclusive, impactful, and innovative resiliency agenda that safeguards the health of all members of its community and all natural resources upon which they rely. To achieve that objective, the text builds upon the vast work already underway in this space led by regional (i.e., Santa Clara County's Silicon Valley 2.0 Project, Joint Policy Committee's Climate and Energy Resilience Project) and state (i.e., California Energy Commission's Cal-Adapt) agencies. The collective works produced by Cupertino's network of partner agencies will assist our advancement as a globally replicable model of the way a small, yet smart and agile, city builds a blueprint for its long-term vitality. Read on to learn our approaches and proposed strategies to galvanize personal and citywide involvement in this critical issue.

Learn

As noted above, a multitude of research has already been conducted by scientists seeking to understand the climate-relative impacts currently experienced by our state and region, and those forecasted in the future. Extreme heat days, temperatures and drought are on the rise, placing our community's water supply and residents' health at risk. Fire season has increased by 78 days per year and a 99.7% chance of a 6.7 or greater earthquake within the next 30 years is predicted by the Southern California Earthquake Center - reminding us that the atmosphere, our oceans and geosphere are inexorably intertwined and so equally susceptible to these new climate-induced stresses and strains.[xxvi]

> *"Tell me and I forget. Teach me and I remember. Involve me and I learn."*
>
> – Benjamin Franklin

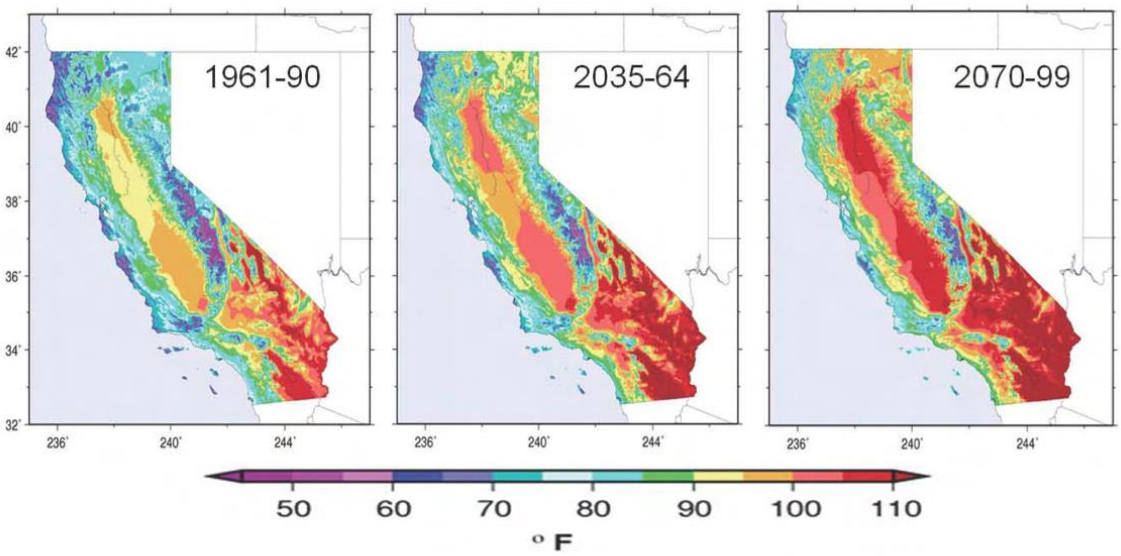
Like many other communities, our backdrop is threatened by the geological and climate instability that has become the new normal. Impacts from climate change currently experienced and forecasted to surge in California are abundant and informed largely by the following recent works:

- United Nation's Intergovernmental Panel on Climate Change (IPCC) 2014 Report: Impacts, Adaptation and Vulnerability
- California Environmental Protection Agency, Office of Environmental Health Hazard Assessment's 2013 Report: Indicators of Climate Change
- California Energy Commission's Climate Change Center's 2012 Report: Our Changing Climate: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California (*note: 2014 update underway*)
- California Emergency Management Agency and California Natural Resources Agency's 2012 Adaptation Planning Guide: Planning for Adaptive Communities.
- California Energy Commission's 2012 Report: Climate Change Impacts, Vulnerabilities and Adaptation in the Bay Area

Note that these resources shared here are not comprehensive, as a large body of California-focused adaptation research exists and can be accessed via the state's Cal-adapt portal, but focus on those that most effectively inform Cupertino's understanding of adaptation impacts to our specific community. Generally, these vulnerability assessments and surveys predict the following direct impacts anticipated for California by 2050:[xxvii]

- **Temperature** – In California, temperature increases are expected to be more pronounced in the summer and in inland areas, like Cupertino. Heat waves, defined as five consecutive days where temperatures exceed 90° Fahrenheit (F) are projected to increase not only in frequency (i.e. six to 10 additional heat waves per year) but in spatial extent. The degree of change experienced partially depends on global greenhouse gas (GHG) emissions and atmospheric concentrations; by 2050, however, average temperature increases between 1.8°F to 5.4 °F are projected.

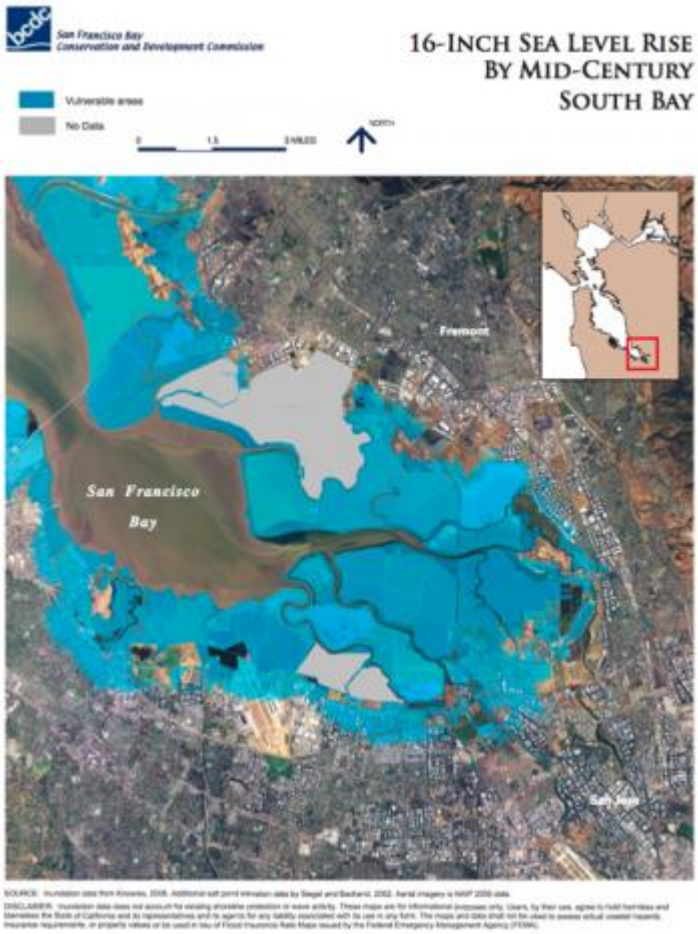
Figure 1. California Historical & Projected July Temperature Increase 1961-2099



Source: Dan Cayan et al. 2009.

- **Precipitation -** Northern California is projected to have a 12 to 35 percent decrease in precipitation. Mountainous regions are expected to see precipitation fall more frequently as rain instead of snow. These changes, coupled with the increased likelihood of drought have implications for the state's water supply. Changes in precipitation and temperature interact. Higher temperatures increase evaporation, which can result in a drier climate, and can result in earlier and faster snowmelt, as depicted in the graphic by the UN's Food & Agriculture Organization below.

- **Sea Level Rise** – Due to global melting of land ice and thermal expansion, the sea level has risen seven inches over the last century and is predicted to rise between 43 and 69 inches by 2100 along the California coastline, posing considerable threats to coastal areas and particularly to low-lying areas adjacent to San Francisco Bay. The number of acres vulnerable to flooding is expected to increase 20 to 30 percent in most parts of the Bay Area, with some areas projected for increases over 40 percent. Coastal areas are estimated to experience an increase of approximately 15 percent in the acreage vulnerable to flooding.



- **Ocean Acidification** – As atmospheric carbon dioxide continues to increase, so does its oceanic concentration, lowering its pH and changing overall ocean chemistry causing detrimental effects on marine life.
- **Wind** – Wind impact predictions for California are still forthcoming, but are being carefully studied to determine how circulation patterns, surface energy, and topography will influence the frequency of extreme events (i.e. wind in combination with hot, dry conditions can worsen fire risk).

The California Adaptation Planning Guide notes that these aforementioned "direct climate impacts affect a wide range of community structures, populations and basic functions" and recommends that agencies orient community climate adaptation assessments around the secondary impacts among the following sectors:

Public Health, Socioeconomic, and Equity Impacts: This sector consists of the public health and socioeconomic impacts of heat events, average temperature change, intense rainstorms, reduced air quality, and wildfires on people, focusing on groups who are most sensitive to these impacts because of both intrinsic factors (e.g., age, race/ethnicity, gender) and extrinsic factors (e.g., financial resources, knowledge, language, occupation).

Ocean and Coastal Resources: Changes such as sea level rise, intensification of coastal storms, and ocean acidification may affect ocean and coastal resources. Potential environmental impacts of these changes include coastal flooding/ inundation, loss of coastal ecosystems, coastal erosion, shifts in ocean conditions (pH, salinity, etc.), and saltwater intrusion.

Water Management: This sector includes climate changes such as altered timing and amount of precipitation and increased temperatures that influence the availability of water supply. In addition, the sector includes an evaluation of the role that intense storms and rapid snowmelt can play in flooding.

Forest and Rangeland: Climate can have an influence on forest health and wildfire. In forest ecosystems, climate change can alter the species mix, moisture and fuel load, and number of wildfire ignitions. These changes in wildfire character are related to a range of forest health indicators such as growth rate, invasive species, erosion, and nutrient loss.

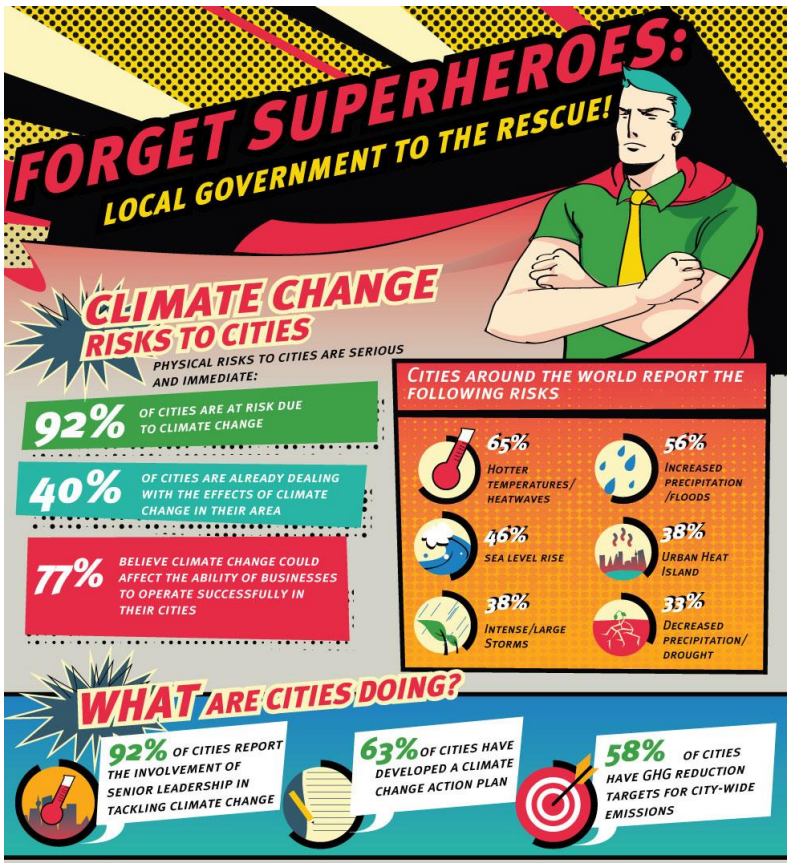
Biodiversity and Habitat: Climate change may affect terrestrial and freshwater aquatic habitats and the species that depend on them. Changes in the seasonal patterns of temperature, precipitation, and fire due to climate change can dramatically alter ecosystems that provide habitats for California's native species. These impacts can result in species loss, increased invasive species' ranges, loss of ecosystem functions, and changes in growing ranges for vegetation.

Agriculture: The threats posed by climate change have the potential to influence both crop and livestock operations. Climate change can affect agriculture through extreme events (e.g., flooding, fire) that result in large losses over shorter durations, or through more subtle impacts such as changes in annual temperature and precipitation patterns that influence growing seasons or livestock health.

Infrastructure: Infrastructure provides the resources and services critical to community function. Roads, rail, water (pipes, canals, and dams), waste (sewer, storm, and solid waste), electricity, gas, and communication systems are all needed for community function. Climate change increases the likelihood of both delays and failures of infrastructure.

It is important to note that nearly all adaptation resources cited in this Chapter focus on the benefits of adaptation and resiliency planning at the city scale, as our communities will serve as the keystone of these predicted impacts. The California Adaptation Planning Guide describes the four primary reasons for this city-level focus:

1. The 2009 California Climate Adaptation Strategy (CAS) recommends that "communities with General Plans and Local Coastal Plans should begin, when possible, to amend their plans to assess climate change impacts, identify areas most vulnerable to these impacts, and develop reasonable and rational risk reduction strategies using the CAS as guidance."



2. Many of the impacts of climate change will be localized and will vary based on a community's physical, social, and economic characteristics. Communities are best positioned to assess and address the implications of climate change at the local level.

3. Communities that begin planning now will have the best options for adapting to climate change. Although the impacts of climate change are already being felt in many communities, they are relatively small at this time. The onset of more significant impacts is likely many years away, but this is not a justification for inaction. Instead it calls for effective planning now while good options still exist. The longer communities wait, the greater the costs of the impacts and the costs to react to those impacts.

4. Many of the actions needed to reduce the impacts of climate change will provide additional benefits to the community, including increased public safety, reduced greenhouse gas emissions, and greater economic stability.

Cupertino offers a unique living laboratory to apply these assumptions about the city's role in fostering community resilience. Our city's renown far surpasses its moderate size of approximately 61,000 residents and 2,000 businesses. Around the world, Cupertino is famous as the home of high-tech giants, such as Apple Inc., and can serve as a beacon for best

practices with the proper foundation and implementation. Glass and steel corporate headquarters rise above and yet blend with tree-shrouded residential neighborhoods, most of which sit atop an active fault line and were constructed prior to the adoption of more aggressive seismic codes. In addition to seismic vulnerability, neighborhoods are increasingly susceptible to fire and flooding as they climb into the foothills of the Santa Cruz Mountain range, a point of wildland-urban interface and home to Cupertino's uphill dam. Like many other communities, our backdrop is threatened by the geological and climate instability that has become the new normal. Extreme heat days, temperatures, and drought are on the rise, placing our community's water supply and health at risk.

Ground-truthing this rationale and the aforementioned forecasted impacts anticipated among and across these broad sectors, as defined by the California Adaptation Planning Guide, will be just one step in the City's future adaptation work. Understanding Cupertino's climate exposures, sensitivities, risks, and will inform its adaptation, and ultimately resilience goals, as will a suite of efforts currently underway by the City's county, regional, and nonprofit partners, detailed below.

Leverage

Detailed below are a sampling of the bodies of knowledge compiled and initiatives focused on climate adaptation and resiliency that Cupertino is tracking and/or is already involved. This list is by no means exhaustive, it's meant to surface those resources anticipated to be most relevant to Cupertino's efforts to define its adaptation approach.

"Alone we can do so little; together we can do so much."

– Helen Keller

Non-Governmental Organization Resources & Activities

Lead	Resource	Description
Rockefeller Foundation	100 Resilient Cities Challenge	Connects cities with resources and one another to support their independent and collaborative efforts to become more resilient to the physical, social and economic challenges of the 21st century and beyond.
ICLEI	Climate Resilient Communities Program and Climate Impacts by Region	Shares information on how to build resilient communities and distinguishes California-specific impacts arising from global warming.
Georgetown	State Adaptation Tracker	Benchmarks all state's, including California, progress in preparing for the impacts of climate change.

Intergovernmental & Federal Agency & Activities

Lead	Resource	Description
White House	Executive Order -- Preparing the United States for the Impacts of Climate Change	Directive to the nation to undertake actions that enhance climate preparedness and resilience.
Federal Emergency Management Agency	Climate Adaptation at FEMA	Describes how FEMA will integrate adaptation into its disaster planning and management; serves as a guide for considering adaptation related to emergency preparedness at the local level.
U.S. Environmental Protection Agency	Tools for Public Officials	Suite of federal agency tools for public officials in specific sectors to begin adaptation planning including EPA's own Climate Resilience Evaluation & Awareness Tool (CREAT).

State Agency Resources & Activities

Lead	Resource	Description
CA Office of Planning & Research	Climate Change Assessment for California (4th)	Offers 3 Climate Change Assessments for California that prioritize actions and investments to safeguard people, economy, natural resources.
CA Natural Resources Agency	Adaptation Planning Guide	Support tools for regional and local climate impact planning.
CA Energy Commission	Climate Change Impacts, Vulnerabilities, and Adaptation in the San Francisco Bay Area	Research synthesis detailing potential regional climate risks to assist adaptation planning.

Regional Agency Resources & Activities

Lead	Resource	Description
Bay Conservation & Development Commission	Resources for Adaptation Planning	Collection of regionally-specific background information, adaptation planning templates, and guidance documents.
Joint Policy Committee	Santa Clara County Snapshot	Provides a snapshot of Santa Clara County's adaptation efforts and activities to date and recommends future resiliency approaches.
Joint Venture Silicon Valley	JVSV Climate Task Force	Serves as the City's conduit to regional climate adaptation and resiliency planning initiatives.
Association of Bay Area Governments	Bay Area Climate Change Adaptation and Resilience	Survey of county-level work to provide examples of projects and identify needs best met through partnerships with other agencies.

County Resources & Activities

Lead	Resource	Description
Santa Clara County	Silicon Valley 2.0 Project	County-specific outcomes expected from Silicon Valley 2.0 will instruct Cupertino's work to define its communitywide resilience agenda.
San Mateo County	Regionally Integrated Climate Action Planning Suite (RICAPS)	Offers a city CAP template and access point for the City to participate in a regional dialog on adaptation and resilience planning.
Marin	County Climate & Adaptation Resources	Surveys the landscape of North Bay-relevant climate and adaptation resources.
Santa Clara Valley Water District	Climate Change Portal	Summarizes Water District climate and adaptation initiatives.

Of these inventoried projects, most relevant to Cupertino's own efforts is the ongoing Strategic Growth Council-funded Silicon Valley 2.0 Project, led by Santa Clara County and noted above. Cupertino is currently serving on the effort's Technical Advisory Committee, which is applying a risk management framework to:

A. Evaluate the exposure of community assets (i.e., infrastructure, populations, and landscapes) to likely climate impacts,

B. Examine the potential consequences to the economy, society, and environment of this exposure, and

C. Develop preemptive adaptation strategies that improve community resiliency.

The outcomes proposed for Silicon Valley 2.0 include:

- Prepare a strategic climate change adaptation plan that aims to facilitate and coordinate regional planning and implementation efforts for Silicon Valley
- Identify assets within the region that are threatened by the anticipated climate change conditions and the magnitude of the potential economic, social, and environmental impacts that could result if no action is taken.
- Identify potential strategies to minimize these impacts.
- Develop a decision-support tool that will allow jurisdictions and other organizations to evaluate potential climate change impacts and strategies within their communities
- Ultimately, the plan will identify the region's top priorities, and the near–term actions needed to implement an effective regional scale adaptation response.

SILICON VALLEY **2.0**

Source: Santa Clara County

Beyond involvement in Silicon Valley 2.0, the City will continue to track all listed agencies' progress to support local adaptation planning, and carefully consider tools developed by other civil service organizations to ensure ongoing community-scale progress. In addition, many of these agency's efforts that are listed above are now further supported by private and nonprofit sector allies, in many cases giving rise to additional funding opportunities to pursue this work. Pursuing these funding opportunities will also be prioritized.

Lead

It is our hope that this network of agencies can inform the City's decision making[xxviii] and increase our application of systemic strategies to expand our capacity to plan for and rebound from the social and physical uncertainties our future holds.

> *"The only person who is educated is the one who has learned how to learn and change."*
>
> – Carl Rogers

The information collected here will inform the City's forthcoming design of a long-term adaptation and resilience program that integrates these

innovative federal, state, regional and county-level efforts to benefit and effectively serve our community.[xxix] In addition, City will follow the following California Adaptation Planning Guide steps, paired with others[xxx] newly developed, to conduct its first community-specific vulnerability assessment and populate its first Adaptation Plan:

Steps in Climate Adaptation Strategy Development

The process of developing climate change adaptation strategies can vary from a short, initial qualitative process to a much more detailed, lengthy, comprehensive approach. Regardless of where a community falls in this spectrum, the basic steps are the same (Figure 1).

Figure ES-1. The nine steps in adaptation planning development. The gray steps are part of vulnerability assessment (steps 1-5) and the blue steps are adaptation strategy development (steps 6-9).

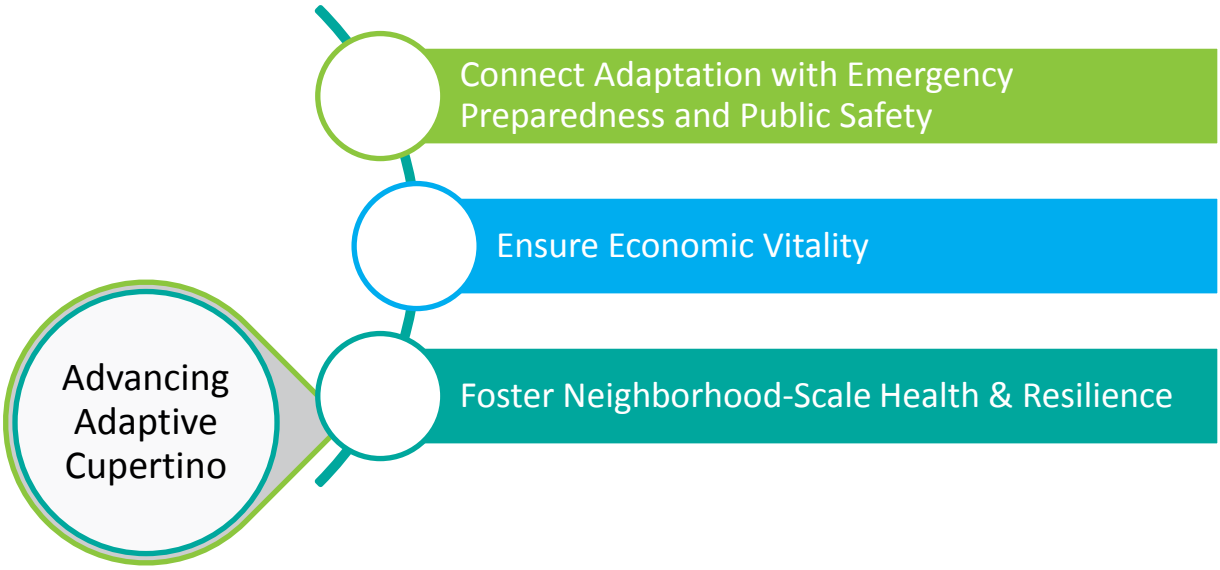
Vulnerability Assessment

1. Exposure: Identify the climate change effects a community will experience.
2. Sensitivity: Identify the key community structures, functions, and populations that are potentially susceptible to each climate change exposure.
3. Potential Impacts: Analyze how the climate change exposure will affect the community structures, functions, and populations (impacts).
4. Adaptive Capacity: Evaluate the community's current ability to address the projected impacts.
5. Risk and Onset: Adjust the impact assessment to account for uncertainty, timing, and adaptive capacity.

Adaptation Strategy Development

6. Prioritize Adaptive Needs: Based on the vulnerability assessment, prioritize the adaptive needs.
7. Identify Strategies: Identify strategies to address the highest priority adaptation needs.
8. Evaluate and Prioritize: Prioritize strategies based on the projected onset of the impact, projected cost, co-benefits, and other feasibility factors.
9. Phase and Implement: Develop an implementation plan that includes phasing of strategies and a monitoring system to assess effectiveness.

In conducting a vulnerability assessment, the City, like other communities, anticipates to find risks to our citizenry, infrastructure, local economy, and local natural resources. To address these risks, the adaptation strategies put forth for our specific community will serve **three overarching goals**, described below. The City believes that by developing an adaptation plan with these Cupertino-specific goals in mind, our community can best prepare for and adapt to a future of changing weather patterns and rise of extreme weather events.



Goal 1: Connect Adaptation Plan with Emergency Preparedness and Public Safety Programs

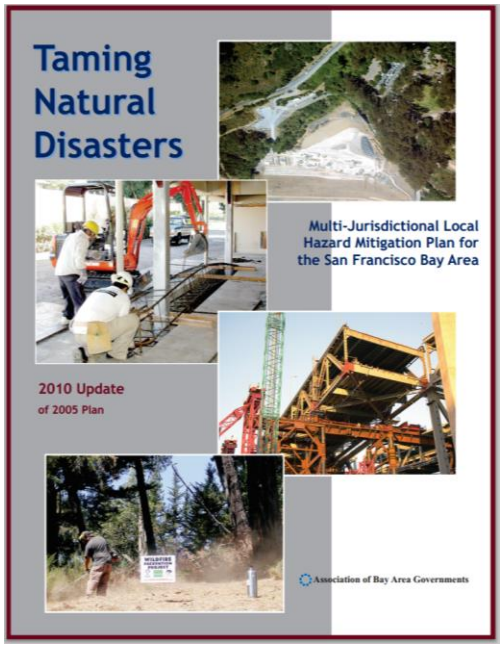
The Rockefeller Foundation's "100 Resilient Cities" defines resilience as "the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience. Simply put, resilience enables people to bounce back stronger after tough times, and live better in good times," thereby creating a critical connector to our emergency preparedness and public safety leaders and volunteers, who already have this risk management and mitigation approach engrained in their operational DNA.[xxxi]

The Federal Emergency Management Agency (FEMA) estimates that $1 in pre-disaster preparedness could save society $4 on post-disaster recovery. The City has institutionalized the goal of building intentional intersections between emergency preparedness and disaster planning and climate change in its current General Plan: Strategy 5- Climate Adaptation and Resiliency, which defines the following steps to achieve these objectives:

> "Implement the General Plan Health & Safety Policy HS-35, Strategy 3 to conduct a climate vulnerability assessment and set preparedness goals and

strategies to safeguard human health and community assets. Build these climate preparedness and resiliency findings and efforts into relevant plans including the future General Plan, Disaster Plan, Local Hazard Mitigation Plan, Dam Plan, Climate Action Plan, and Energy Assuredness Plan."

To implement this policy, staff will connect with the City's Emergency Preparedness Program, Police and Fire staff, as well as Public Safety Commissioners to identify relevant policy and programmatic nodes for prospective adaptation work. One mutually beneficial project already identified is interdepartmental collaboration to develop a Local Energy Assuredness Plan, leveraging existing California Energy Commission tools to identify and "ensure key assets within the community are able to function, protecting the public and minimizing economic loss, after all types of events."[xxxii]

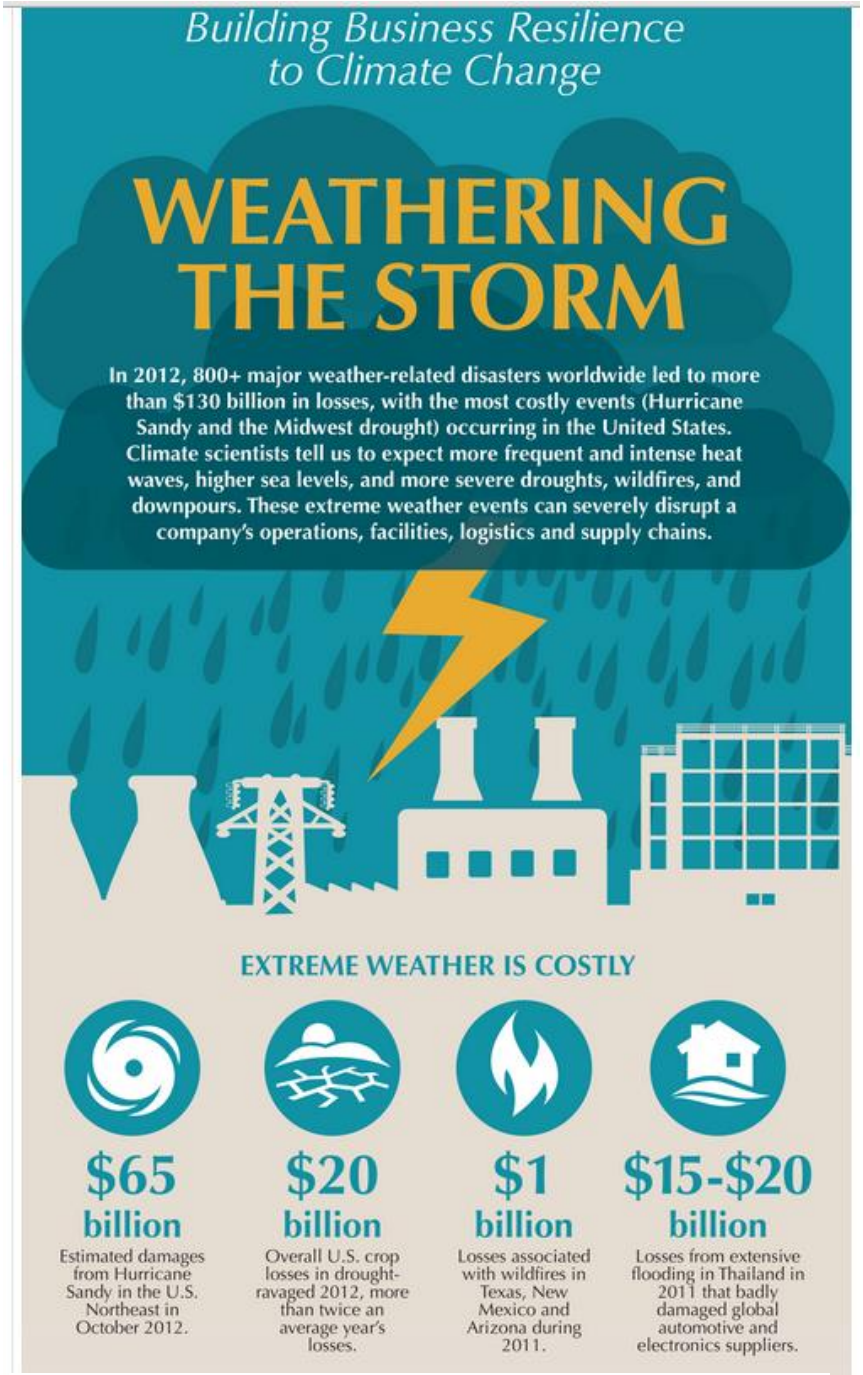


Following a Joint Policy Committee Bay Area Climate Energy Resilience Project (BACERP) recommendation, staff will also consider holding climate change-focused simulations or emergency drills to raise awareness about these imminent risks across participating agencies, volunteers and the community more broadly. Cupertino's team will also revisit regional emergency and disaster planning tools to find the connections with Cupertino's plan, including, but not limited to ABAG's Disaster Resilience Initiative, including the Local Government Recovery Toolkit, and its Bay Area Regional Hazard Mitigation Plan.

Goal 2: Ensure Economic Vitality

Just as ensuring community health is a core component of an adaptation plan, in order for Cupertino to stay resilient to the impacts of climate change, business health and resiliency is vital. Cupertino's portfolio includes 2,000 businesses from corporate giants to small independent restaurants, shops, and other businesses. About half of our businesses are home-based. These businesses both contribute to and will be impacted by future climate-related challenges, and Cupertino is working toward ensuring their ability to continue to provide goods, services, and employment in our community.

Because many larger corporations are undergoing their own risk assessment and planning activities, Cupertino will give special attention to our business community. The primary way Cupertino is looking at building resiliency among this population of businesses is to embed adaptation strategies into existing programs and services for businesses. One way we can do this is to integrate adaptation measures into our green business certification program (GreenBiz Cupertino), so that businesses currently working toward meeting a suite of voluntary sustainability measures will also be introduced to new resiliency objectives.



Source: Center for Climate and Energy Solutions

Because our existing green business program already acts as a way for the City to educate businesses on environmentally preferable practices, it can double as an adaptation education tool in the future. The City can also infuse adaptation planning into its forthcoming Economic Development Plan. Because that plan seeks to guide new business development, enhance services for businesses, and foster Business to Business (B2B) as well as public/private partnerships, including a conversation about adaptation will steer our local economy toward practices and partnerships that promote long term resiliency. The City plans to connect with the Cupertino Chamber of Commerce and Economic Development Committee to engage businesses in shaping our shared adaptation-focused priorities.

As for community-facing adaptation planning, Cupertino will also seek to bring in resources from regional business-oriented partners already promoting sustainable economic development locally. For example, the Silicon Valley Leadership Group's Bay Area Climate Compact, of which Cupertino is a signatory, is driving efforts to convene joint procurement of energy efficient technologies and renewable energy sources as a means of fostering stronger Business to Government (B2G) climate-tied partnerships. It also calls for all signatories to develop and adopt municipal adaptation plans.

Goal 3: Foster Neighborhood Health & Resilience

Source: resilience.org

Beyond being home to the globally influential companies, Cupertino is also home to a diverse populous, absent an ethnic majority with nearly three-quarters of its residents identifying as non-white. Our cultural diversity is part of our community's identity, and Cupertino has programmed robust community engagement networks including Neighborhood Block and Watch Leaders, Community Emergency Response Teams, Medical Reserve Corps and more to connect to find strength in our varied backgrounds and source commonalities among our perceived differences. Record community service and program participation rates and high-scored communitywide surveys attest, our City is not culturally complacent and our members feel connected to one another, their community, and their government. To continue Cupertino's history of success in bringing its residents, businesses and schools together to develop solutions to issues challenging the future vitality of our community, the City will aspire to construct its adaptation plan through an inclusive and culturally-literate approach, which will continue to be refined through this effort.

According to the Joint Policy Committee, adaptive capacity is the "degree to which a country, region, community or individual is able to adapt to changing conditions. The ability to understand the risks, the faculty to develop an effective plan, and access to financial and technical resources to implement that plan all help to define an entity's adaptive capacity." Through this working definition, the City realizes the need to expand previously described organizational adaptive capacity to the

Source: rand.org

individual. This goal extends beyond the essential need to engage citizens in participatory adaptation-focused decision making to target ways our agency can support local residents to achieve their own vision for healthy neighborhoods. The best place to start is our existing network of civic leaders as a means of expanding our block-by –block-reach, which will serve as an access point to fully engage all community members, including our most vulnerable.

A community cannot remain resilient to environmental change if its individual members are not. As pursued for crime prevention (i.e. Neighborhood Watch) and emergency preparedness, Cupertino's adaptation planning will promote human health and wellbeing, as well as foster connections among community members, to build social cohesion and strong support networks into and across our neighborhoods. To that end, Cupertino will strive to embed the following Resilient Cities characteristics to build personal, neighborhood and agency capacity to enhance our ability to weather all types of storms – natural, economic, political, or social:

- Pillar 1: Constant Learning – The ability to internalize past experience linked with robust feedback loops that sense, provide foresight and allow new solutions
- Pillar 2: Rapid Rebound – The capacity to re-establish function, re-organize and avoid long-term disruptions.
- Pillar 3: Limited or "Safe" Failure – Prevents failures from rippling across systems.
- Pillar 4: Flexibility – The ability to change, evolve, and adapt to alternative strategies in the face of disaster.
- Pillar 5: Spare Capacity – Ensures that there is a back-up or alternative available when a vital component of a system fails.

In seeking individual and neighborhood-level enrichment from our climate work, the City will also identify the nexus of education, food and nutrition, public health, and the effects of climate change upon our most vulnerable communities, using the Bay Localize Resilience Toolkit pathway below. The health effects of climate change disproportionately impact low-income communities and people of color, acting as a stress multiplier in communities with already high burdens of disease and food insecurity. Our most vulnerable populations, including lower income, recent immigrant, and older residents, are at greater risk from the impacts of climate change and they often have the fewest resources to respond to changing conditions. Fostering resilience of these more vulnerable residents and supporting their recovery after extreme events is especially critical. To enhance equity in both climate mitigation and adaptation, our strategies should:

- Prioritize actions that help vulnerable populations to moderate potential impacts and to cope with the consequences of climate change.
- Incorporate input and perspectives from members of vulnerable populations.

Bay Localize Resilience Toolkit				
	Equity	Quality	Sustainability	Ownership
Food	Residents have enough to eat	Healthy, organic food is convenient & affordable	Local & regional food is grown sustainably	Our community has a strategy to ensure food supply
Water	Residents have enough water to meet basic needs	Our water is clean & safe	Our water comes from a local watershed & we conserve it	Our community owns our water rights & can guarantee access
Energy	Residents have enough energy to meet basic needs	Our energy supply is stable & consistent & can withstand disasters	Our community conserves energy & gets the rest from local renewable sources	Our community controls where our energy comes from & how it is distributed
Transportation & Housing	Those who wish to live in our community can find quality affordable housing near jobs & schools.	Neighborhoods have access to jobs, schools, open space, fresh produce, & key services via walking, biking, and public transit	Our transportation is powered by renewable energy sources	Our community has adequate political control over our transportation & housing systems to keep them affordable
Local jobs & Economy	Residents of our community have access to sufficient income to sustain a household	Our schools and training programs prepare students to secure or create work locally.	Our community's economy is based on sustainable use and re-use of our region's resources.	Our community has effective public strategies to secure local employment opportunities.
Social Services & Civic Preparedness	Neighbors in our community are well organized to help each other in times of need.	Our local government is adequately prepared for climate change, rising costs, and natural disasters.	Our local government services are funded from sources that are sustainable (as energy prices rise)	Our local government responds effectively to community needs

By focusing on quality-of-life improvements for all members of our community, Cupertino will demonstrate that all have a powerful role to play in a common vision for change in good times and in times of stress. To achieve these aims, staff should tap into the work led by the Bay Area Resilient Communities Initiative to assess resilience vulnerability and assets and conduct effective multilingual community engagement. Members of this coalition include the Asian Pacific Environmental Network (APEN), Bay Localize, Communities for a Better Environment, Youth United for Community Action and more. City adaptation team members will also need to engage with Teen Commissioners, Senior Center staff, Cupertino Chamber Asian American Business Council, Sister City leaders, and organizers of the City's Leveraging Ethnic Diversity (LED) Workshop to build cultural competency and engagement into forward-thinking climate conversations.

This aligns with the Joint Policy Committee's guidance to develop a common, powerful advocacy message and vision to represent our region's adaptation goals. According to a social equity study conducted by the JPC, Bay area residents are concerned with the following climate change impacts: flooding, local wild plant and animal species dying off or loss of biodiversity, poor air quality just to name a few. The study also indicates that "evaluating existing community resilience" was rated in the top two choices of how Bay Area residents would like to get involved in climate adaptation planning. To ensure that our community members have a voice in forthcoming climate mitigation and adaptation work, Cupertino will follow JPC's recommendation to access and learn from our most powerful assets- our people, community groups and

institutions -when reviewing the vulnerabilities of our shared natural resources (e.g., creeks, trees) and infrastructure to map a true resilience agenda to address local climate impacts.

In closing, as Robert Jordan noted, “The oak fought the wind and was broken, the willow bent when it must and survived.” Our agency realizes that it cannot simply build a fortress to safeguard our community from these stresses and shocks; strategic action is required before the next impending disaster reveals the cracks, as we saw recently in Napa, just 70 miles to our north. To protect our shared future, the City must fully assess our vulnerabilities to ensure that our current stresses do not become catastrophes. This Chapter outlines the City’s goals and strategies to team up with regional agencies and partner cities that will enable our agency to function as the willow does by germinating the seeds of our resiliency agenda.

Cupertino has decades of experience in building civic capacity and empowering civic leaders as policy knowledge experts, media gurus and technologists, public safety volunteers, disaster service workers, and more. Our participatory approach to community design and planning efforts have gained our agency awards and more importantly a community where voices are heard, priorities are pursued, issues addressed, and visions realized. Let’s work together to build an adaptation plan that will help all members of our community live resiliently despite our changing climate.

CHAPTER 7
BENCHMARKS AND NEXT STEPS

This chapter describes how the City will implement the CAP emissions reduction measures and actions. It reviews strategies for staff to implement the CAP measures and related actions, and then recommends approaches for the City to track its progress in achieving the outcomes identified for each measure in Chapters 3 and 4. Finally, the chapter presents a proposed process for evaluating, updating and amending the document over time to ensure it remains effective, actionable, and current.

Implementation and Monitoring

Ensuring that the CAP measures translate from this document into on-the-ground results is critical to the success of the plan and the City reaching its 2020, 2035, and 2050 emission reduction targets. To facilitate this, each recommended measure and action described in Chapters 3 and 4 contains an associated table that identifies the estimated greenhouse gas reduction potential in 2020, implementation actions that help to achieve those reduction levels, current implementation status of those steps, department responsible for implementing those actions, performance indicators used to quantify emissions reductions (where applicable), implementation timeline, and additional co-benefits (see graphic example below for review).

ACTION		
Implementation Steps	**Status**	**Responsibility**
• Implementation Step • Implementation Step • Implementation Step	P	Public Works Department
Progress Indicator (2020) Update x, y, and z by 2020	**Reduction Potential** (MT CO2e/yr) **100**	
Co-Benefits	**Implementation Timeline**	

These tables enable City staff, the City Council, and the public to track measure implementation and monitor overall CAP implementation progress. The 2020 performance indicators are especially important, as they provide a checkpoint to evaluate if a measure is on target to achieving its anticipated longer-term emission reductions.

Each measure's estimated GHG emissions reductions are based on that measure's quantified performance indicator, which will help City staff track progress toward the GHG reduction targets. For example, Measure M-F-2 (shown in Table 7.1) focuses on the installation of renewable energy systems. The measure's estimated GHG emissions reductions are based on various assumptions, including the generation capacity of new solar photovoltaic systems installed on City buildings and parking lots by the 2020 target year. The 2020 performance goals are based on installation of approximately 500 kW of photovoltaic (PV) capacity at five City facilities, including rooftops and parking lot carport structures. If the City is able to install more renewable energy capacity than estimated in this measure, additional emissions reductions will occur. Likewise, if the amount of renewable energy installed is less than the amount indicated in the performance indicator, then this measure will achieve less than its stated GHG reductions.

Table 7.1
Measure Implementation Tracking Template

MEASURE M-F-2 Renewable or Low-Carbon Electricity Generation

Develop renewable energy facilities at municipal buildings and facilities.

Actions and Implementation Steps	Department and Division Responsible	Phasing
A. Solar PV Installations on City Buildings / Property		
▪ Based on results of City's previous solar feasibility study, pursue PV installations at City Hall complex, Quinlan Community Center, Cupertino Library, Corporation Yard, and Civic Center carports through Santa Clara County Regional PPA or other financing option (e.g., City procurement, lease-to-own)	Department, Division	Establish a target date or timeframe for Implementing each action, (e.g., September 2015, Fall 2015, or FY 2015-16.)
▪ Review future potential for additional PV installations at sites associated with implementation of Civic Center Master Plan (e.g., Teen Center, new City Hall, Sheriff's Office)	Department, Division	Establish a target date or timeframe for Implementing each action, (e.g., September 2015, Fall 2015, or FY 2015-16.)
B. Solar Thermal Installations on City Facilities		
▪ Following implementation of other energy audit improvement opportunities, conduct further feasibility analysis for primary solar thermal systems identified in audit (i.e., Blackberry Farm Pool and Sports Center)	Department, Division	Establish a target date or timeframe for Implementing each action, (e.g., September 2015, Fall 2015, or FY 2015-16.)
▪ Identify funding / financing source to implement cost-effective solar thermal options at opportunity sites, either through ESCO contract or direct City install	Department, Division	Establish a target date or timeframe for Implementing each action, (e.g., September 2015, Fall 2015, or FY 2015-16.)
▪ Annually review hot water usage at City buildings and facilities to identify additional cost-effective opportunities for solar thermal installations	Department, Division	Establish a target date or timeframe for Implementing each action, (e.g., September 2015, Fall 2015, or FY 2015-16.)

Performance Indicator	Year	Tracking Mechanisms
▪ Assumes five solar sites are developed for total installed capacity of 508 kW generating 818,000 kWh/yr ▪ Assumes no solar thermal systems are pursued prior to 2020	2020	Collect installation data from renewable energy project contracts (or meters) and analyze to gauge progress toward goals: Examples: What was the total installed generation capacity (in kW) for the photovoltaic systems? How many kWh/yr of electricity are generated from the photovoltaic systems? How many therms of natural gas will be reduced by the solar hot water systems?

Upon adoption of the CAP, the City departments identified in the implementation tables shown in Chapters 3 and 4 will have responsibility for investigating or implementing their assigned actions. Sustainability staff will work with key staff in each department to facilitate the measures and actions. To assess the status of City efforts, CAP implementation meetings should take place on a regular basis. Some actions will require inter-departmental cooperation, and appropriate partnerships will need to be established.

Implementation Timeline – Near-Term Actions

Table 7.2 provides a summary of all community-wide and municipal operations actions that are identified for near-term implementation. While community and agency priorities will likely shift in the future, this table provides a quick reference for where implementation can begin today.

Table 7.2
Summary of Near-Term Reduction Actions

Reduction Measures / Actions	2020 Reductions (MT CO2e/year)
COMMUNITY-WIDE REDUCTION STRATEGIES	
Facilities Strategy	
C-E-1 Energy Use Data and Analysis A. Work with PG&E to facilitate aggressive implementation of PG&E's Home and Business Area Network (HAN) program within Cupertino	
C-E-2 Retrofit Financing B. Continue to participate in effort with other Santa Clara County local governments to establish countywide PACE financing district available for residential property owners (could also provide another source of commercial financing to compliment California FIRST program)	
C-E-3 Building Retrofit Outreach A. Partner with local realtor community to develop and implement a building owner outreach campaign that targets new building owners to provide information on available building energy efficiency audit and retrofit programs, as well as locally-available financing options (including PACE financing)	

Table 7.2
Summary of Near-Term Reduction Actions

Reduction Measures / Actions	2020 Reductions (MT CO2e/year)
C-E-5 Community-wide Solar Photovoltaic Development	
F. Work with PG&E to share information about PG&E's Community Solar program	
L. Instruct building and plan check officials to provide information to customers on the benefits of pre-wiring / pre-plumbing for solar applications at the time of new construction or substantial retrofits, including lower up-front costs as compared to retrofitting buildings in the future	
Transportation and Land Use Strategies	
C-E-7 Community Choice Energy Option	
A. Work with other Santa Clara County partners to conduct feasibility study of developing multi-jurisdiction CCA program	
C-T-3 Transportation Demand Management	
A. Support regional efforts to implement SB 1339 commute benefit requirements for employers with more than 50 employees	
C-T-7 Community-wide Alternative Fuel Vehicles	
B. Work with MTC and Bay Area local governments to develop informational brochures and technical support for developers / contractors interested in providing public electric vehicle (EV) charging ports in new projects	
C. Identify regional partners for collaboration on multi-family EV charging station retrofit program to develop strategies for installing EV chargers in existing multi-family buildings/apartment developments	
E. Provide links on City's website to sources of cash rebates or other financial incentives for purchase and/or lease of alternative fuel vehicles	
Water Strategies	
C-W-1 SB-X7-7	
B. Implement process to track and report community-wide water usage through quarterly staff reports; explore options to make information publicly available through an open data portal system	
C. Partner with community/neighborhood groups to promote existing water conservation programs and participation in voluntary turf-removal programs	
C-W-2 Recycled Water Irrigation Program	
C. Identify City-owned site to install educational demonstration project that showcases water-efficient landscaping strategies, alternative irrigation options, and/or low-impact landscape design techniques	
Solid Waste Strategies	
C-SW-1 Zero Waste Goal	
A. Continue to implement City's goal to divert 75% of community-wide solid waste through franchise waste hauling contract	

Table 7.2 Summary of Near-Term Reduction Actions	
Reduction Measures / Actions	**2020 Reductions (MT CO2e/year)**
MUNICIPAL OPERATIONS REDUCTION STRATEGIES	
Facilities Strategies	
M-F-1 Sustainable Energy Portfolio A. Support utility enhanced clean generation portfolio B. Create a community choice energy option	
M-F-6 Complete Citywide Public Realm Lighting Efficiency B. Retrofit remaining parking lot and park facility lighting	
M-F-7 Conserve Water through Efficient Landscaping C. Adopt water budget and green grounds policy	
Solid Waste Strategies	
M-SW-1 Waste Reduction D. Conduct waste characterization audits and track materials/diversion	

Plan Evaluation and Evolution

The CAP represents the City's first comprehensive plan to reduce municipal operations GHG emissions in alignment with short- and long-term reduction targets. Staff will need to evaluate the CAP's performance over time and be ready to alter it if the City is not achieving its reduction targets, as directed by the City's General Plan, and to ensure future project CEQA streamlining benefits described in previous chapters.

Plan Evaluation: Ongoing Monitoring for Continued Success

Two types of performance evaluation are important: (a) evaluation of the City's overall ability to reduce GHG emissions, and (b) evaluation of the performance of individual CAP measures. Future emissions inventory updates will provide the best indication of CAP effectiveness. Conducting these inventories periodically will enable direct comparison to the 2010 baseline inventories and measurement of progress toward meeting the City's adopted reduction targets.

While GHG inventories provide information about overall emission reductions, it will also be important to understand the effectiveness of each measure. Evaluation of the emissions reduction progress of individual measures will improve staff and decision makers' ability to manage and implement the CAP. The City can reinforce successful measures and reevaluate or replace under-performing ones.

To track measure performance, City staff will need to collect important data that are related to the performance indicators shown in the measure tables. While much of the data is already available from existing reports or processes, some improvements in data collection will be needed. It is therefore important that Sustainability staff and key staff from relevant departments establish methods of data collection in a consistent, simplified, and ideally, centralized way. The implementation tables from Chapters 3 and 4 have been expanded and collected in Appendix C as the basis for a CAP Implementation Tracking Framework. Table 7.1 (included above) presents a sample from this appendix to show the types of information that will need to be collected in order for the City to monitor and track measure implementation progress.

Similar to the implementation tables, Table 7.1 presents the Measure, Actions, and Implementation Steps. It also provides a space to designate responsibiltiy for individual implementation steps, establish phasing timelines, and track important data related to the Performance Indicator. The Phasing column allows each responsible department to identify internal timelines for implementing specific action steps, which could be expressed as specific target years or more generally as short-, medium-, and long-term actions. The Tracking Mechanisms specify how implementation of the Performance Indicators will be monitored. The Performance Indicators should be evaluated regularly to ensure each measure is on track to achieve its stated emissions reductions. If during the implementation review process a measure is found to be falling short of its performance goals, then additional attention can be given to modifying the implementation actions. Further, if implementation review indicates that a measure will be unable to achieve its stated reduction level, then new CAP measures would need to be developed to make up the difference, or other existing measures could be enhanced to increase their emissions reduction potential. CAP implementation should be an iterative process to reflect future changes in technology, available budget, and staff resources. City staff will use the Implementation Tracking Framework from Appendix C to develop a performance tracking system that covers each CAP measure and action and fits within existing City procedures.

Sustainability staff will collaborate with staff from responsible departments to evaluate measure performance on a regular, defined basis. Sustainability staff will also prepare a periodic summary report that outlines progress toward CAP measures and actions. The report could cover areas such as estimated GHG emissions reductions to date, progress toward the next reduction target, progress toward implementation of the actions, achievement of measure performance indicators, implementation challenges, and recommended next steps. Staff may want to deliver this report in conjunction with the state-required annual report to the City Council regarding implementation of the City's General Plan.

PLAN EVOLUTION: ADAPTING FOR CONTINUOUS IMPROVEMENT

For it to remain relevant, the CAP also needs to be adapted over time. It is likely that new GHG reduction technologies and strategies will be developed, new financing mechanisms will be available, and state and federal legislation will change. It is also possible that future GHG emission inventories will indicate that the City is not on track toward achieving its adopted GHG reduction targets. If this is the case, the City can assess the implications of new scientific findings, explore new emission reduction technologies, respond to changes in state and federal climate change policy, and modify the CAP accordingly to help the City get back on track toward meeting its GHG reduction targets.

Following the 2020 CAP target year, the City should also begin to define the priority measures and implementation action steps that it will pursue to help achieve the 2035 reduction target. This process should begin with preparation of a 2020 emissions inventory that can be used to compare progress made since the baseline 2010 inventory. The updated inventory will also be helpful in identifying priorities for new City actions. The City can refer to the 2035 and 2050 target achievements sections in Chapters 3 and 4 for guidance on the types of strategies that should be included in future CAP revisions. However, it will be important to consider the City's current emissions inventory, ongoing City actions, new state legislation, and emerging technologies to define the specific pathway towards achieving the next emissions reduction target.

Inventory Updates

As mentioned throughout this document, the City's ability to track implementation success is best achieved through regular emissions inventory updates (e.g., every 3-5 years). These updates will allow the City to compare its actual future emissions levels to those forecasted in Chapter 2, and track the long-term trajectory of the City's emissions. As part of the future inventorying process, the City should also develop a procedure to share this new information with the public and City Council, report on progress made towards the next target, and compare the updated inventories to previous estimates presented in this CAP.

There are various challenges inherent when inventorying emissions, which can make it difficult to allow for direct comparisons from one inventory year to the next. For example, the state of the climate science industry is perpetually advancing and shifting, leading to revisions in inventory methodologies. Similarly, the emissions factors upon which inventories are developed are constantly being refined by various agencies and entities (e.g., California Air Resources Board, International Panel on Climate Change). There are also instances in the inventory process where judgment calls must be made in order to interpret and apply the best available data at the time. While the Local Government Operations Protocol and ICLEI have developed guidance on how local governments should prepare their inventories, inconsistencies can arise and practitioners do have nuanced approaches to applying this guidance.

In order to best position itself to produce future inventories that can be compared to past inventories with relative consistency, the City should continue to develop its institutional

knowledge in the area of emissions generation sources, reduction opportunities, and emissions inventory variables. Whether through a strong leadership role in preparing its own updates (possibly using ICLEI's online resources) or through a partnership with other area jurisdictions, the City should remain engaged in the inventorying process so that City staff can provide a level of consistency from one update period to the next. Additionally, Appendix B provides the inventory methodology used to prepare the community-wide and municipal operations inventories and forecasts presented in this CAP. This appendix should serve as a reference for future inventory updates to provide as much consistency as possible.

Reporting Progress and Celebrating Successes

Monitoring and updating the plan are only beneficial exercises if shared with the broader community to ensure ongoing effort transparency and staff accountability in achieving the objectives of this CAP. As mentioned throughout this document, the CAP is a living document that will be most successful when provided consistent attention and care. City staff already provides annual updates to the City Council regarding implementation of the General Plan. A similar reporting schedule should be developed for the CAP to celebrate the numerous successes that will occur following implementation, and as a way to formally recognize the hard work of staff and community members in cultivating that success. One consideration to prioritize this timeline is to partner with a third-party to elevate agency accountability and expand acknowledgement of the City's emissions reduction efforts (e.g, the Institute for Local Government's Beacon Award (http://californiaseec.org/beacon-award) or a broader community sustainability initiative called the STAR Community Rating System (http://www.starcommunities.org)).

This plan was developed through collaboration with residents, businesses, City staff, and elected officials, and represents a shared vision for Cupertino's sustainable future. Together, we can bring life to this bold vision and share in its rewards.

Endnotes

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CUPERTINO

CITY OF CUPERTINO

CLIMATE ACTION PLAN

APPENDIX A – Community Outreach Responses

The City of Cupertino provided several public engagement opportunities in their efforts to develop a communitywide Climate Action Plan (CAP). Two public workshops were at held De Anza College, along with supporting online surveys developed to mimic the workshop activities for residents who were unable to attend. The City additionally held two focus group meetings: the first with the Cupertino Chamber of Commerce, and the second with representatives of the local real estate industry. This memorandum summarizes public comments received from each of these outreach activities.

Workshop #1

City of Cupertino staff and the CAP consultant team facilitated the first public workshop at De Anza College on May 14, 2014. The workshop began with a presentation that provided an introduction to climate action planning efforts in the state, the City's role in the Santa Clara County regional CAP project, and the common components of a CAP. The presentation also briefly introduced the reduction measure categories that would be explored and discussed in greater detail during the open house portion of the workshop. A brief question and answer session was held following the presentation, after which attendees were invited to informally explore three workshop stations: Energy, Transportation, and Natural Resources. Each station included two presentation boards with CAP-related information to help focus the open discussions. One board presented an overview of existing City actions, policies, and programs that result in emissions reductions within the specific topic areas (e.g., Energy). The second board presented high-level opportunities within the topic areas where the City could expand its existing offerings or develop new programs. City staff and consultant team members were on hand at each station to facilitate dialogue and record participants' comments and ideas. Broad questions were asked to initiate conversations, including:

- How can the City better implement its existing actions/programs on Board #1?
- What do you think of the proposed strategies on Board #2?
- What ideas do you have for additional strategies?

The following notes summarize public comments collected during Workshop #1 and are organized according to the presentation board topics.

General Themes

- Provide financial incentives to encourage participation
- Design/develop all-inclusive programs (regardless of income, social conditions)
    - Environmental justice is important consideration in measure selection/development
- Draft reduction target is not aggressive enough – should be straight line between baseline year and 2050

TRANSPORTATION AND LAND USE THEMES

- Bike/Pedestrian
  - Improve bike safety – infrastructure enhancements, enforcement
  - Slow down traffic throughout city – improve safety for pedestrians/cyclists
  - Plant native shade trees to increase walking comfort
- Transit
  - Bring light rail to I-85 instead of bus
  - Bring back VTA busses through neighborhoods
  - Develop transit spur to Caltrans/BART
    - Community shuttle bus
- Vehicle-Miles-Traveled (VMT) Reduction
  - Require Transportation Demand Management programs for employers and enforce them – link to reduced VMT (e.g., per employee VMT targets)
  - Build parking structures in dense commercial areas to prevent circling to find parking

ENERGY THEMES

- Retrofits
  - Develop outreach/education campaign to demonstrate how existing homes can be retrofitted to be net-zero/highly-efficient
    - Provide local project examples; arrange tours
  - Do no develop Residential Energy Conservation Ordinance (RECO) – not enough turnover in residential market to make a difference
  - Do not include point-of-sale requirements
- New Construction
  - Develop pre-wiring requirement for electric vehicle (EV) charging units in garages – Palo Alto has ordinance, as example
  - Choose lowest level of development for General Plan Amendment alternative = fewer emissions
- Renewable Energy Development
  - Provide outreach/education on cost-comparison of solar to grid electricity/natural gas

- Make photovoltaics (PVs) more affordable – property assessed clean energy (PACE), power purchase agreements (PPAs), better information on existing financing options
- Install more PVs on City buildings/land
- Require PVs on new carports

NATURAL RESOURCES THEMES

- Water Conservation
  - Increase water-use regulations / strict enforcement of xeriscaping requirements
  - Clearly demonstrate existing City water-conserving activities (e.g., where can xeriscaping examples be seen?)
  - Increase conversion/removal of turf lawns – to native vegetation, vegetable gardens, etc.
- Native Species
  - Develop support services to help residents plant native species in their gardens
    - Seed-sharing workshops (native species)
  - Increase native street tree planting
    - Promote community tree-planting drive
    - Incentivize tree-planting in residential parking strips
  - Support services to help residents plant native species in their gardens
- Education / Outreach
  - Increase public education on sustainability issues and what City is already doing
- Waste Reduction
  - Develop plastic bottle ban
- Overarching Comments
  - Implement large-scale demonstration project from conception to installation
  - Provide additional community outreach on climate change/sustainability issues - community member offered to give presentation on climate change basics to fill information/knowledge gap of some residents
  - Highlight City's past actions/success more visibly within community

Workshop #2

City of Cupertino staff and the CAP consultant team facilitated the second public workshop at De Anza College on June 4, 2014. This workshop began with a brief introduction to the CAP project, a summary of comments provided at the previous workshop, and an introduction to the specific measures to be discussed during the breakout exercise portion of the workshop. Following the presentation, participants were separated into five facilitated discussion groups. Each group discussed the same topics, and included 6-8 participants with one facilitator and one note taker from the City staff or consultant team. The groups reviewed a poster that presented a list of the existing City actions to be continued and/or expanded, as well as potential new actions organized into High Impact and Low Impact categories. The facilitators presented the existing actions as a reminder from the first workshop, and then focused the discussion on the potential new actions to solicit community input on these items. The facilitator's each asked similar questions at their breakout tables to focus the dialogue:

- Do you support these measures, programs and policies? Why or why not? Pros/cons?
- What are the barriers and opportunities for local implementation?
- What kind of timeline is reasonable (short – medium – long)?
- Who should lead this effort?
- What can you do (in your role as business person, resident, etc.) to support it?

Following the breakout table exercise, workshop participants reconvened as a large group to share conclusions from their small group discussions. One community representative from each table presented their primary conclusions to the whole group. The following notes summarize public comments collected during Workshop #2 and are organized according to the presentation board topics.

Building Regulations Strategies

- If these are pursued, should be through regional effort so that Cupertino is not disadvantaging itself from an economic development perspective
- Need strong public outreach programs as related to building regulation strategies to link building and home owners with available rebate programs and financing options
- Mandatory energy audits slow down home sales process
- Point-of-sale regulations are ineffective in Cupertino because there is very low turnover rate in residential building stock
- Building energy rating disclosure does not compel action (e.g., energy efficiency retrofits)
- Need to incentive commercial retrofits; stream-lined permitting process could be good option

Clean Electricity Options

- Explore partnership with Sunnyvale's community choice aggregation (CCA) plan

Transportation

- Promote greater bicycle use through:
  - Regional bike maps, beyond Cupertino
  - Safer street design
  - Bike-share program
- Community shuttle option, with Maguerite example from Stanford/Palo Alto
- Bring amenities closer to residential areas

Community Education/Outreach

- Additional outreach is necessary to encourage participation in many of programs considered
  - Use De Anza College as resource for information dissemination; involve local schools as well
  - Use community block leaders to spread information
- Need more/better access to information on PG&E rebates
- Connect residents/businesses with free energy audit/evaluation programs to start energy efficiency improvement process
- How do you convince people to pay more for energy they use? Re: CCA or Green Option programs

Workshop "Lessons Learned"

Following the two workshops, the CAP consultant team prepared a brief summary of lessons learned as it relates to public engagement around the CAP. City staff and the consultant team also held conferences between the two workshops to incorporate relevant lessons from the first workshop into design of the second. The following notes summarize the lessons learned from both workshops.

Promotion

- Overall turnout was good, particularly considering aggressive time frame for planning and promoting these events and comparable turnout for General Plan Update workshops
  - Success may be linked to overall community engagement through General Plan Amendment (GPA) process since many CAP participants also attended GPA workshops

- Participants specifically learned of workshops through Mercury News coverage / press release and postcard mailing

- Turnout from De Anza College students was not high considering that workshops occurred on their campus

    - One professor gave bonus points for students who attended; would be good to reach out to other professors and suggest similar approach – environmental classes, political science, sociology, etc.

PRESENTATIONS

- Content and delivery were very good; helpful to have City representative and technical consultant share presentation and be available to answer specific questions

    - Presentation slides could have included less technical information for first workshop

    - Less policy and regulatory information would have been appropriate for general public audience

LOGISTICS

- More lead time for preparation and materials production would have been desirable, though tight project schedule dictated timing of workshops

    - One full day to review draft posters/presentations, and another full day to incorporate revisions would be ideal for future workshops

- Additional City staff attendees were exceptionally organized, supportive, and engaging with attendees

    - Formal team coordination and preparation call (or in-person meeting immediately prior to workshop) with supporting City staff would have helped ensure everyone felt prepared and understood workshop's desired outcome

        - This type of preparation meeting was held immediately prior to second workshop, but was interrupted by early workshop participant arrivals; should be held not less than one-hour before advertised workshop start time

- More directional signs would have helped public attendees find meetings, particularly if workshop is held off-site of City Hall campus at locations that are less known to general public

- Schedule conflict with Chamber of Commerce was unfortunate for Workshop #1, but unavoidable due to tight project deadline

    - Special focus group meeting with Chamber to recap Workshop #1 was appreciated by Chamber members, and good use of project team time (though meeting time was limited and began late; more time would have been useful)

Focus Group #1 – Chamber of Commerce

City of Cupertino staff and the CAP consultant team met with members of the City of Cupertino Chamber of Commerce on May 22nd, 2014 to present information to Chamber members who were unable to attend the first community workshop on May 14th due to a conflict.

Staff presented an overview of the CAP, including the regulatory framework, draft emissions reduction targets, and current city and regional efforts to address climate change. Chamber members had the chance to review proposed efforts in the energy, land use / transportation, and natural resources sectors, and provide feedback and suggestions to project staff. Eleven Chamber members, including several Board members, were present.

A brief summary of written and verbal comments received at this meeting follows. Chamber members were invited to the second community workshop scheduled for June 4th (see Workshop #2 notes above), and encouraged to review materials online and share these opportunities to comment with their colleagues.

ENERGY

- What is trigger for building retrofits? Realtors are typically opposed to mandates associated with point of sale
- An alternative that real estate industry supports is to communicate with homebuyers about opportunities for efficiency improvements
    - City of Los Altos has alternative approach that Cupertino could review
- Education and outreach about home efficiency upgrades are broadly supported
- Cost and timing associated with commercial lighting retrofits are concern, particularly for small businesses
    - Typically need to pay extra fee/higher rates for work performed outside of contractors' normal business hours to avoid disruption of local business (e.g., restaurant serving hours, store hours)
- Providing lists of preferred vendors or other tools to business owners is beneficial
- There is often significant lag time between adoption of state building codes and local customization; it is not easy to modify local building code
- City of Los Altos Hills offers streamlined permitting for energy-efficient construction, which is supported by development community

TRANSPORTATION AND LAND USE

- Consider requiring or providing incentives for 2-3 electric vehicle (EV) parking and charging spots in new multi-family residential buildings

- Improving safety and awareness of walking and bicycling around schools will help relieve these congestion areas
- Impact of corporate buses on Cupertino's emissions is mostly positive; there may be additional opportunities associated with alternative fuel or electric vehicles for these corporate shuttles
- Tesla is considering electric charging stations on Peninsula, but it is unknown what sites are being considered

NATURAL RESOURCES

- There is concern that development allocations that may be allowed under General Plan Amendment may push sewage treatment plant over capacity and trigger development moratorium

OTHER COMMENTS

- It would be advisable to build in study session with City Council prior to CAP adoption to allow adequate review and revision time
- Realtors are opposed to point-of-sale regulations, but amenable to working with City on proactive programs
- More specificity in CAP presentation would be appreciated, particularly with regard to impacts on residents and businesses

Focus Group #2 – Real Estate Groups

A second focus group meeting was held on June 12th, 2014 in response to a request for additional discussion from a participant at the second workshop. City of Cupertino staff hosted representatives of the real estate industry at City offices, while the CAP consultant team attended via conference call. The discussion focused on the proposed CAP actions from the second workshop that included new mandatory regulations for the building industry. A summary of comments from that meeting follow.

- Point-of-sale (POS) regulations would slow down real estate transaction process in Cupertino, which can sometimes close in as few as two days
- Similar POS home energy rating requirements in Austin were deemed unsuccessful by area Realtors due to lack of enforcement, format that was not user friendly, and getting lost in paper shuffle
- Residential turnover in Cupertino is very low (3% of housing stock per year), which means uptake of mandatory regulations would be enacted slowly as well
    - Voluntary, outreach- or incentive-based alternatives could drive greater success in Cupertino than mandatory programs would achieve

- POS energy and water efficiency upgrades, either through RECO/CECO or other mechanisms, can be problematic if seller installs low-quality fixes and new buyer replaces those same items upon closing
    - Anecdotal data from the Berkeley RECO/CECO program indicates this may be happening there
- Buyers already do appliance, lighting, and landscaping upgrades within three months of home purchase, particularly on homes built prior to the 1990s
- Incentives are better than mandates

Online Survey #1

Online surveys were developed to mirror the workshop activities as best as possible for residents who were unable to attend one or both in person. The first survey was posted May 14, 2014, and asked participants to read through existing and proposed community actions to reduce greenhouse gas emissions and provide their comments and feedback. PDFs of the boards presented at Workshop #1 were included as well.

Eleven participants completed this survey. Their comments are summarized below and organized by topic area.

NEW COMMUNITY ACTIONS TO REDUCE ENERGY CONSUMPTION AND USE MORE RENEWABLE ENERGY:

- Respondents wanted actions that are supported by science, data, and analysis of financing and savings for renewable energy, lighting retrofits, and new construction energy efficiency installments; they also wanted easy-to-follow instructions/policies
- Several people expressed concern about how much proposed policies and programs would cost home owners, car owners, and business owners

OPPORTUNITIES IN ENERGY CONSERVATION AND CLEAN ENERGY USE:

- Provide free and frequent mid-day shuttle service for seniors, students, and workers to transport people on route that goes to neighborhoods, transit stations, and health services
- Create tour of energy-efficient buildings that have been retrofitted in Cupertino
- Encourage all new construction to incorporate solar energy at earliest phase of design

NEW COMMUNITY ACTIONS TO REDUCE NATURAL RESOURCE CONSUMPTION AND ENHANCE THE NATURAL ENVIRONMENT:

- Respondents showed some enthusiasm for organic waste diversion but want it to be easy, and are curious about its cost/benefit

- One responded suggested developing curriculum to teach students about composting, recycling, etc.
- People wanted examples of local buildings with water conservation technology, and they want discounts and assistance with gray water installation in homes
- Respondents' comments on urban forestry included:
    - Drought with trees too close to structures can create major problems in high fire danger situations
    - List local examples and service providers for forestry/tree services
    - Work with Master Gardeners and other experts on public education campaigns
- Respondents' comments on water conservation included:
    - Share water conservation tips with public
    - Provide incentives for facility staff to implement water conservation

NEW COMMUNITY ACTIONS TO ENCOURAGE MORE WALKING, BICYCLING, PUBLIC TRANSIT, AND ALTERNATIVE FUEL VEHICLE USE:

- Respondents generally resisted alternative fuel vehicle programs; there were various concerns, including coal-fired electricity used to power cars, vehicle cost, and notion that it is misplaced priority and that City should focus on reducing use of all cars; resistance and similar concerns carried through to survey questions about state regulations to encourage cleaner vehicle fuels
- Respondents had mixed responses to programs and partnerships to help employers reduce single-occupancy vehicle trips; one person suggested there should be rewards for employees
- Transit and Bike/Pedestrian strategies:
    - City should have separated/protected lanes (not on-street bike lanes)
    - Need to get families involved in walking and biking efforts
    - Bike lane on Stevens Creek Blvd.
    - Senior transportation options to reduce senior isolation; sponsor STAR Program

OTHER COMMENTS, SUGGESTIONS, AND IDEAS:

- Some respondents were skeptical of government action and preferred market-based actions
- Create interactive program that can be used to get information on individual buildings and model efficiencies as well as offer information on local sustainable building resources and companies that supply them
- Need to make smarter use of City-owned facilities so residents can minimize driving (Comment referenced the need for exercise classes at Monta Vista Recreation Center)

- Need for more healthy and affordable restaurants that are walkable/bikable
- Additional ideas related to residential energy efficiency programs:
    - Every time commercial unit gets new tenant, they should be given checklist of energy efficiency items to review (e.g., weather stripping)
    - Provide demonstration products for retrofits
    - New residential home requirement for turn-key solar panel installation
    - Community solar program could work with cutting-edge marketing

Survey #2: Posted June 5, 2014

The second online survey was posted on June 5, 2014, following the second workshop. The survey provided information about the City's current efforts and potential new measures to reduce greenhouse gases. The survey asked for respondents' comments and feedback as related to information shown in the PDF of the second workshop's poster. One person completed this survey.

- Respondent was supportive of need for plans and policy actions to reduce greenhouse gases; they felt that City should lead effort and that actions should be voluntary and made as affordable as possible; they did not support point-of-sale energy rating requirements because it places burden on sellers

Planning Commission Study Session

- Alternative 3 (Mandatory Building Regulations) is not supported, unless pursued through a regional implementation partnership
- Traffic congestion, pedestrian, and bicycling should all be considered since transportation emissions account for nearly half of the total inventory
- Voluntary, outreach-based programs are preferred, but City should consider their bang-for-buck in terms of staff resource time on measure implementation
- Some additional information regarding the CCA start-up costs, program development timeline, and likely efficacy would be needed before Planning Commission would be comfortable recommending this option for inclusion
- City should participate in PG&E Green Option program to purchase clean municipal electricity

City Council Study Session

- A representative from the Cupertino Chamber of Commerce, Silicon Valley Association of Realtors, and the Commercial Real Estate Development Organization/Building Industry Association (BIA) expressed support for the first two alternatives, of three, presented by staff.

- A representative from the Silicon Valley Association of Realtors offered support to reach out to homeowners and homebuyers to help educate them in energy conservation.
- A community member noted that there should be a voluntary program that includes incentives for new homeowners to help upgrade more energy efficiently.
- Members of the Council asked for additional information on the Marin and Sonoma Community Choice Aggregation Programs and the Berkeley Residential Energy Conservation Ordinance (RECO) and Commercial Energy Conservation Ordinance (CECO), if the mandatory alternative advanced.
- Council members recommended staff advance analysis and environmental review of the measures included in Alternative 1 (Community Choice Aggregation) and Alternative 2 (Enhanced Voluntary Outreach).

Additional Public Comments Received

- Do not over-specify green requirements
  - White roofs/cool roofs are cheaper to install than green roofs and out-perform green roofs in reducing emissions because they are more efficient to produce, install, and maintain
  - CALGreen code already specifies green requirements, there is no need to expand upon this
- AB 32 will increase state's electricity costs; CAP does not need to encourage energy conservation because the state will already achieve that end through higher energy prices
- Grants that could be used to establish a CCE program are not free, they come from tax payers dollars
- Report does not mention that renewable energy is being subsidized by state and federal governments, making the actual cost to generate clean electricity much higher than reported
- Commenter is opposed to the following types of measures:
  - Building Retrofit and Public Realm Lighting Regulations – opposed to additional building regulations, there is already a building code, local LEED requirements, and state regulations addressing these issues
  - Community-wide Solar Photovoltaic Development Programs
  - Community Choice Energy Option – does not consider actual cost to generate clean electricity, need further financial analysis first
  - Parking Cash-Out Programs – attempt to penalize commuters, and can lead to long-term parking shortages
  - Transit Priority Strategies – intersection queue jumpers could lead to increased congestion and higher emissions levels
- Government regulations result in loss of American jobs, including health and safety standards

- State's solar power mandates increase price of electricity
- State's clean fuel mandates reduce vehicle efficiency and pollute water
- CAP can represent an un-necessary and unwarranted administrative cost burden unless thoroughly studied
- Do not make building retrofits mandatory at point-of-sale
  - Unless it is a major renovation over $120,000
- Encourage major employers to shift starting work ties or stagger work days to reduce freeway and street congestion
- Public transit needs to review their operating conditions
  - Promote use of mass transit, but do not operate buses with only 1-2 passengers
- Include discussion and promotion of nuclear fuel use
  - High potential for large-scale nuclear use in US if political barriers can be overcome
  - Safer than mining industries (e.g., coal, petroleum)
  - Standard power plant designs would reduce cost and environmental litigation fees
  - Hydrogen produced at nuclear plants could be used in vehicles to reduce dependence on oil and produce clean electricity; greatly reducing emissions and pollution
  - Nuclear is more economical than wind and solar, and power plants constantly generate electricity (even at night)

Environmental Review Committee Meeting Comments

- How many EV charging stations will be installed and where?
  - Did you consider installing EV charging stations at Quinlan Center and the Senior Center?
- How will you implement building retrofit measure? A work program to direct implementation of that measure and other high-impact reduction measures should be prepared; the measures with lower reduction potential should not be prioritized at this time
  - Would like to see a concrete proposal for how the high-impact items will be implemented
  - CAP implementation priority should focus on the energy and transportation measures with highest reduction potential
- Concern about leakage that can occur during natural gas transmission, based on CAP's reference to CNG refueling station studies; commenter recommends not using CNG as a bridge technology at all

- Issue could be worth an inquiry to PG&E regarding the quality of Cupertino's gas lines.
    - There are no transmission pipelines going through Cupertino, but City could still request any reports PG&E has prepared regarding the area's CNG distribution infrastructure

CUPERTINO

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APPENDIX B – GHG Inventory and Reductions Methodology

This appendix describes the emissions sectors, data sources, and methodology used to prepare the CAP's 2010 baseline emissions inventories and the 2020, 2035, and 2050 emissions forecasts. The community-wide and municipal operations inventory and forecast methodologies are presented separately in the sections below. The remainder of the appendix describes the assumptions and methodology used to estimate emissions reductions associated with implementation of the local CAP measures described in Chapters 3 and 4.

It should be noted that the 2010 inventories were prepared separately from the remainder of the CAP (i.e., emissions forecasts, CAP document, supporting appendices), and were not prepared by the same project team that developed the CAP. Per the Santa Clara County regional CAP project scope under which this CAP was prepared, the 2010 inventories were used as the baseline from which the 2020, 2035, and 2050 emissions forecasts were calculated. The 2010 baseline inventories were previously prepared under a separate project contract, and provided to the CAP project team for incorporation and use in preparing the emissions forecasts. However, during the course of preparing the emissions forecasts, several methodological errors were identified in the original 2010 baseline inventory work, and the CAP project team made revisions to the original work to prepare baseline inventories that reflected the best available data and methodologies at their time of completion. In addition, preparation of a baseline inventory methodology appendix was not included in the original scope of work for the baseline inventories, so this technical component was prepared as part of the CAP development process. This appendix describes, to the extent feasible, the methodologies used by the original baseline inventory project team based on the supporting data and inventory worksheets that were provided to the CAP project team. In the future, inventory updates should follow the methodologies presented below to provide consistency between inventory versions and allow direct comparisons from one year to another. It is likely that inventory methodologies will continue to evolve though, and the City may find it more beneficial to follow prevailing industry standards, even if those changes make direct comparisons to prior year inventories more difficult.

Community-wide Inventory and Methodology

This section describes revisions that the CAP project team made to the original baseline inventory. It then presents the emission sources, data sources, and methods used to develop the baseline GHG emissions inventories for the City according to each emissions sector.

Baseline Emissions Inventory Revisions

The CAP project team reviewed the original Cupertino community-wide inventory that was previously prepared by the baseline inventory project team. During this review, several methodological revisions were made to the original community-wide inventory to provide a more accurate and useful inventory for the purposes of climate action planning. These adjustments included methodological revisions to the transportation and solid waste sectors.

In the transportation sector, the original inventory used the California Department of Transportation (Caltrans) Highway Performance Monitoring System (HPMS) to identify vehicle miles traveled (VMT) to be allocated to the City. However, HPMS VMT data only accounts for VMT physically occurring on City roadways, which includes pass-through trips and does not consider the origin or destination of those VMT. Because the City's CAP cannot affect pass-through trips, and understanding the origin and destination of vehicle trips is important to allocating transportation emissions to the correct jurisdiction, the original transportation sector was revised using the origin-destination methodology. The Regional Targets Advisory Committee (RTAC) and Bay Area Air Quality Management District (BAAQMD) have recommended that emissions inventories use the origin-destination method to quantify transportation-related emissions. Therefore, the General Plan Amendment transportation consultant provided the CAP project team with VMT data using the RTAC-prescribed methods, which were used to revise transportation sector emissions in the original inventory. The RTAC methodology is described in the Transportation Sector section below.

The original inventory's solid waste sector included lifecycle emissions of annual solid waste disposed by City land uses. These lifecycle emissions would occur gradually over the lifetime of the solid waste's decomposition, but not necessarily during the year of the inventory. Because the remainder of the inventory is based on annual activities and emissions, this original solid waste methodology would not be consistent with the rest of the emissions inventory. The solid waste sector was revised to use the California Air Resources Board's first-order decay model to quantify annual GHG emissions associated with past and present solid waste disposed by the community.

EMISSIONS UNITS AND CLASSIFICATION

Emissions inventories are commonly expressed in metric tons (or tonnes) of carbon dioxide equivalent per year (MT CO_2e/yr) to provide a standard measurement that incorporates the varying global warming potentials (GWP) of different greenhouse gases. GWP describes how much heat a greenhouse gas can trap in the atmosphere relative to carbon dioxide, which has a GWP of 1. For example, methane has a GWP of 25, which means that 1 metric ton of methane will trap 25 times more heat than 1 metric ton of carbon dioxide, making it a more potent greenhouse gas. Some gases used in industrial applications can have a GWP thousands of times larger than that of CO_2. In order to maintain consistency within each inventory and between the baseline and projected emissions inventories, all GHG emissions have been quantified in units of MT CO_2e/yr.

Emissions can be described as direct or indirect, depending upon where the emissions generation occurs. Direct emissions are those where the consumption activity directly generates the emissions, such as natural gas combustion for heating or cooling. In this instance, natural gas can be consumed on-site and the resulting emissions are a direct result of that consumption. Indirect emissions are those where the consumption activity takes place within the jurisdiction, but the actual emissions generation occurs outside of that boundary. For example, a

Cupertino resident can consume electricity within their home, but that electricity may be generated in an area outside of the City's jurisdiction (e.g., power plants throughout the state).

ENERGY SECTOR

Emission Sources

Energy emissions are generated through the combustion of fossil fuels to generate electricity or directly provide power (e.g., natural gas combustion for water heating). The energy sector includes the use of electricity and natural gas in residential, commercial, and industrial land uses within the legal boundaries of the City. Although emissions associated with electricity production are likely to occur in a different jurisdiction, the emissions are allocated to the point of consumption and not the point of generation. In other words, consumers are considered accountable for the generation of those emissions. Therefore, electricity-related GHG emissions are considered *indirect* emissions because they are a result of activities occurring within the jurisdiction, even though emissions associated with electricity generation occur in different geographic areas, and natural gas-related GHG emissions are typically considered *direct* emissions because the consumption occurs on-site and within the jurisdiction.

Inventory Data Sources

PG&E provides electricity and natural gas to the community, and provided annual year 2010 electricity and natural gas consumption data for the City of Cupertino to develop the baseline inventory. PG&E provided all community-wide electricity and natural gas consumption data in the form of kilowatt-hours per year (kWh/yr) and therms per year (therms/yr), respectively. PG&E also provided an electricity emissions factor specific to their generation portfolio in the baseline year of 2010.

Inventory Methodology

Electricity-related GHG emissions were quantified using the PG&E-specific emission factor that accounts for PG&E's 2010 electricity production portfolio (e.g., the mix of coal, oil, wind, solar and other sources of electricity production). Natural gas GHG emissions were also quantified using a PG&E-specific natural gas emissions factor. The energy use activity data provided by PG&E was multiplied by the appropriate emissions factors to calculate total MT CO_2e/yr. The following emissions factors were used to calculate 2010 baseline emissions:

Table B-1
Baseline Energy Emissions Factors

Energy Type	Metric Tons CO_2e/kWh	Metric Tons CO_2e/therm
Electricity	0.000204	-
Natural Gas	-	0.005321

TRANSPORTATION SECTOR

Emission Sources

Transportation emissions come from vehicle trips that begin and/or end within Cupertino's boundaries. Pass through trips (for example, non-local drivers on Highway 85 and Interstate 280) are not included within Cupertino's emissions inventory because the CAP measures would not affect those emissions. This sector includes GHG exhaust emissions from both private and City-owned vehicles.

Inventory Data Sources

Unlike most of the other emissions sectors where empirical activity data is available to more precisely calculate actual resource consumption (e.g., electricity used, wastewater generated, solid waste disposed), the transportation sector relies upon travel models to estimate vehicle use within a community. Travel models estimate the total vehicle miles traveled (VMT) within a community, which can then be combined with vehicle fuel emissions factors to estimate transportation-related emissions.

Daily VMT estimates were acquired from the City's General Plan Amendment transportation consultant to develop the transportation emissions for the CAP's 2010 baseline year. Estimates were provided for a General Plan baseline year of 2013 and the General Plan buildout year of 2040 under the highest growth land use alternative (to ensure the maximum amount of growth would be addressed by the CAP's measures). Daily VMT values were converted to annual VMT values using an annualization factor. The VMT estimates for 2013 and 2040 were then used to interpolate for years 2020 and 2035, and used to extrapolate the CAP's baseline year of 2010 and long-term target year of 2050. These calculations assumed a linear growth in vehicle miles traveled from 2010 through 2050 using the projected growth rate from 2013 to 2040. This ensured that transportation-related emissions are internally consistent (i.e., based on the same traffic model) between the General Plan Amendment and CAP, as opposed to using the Metropolitan Transportation Commission's VMT estimates, which were developed using different traffic models and demographic assumptions than those used in the City's General Plan Amendment.

Inventory Methodology

Emission factors for the transportation sector were obtained from the California Air Resources Board's (ARB) vehicle emissions model, EMFAC2011, which was the most recent version of EMFAC available at the time of the analysis. EMFAC2011 is a mobile source emission model for California that provides vehicle emission factors by both county and vehicle class. Santa Clara County-specific emission factors were used in this emissions inventory.

As described above, the adjusted transportation sector used origin-destination VMT data provided by the General Plan Amendment transportation consultant. This methodology is designed to omit pass-through highway trips from the emissions inventory and allocate a fair-

share of VMT and emissions to each vehicle trip's origin and destination. The VMT data provided for this method separates VMT by four different trip types: internal-internal, internal-external, external-internal, and external-external. The internal refers to an origin or destination that is within the City's jurisdiction, and the external refers to an origin or destination outside of the City's jurisdiction. All internal-internal VMT are included in the emissions inventory, while all external-external VMT, which are pass-through trips, are excluded from the inventory. For the internal-external and external-internal trips, half the trip distance is included in the City's inventory. The intent is to allocate half of the VMT for a trip to each jurisdiction that causes a trip (i.e., is a trip's origin or destination). As stated above, this method is consistent with guidance provided by RTAC and BAAQMD. It also provides a consistent methodology to allocate VMT to each jurisdiction responsible for a vehicle trip.

WASTEWATER SECTOR

Emission Sources

The wastewater sector includes emissions resulting from wastewater treatment processes and from energy used to power wastewater treatment plants. Treatment of wastewater influent could generate methane (CH_4) emissions, while discharged effluent could generate nitrous oxide (N_2O) emissions. Both of these emissions sources are considered direct process emissions, while electricity consumption to power the wastewater treatment plant would generate indirect GHG emissions (see previous discussion of indirect GHG emissions).

Inventory Data Sources

The City's wastewater is treated by the San Jose and Santa Clara County Wastewater Treatment Plant (WWTP), which also treats wastewater from the City of Saratoga and unincorporated Santa Clara County. A GHG emissions inventory for the San Jose and Santa Clara County Wastewater Treatment Plant was developed as part of the San Jose/Santa Clara Water Pollution Control Plant Master Plan. The emission inventory included GHG emission sources from the WWTP such as energy consumption (i.e., electricity and natural gas), stationary sources, nitrification and denitrification processes, effluent discharge, biosolids treatment, and production and transport of chemicals used for wastewater treatment. Cupertino's wastewater-related GHG emissions would be a portion of the total GHG emissions calculated for the WWTP's GHG inventory.

Inventory Methodology

Using a top-down approach, Cupertino's portion of the total WWTP's GHG emissions were allocated using the ratio of the City's population to the total population served by the WWTP. Cupertino's population and thus GHG emissions represent approximately 30% of the total WWTP's emissions.

WATER SECTOR

Emission Sources

The potable water sector includes energy emissions associated with water treatment, distribution, and conveyance. Water-related GHG emissions are considered indirect emissions similar to electricity-related emissions because the actual emissions generation occurs at a different geographical location than that of the consumption activity (i.e., treatment, distribution, and conveyance occur in a different location than final water consumption).

Inventory Data Sources

The amount of total annual potable water provided to the City was obtained from the San Jose Water Company 2010 Urban Water Management Plan (UWMP) and the CalWater Los Altos-Suburban District 2010 UWMP. Potable water consumed by the City was provided in units of million gallons per year.

Inventory Methodology

The original baseline emissions inventory information provided to the CAP project team included the community's total water consumption in 2010 (as millions of gallons) and the resulting emissions associated with that water consumption (as MT CO_2e/yr). However, the supporting emissions factors were not provided, suggesting that the calculations were prepared using a separate emissions-calculating software package. To establish consistency in future water sector emissions calculations, the City should incorporate the following methodology.

The CEC's *Refining Estimates of Water-Related Energy Use in California* report provides water-energy intensities for California, and was used to calculate the electricity required to provide potable water for the community. GHG emissions associated with potable water supply were then calculated using California's statewide electricity intensity factors from the California Climate Action Registry's General Reporting Protocol Version 3.1 (CCAR 2009). Statewide electricity intensity factors were used rather than local PG&E factors because electricity used to provide Cupertino's potable water could be provided by a mix of various utilities, particularly for water supply that is sourced outside of the City.

SOLID WASTE SECTOR

Emission Sources

The solid waste sector includes emissions associated with solid waste disposal. During the solid waste decomposition process, only organic materials release GHGs. Carbon dioxide emissions are generated under aerobic conditions (i.e., in the presence of oxygen), while CH_4 emissions are generated under anaerobic conditions (i.e., in the absence of oxygen), as in many landfill environments. Solid waste-related CO_2 emissions are considered biogenic emissions that are part of the natural carbon cycle. However, CH_4 emissions have a higher GWP and are

generated as a result of controllable landfill waste management techniques, and are therefore counted as GHG emissions within an emissions inventory. In addition, waste collection and hauling activities (i.e., heavy-duty haul trucks) also generate GHG exhaust emissions. However, hauling-related emissions are assumed to be included within the City's General Plan Amendment transportation consultant's traffic model, and therefore, represented within the Transportation Sector.

Inventory Data Sources

Solid waste generated within the City is primarily sent to the Newby Island Landfill. Annual tons of solid waste generated by land uses (e.g., residential, commercial) and waste characterization data (e.g., percentage of paper, plastic, green waste) were collected from CalRecycle. Historic population data was collected from the US Census.

Inventory Methodology

The California Air Resources Board's first-order-decay methodology was used to estimate landfill methane emissions in order to incorporate the time factor of the solid waste degradation process, which can take decades to occur. These calculations assumed that Cupertino's solid waste is disposed of in landfill facilities with methane capture systems in place that operate with 75% efficiency rates (per the US EPA's guidance on estimating landfill emissions). Decennial historic population estimates were used to interpolate solid waste disposal (on a per capita basis) from the 2010 baseline year to 1960, with the assumption that nearly 100% of the methane generated from landfill waste is released within 50 years; therefore, solid waste disposed more than 50 years ago would not still generate methane emissions. Annual solid waste emissions represent a snap shot of a community's solid waste, which is decomposing at various rates due to the different times of disposal into the landfill. This approach attempts to quantify the annual emissions that occurred in 2010 as a result of solid waste that was disposed of beginning in 1960 (i.e., what percentage of methane from waste disposed of in 1960 to 2010 is released in 2010?).

OFF-ROAD VEHICLES SECTOR

Emission Sources

Off-road equipment emissions are generated by fuel combustion for local construction equipment, lawn and garden equipment (e.g., lawn mowers, leaf blowers), industrial equipment, and light commercial equipment.

Inventory Data Sources

Data for construction, lawn and garden, industrial, and light commercial equipment were obtained from ARB's OFFROAD2007 model, which provides county-level emissions for off-road

equipment. Similar to the transportation sector, these emissions are modeled with OFFROAD2007 and not based on empirical activity data.

Inventory Methodology

As described above, OFFROAD2007 provides county-level GHG emissions for each off-road equipment category. Cupertino's share of the County's total households and population were calculated using 2009 ABAG estimates for 2010. These factors were then multiplied by the total county-wide emissions per off-road source to determine Cupertino's share of the emissions. Lawn and Garden Equipment emissions were calculated using Cupertino's share of total county households, while the remaining off-road emissions sources were allocated using Cupertino's share of the total county population.

Community-wide Emissions Forecast Assumptions and Methodology

BUSINESS-AS-USUAL

The baseline inventory was used to project the future community-wide GHG emissions under a business-as-usual (BAU) scenario. Cupertino's GHG emissions were forecast for the years 2020, 2035, and 2050 assuming that historic trends describing energy and water consumption, vehicle miles travelled, and solid waste generation will remain the same in the future, on a per unit basis (i.e., per resident, per employee, per service population). Therefore, emissions forecasts demonstrate what emissions levels are likely to be under a scenario in which no additional statewide or local actions are taken to curtail emissions growth.

Although most other cities participating in this collaborative CAP development process (i.e., Gilroy, Morgan Hill, San Jose, Saratoga, Santa Clara County) used *Plan Bay Area* growth projections to provide regional consistency, Cupertino's General Plan was in the process of being updated at the time of CAP development. Therefore, to ensure that the CAP covered the same growth projections being planned for in the General Plan Amendment, the CAP used population and employment projections that align with the General Plan's Preferred Land Use Alternative (which was also the highest-growth alternative analyzed). These same growth assumptions were used by the City's General Plan Amendment transportation consultant to develop the VMT estimates used to prepare the baseline emissions inventory (as described above). Table B-2 below presents the population and employment baseline and projection estimates used to develop the CAP's emissions forecasts. The service population line is the sum of population and employment. The forecasts applied different growth rates (i.e., population, employment, service population) to different emissions sectors, depending upon how these factors would influence future emissions.

Population growth rates were used to forecast residential electricity and natural gas use. Employment growth rates were used to forecast commercial/industrial electricity and natural gas

use, and off-road emissions sources. Service population growth rates were used to forecast water consumption, wastewater generation, and solid waste generation. As described in the transportation sector above, transportation emissions were based on estimated VMT growth as related to the City's General Plan Amendment highest growth scenario.

Table B-2
Population and Employment Factors

	2010[1]	2020	2035	2050[2]
Population	58,739	62,926	69,207	75,488
Employment	26,220	32,227	41,238	50,249
Service Population	84,959	95,153	110,445	125,736

[1] 2010 population and employment values from Cupertino GPA EIR Volume 1, Pg 4.11-7, Table 4.11-1 Population, Household, and Employment Projections

[3] 2040 population and employment values from Cupertino GPA EIR Volume 1, Pg 3-12 were used to estimate 2050 values

Note: Linear interpolation used to calculate 2020 and 2035 values (i.e., straight line growth from 2010 to 2040)

FORECAST METHODOLOGY

The projected population and employment growth described above was used to project all non-transportation emission sectors (i.e., energy, solid waste, water, wastewater, off-road equipment). The following formula provides an example of how GHG emissions were projected using average annual growth rates:

$$Emissions_{PHY} = Emissions_{BASE} + (Emissions_{BASE} \times AAGR \times Years)$$

Where:

Emissions$_{PHY}$ = GHG emissions during the planning horizon year

Emissions$_{BASE}$ = GHG emissions during the baseline year

AAGR = average annual growth rate (either population, employment, or service population, as previously described)

Years = years of growth between the baseline and planning horizon year

For example, the planning horizon year 2020 emissions were projected from the baseline year 2010, which involves 10 years of growth (i.e., *Years* factor above). The planning horizon year 2035 involves 30 years of growth.

Transportation Sector

The preceding methodology was used to forecast emissions in all sectors except for transportation emissions. For the transportation sector, the City's General Plan Amendment transportation consultant provided buildout year 2040 VMT activity levels using the same activity-based travel model used to develop baseline year 2013 VMT. The 2040 VMT values are based on population and employment estimates that correlate to build out of the land uses identified in the General Plan Amendment. Daily VMT values were converted to annual VMT values using an annualization factor determined for each planning horizon year by the General Plan Amendment transportation consultant. The 2020 and 2035 horizon years VMT estimates were interpolated using the traffic consultant's 2013 and 2040 values, and 2050 horizon year was extrapolated from these values.

Municipal Operations Inventory and Methodology

The California Air Resources Board, ICLEI – Local Governments for Sustainability (ICLEI), and the Climate Registry (TCR) have co-developed standardized methods for quantifying and reporting GHG emissions from local government sources. These methods are contained within the Local Government Operations Protocol (LGOP).

As with the community-wide baseline inventory described in the preceding section, the Cupertino municipal operations 2010 baseline inventory was developed by a different team than that which prepared the CAP document and emissions forecasts (see the introduction to this Appendix for further description).

Emissions Quantification Methodology

Emissions Inventory Boundaries

Establishing the boundaries of an emissions analysis is an important first step in the greenhouse gas (GHG) inventory process. A city exerts varying levels of control or influence over the activities occurring within its borders. A municipal GHG inventory should be defined broadly enough to include all emissions sources that fall within the local government's direct and indirect control. In general, the inventory should encompass sources that are within the purview of the City's discretionary actions and regulatory authority, and can additionally include sources of indirect emissions that can be influenced by City policies or programs, such as solid waste reduction.

Cupertino's Organizational Boundary

Setting an organizational boundary for a GHG inventory involves identifying the facilities and operations that are to be included. National and international GHG accounting standards define the organizational boundary as the boundary that determines the operations owned or controlled by the reporting entity. The City of Cupertino's municipal operations inventory

encompasses the GHG emissions resulting from actions governed directly by the local government, such as municipal buildings, fleet, and streetlights. It should be noted that emissions from City employee commute trips were excluded from the inventory due to the lack of ownership of or control over the employee vehicles and employees commuting choices. This exclusion is compatible with the guidance provided within the LGOP, in which this emissions source can be voluntarily reported but is not required.

Scope of Emissions Sources in Cupertino

The GHG Protocol defines the operational boundary as the sum of all sources of direct and indirect emissions that are included in the inventory. The GHG Protocol divides the operational boundary into three different Scopes, defined as follows:

- **Scope 1** emissions are those that come from sources that are owned or controlled by the reporting entity, in this case, the City of Cupertino. From the municipal perspective, Scope 1 emissions are direct GHG emissions from sources owned or controlled by the City within Cupertino's boundaries. Such sources include stationary emitters like furnaces and boilers, and mobile emitters like vehicles and construction equipment.
- **Scope 2** emissions are indirect GHG emissions related to the consumption of purchased energy (i.e., electricity) that is produced by third-party entities, such as power utilities. From the municipal perspective, the emissions associated with all electricity purchased by the City are considered Scope 2.
- **Scope 3** emissions are other indirect GHG emissions not covered by Scope 2 that are associated with municipal activities. In a municipal inventory this generally includes emissions occurring upstream or downstream of a municipal activity, such as the methane emissions resulting from degradation of the City's solid waste deposited at a landfill outside of city limits, or the electricity used to pump water to the City from upstream reservoirs. Quantification and reporting of Scope 3 emissions is generally considered optional, but including them in a municipal inventory is appropriate where there is local control over an activity that has an indirect emissions reduction impact, such as diverting waste from landfills.

The 2010 municipal operations inventory includes emissions from the following sectors:

- **Facilities:** This sector comprises direct stationary emissions from natural gas combustion (Scope 1) and indirect emissions from purchased electricity for City buildings and facilities, and City streetlights and traffic signals (Scope 2);
- **Vehicle Fleet:** This sector includes direct emissions from fuel combustion in fleet vehicles (Scope 1);
- **Solid Waste:** This sector consists of the total solid waste sent to or contained within government-operated landfills (Scope 3), and solid waste sent to a landfill that is generated by government-owned and/or operated facilities (Scope 3); and

- **Water:** This sector includes indirect emissions from electricity used to convey and treat water consumed by municipal operations (Scope 2).

MUNICIPAL OPERATIONS INVENTORY METHODOLOGY BY SECTOR

Facilities

The Facilities sector comprises the Building Energy and Public Lighting subsectors. Building Energy emissions were calculated using metered electricity and natural gas activity data from the buildings and facilities operated by the City of Cupertino and 2010 emission factors. The activity data and emission factors were provided by PG&E. The Public Lighting subsector includes electricity consumption from City-operated streetlights, traffic lights, and other outdoor lighting operated by the City. Emissions were calculated using activity data from the streetlight, traffic light, and other outdoor lighting meters and 2010 emission factors. The activity data and emission factors were provided by PG&E, which were entered into ICLEI's CACP software.

Vehicle Fleet

This sector includes emissions from on-road and off-road fuel consumption from vehicles operated by the City of Cupertino, including the City vehicle fleet. Fleet data and fuel usage data was provided by the City. Relevant emission factors contained in ICLEI's CACP software were applied to both gasoline and diesel fuel quantities to obtain emissions estimates.

Solid Waste

The Solid Waste sector comprises the Municipal Operations and Landfill subsectors. The Municipal Operations subsector includes landfill methane emissions produced by solid waste generated by City government facilities. Municipal solid waste and recycling volume data was provided for each City facility. Emission factors for various waste categorization types contained in ICLEI's CACP software were used to quantify GHG emissions associated with municipal solid waste.

Water

This sector comprises electricity consumed by the City's water delivery subsector. The activity data were provided by each City facility. Emission factors contained in ICLEI's CACP software were used to estimate GHG emissions associated with municipal water consumption.

Municipal Operations Emissions Forecast Assumptions and Methodology

Forecast Methodology

While standardized methods for quantifying *baseline* local government operations emissions are provided within the LGOP, the LGOP does not provide guidance on developing *future-year* emissions forecasts. For this reason, the CAP project team utilized a growth estimation methodology based on methods used frequently within city fiscal impact analyses. Rather than assuming that each emissions sector will increase at a one-to-one ratio with new population and employment growth, the analysis assumes that a portion of each sector's activity is independent and not influenced by growth. To reflect this assumption, the analysis estimates the degree of independence or dependence (expressed as a variable percentage) for each sector. The higher the percentage the more closely correlated the growth in emissions is to the growth in population and employment (referred to as service population). The factors used within the CAP are presented below in Table B-3.

Table B-3
Sector Activity Growth Variable Factors

Sector/Subsector Variable	Variable Factor
Facilities	
Building Energy	40%
Public Lighting	40%
Vehicle Fleet	60%
Solid Waste	40%
Water Services	100%

Municipally-generated waste, building energy, and public lighting factors are 40% based on the understanding that future city growth will not create much additional need for City administrative operations, and since the growth is of an infill nature it is unlikely that public lighting needs will greatly increase (i.e., extensive new roads constructed that require net new street light installations). The vehicle fleet factor is 60% based on the assumption that the infill growth will generate only a small increase in the need for additional City vehicle use (e.g., code enforcement, parks department). The solid waste sector applies a 40% factor based on the assumption that growth in the community's service population would not directly result in proportional increases in municipal solid waste generation. Rather it assumes marginal growth in new City employees who would generate additional waste. The water sector conservatively used a 100% factor based on the assumption that treating and pumping demand will likely grow in close parallel to service population growth. However, given the relatively small contribution of water emissions to the City's baseline inventory, even a 40% factor as applied to other sectors would result in nearly identical emissions as when using a 100% factor.

Additionally, the analysis applied service population factors to identify the amount of emissions likely generated by an additional resident and employee. A residential factor of 100% and an employment factor of 50% were utilized. The lower employment factor serves to reduce the overall service population growth factor, and reflects the reality that the average resident demands considerably more services than the average non-resident employee. Table B-4 demonstrates how these factors dampen the service population growth rate to create the weighted service population values that from the basis for the forecast's growth rate estimates.

The application of the sector variable factors and the residential and employment factors provide a more nuanced method for estimating municipal operations growth. Using this method, emissions forecasts were developed for 2020, 2035, and 2050.

Table B-4
Residential and Employment Factors Influence on Service Population Growth Rates

	2010		2020		2035		2050	
	Value	Service Factor	Value	Service Factor	Value	Service Factor	Value	Service Factor
Population	58,739	1.0	62,926	1.0	69,207	1.0	75,488	1.0
Employment	26,220	0.5	32,227	0.5	41,238	0.5	50,249	0.5
Service Population	84,959		95,153		110,445		125,737	
Weighted Service Population	71,849		79,040		89,826		100,612	
Weighted Service Population Annual Growth Rate	-	-	2010-2020	1.00%	2020-2035	0.91%	2035-2050	0.80%

Note: See Table B-2 for sources of population and employment values

Similar to the community-wide emissions forecast methodology described in the previous section, the municipal operations emissions were forecasted using the following formula:

$$Emissions_{PHY} = Emissions_{BASE} + (Emissions_{BASE} \times SP_{WEIGHTED} \times VF \times Years)$$

Where:

$Emissions_{PHY}$ = GHG emissions during the planning horizon year

$Emissions_{BASE}$ = GHG emissions during the baseline year

$SP_{WEIGHTED}$ = weighted service population annual growth rate from Table B-4

VF = variable factor from Table B-3

$Years$ = years of growth between the baseline and planning horizon year

Emissions Reduction Estimates Methodology

This section of the appendix summarizes the methodology for quantifying the greenhouse gas (GHG) reductions estimates resulting from implementation of the local CAP measures. Calculations and/or background information are shown for horizon year 2020 (unless otherwise stated). Supporting tables may show reduction totals that vary slightly from those presented in the CAP due to rounding.

Baseline and Mitigated Scenarios

Many of the emissions reduction calculations described throughout this section are based on a baseline scenario (e.g., how much energy would be consumed if the measure *is not* implemented) and a mitigated scenario (e.g., how much energy would be consumed if the measure *is* implemented). The difference between the baseline and mitigated scenarios represents the measure's reduction potential (i.e., baseline scenario - mitigated scenario = reduction potential).

The baseline energy use scenarios were calculated by multiplying the total housing units or square footage (shown in Tables B-7 and B-8 below) by climate zone-specific energy consumption factors (shown in Tables B-9 and B-10 below). Mitigated energy savings estimates were based on outputs from Lawrence Berkeley Laboratory's Home Energy Saver™ building energy modeling software, unless otherwise stated. As with the baseline calculations, total energy savings were calculated by multiplying the total units or square footage by participation rates assumed for each measure (shown as Progress Indicators in the CAP) by mitigated energy consumption factors.

Mitigated energy savings were then subtracted from baseline energy use levels to derive the total energy savings associated with the measure. These energy savings (expressed as kWh and therms) were multiplied by energy emissions factors expressed as MT CO_2e/kWh and MT CO_2e/therm. The electricity emissions factor used in these calculations was PG&E's 2020 estimated emissions factor (unless otherwise stated), which takes into account compliance with the Renewable Portfolio Standard and PG&E's own de-carbonizing activities (e.g., shifting energy purchases from coal-fired power plants to cleaner, natural gas plants). The natural gas emissions factor comes from the US Energy Information Administration. These mitigated scenario energy emissions factors are shown in Table B-5. Emissions reduction estimates were calculated by multiplying the total energy savings by their associated emissions factors, and then adding the electricity and natural gas emissions reductions together for total emissions reductions expressed as MT CO_2e/yr.

Table B-5 Mitigated Scenario Energy Emissions Factors		
Energy Type	**Metric Tons CO_2e/kWh**	**Metric Tons CO_2e/therm**
Electricity[1]	0.000132	-
Natural Gas	-	0.005303

[1] http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf; see Table B-6 below for emissions factor inputs

Table B-6 Electricity Emissions Factor Inputs			
	Value	**Unit**	**GWP**[3]
CO_2	0.131[1]	MT CO_2/MWh	1
N_2O	0.000003[2]	MT N_2O/MWh	298
CH_4	0.000013[2]	MT CH_4/MWh	25
Total	0.132	MT CO_2e/MWh	1

[1] Source (CO_2 EF): http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf

[2] Source (N_2O and CH_4 EF): http://www.epa.gov/cleanenergy/documents/egridzips/eGRID_9th_edition_V1-0_year_2010_Summary_Tables.pdf

[3] Source (GWP - 100-yr): http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

BASELINE BUILDING INVENTORIES

For purposes of establishing the baseline energy use scenarios (from which the future mitigated scenario was developed), the City's electricity and natural gas consumption were modeled per land use type. This allowed application of local CAP measures to specific portions of the community (e.g., single-family homes, warehouses). The selected land use types correspond to those used in the California Energy Commission's Residential Appliance Saturation Survey and Commercial End Use Surveys, which describe energy consumption levels by building type across the state's various climate zones. Use of this type of granular data helped to make the emissions reduction estimates as closely applicable to Cupertino's local climate, as opposed to using more generalized assumptions, such as average California household electricity use or national-level data.

Residential land use types included single family-detached and –attached, 2-4 unit multi-family properties, 5+ unit multi-family properties, and mobile homes. Data from the Department of Finance's Table E-5 was used to estimate the future proportion of total residential units within these land use types based on the city's 2010 ratios as shown in Table B-7. These ratios were

then held constant through 2020 and 2035 reduction estimates, by multiplying the estimated total housing units in those years by these housing type ratios. This approach is consistent with the business-as-usual methodology used when developing the emissions inventory forecasts.

Table B-7
Cupertino 2010 Housing Units by Building Type

	Total	Detached	Attached	2 – 4 Unit	5+ Unit	Mobile Home
Units	21,027	12,060	2,557	1,988	4,422	0
% of Total	100%	57.4%	12.2%	9.5%	21.0%	0.0%

Source: California Department of Finance, Table 2: E-5 City/County Population and Housing Estimates, 4/1/2010

Finding accurate data on the square footage of existing non-residential buildings in a community is typically more challenging than finding existing housing unit data, since there is no state database or annual report on this metric (at the city-specific level). Therefore, non-residential square footage estimates were collected from the City's General Plan Amendment Environmental Impact Report (EIR) and used as a proxy for the CAP's 2010 baseline year. The General Plan's buildout year estimates for 2040 were also used. Estimates for 2020 and 2035 were calculated using an average annual growth factor between the 2010 and 2040 values. Table B-8 shows the non-residential square footage estimates used to calculate the emissions reduction baseline and mitigated scenarios.

Table B-8
Cupertino Non-Residential Area

Land Use Type	Built/Approved (square feet)	New from GPA (square feet)	Total in 2040 (square feet)	Average Annual Growth/yr
Office	8,929,774	4,040,231	12,970,005	1.7%
Commercial	3,729,569	1,343,679	5,073,248	1.3%

Source: City of Cupertino General Plan Amendment, Housing Element Update, and Associated Rezoning EIR, Volume I, Pg 3-13, Table 3-2 Summary – All Project Components Development Allocations

Data from the real estate analysis company Co-Star was also collected as part of the regional climate action planning project in which Cupertino was a participant. This data identified a 2010 baseline in non-residential area of approximately 14.4 million square feet, or 14% greater than the estimate provided in the City's General Plan EIR. In order to make the most conservative CAP reduction estimates, the values found in the EIR were used. This means that measures estimating commercial energy savings were applied to a smaller population group (i.e., square footage of commercial space) than might actually exist, resulting in lower, or more conservative, reduction estimates. CAPs are inherently based on numerous assumptions,

and it is industry practice to make more conservative assumptions when possible to avoid over-estimating the reduction potential of measure implementation.

Baseline Energy Use by Building Type

As mentioned above, the baseline energy consumption scenarios were modeled using data from the CEC's reports. Baseline residential energy consumption levels (i.e., kWh/unit, therms/unit) were modeled by land use type using the CEC's Residential Appliance Saturation Study (RASS) data for Forecast Climate Zone 5 (see Table B-9). The housing types nomenclature used in the RASS does not exactly align with the terminology used in the DOF's housing estimate data shown in Table B-1, so "Single Family" in Table B-3 includes "Detached" units from Table B-1, while "Townhome" includes "Attached" units.

Table B-9
Baseline Residential Energy Consumption by Housing Type in Forecast Climate Zone 5

Housing Type	kWh/unit/year	therms/unit/year
Single-Family	6,138	691
Townhome	3,815	402
2-4 Unit Apartment	3,418	376
5+ Unit Apartment	3,466	245

Source: 2009 California Residential Appliance Saturation Study, Prepared for California Energy Commission, Prepared by KEMA, Inc., October 2010

Baseline commercial energy consumption levels (i.e., kWh/sqft, kBTU/sqft) were identified by land use type using the CEC's Commercial End Use Survey (see Table B-10).

Table B-10
Baseline Commercial Energy Consumption by Land Use Type

Housing Type	kWh/square foot/year	kBTU/square foot/year
Large Office	15.25	23.28
Retail	12.65	5.51

Source: California Commercial End-Use Survey, Prepared for California Energy Commission, Prepared by Itron, Inc., March 2006

Demographic Projections

Population, employment, and housing unit estimates were also prepared to support calculations for certain reduction measures. Table B-11 presents these values and their sources.

Table B-11 Cupertino Population, Employment, and Housing Unit Projections				
	2010	**2020**	**2035**	**2040**
Population	58,739[1]	62,926	69,207	71,300[2]
Employment	26,220[1]	32,227	41,238	44,242[2]
Housing Units	21,027[1]	22,625	25,021	25,820[2]

[1]2010 population and employment values from Cupertino GPA EIR Volume 1, Pg 4.11-7, Table 4.11-1 Population, Household, and Employment Projections

[2] 2010 housing unit value from California Department of Finance, Table 2: E-5 City/County Population and Housing Estimates, 4/1/2010

[3]2040 population, employment, and housing unit values from Cupertino GPA EIR Volume 1, Pg 3-12

Note: Linear interpolation used to calculate 2020 and 2035 values (i.e., straight line growth from 2010 to 2040)

Community-wide Measures

C-E-1 Energy Use Data Analysis

This measure estimates the emissions reductions resulting from implementation of an advanced building energy management program to identify building optimization opportunities in system maintenance and operational controls. The calculations were based on electricity and natural gas use forecasts by land use type. Each land use type's total energy use was then multiplied by the end-use appliance and equipment ratios per the CEC's Commercial End Use Survey and Residential Appliance Saturation Study. This established the baseline scenario for energy use by land use type and end use.

The mitigated scenario was developed by applying varying energy savings to end use equipment in the baseline scenario. The assumed energy savings potential was based on a presentation from First Fuel, a building-energy analytics company that specializes in identifying low- or no-cost building energy optimization improvements.

The following end uses were assumed to realize 20% electricity savings in non-residential land uses through implementation of this measure:

- Cooling
- Exterior Lighting
- Heating
- Interior Lighting
- Office Equipment
- Ventilation

The following end uses were assumed to realize 20% electricity savings in single-family residential land uses through implementation of this measure:

- Convention Heaters
- Auxiliary Heaters
- Central Air Conditioning
- Room Air Conditioners
- Outdoor Lighting

C-E-2 RETROFIT FINANCING

This measure estimates the reduction in energy-related emissions (i.e., electricity and natural gas) resulting from retrofitting existing residential units and commercial properties. The measure includes retrofitting both residential and commercial properties based on pre-defined packages of energy efficiency retrofits. The basic retrofit package includes installation of high-efficiency light bulbs, ductwork sealing, and installation of programmable thermostats. The comprehensive retrofit package additionally includes gas water heater upgrades, gas furnace upgrades, attic insulation, and building envelope sealing/weatherization. Reduction estimate calculations for this measure included energy savings associated with past installation of utility-sponsored retrofit programs and estimates for similar types of retrofits.

PG&E provided energy savings related to residential and commercial efficiency programs that were installed in Cupertino homes and businesses between 2010 (the CAP's baseline year) and the second quarter of 2014 (the most current data available at the time of plan preparation). This data identified the following utility program-related energy savings within the Cupertino community, which were multiplied by the mitigated scenario emissions factors shown in Table B-5 to calculate associated emissions reductions:

	Residential	Commercial	Total	Reductions (MT CO_2e/yr)
kWh/yr	3,799,126	19,401,506	23,200,632	3,062
therms/yr	12,596	621,618	634,214	3,363
Total	-	-	-	**6,425**

Source: PG&E, 2014

In addition to these past reductions that have already been realized since the CAP's 2010 baseline year, this measure estimates additional future building retrofits that could be implemented by 2020. As described in Measure C-E-2 and C-E-3, there are several retrofit-oriented programs available to Cupertino residents, which could drive this future participation. It is likely that utility-sponsored programs will continue into the near future, through Energy

Upgrade California or similar programs. The City plans to continue its Green@Home and GreenBiz programs, which offer additional incentives to make energy- and water-saving retrofits. The City is also a participating member of the CaliforniaFIRST PACE program, which provides funding for commercial, industrial, and multi-family retrofit and renewable energy projects, with plans to roll out financing opportunities to single-family residents in the near future. Finally, Measure C-E-3 directs the City to partner with the local Realtor community to develop and implement an aggressive home and commercial building retrofit outreach campaign to advertise available financing/funding opportunities and provide local examples of retrofit energy and water savings for various property types. Based on comments from Realtor representatives who participated in a CAP focus group meeting, residential turnover is approximately 3% per year in Cupertino. The homeowner outreach program was devised as a point-of-sale strategy, so approximately 15% of Cupertino housing units could be introduced to the program by 2020. The CAP estimates that participation in all of these various retrofit-related programs could result in an additional 8% of housing units pursuing some type of energy-retrofit installation, with 5% of residential units pursuing a comprehensive package, as described above, and 3% pursuing a basic retrofit package. It also assumes that 7% of non-residential properties pursue comprehensive retrofit packages.

This additional level of participation in retrofit programs is estimated to provide reductions of an additional 1,727 MT CO_2e/yr, as shown in the table below, for total measure reductions of approximately 8,150 MT CO_2e/yr.

	Total	Reductions (MT CO_2e/yr)
kWh/yr	4,183,460	552
therms/yr	221,618	1,175
Total	**-**	**1,727**

Source: AECOM SSIMe^{TM} Building Energy Analysis, 2014

C-E-5 Communitywide Solar Photovoltaic Development

This measure estimates the reduction in electricity-related emissions resulting from installation of grid connected photovoltaic (PV) systems in residential and commercial uses. The measure uses National Renewable Energy Laboratory (NREL) solar insolation data specific to the City's geographic location and climate to estimate future PV-related reductions, or conversion of kilowatt hours to MT CO_2e/yr in instances when a solar analysis has calculated potential electricity generation rates.

This measure considers reductions resulting from solar PV systems installed community-wide from 2010-2014, the planned solar generation potential related to the Apple 2 Campus project,

the anticipated municipal solar installations (described in Measure M-F-2), and potential additional community-wide installations to occur by 2020.

Similar to the retrofit-related energy savings described in Measure C-E-2 above, PG&E also provided data on the amount of solar PV generation capacity installed community-wide from 2010-2014. Based on this data, approximately 5.5 MW of solar capacity were installed during that timeframe.

Based on the Draft EIR prepared for the Apple 2 Campus project, the new facility will incorporate approximately 650,000 square feet of solar panels capable of generating 15,000,000 kilowatt hours per year (kWh/yr).

The City has prepared solar reports to study the potential of municipal solar PV systems on City buildings/property, and has selected five viable sites for future installations. These systems combined would generate approximately 820,000 kWh/yr.

In addition, currently available tax credits, utility rebates, and financing programs make solar PV installations increasingly economically viable, which will likely lead to additional residential and non-residential installations in the future. PG&E is also beginning to implement its community shared solar program to further encourage development of local solar PV systems and participation in their development through purchase programs that sell the generated electricity locally. Therefore, the CAP conservatively assumed installation of another 1.5 MW of solar PV capacity by 2020 (i.e., in addition to the capacity installed since 2010, the planned Apple 2 Campus system, and the City's five planned municipal systems). This conservative estimate takes into account the gradual phase-out of California utility-funded solar incentive programs.

Where only generation capacity (e.g., kW, MW) was known or estimated, total installed capacities were multiplied by NREL solar insolation data to calculate total kWh of electricity generation potential. This total was then multiplied by the mitigated scenario emissions factor shown in Table B-5 to calculate the GHG emissions that would be offset by installation of the assumed PV systems. Where total generation potential was known, that amount of electricity was simply multiplied by the mitigated scenario emissions factor to calculate associated reductions.

The table on the following page demonstrates the inputs and calculations.

	Generation Capacity (MW)	Generation Potential (kWh/yr)	Reductions (MT CO_2e/yr)
Past Installations – 2010-2014	5.5[1]	9,470,000[2]	1,250
Future Installations – 2015-200	1.5	2,580,000[2]	341
Apple 2 Campus	-	15,000,000[3]	1,980
Municipal Solar Projects	-	820,000[4]	108
Total			**3,679**

[1] PG&E, 2014

[2] Calculated using NREL factors shown in table below

[3] Apple 2 Campus Project EIR, Pg 506 Renewable Energy Generation

[4] Solar Feasibility Study for the City of Cupertino, Prepared by Optony, Inc, December 2012

The table below demonstrates the assumptions used to convert solar PV system installed capacity to electricity generation potential, based on solar insolation data specific to Cupertino provided by NREL. While the table shows efficiency and area assumptions, these specific assumptions are not important to the calculation since they are directly related. That is, if the installed system's efficiency is greater than 15%, then the required system area can be reduced to generate the same amount of electricity. Conversely, if the system is less efficient, then a greater installation area would be required to generate the same amount of desired electricity.

Generation Potential (MW)	Watts/square foot	Efficiency	Area (square feet)	kWh/sqft/day[1]	Electricity Generated (kWh/yr)
1.5	15	15%	100,000	0.47	2,583,912
5.5	15	15%	366,667	0.47	14,527,329

[1] Solar Insolation data: National Renewable Energy Laboratory Renewable Resource Data Center, 2011

C-E-6 COMMUNITY-WIDE SOLAR HOT WATER DEVELOPMENT

This measure quantifies natural gas-related emissions reductions resulting from the installation of solar hot water heaters in residential units. Baseline water heating-related natural gas consumption levels per residential unit type were identified using CEC's Residential Appliance Saturation Survey data for Forecast Climate Zone 5. In addition, CEC data identifies the energy savings potential of solar hot water heaters for specific climates in California. The measure assumes that 47-63% of water-heating natural gas can be reduced through the use of solar hot water heaters, depending on the performance of the system and the building type in which it is installed.

Current utility-rebate programs have had little impact at broadly attracting solar hot water system users (e.g., California Solar Initiative – Thermal Program). This is possibly due to a combination of system expense and relatively cheap natural gas prices applicable to traditional hot water heater systems. However, the state's utilities have begun implementing more aggressive solar hot water pilot programs to identify the incentive levels at which participation begins to improve, and these programs may be expanded beyond pilot studies in the future. Therefore, the CAP assumed zero solar hot water installations would occur community-wide prior to 2020, but that participation would begin to occur by the 2035 target year. The CAP assumes that 5% of residential units and 5% of non-residential square footage will install (or have access to) a solar hot water heater by 2035.

The table below demonstrates the assumptions used to convert estimated solar hot water system installations to total therms or kBTU savings. Therms saved are then multiplied by the mitigated scenario emissions factor shown in Table B-6 (kBTU were first converted to therms and then multiplied by the emissions factor).

Residential Land Uses						
Property Type	**Units (2035)**	**Hot water heater energy per unit (therms/yr)[1]**	**Solar Fraction[2]**	**Energy Savings per unit (therms/yr)**	**Participation Rate (% of units)**	**Total Savings (therms/yr)**
Single-Family	15,110	169	70%	118.04	5%	89,180
Townhome	2,653	146	70%	102.44	5%	13,591
2-4 Unit Apartment	2,093	116	64%	74.22	5%	7,766
5+ Unit Apartment	5,154	72	64%	45.93	5%	11,837
Commercial Land Uses						
Property Type	**Square Footage (2035)**	**Hot water heater energy per SF (kBTU/yr)[1]**	**Solar Water Heater Effectiveness[2]**	**Energy Savings per SF (kBTU/yr)**	**Participation Rate (% of square footage)**	**Total Savings (kBTU/yr)**
Large Office	12,670,729	1.781	30%	0.53	5%	338,461
Retail	4,973,716	1.040	30%	0.31	5%	77,602

[1] Baseline Hot Water Natural Gas Consumption: Residential Appliance Saturation Survey, CEC, 2010; California Commercial End-Use Survey, CEC, 2006

[2] Solar Fraction: Solar Water Heating CEC 2013 Title 24 Pre-rulemaking Workshop, California Energy Commission, June 9, 2011; Solar Insolation: National Renewable Energy Laboratory Renewable Resource Data Center, 2011

C-E-7 COMMUNITY CHOICE ENERGY OPTION

The CAP explored several long-term reduction opportunities that were analyzed for the potential impact on the 2035 target, but were assumed to be infeasible for full implementation by the 2020 target year. One option explores community-wide participation in a community choice energy (CCE) district.

The measure assumes that by 2035, 75% of the community would voluntarily participate in a CCE district in which they purchase 100% emissions-free electricity. The Marin Clean Energy District currently provides electricity to 75% of its service population, so this participation rate was used as a best estimate for what might be possible in Cupertino at full program implementation.

Total electricity consumption projected for the 2035 horizon year was multiplied by the participation factor of 75% and then multiplied by PG&E's estimated 2020 electricity emissions factor (see Table B-6) to calculate the total GHG emissions that would be avoided by CCA participation. Calculation inputs are shown in the table below.

End User	kWh/yr	Participation Rate	Emissions Reductions (MT CO_2e/yr)
Residential	147,189,027	75%	14,571
Commercial / Industrial	431,644,101	75%	42,732

C-T-3 TRANSPORTATION DEMAND MANAGEMENT

This measure estimates the impact of transportation demand management programs designed to reduce single occupancy vehicles trips through commuter benefit programs as directed through SB 1339 and planned for at the new Apple 2 Campus project (per the project's EIR analysis). The estimated vehicle trip reductions were developed based on research available regarding the efficacy of various transportation demand management program options. The calculations assume implementation of rideshare/vanpool programs, telecommuting/alternative work schedules, and subsidized transit fares.

This measure assumes the following level of performance from each transportation demand management components. It is estimated that the enhanced rideshare program would yield a 3% reduction in auto commute trips. The telecommuting program would reduce auto commute trips by 2%. Subsidized transit passes at $40 per month program would reduce auto commute trips by 5%. Cumulatively the TDM program would achieve a 10% reduction in auto commute trips. These reductions were estimated by reviewing relevant TDM literature and case studies from existing TDM programs.

Rideshare promotion – A study conducted by Reid Ewing concluded that ridesharing programs can reduce daily vehicle commute trips to specific worksites by 5-15%, and up to 20% or more if implemented with parking pricing. This measure assumes 3% of commute trips shifted from single-occupancy vehicle (SOV) to other modes.

Telecommuting/alternative work schedule – A Center for Urban Transportation Research survey found vehicle trips reduced by up to 8% if 50% of employees are participating in alternative work programs, making it among the most effective commute trip reduction strategies considered in that study. A National Association of Regional Councils analysis estimates that compressed work weeks can reduce up to 0.6% of VMT and up to 0.5% of vehicle trips in a region. This measure assumes telecommuting/compressed work will result in an additional 2% of commute trips shifted from SOV to other modes (when combined with the other identified TDM programs).

Subsidized transit fares – Various studies of the impact of subsidized transit passes indicate reductions in drive-alone mode share of 4% to 42%, with an average reduction of 19%. This measure estimates an additional reduction in vehicle trips from transit pass subsidies of 5% (when combined with the other identified TDM programs).

The measure calculated a baseline scenario in which travel patterns remained constant from 2010 to 2020, and a mitigated scenario in which employees voluntarily participated in the TDM program offerings available at their jobs. The VMT difference in these two scenarios was used to calculate the estimated GHG emissions reduction attributed to implementation of this measure.

The baseline scenario assumes that 80% of vehicle trips in Cupertino are made in single-occupancy vehicles (per 2010 Census data). It also assumes that the average commute length is 15 miles (one way). It also assumes 255 commute days per year (five days per week, minus 5 holidays). Finally, it assumes that 3,200 employees community-wide will participate in ridesharing, telecommuting/alternative work schedule, or subsidized transit fares by 2020, representing approximately 10% of the 2020 estimated workforce. Apple already offers a comprehensive TDM program to its current employees in Cupertino. Per the Apple 2 Campus Project Draft EIR, these TDM programs would be offered to the 9,356 net new employees at the project site, along with expanded TDM offerings. The TDM program expansion would include increased Apple Transit service to additional geographic areas and with increased frequency, as well as mass transit shuttle links to expand current shuttle service to future high-capacity corridors, such as VTA BRT lines, electrified Caltrain lines, and Santa Clara BART extensions (Apple 2 Campus Project Draft EIR, pg 515). The CAP conservatively estimates that 10% of its employed population will have access to TDM programs, though it is likely that a higher proportion will ultimately have access to such programs following completion of the Apple 2 Campus project.

All of these factors were multiplied to establish a baseline annual VMT associated with SOV commuting. The VMT reduction rates described above were applied to this SOV VMT value to

determine the annual VMT reduction associated with implementation of this measure. The reduction was expressed as a percentage of total community-wide VMT, and then applied to fuel consumption estimates from the 2020 emissions projections. The result was total gasoline and diesel fuel consumption that would be reduced as a result of this measure, which were then multiplied by emissions factors provided by the California Air Resources Board EMFAC model to estimate total GHG emissions reductions. The following table shows the values and inputs used to calculate emissions associated with implementation of this measure.

Percent Reduction in VMT from Implementation of TDM Measures				
	VMT Split by Vehicle Fuel Type		Reduction in Total VMT by Vehicle Fuel Type	
	Gasoline	Diesel	Gasoline	Diesel
Reduction in Total VMT	90.5%	9.5%	0.54%	0.06%

2020 Mitigated Scenario – Vehicle Miles Traveled and Emissions							
	Community Travel (miles)	Weighted Average Fuel Efficiency (mi/gal)	Fuel Consumption (gallons)	Emissions Factors			Total Emissions (MT CO_2e/yr)
				CO_2 (g/gal)	N_2O (g/mi)	CH_4 (g/mi)	
Gasoline VMT (miles)	289,983,711	21.8	13,302,005	8,565	0.0700	0.0620	120,352
Diesel VMT (miles)	30,440,279	9.3	3,273,148	10,007	0.0500	0.0420	33,234
Total	320,423,990		16,575,153				153,586

Calculation of VMT, Fuel Consumption, and GHG Emission Reduction from TDM Measures			
	Community Travel (miles)	Fuel Consumption (gallons)	Total Emissions (MT CO_2e/yr)
Gasoline VMT (miles)	1,734,575	79,568	720
Diesel VMT (miles)	182,082	19,579	199
Total	1,916,657	99,146	919

Reference sources for VMT reduction assumptions related to implementation of TDM programs included:

- Bryon York and David Fabricatore, 2001, Puget Sound Vanpool Market Assessment, www.wsdot.wa.gov
- Philip Winters and Daniel Rudge 1995 , Commute Alternatives Educational Outreach, www.cutr.eng.usf.edu
- Reid Ewing, 1993, TDM, Growth Management, and the Other Four Out of Five Trips.

- Alyssa Freas and Stuart Anderson, 1994, Effects of Variable Work Hour Programs on Ridesharing and Organizational Effectiveness, Transportation Research Record 1321
- Center for Urban Transportation Research, 1998, A Market-Based Approach to Cost-Effective Trip Reduction Program Design, http://ntl.bts.gov/lib/3000/3600/3633/cashdoc.pdf
- Apogee, 1994, Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature, National Association of Regional Councils, www.narc.org
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- Santa Clara Valley Transportation Authority , 1997, Eco Pass Pilot Program Survey Summary
- King County Metro, 2000, FlexPass: Excellence in Commute Reduction, Eight Years and Counting, www.commuterchallenge.org/cc/newsmar01_flexpass.html
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- University of Washington Facilities Services, The U-PASS Online and Telephone Survey Report , 2006, www.washington.edu/commuterservices/programs/upass/reports.php
- Comsis Corporation , 1993, Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience, USDOT and Institute of Transportation Engineers (www.ite.org), www.bts.gov/ntl/DOCS/474.html
- Victoria Transport Policy Institute , 2009, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm
- Victoria Transport Policy Institute , 2008, Transportation Elasticities, http://www.vtpi.org/elasticities.pdf

C-T-7 Community-wide Alternative Fuel Vehicles

This measure estimates the reduction in vehicle emissions resulting from a community-wide shift towards alternative-fueled vehicles. Based on automobile industry projections and other market absorption studies, assumptions for the potential vehicle fleet transition towards alternative-fuels by 2020 were developed. These assumptions estimate a shift from gasoline and diesel passenger and light duty vehicles to plug-in hybrid electric vehicles (PHEV) and compressed natural gas (CNG) vehicles.

The calculations used the community's 2020 vehicle miles travelled (VMT) estimates to develop a baseline scenario for community-wide transportation emissions (based on the same assumptions used to develop the transportation sector emissions inventory). This scenario includes assumptions for VMT by fuel type (e.g., gasoline, diesel, CNG) and by vehicle class (i.e., passenger cars, light duty trucks, medium duty trucks, heavy duty trucks, buses, motorcycles). Emission factors for the transportation sector were obtained from the California Air Resources Board's (ARB) EMFAC model, which is a mobile source emission model for California that provides vehicle emission factors by both county and vehicle class. Santa Clara County-specific emission factors were used in this calculation. The mitigated scenario includes assumptions for how VMT by fuel type and by vehicle class would begin to shift from one type to another. For example, it assumes that 5% of gasoline passenger cars switch to plug-in hybrid electric vehicles by 2020. Emissions factors for alternative-fueled vehicles were collected from academic studies, industry sources, the US Energy Information Administration, and other agencies. The mitigated scenario vehicle emissions were subtracted from the baseline scenario to estimate the GHG emissions reduction potential of the community-wide shift toward alternative-fueled vehicles described in the measure. The following table identifies the fuel switch-by-vehicle type assumptions used to calculate reductions from this measure.

Fuel Switch Assumptions	
Baseline Fuel and Switch	**Percent VMT Switch**
From Gasoline To:	
Gasoline Passenger Cars	***5%***
Diesel	0%
CNG	0%
BEV	0%
PHEV	5%
Gasoline Light Duty Trucks	***5%***
Diesel	0%
CNG	0%
BEV	0%
PHEV	5%
Gasoline Medium Duty Trucks	***0%***
Diesel	0%
CNG	0%

BEV	0%
PHEV	0%
Gasoline Heavy Duty Trucks	***3%***
Diesel	0%
CNG	3%
BEV	0%
PHEV	0%
From Diesel To:	
Diesel Passenger Cars	***5%***
Gasoline	0%
CNG	0%
BEV	0%
PHEV	5%
Diesel Light Duty Trucks	***0%***
Gasoline	0%
CNG	0%
BEV	0%
PHEV	0%
Diesel Medium Duty Trucks	***0%***
Gasoline	0%
CNG	0%
BEV	0%
PHEV	0%
Diesel Heavy Duty Trucks	***3%***
Gasoline	0%
CNG	3%
BEV	0%
PHEV	0%
Diesel Buses	***60%***
Gasoline	0%
CNG	40%
BEV	0%
PHEV	20%

C-W-1 SB-X7-7

Senate Bill X7-7 established a goal to reduce per capita water consumption by 20% by December 31, 2020. In order to calculate the water savings and emission reductions associated with implementation of SB X7-7, the baseline year's total water consumption was divided by the City's baseline population to determine the baseline per capita water consumption rate in units of million gallons per capita per year (MG/capita/yr).

Assuming business-as-usual (BAU) growth, the projected 2020 population was multiplied by the baseline per capita water consumption rate (MG/capita/yr) to estimate the total BAU water consumption in year 2020. Then, assuming implementation of SB X7-7, the baseline per capita water consumption rate was multiplied by (1 – 0.2) to calculate the SB X7-7 target per capita water consumption rate in year 2020. The target per capita water consumption rate was then multiplied by the projected 2020 population to estimate the total water consumption for the City assuming implementation of SB X7-7. Total water savings were calculated by subtracting the SB X7-7 total water consumption from the BAU total water consumption.

The total water savings associated with SB X7-7 were then multiplied by a water intensity factor in units of kilowatt-hours per million gallons to estimate the associated electricity saved from the water savings. Water use was assumed to be 85% indoor water use and 15% outdoor. Indoor water use was calculated using the total water intensity factor, to include wastewater treatment energy use as well. Outdoor water use only used energy intensity factors for supply/conveyance, treatment, and distribution. Water intensity factors were provided by the California Energy Commission's report *Refining Estimates of Water-Related Energy Use in* California, prepared by Navigant Consulting in 2006. Finally, the electricity saved was multiplied by the mitigated 2020 PG&E electricity emissions factor shown in Table B-6 to estimate the GHG savings associated with implementation of SB X7-7 in the community. The table below identifies the inputs used to calculate emissions reductions associated with this measure.

	Value	Units
Baseline Year		
Operational Year	2010	year
Total Water Consumption	3,248	million gallons (MG)
Population (residents)	58,739	capita
Baseline Water Efficiency	0.055	MG/capita/yr
Planning Horizon Year		
Operational Year	2020	year
Planning Horizon Population (residents)	62,926	capita
Total BAU Water Consumption	3,480	million gallons (MG)
SB X7-7 Water Efficiency Level	0.044	MG/capita/yr
Total Water Consumption (under SB X7-7)	2,784	million gallons (MG)
Water Savings	696	MG/yr

Outdoor Savings	*104*	*MG/yr*
Indoor Savings	*592*	*MG/yr*
Water Use Energy Intensity Factors[1]		
Water Process	**Northern CA (kWh/MG)**	**Southern CA (kWh/MG)**
Water Supply/Conveyance	150	8,900
Water Treatment	100	100
Water Distribution	1,200	1,200
Wastewater Treatment	2,500	2,500
Total	3,950	12,700

[1] Source: http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF

C-SW-2 Food Scrap and Compostable Paper Diversion

An inventory of the community's organic waste was created using Cal Recycle waste volume and characterization data. Using the first-order decay methodology from the 2006 IPCC guidelines, fugitive methane emissions from the organic landfill waste were calculated for base-case and mitigated scenarios. This measure assumes that 40% of residential households will divert 80% of food scrap and compostable paper waste from landfills by 2020, and that 10% of commercial businesses with divert 20% through participation in the City's existing food scrap and compostables collection service. The measure further assumes that 85% of residential and commercial landscape waste is diverted from the solid waste stream, either through on-site composting/mulching or disposal in green waste bins. This measure would apply to GHG emissions associated with new waste generated and would not apply to waste in place disposed prior to CAP implementation. Further, these calculations are based on the assumption that the landfill(s) accepting the City's waste have a methane capture system in place with a 75% efficiency rate.

The City's waste inventory was developed using community-wide waste disposal data collected from CalRecycle for the years 1995-2011. These historical disposal rates (i.e., waste tons disposed per population) were projected to 2020 and 2035 using estimated population growth rates, and backcast to 1950 using historic census data. The 2008 State Waste Characterization Study was used to estimate the volume of community-wide waste by various waste categories (e.g., lumber, food scraps, grass). It was assumed that the City's waste composition is comparable to that of the statewide average (as represented in the State Waste Characterization Study). This created the community-wide baseline solid waste emissions profile, against which solid waste diversion measures were calculated.

The community-wide total 2020 estimated tonnage was then multiplied by the proportional share of each appropriate waste category in the State's waste characterization study, and multiplied by the measure's participation rates to determine the total solid waste to be diverted from implementation of this measure. The IPCC's first-order decay methodology was then applied to calculate the total GHG emissions associated with that volume of waste to determine the measure's GHG reduction.

C-SW-3 Construction and Demolition Waste Diversion Program

This measure assumes community-wide compliance with the City's Green Building Ordinance requirement for 60% of construction and demolition (C&D) waste to be diverted from landfills. An inventory of the community's organic waste was created using Cal Recycle waste volume and characterization data. Using the first-order decay methodology from the 2006 IPCC guidelines, fugitive methane emissions from the organic landfill waste were calculated for base-case and mitigated scenarios. This measure assumes that all new construction and applicable retrofit projects will divert 60% of their generated C&D waste from landfills by 2020. This measure would apply to GHG emissions associated with new waste generated and would not apply to waste in place disposed prior to CAP implementation.

The community's waste inventory was developed using community-wide waste disposal data collected from CalRecycle for the years 1995-2011. These historical disposal rates (i.e., waste tons disposed per population) were projected to 2020 and 2035 using estimated population growth rates. The 2008 State Waste Characterization Study was used to estimate the volume of community-wide waste by various waste categories (e.g., lumber, food scraps, grass). It was assumed that the community's waste composition is comparable to that of the statewide average (as represented in the State Waste Characterization Study). The community-wide total 2020 estimated tonnage was then multiplied by the proportional share of each appropriate waste category in the state's waste characterization study, and multiplied by the measure's participation rates to determine the total solid waste to be diverted from implementation of this measure. The IPCC's first-order decay methodology was then applied to calculate the total GHG emissions associated with that volume of waste to determine the measure's GHG reduction.

C-G-1 Urban Forest Program

This measure estimates reductions associated with the carbon sequestration potential of new trees planted as part of City landscaping requirements and development agreements. The calculations are based on extrapolating the carbon potential of a typical tree planting palette. The measure assumes that the nearly 2,400 net new trees described in the Apple 2 Campus project EIR will be planted by 2020, in addition to 100 net new trees planted community-wide. Trees planted to achieve implementation of this Urban Forest Program measure might be found in decorative landscaping, new City street planting strips, or parks and recreation areas.

A sample plant palette was created, including Camphor, Modesto Ash, Sweetgum, Roble Negro, Turkish Pine, Bolander Beach Pine, London Planetree, and Common Crape Myrtle. There are myriad tree palette options, and the tree types included in this measure's calculations may not correlate exactly with those selected for planting in the community. Carbon sequestration rates specific to the species and age of the sample plant palette were collected from the Center for Urban Forest Research (CUFR) Tree Carbon Calculator and used to calculate the annual sequestration potential of the trees from 2015 – 2020. For purposes of the calculation it was assumed that an equal number of trees will be planted each year, though the exact number of trees planted per year may vary.

M-F-1 Sustainable Energy Portfolio

This measure estimates the emissions reductions associated with the City purchasing its electricity from lower-emissions sources than currently provided through PG&E's portfolio. The measure assumes future development of a Community Choice Energy program, in which the City could participate, or municipal participation in PG&E's proposed Green Option program. The measure further assumes that the City would participate in the Green Option program level that provides 75% clean electricity. Alternatively, calculations for participation in the CCE assumed that electricity purchases would be 100% clean.

Both scenario calculations used the City's estimated total kWh/yr based on the 2020 emissions forecast and subtracted the estimated electricity generation of solar PV systems described in M-F-2 to calculate the total remaining electricity the City would need to purchase. The Green Option scenario assumed that 75% of the remaining electricity need would be emissions-free, and used the baseline electricity emissions factor to calculate emissions avoided from implementation of this measure. The CCE scenario assumed that 100% of the remaining electricity need would be emissions-free.

In the CAP, this measure is not included in the 2020 target achievement estimates. It is included in the 2050 target achievement scenario, and in that instance, reductions from the state's Renewable Portfolio Standard (RPS) are omitted to avoid double counting emissions from these overlapping strategies. The table below shows the inputs used to calculate the 2020 reduction estimates for these two scenarios, which are described in the CAP for illustrative purposes only (as presented in the Measure M-F-1 text).

Inputs	Values
2020 Electricity - kWh/yr	5,086,069
2020 Solar PV Production - kWh/yr	818,390
Electricity Available for Measure - kWh/yr	4,267,679

Green Option Scenario	
% Clean Electricity Purchased of City Total	75%
Electricity Affected by Measure - kWh/yr	3,200,759
2020 BAU Emissions Factor – MT CO_2e/kWh	0.000204
Measure Reductions – MT CO_2e/yr	**651**
CCE Scenario	
% Clean Electricity Purchased of City Total	100%
Electricity Affected by Measure - kWh/yr	4,267,679
2020 BAU Emissions Factor – MT CO_2e/kWh	0.000204
Measure Reductions – MT CO_2e/yr	**870**

M-F-2 Renewable or Low-Carbon Electricity Generation

This measure assumes the installation of five solar PV systems by 2020 that the City has previously studied. The calculations use the findings from a City-commissioned solar feasibility analysis report. The report estimated the electricity generation potential of the five systems based on solar access, system size, and other applicable factors. The report concluded that approximately 820,000 kWhr/yr of emissions-free electricity could be generated following installation of the five systems. Reductions were calculated by multiplying the electricity generation potential by the mitigated 2020 electricity emissions factor show in Table B-6. Emissions reductions from this measure are presented in combination with reductions associated with the state's RPS, which is why the mitigated electricity emissions factor was used, instead of the baseline emissions factor. This allows reductions from both actions to be calculated and presented separately.

Inputs	Values
2020 Solar Electricity Generation - kWh/yr	818,390
2020 Mitigated Emissions Factor – MT CO_2e/kWh	0.000132
Measure Reductions – MT CO_2e/yr	**108**

M-F-3 Advanced Energy Management

This measure estimates the emissions reductions resulting from implementation of an advanced building energy management program to identify building optimization opportunities in system maintenance and operational controls. The calculations were based on electricity and natural gas use per facility as identified in the supporting documents to the original baseline inventory. Each facility's total energy use was then multiplied by the end-use appliance and equipment ratios per the CEC's Commercial End Use Survey. The Survey provides information based on different land use types, so proxy land uses were selected to align with the different municipal facilities being analyzed, as follows: City Hall was analyzed as a Large Office, the Monta Vista Recreational Center and Quinlan Community Center were analyzed as Schools, the Corporation Yard was analyzed as an Unrefrigerated Warehouse, and the Engineering Department was analyzed as a Small Office. This established the baseline scenario for energy use by facility and end use. The following table shows the percentage of energy use attributed to each end use within each land use category.

Energy End Use	Large Office	School	Small Office	Unrefrigerated Warehouse
Electricity				
Air Compressors	0.36%	0.00%	0.28%	1.45%
Cooking	0.36%	2.44%	0.26%	0.49%
Cooling	19.54%	10.37%	17.71%	3.03%
Exterior Lighting	2.43%	7.89%	4.41%	12.49%
Heating	2.59%	2.50%	1.80%	1.25%
Interior Lighting	18.76%	40.39%	24.61%	51.68%
Miscellaneous	3.85%	4.25%	4.77%	6.68%
Motors	1.87%	0.92%	0.22%	4.26%
Office Equipment	27.16%	5.77%	31.47%	5.07%
Process	0.00%	0.00%	0.06%	0.00%
Refrigeration	2.15%	6.00%	2.17%	7.28%
Ventilation	20.22%	19.07%	10.86%	5.14%
Water Heating	0.70%	0.42%	1.38%	1.18%
Natural Gas				
Air Compressors	0.00%	0.00%	0.00%	0.00%
Cooking	0.33%	4.05%	0.22%	0.00%
Cooling	0.00%	0.00%	0.00%	0.00%
Exterior Lighting	0.00%	0.00%	0.00%	0.00%
Heating	85.11%	79.63%	95.06%	91.54%
Interior Lighting	0.00%	0.00%	0.00%	0.00%
Miscellaneous	0.00%	0.05%	0.00%	1.61%
Motors	0.00%	0.00%	0.00%	0.00%
Office Equipment	0.00%	0.00%	0.00%	0.00%
Process	0.00%	0.00%	0.00%	0.00%
Refrigeration	0.00%	0.00%	0.00%	0.00%
Ventilation	0.00%	0.00%	0.00%	0.00%
Water Heating	14.56%	16.27%	4.72%	6.84%

The mitigated scenario was developed by applying energy savings to the baseline scenario. Energy savings potential was based on information from First Fuel, a building-energy analytics company that specializes in identifying low- or no-cost building energy optimization improvements. The following end use savings were used to calculate total reductions from implementation of this measure.

Air Compressors – 10% savings (kWh)

Cooling – 20% savings (kWh)

Exterior Lighting – 25% savings (kWh)

Heating – 20% savings (therms)

Interior Lighting – 25% savings (kWh)

Equipment Motors – 20% savings (kWh)

Office Equipment – 20% savings (kWh)

Process Electricity – 10% savings (kWh)

Refrigeration – 10% savings (kWh)

Ventilation – 20% savings (kWh)

Water Heating – 10% savings (kWh)

M-F-4 Existing Building Energy Retrofit

This measure estimates the emissions reductions resulting from implementation of building lighting retrofits and plug load efficiency programs identified in the City's detailed energy audit. This audit provided estimates for electricity use reductions totaling approximately 313,000 kWh/yr following implementation of these opportunities. These savings were multiplied by the mitigated electricity emissions factor presented in Table B-6.

Inputs	Values
Building Lighting Retrofits	
Electricity Savings per year- kWh/yr	254,272
2020 Mitigated Emissions Factor – MT CO_2e/kWh	0.000132
Measure Reductions – MT CO_2e/yr	**34**

Plug Load Efficiency	
Electricity Savings per year- kWh/yr	59,130
2020 Mitigated Emissions Factor – MT CO_2e/kWh	0.000132
Measure Reductions – MT CO_2e/yr	**8**

M-F-6 Public Realm Lighting Efficiency

This measure estimates the reduction in electricity-related emissions resulting from installation of high-efficiency street light bulbs. As part of an energy performance contract, the City upgraded 99% of the City-owned streetlights, resulting in savings of approximately 872,000 kWh/yr. In addition to street lights, the City-commissioned detailed energy audit identified opportunities to retrofit lighting at City parks, particularly in parking lots and along pathways. The energy audit estimated an electricity savings potential of approximately 75,000 kWh/yr following implementation of these upgrades. The table below shows the inputs used to calculate emissions reductions associated with this measure. As with most of the other energy measures, these calculations use the mitigated 2020 electricity emissions factor shown in Table B-6.

Inputs	Values
Street Light Retrofits	
Electricity Savings per year- kWh/yr	871,860
2020 Mitigated Emissions Factor – MT CO_2e/kWh	0.000132
Measure Reductions – MT CO_2e/yr	**115**
Parking Lot/Park Facility Light Retrofits	
Electricity Savings per year- kWh/yr	74,898
2020 Mitigated Emissions Factor – MT CO_2e/kWh	0.000132
Measure Reductions – MT CO_2e/yr	**10**

M-F-7 Landscape Water Conservation

This measure estimates the reductions associated with water conservation resulting from the City's implementation of climate-sensitive irrigation controllers in 2011 through its energy performance contract. Based on the City's detailed energy audit, this program saves approximately 19 million gallons of water each year. The detailed energy audit also cites a 2008 baseline water use of 137 million gallons per year, so the irrigation efficiency savings provided a savings of approximately 14% over baseline levels. Due to the complexities inherent in modeling emissions associated with potable water use and water conservation, this CAP used a top-down reduction estimate to determine 2020 emissions reductions from this measure. The CAP forecasts estimate water-related emissions in 2020 of 7 MT CO_2e/yr. Since this measure has resulted in water savings of 14% over baseline levels, the CAP calculated 14% of the 2020 emissions value to determine the emissions reductions associated with this measure. The table below shows the inputs used to calculate reductions from this measure.

Inputs	Values
Water Savings from Irrigation Retrofit Program – million gallons/year	19
2008 Baseline Municipal Water Use – million gallons/year	138
Water Savings Achievement	14%
2020 Water Sector Emissions - MT CO_2e/yr	7
Measure Reductions – MT CO_2e/yr	**1**

M-VF-1 Low Emission and Alternative Fuel Vehicles

This measure estimates reductions associated with transitioning the municipal fleet towards alternative fuel vehicles. The measure is based on the City's desire to comply with the Bay Area Climate Compact's goal to achieve vehicle fleets in which zero- or low-emissions vehicles make up 25% of the total fleet by 2018. Since the CAP's near-term target year is 2020, this measure extended the goal to transition 28% of the municipal fleet by 2020. Approximately 90 vehicles comprise the City's baseline vehicle fleet, including 5 hybrid electric vehicles. To achieve the 28% target, the City would need 25 vehicles in its fleet to be zero- or low-emissions vehicles, which means 21 additional vehicles would need to be transitioned by 2020.

The City's fleet inventory tracks vehicles by age, make and model, fuel type and annual consumption, and annual mileage. This information was used to identify which vehicles could potentially be replaced by 2020 with a hybrid or low-emissions option. As with the energy measure calculations, a baseline and mitigated scenario were developed, with the difference

between the two representing the emissions reductions that would result following implementation of this measure. The baseline scenario assumed that annual fuel use and mileage per vehicle would remain constant through 2020. The mitigated scenario assumed certain vehicles would be replaced with hybrid or other low-emissions options, and those new vehicles would have the same annual mileage as their baseline scenario counterparts. This mileage was then converted into annual fuel use assuming greater mileage efficiency in the mitigated scenario vehicles. The measure assumed conversions of passenger vehicles, light-duty trucks, and heavy-duty trucks to low-emissions options. The mitigated scenario assumes passenger vehicles are replaced with a Ford Escape hybrid or comparable vehicle, light-duty trucks are replaced with a Ford plug-in hybrid electric CMAX or comparable vehicles, and that heavy-duty vehicles are replaced with a GMC Sierra 3500 or comparable efficiency vehicle.

The following table identifies the 21 additional fleet vehicles estimated for conversion in this measure. The vehicles are presented as pairs with the baseline vehicle on top in gray and the corresponding mitigated vehicle option below. The table identifies the fuel use per year for each vehicle and scenario, along with miles per gallon (MGP) and mileage per year.

Vehicles	Gallons/Year	MPG	Mileage/Year
1989 Chevy C20 Pickup Truck	384	11	4,219
Ford Escape Hybrid	66	32	4,219
1990 Chevy 2500 Pickup Truck	774	11	8,513
Ford Escape Hybrid	133	32	8,513
1997 Ford RGRXLS	637	15	9,552
Ford Escape Hybrid	149	32	9,552
1998 GMC 3500 Pickup Truck	483	5	2,415
GMC Sierra 3500	134	18	2,415
1998 GMC 3500 Pickup Truck	760	5	3,800
GMC Sierra 3500	211	18	3,800
2000 Ford Ranger Mini Truck	251	21	5,270
Ford Escape Hybrid	82	32	5,270
1995 Ford Ranger Mini Truck	303	20	6,054
Ford Escape Hybrid	95	32	6,054
1997 Ford Aerostar Minivan	72	17	1,232
Ford Escape Hybrid	19	32	1,232

1999 Ford Taurus	141	21	2,959
PHEV CMAX	34	43	2,959
1996 Ford Aerostar Mini Cargo	162	18	2,923
Ford Escape Hybrid	46	32	2,923
1996 GMC 3500 Pickup Truck	556	12	6,675
Ford Escape Hybrid	104	32	6,675
1998 Ford E250 Cargo Van	488	15	7,326
Ford Escape Hybrid	114	32	7,326
1995 Ford Ranger	224	21	4,706
Ford Escape Hybrid	74	32	4,706
2003 Ford Crown Victoria	373	18	6,707
PHEV CMAX	78	43	6,707
1999 Ford Crown Victoria	263	18	4,726
PHEV CMAX	55	43	4,726
2005 Ford Crown Victoria	392	19	7,457
PHEV CMAX	87	43	7,457
2008 Ford Crown Victoria	230	19	4,361
PHEV CMAX	51	43	4,361
1995 Ford Aerostar Mini Van	282	18	5,073
PHEV CMAX	59	43	5,073
1998 Ford Ranger Mini Truck	441	21	9,259
Ford Escape Hybrid	145	32	9,259
1998 Ford Ranger Mini Truck	262	21	5,512
Ford Escape Hybrid	86	32	5,512
1998 Dodge Dakota Mini Truck	521	16	8,336
PHEV CMAX	97	43	8,336

Summation			
	Gallons/Year		Mileage/Year
Baseline Scenario Total	7,999		117,074
Mitigated Scenario Total	1,919		117,074
Difference	6,080		-

The fuel savings were converted to emissions reductions using the vehicle fuel emissions factors in the following table.

	CO_2 (g/gal)	N_2O (g/mi)	CH_4 (g/mi)
Gasoline emissions	8,565	0.07	0.06
Diesel emissions	10,007	0.05	0.04

Source: CCAR's General Reporting Protocol version 3.1

In addition to these fuel emissions factors, the hybrid vehicle replacements were conservatively assumed to achieve 50% of their mileage needs from their electric battery systems, with the remaining 50% to be powered by gasoline internal combustion engines. Emissions related to re-charging the hybrid vehicles were included in the calculations and assumed to use the mitigated scenario electricity emissions factor shown in Table B-6.

M-VF-3 Behavior / Fuel Conservation

This measure estimates the reductions associated with implementation of a vehicle fleet telematics program that would support fuel-efficient driving practices, regular vehicle maintenance, and reduced vehicle miles traveled through GPS-based vehicle route optimization. The calculations assume implementation of M-VF-1 described above in calculating the total amount of remaining gasoline fuel use that could be affected by this measure. If Measure M-VF-1 were not implemented, then reductions associated with this measure would be greater due to the larger amount of gasoline fuel use.

As in Measure M-VF-1 described above, this measure calculated a baseline scenario for 2020 vehicle fuel use, incorporating the vehicle replacements presented above. This resulted in a total baseline use of approximately 20,700 gallons of gasoline. The calculations for this measure assume a 10% reduction in fleet gasoline-vehicle fuel use following measure implementation. This would result in a fuel use reduction of approximately 2,070 gallons of gasoline in 2020. The table below shows the fuel emissions factors (based on those shown in Measure M-VF-1 above) applied to the estimated fuel reduction to calculate the total emissions reductions resulting from this measure.

	CO_2 (g/gal)	N_2O (g/mi)	CH_4 (g/mi)
Gasoline	17,734,079	2,813	2,492
Metric Tons[1]	17.73	0.0028	0.0025
GWP[2]	1	298	25
MT CO_2e	18	0.8	0.1

[1] See previous table for fuel emissions factors

[2] Source (GWP - 100-yr): http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

SOLID WASTE MEASURES

Based on the original baseline municipal operations inventory, the City disposed of 376 tons of municipal solid waste in 2010. Per the methodology used to prepare the municipal baseline inventory, the total tonnage of disposed waste was split into waste types, with the waste characterization data provided by the CIWMB 1999 Waste Characterization Study. Waste categories from the report were then bundled to fit the waste categories of the CACP software used to develop the solid waste baseline emissions inventory. The following waste characterization rates were used in this calculation.

Paper Products	Food Waste	Plant Debris	Wood/Textile	All Other Waste
39.4%	9.8%	17.0%	6.7%	27.1%

Source: CIWMB 1999 Waste Characterization Study -- Public Administration Group:
http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asp

The total disposed solid waste was then organized into these waste categories. It was assumed that the All Other Waste category included non-organic waste materials that would not decompose within the landfill to produce methane emissions. The other four categories were then totaled and used to calculate new ratios of the emissions contribution from each category. These new ratios were multiplied by the 2020 solid waste emissions forecast value (i.e., 99 MT CO_2e/yr) to estimate the future emissions contribution by waste type so that reduction measures could be applied to individual waste types, as shown in the table below.

	Paper Products	Food Waste	Plant Debris	Wood/Textile	All Other Waste	Total
Tons	148	37	64	25	102	376
Tons – Organic Waste	148	37	64	25	-	274
Organics Ratio	54%	13%	23%	9%	-	100%
Share of 2020 Emissions (MT CO_2e/yr)	54	13	23	9	-	99

It should be noted that this calculation assumes that the methane-generating potential of these four waste categories are the same. Specific emissions factors by material type from the EPA's WARM model were considered for use in this calculation. However, as specified on the WARM website, those factors are for use in lifecycle emissions analysis, and are not appropriate for emissions inventory analysis. While these four waste types may produce methane at varying rates, no one emissions factor can be applied to easily calculate the reductions from the CAP's measures with a high-level of accuracy. Therefore, these calculations were prepared to ensure that total emissions reductions from the solid waste measures were not greater than the total emissions forecast for the sector, in order keep reduction estimates within the realm of feasibility.

The measure could have alternatively been quantified to assume that 80% of organic waste materials are diverted from landfills by 2020 (as described in Measure M-SW-1 Action 1), to achieve the same total amount of reductions as shown in these individual measures, without the specificity of where the reductions would come from. While solid waste emissions reductions are highly complicated to estimate (as opposed to energy reductions, which rely upon on simple emissions factors), reductions from this sector also represent a relatively small proportion of total municipal reductions estimated from this CAP (i.e., 12% in 2020). Even if no solid waste management strategies were pursued, the City could still achieve its 2020 reduction target through energy- and transportation-sector measures. Additionally, solid waste emissions are counted as a Scope 3 emissions source in the LGOP emissions inventory guidance, acknowledging that the City has limited ability to influence reductions from this source since the City lacks financial or operational control over the landfills in which municipal solid waste is disposed. Scope 3 emissions can be voluntarily reported, but are understood to be based upon less accurate or specific data as Scope 1 and Scope 2 emissions sources, which also contributes to the lower level of accuracy in their associated emissions reduction calculations.

The following three solid waste measures are each based on the same methodology and input table presented above.

M-SW-1 Waste Reduction

This measure estimates the reductions associated with removing paper and paper-products from the municipal waste stream through a paperless office policy and other waste reducing and diverting programs. The calculations assume that implementation of this measure could result in an 80% reduction in paper waste from the solid waste stream. Per the solid waste emissions table presented in the introduction to the municipal solid waste measures, it was assumed that 80% of the emissions attributed to the Paper Products category could be offset by 2020, as shown below. As described in the CAP's municipal solid waste discussion section, future municipal waste characterization surveys will be the best method to monitor successful implementation of this measure.

	Paper Products	Food Waste	Plant Debris	Wood/Textile	All Other Waste	Total
Share of 2020 Emissions (MT CO_2e/yr)	54	13	23	9	-	99
Diversion Rate	80%	-	-	-	-	-
Reductions (MT CO_2e/yr)	43	-	-	-	-	**43**

M-SW-2 Food Scrap and Compostable Paper Diversion

This measure estimates reductions associated with continued implementation of the City's organics collection program, including expansion to municipal facilities that currently lack food scrap collection bins. It also assumes continued implementation of green waste management practices in City parks, medians, and other landscapes, such that the majority of green waste is composted on-site, mulched by lawnmowers, or otherwise diverted from the solid waste stream. Per the solid waste emissions table presented in the introduction to the municipal solid waste measures, it was assumed that 90% of the emissions attributed to the Food Waste and Plant Debris categories could be offset by 2020, as shown below. As described in the CAP's municipal solid waste discussion section, future municipal waste characterization surveys will be the best method to monitor successful implementation of this measure.

	Paper Products	Food Waste	Plant Debris	Wood/Textile	All Other Waste	Total
Share of 2020 Emissions (MT CO_2e/yr)	54	13	23	9	-	99
Diversion Rate	-	90%	90%	-	-	-
Reductions (MT CO_2e/yr)	-	12	21	-	-	**33**

M-SW-3 Construction and Demolition Waste Diversion

This measure estimates reductions associated with implementation of the City's Green Building Ordinance, which requires diversion of 60% of construction and demolition waste from applicable new construction and renovation projects, including municipal projects. Per the solid waste emissions table presented in the introduction to the municipal solid waste measures, it was assumed that 60% of the emissions attributed to the Wood/Textile category could be offset by 2020, as shown below. As described in the CAP's municipal solid waste discussion section, future municipal waste characterization surveys will be the best method to monitor successful implementation of this measure.

	Paper Products	Food Waste	Plant Debris	Wood/Textile	All Other Waste	Total
Share of 2020 Emissions (MT CO_2e/yr)	54	13	23	9	-	99
Diversion Rate	-	-	-	60%	-	-
Reductions (MT CO_2e/yr)	-	-	-	5	-	**5**

CUPERTINO

CITY OF CUPERTINO

CLIMATE ACTION PLAN

APPENDIX C – Implementation Tracking Framework

This appendix represents a collection of the CAP measure implementation tables presented throughout Chapters 3 and 4. It can serve as a handy reference document to track implementation of each measure, easily identify departmental and staff responsibilities for various actions, and update implementation timing dependent upon fiscal and other community priorities. It also suggests methods or processes for collecting data that will be important to verifying the reduction estimates presented in the CAP.

Unfortunately, for many of the CAP's quantified measures, there is no readily published dataset with pertinent information, or certain data is not yet consistently collected to allow tracking measure implementation. In these instances, this appendix suggests a data collection framework to serve as a starting point. However, the City may discover better methods to access and sort the necessary data or find that it is not possible to collect all raw data, and that proxies will need to be developed to estimate implementation levels. Tracking mechanisms are provided for the CAP's quantified reduction measures. The remaining measures, identified as "Supporting Measures" in the CAP, simply re-present the measure statement, actions and implementation steps, responsible departments / staff, and implementation phasing.

When tracking measure implementation, City staff may discover that there is strong overlap in the data collected for certain measures. For example, energy reductions associated with participation in an advanced energy analytics program (Measure C-E-1) may also be reported within the existing building retrofit financing measure (Measure C-E-2). While efforts can be made to separate energy savings into appropriate measure categories, the variety and type of likely data sources will inevitably lead to double counting of reduction potential among the CAP's measures. Therefore, this appendix should be used to generally track the implementation success of individual measures, to the extent feasible, but regular emissions inventory updates should still be used to track the macro-level emissions trends within the community.

This appendix can serve as an initial framework to help the City establish its CAP implementation tracking procedures, and should be freely modified and amended to best fit existing City procedures for ease of use.

MEASURE C-E-1 Energy Use Data and Analysis

Increase resident and building owner/tenant/operator knowledge about how, when, and where building energy is used.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Work with PG&E to facilitate aggressive implementation of PG&E's Home and Business Area Network (HAN) program within Cupertino	Sustainability Division, Staff person	Near-term, FY "Year"
B. Partner with PG&E, other Santa Clara County local governments, third-party service providers, and local businesses to establish leading regional advanced metering and analytics implementation program for commercial and residential buildings	Sustainability Division, Staff person	Medium-term, FY "Year"
C. Collaborate with other Santa Clara County local governments to develop outreach program that communicates benefits of using advanced analytics to improve energy efficiency and reduce energy bills	Sustainability Division, Staff person	Medium-term, FY "Year"

Progress Indicator	Year
2,200,000 kWhr/yr saved – assumes 10% of nonresidential square footage in 2010 baseline year (i.e., 1.27 million sqft) participates in advanced analytics program; 775,000 kWhr/yr saved – assumes 10% of single family units (i.e., 1,500 homes) and 5% of multi-family units (i.e., 300) participate in advanced analytics program	2020
4,400,000 kWhr/yr saved – assumes 20% of nonresidential square footage in 2010 baseline year (i.e., 2.5 million sqft) participates in advanced analytics program; 2,000,000 kWhr/yr saved – assumes 25% of single family units (i.e., 3,750 homes) and 10% of multi-family units (i.e., 600) participate in advanced analytics program	2035

Tracking Mechanisms

Goal: Identify energy savings from participation in energy use data analytics programs.

Work with PG&E to identify energy savings resulting from participation in PG&E energy analytics services (e.g., HAN program)

Identify methods to collect participation data from third-party analytics providers. Establish voluntary reporting program for businesses / residents to report energy savings from analytics data use, possibly through landing page on City's website that collects various pieces of program information:

- What type of improvements were made as a result of analytics program participation?

- Was the program provided through PG&E or another third-party provider?

- What were estimated energy savings in kWh/year and therms/year?

- What were primary barriers/challenges to participation in analytics program?

MEASURE C-E-2 Retrofit Financing		
Promote existing and support development of new private financing options for home and commercial building retrofits and renewable energy development.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
Property Assessed Clean Energy		
A. Continue to participate in California FIRST to make PACE financing available to commercial, industrial, multi-family residential (5+ units), and non-profit-owned buildings	Sustainability Division, Staff person	On-going, FY "Year"
B. Continue to participate in effort with other Santa Clara County local governments to establish countywide PACE financing district available for residential property owners (could also provide another source of commercial financing to compliment California FIRST program)	Sustainability Division, Staff person	Near-term, FY "Year"
C. Work with PACE financing providers to educate local Realtor and contractor community about PACE offerings, process, and benefits to increase participation	Sustainability Division, Staff person	Medium-term, FY "Year"
D. Finalize GreenBiz Financing Guide and create residential-focused guide and companion website to direct interested parties to utility, public agency, and local lending institution resources to advance energy efficiency and water conservation measures	Sustainability Division, Staff person	On-going, FY "Year"
Energy Service Company Promotion		
E. Develop business energy performance contracting market aggregation program that identifies interested commercial and industrial properties and aggregates them into markets of sufficient scale to attract energy service companies (ESCOs) or energy service agreement (ESA) providers	Sustainability Division, Staff person	Medium-term, FY "Year"
F. Work with local commercial banks to reduce mortgage lender limitations on external financing that limit use of ESCO and ESA contracts	Sustainability Division, Staff person	Long-term, FY "Year"
Progress Indicator	**Year**	
750 single-family houses install a comprehensive retrofit package; 450 single-family houses install a basic retrofit package; 300 multi-family units receive a comprehensive retrofit package; 175 multi-family units receive a basic retrofit package; 875,000 square feet of nonresidential space installs a comprehensive retrofit package	2020	
1,500 single-family houses install a comprehensive retrofit package; 1,500 single-family houses install a basic retrofit package; 600 multi-family units receive a comprehensive retrofit package; 600 multi-family units receive a basic retrofit package; 1,900,000 square feet of nonresidential space installs a comprehensive retrofit package	2035	

MEASURE C-E-2 Retrofit Financing

Promote existing and support development of new private financing options for home and commercial building retrofits and renewable energy development.

Tracking Mechanisms

Goal: Calculate energy savings resulting from existing building retrofits.

Establish data-sharing partnership with local PACE financing districts to collect participation data that shows:

- kWh and therms saved per year (data should be collected annually and disaggregated to show changes by year – e.g., 2015, 2016)

- Number and type of participants (e.g., 15 single-family homes, 20 apartment units, 10,000 sqft of non-residential) to help track what percentage of total city building stock has participated, and what additional percentage could participate in the future

- Types of retrofits made, and energy savings by retrofit category, if possible. For example, indoor lighting retrofits saved 1,000,000 kWh/yr in 2015, while attic insulation installations saved 200,000 kWh/yr in 2015. This data will help indicate popular retrofits that can be advertised through Measure C-E-3, or identify retrofit categories that do not yet "pencil-out" financially for building owners

Special care should be given to separate any reported emissions reductions or energy savings associated with PACE-financed solar PV or other renewable energy systems. This data should be collected, when available, to identify the total impact of PACE financing districts on advancing solar PV installations community-wide However, PG&E's PV interconnection data, or data collected from the City's Building Department, will provide a more comprehensive set of information on PV installations. These broader data sets should also include the PV installs occurring through PACE financing programs, so adding the sets together would likely result in double-counting.

MEASURE C-E-3	Home and Commercial Building Retrofit Outreach		
Develop aggressive outreach program to drive voluntary participation in energy- and water-efficiency retrofits.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Partner with Housing Division to design a low- to moderate-income targeted energy and water conservation pilot program	Sustainability Division, Staff person	Near-term, FY "Year"
B.	Partner with local realtor community to develop and implement a building owner outreach campaign that targets new building owners to provide information on available building energy efficiency audit and retrofit programs, as well as locally-available financing options (including PACE financing	Sustainability Division, Staff person	Near-term, FY "Year"
C.	Identify ways to streamline permitting process for large non-residential retrofit programs; consider developing checklists, guides and/or a City liaison role in Building Department to assist projects through the permitting process	Sustainability Division, Staff person	Medium-term, FY "Year"
D.	During CAP implementation monitoring and updates, determine if voluntary, incentive-based approach to existing building retrofits is achieving desired results regarding energy conservation; if implementation metrics in Measure C-E-2 are not being met, first identify additional outreach strategies or incentives that could increase voluntary participation based on focus group discussions with local contractors, Realtors, business owners, and community leaders; if additional outreach/incentives still fail to produce necessary results, engage community members again regarding potential building regulations that could increase energy savings; benefits from adding new building regulations should first be analyzed with regards to current state building regulations, opportunities to increase reductions from other CAP measures, and cost/benefit analysis or potential new regulations	Sustainability Division, Staff person	Medium-term, FY "Year"

MEASURE C-E-4	Energy Assurance & Resiliency Plan		
Develop a long-term community-wide energy conservation plan that considers future opportunities to influence building energy efficiency through additional or enhanced building regulations.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Develop overarching energy plan for community that considers energy sources and their reliability with regards to estimated climate change impacts	Sustainability Division, Staff person	Long-term, FY "Year"
B.	Based on most current Statewide legislation (e.g., CalGreen code) and successful case studies in other cities, research additional opportunities for feasible building retrofit regulations that generate long-term energy savings in existing building stock	Sustainability Division, Staff person	Long-term, FY "Year"
C.	Consider emissions reduction potential from additional regulations in context of other available emissions reduction strategies and give preference to voluntary, incentive-based programs that allow City to achieve its emissions reduction targets	Sustainability Division, Staff person	Long-term, FY "Year"
D.	Work closely with local realtor community to identify barriers to implementation and develop strategies to reduce potential burden on building sellers and real estate transaction process	Sustainability Division, Staff person	Long-term, FY "Year"

MEASURE C-E-5	Community-Wide Solar Photovoltaic Development		
Encourage voluntary community-wide solar photovoltaic development through regulatory barrier reduction and public outreach campaigns.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
Solar Service-Provider PPA Promotion			
A.	Conduct outreach program to educate residents and businesses about potential benefits of solar service providers' power purchase agreements (PPA)	Sustainability Division, Staff person	Medium-term, FY "Year"
B.	Host workshop with area solar service providers to identify opportunities to streamline installation of solar PV systems	Sustainability Division, Staff person	Medium-term, FY "Year"
C.	Pending result of PPA workshop, remove identified barriers to wide-scale solar installation throughout city	Sustainability Division, Staff person	Long-term, FY "Year"
D.	Provide general information on City website describing various solar PV financing / installation options (e.g., PPA, community shared solar, outright purchase)	Sustainability Division, Staff person	Medium-term, FY "Year"
Community Shared Solar Promotion			
E.	Conduct outreach program to educate residents and businesses about opportunities for community shared solar PV systems; invite neighborhood groups/organizations to help identify potential interest	Sustainability Division, Staff person	Medium-term, FY "Year"
F.	Work with PG&E to share information about PG&E's Community Solar program	Sustainability Division, Staff person	Near-term, FY "Year"
G.	Work closely with identified candidate to develop successful pilot program (e.g., assist group in navigating permitting requirements) that can be replicated by others; share success stories on City's Sustainability website; work to remove regulatory barriers identified during pilot project	Sustainability Division, Staff person	Medium-term, FY "Year"
Solar Empowerment Zones			
H.	Conduct analysis to identify areas within City most suited for large-scale photovoltaic system development (e.g., excellent solar access; large, flat rooftop or parking lot expanses; minimal number of property owners); identify potential barriers (e.g., regulatory, ownership, structural / technical) to photovoltaic system development in these areas	Sustainability Division, Staff person	Long-term, FY "Year"
I.	Identify these areas as "priority solar development areas" and work to reduce existing barriers to system development	Planning Department, Staff person	Long-term, FY "Year"
J.	Conduct focused outreach to land owners and tenants regarding photovoltaic system development opportunities; partner with PACE program, PG&E, or other renewable energy funders as appropriate on outreach campaign	Sustainability Division, Staff person	Long-term, FY "Year"

MEASURE C-E-5 Community-Wide Solar Photovoltaic Development

Encourage voluntary community-wide solar photovoltaic development through regulatory barrier reduction and public outreach campaigns.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
Building Regulations		
K. Consider including solar pre-wiring / pre-plumbing requirements in future revisions to City's Green Building Ordinance	Building Division, Staff person	Long-term, FY "Year"
L. Instruct building and plan check officials to provide information to customers on the benefits of pre-wiring / pre-plumbing for solar applications at the time of new construction or substantial retrofits, including lower up-front costs as compared to retrofitting buildings in the future	Building Division, Staff person	Near-term, FY "Year"

Progress Indicator	Year
1.5 MW of new solar PV capacity installed community-wide (residential and nonresidential combined – excluding Apple Campus 2 project listed below); Apple Campus 2 solar PV systems installed to generate 15 million kWh/yr; 5.5 MW of existing solar PV installed from 2010-2014	2020
5.0 MW of new solar PV capacity installed community-wide (residential and nonresidential combined – excluding Apple Campus 2 project listed below); Apple Campus 2 solar PV systems installed to generate 15 million kWh/yr; 5.5 MW of existing solar PV installed from 2010-2014	2035

Tracking Mechanisms

Goal: Track total community-wide installed PV capacity and electricity generation potential.

Establish annual data reporting process with PG&E to collect community solar PV interconnection reports that show yearly installations of PV systems; Collect reports in shared location, or transfer data to Excel database, to demonstrate total measure impact over time

Set smaller, annual measure implementation goals to help achieve larger target year goals (e.g., 300 kW PV capacity installed annually through 2020 to achieve CAP 2020 goal of 1.5 MW new community capacity)

Verify generation capacity of Apple Campus 2 PV system following installation

For reporting and verification purposes, convert total installed PV capacity (i.e., capacity installed since baseline year) to kWh electricity generation. This number will be useful when calculating statewide RPS reductions, and verifying emissions reductions resulting from this measure (i.e., kWh solar electric generation * utility electricity emissions factor = MT CO_2e/yr reductions)

MEASURE C-E-6	Community-Wide Solar Hot Water Development		
Encourage communitywide solar hot water development through regulatory barrier reduction and public outreach campaigns			
Actions and Implementation Steps		**Department/Staff Responsible**	**Phasing**
A.	Collaborate with PG&E and California Solar Initiative - Thermal Program to develop local outreach program to maximize installation of solar hot water systems and leverage existing funding opportunities	Sustainability Division, Staff person	Medium-term, FY "Year"
B.	Work with PG&E to identify businesses and multi-family residential building owners with high hot water use, and provide targeted outreach with promotional materials for participation in CSI-Thermal Program	Sustainability Division, Staff person	Medium-term, FY "Year"
C.	Host roundtable discussion with large hot water users to identify potential City barriers to installation of solar thermal systems; work with City departments to remove or reduce identified barriers, where possible	Sustainability Division, Staff person	Long-term, FY "Year"
Progress Indicator		**Year**	
750 single-family houses install a solar thermal system capable of providing 70% of the building's hot water heating energy; 300 multi-family buildings install a solar thermal system capable of providing 65% of the building's hot water heating energy; 630,000 square feet of nonresidential space installs a solar thermal system capable of providing 30% of the building's hot water heating energy		2035	

Tracking Mechanisms

Goal: Track total hot water heating capacity of installed solar hot water heaters.

Establish annual data reporting process with PG&E to collect community solar hot water heater installation data, or collect this data from City's Building Department. Necessary data to be collected includes:

- Total therms of natural gas or kWh or electricity offset by solar water heater (depending on type of retrofitted hot water heater system)

Additional informational data could be collected to enhance participation in this measure, such as:

- Primary barriers/challenges to participation in solar hot water heater program (e.g., financial, technical, bureaucratic)

- Use of utility-funded rebates or rate incentive programs

- Percentage of annual hot water heating load to be offset by solar heating system (based on full year of data or amount estimated by contractor/service provider)

It is likely that this program will gain little traction in the near-term. However, the City can begin annual monitoring as described above, and calculate emissions reductions applicable to the City's 2020 target, should participation occur prior to that target year.

MEASURE C-E-7 Community Choice Energy Option

Partner with other Santa Clara County jurisdictions to evaluate the development of a regional CCE option, including identification of the geographic scope, potential costs to participating jurisdictions and residents, and potential liabilities.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Work with other Santa Clara County partners to conduct feasibility study of developing multi-jurisdiction CCE program	Sustainability Division, Staff person	Near-term, FY "Year"
B. If study determines CCA to be feasible and advantageous to Cupertino residents and businesses, work with Santa Clara County partners to prepare necessary additional study reports, informational materials, and any other supporting research and/or documents to help pursue development of CCA program	Sustainability Division, Staff person	Long-term, FY "Year"

Tracking Mechanisms

Goal: Track community participation in clean-electricity purchasing programs.

While this measure does not include progress indicators in the CAP, it was identified as an important long-term strategy to help the community achieve their more aggressive future-year reduction targets. The following strategies will help to track participation and allow better reduction estimates resulting from this measure.

Establish working relationship with any CCE program in which Cupertino participates to collect City-specific participation data (assuming privacy protections would not be compromised); If data privacy concerns prevent this type of data collection, establish a voluntary reporting mechanism, similar to the one described in Measure C-E-1 in which a voluntary participant tracker could be added to the City's sustainability webpage. The tracker could collect information to determine the number of residential households and local businesses that participate, as well as their level of participation (e.g., 50% clean electricity, 75% clean electricity, 100% clean electricity).

Similarly, work with PG&E to identify the total amount of traditional grid electricity that is offset through voluntary participation in PG&E's Green Option program within the city (assuming the CEC approves the program and local residents and businesses participate).

The total amount of clean electricity consumption from participation in a CCE or PG&E's Green Option program can be combined into one total value of kWh/yr and multiplied by the utility's electricity emissions factor for the target year (e.g., 2020) to calculate total emissions reductions from this measure. This total amount of electricity, plus the total electricity generation capacity of the community's PV systems, should be factored into future calculations of reductions associated with the state's RPS program because that program will be affecting a smaller share of community electricity (i.e., Solar PV electricity and CCE or Green Option electricity that is cleaner than the prevailing RPS rate will supersede reductions associated with the RPS. Only the remaining electricity demand that is not met by one of these alternative electricity options will be subject to the RPS, and therefore able to generate additional reductions.)

MEASURE C-T-1	Bicycle & Pedestrian Environment Enhancements		
Continue to encourage multi-modal transportation, including walking and biking, through safety and comfort enhancements in the bicycle and pedestrian environment.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Update City's Bicycle and Pedestrian Transportation Plans to reflect current bicycle and pedestrian safety and access needs; prioritize new projects identified	Transportation Division, Staff person	Medium-term, FY "Year"
B.	Partner with local bicycle advocacy groups / clubs and neighborhood groups to identify dangerous bicycle or pedestrian conditions, and develop strategies to address problem areas	Transportation Division, Staff person	Medium-term, FY "Year"
C.	Identify grant-funds to pursue Plan-recommended education, design, and/or construction projects	Sustainability Division, Staff person	Medium-term, FY "Year"
D.	Partner with schools, neighborhood groups, and businesses to encourage alternative transportation commute options. Expand alternative commute measures within existing sustainability programs, including Green@Home, GreenBiz, and green@school	Sustainability Division, Staff person	Medium-term, FY "Year"
E.	Continue to evaluate City's bike & walkability through use of online and community surveying tools including WalkScore, Bicycle Friendly Community criteria, Safe Routes to School Walkability Checklist, etc.	Sustainability & Transportation Divisions, Staff person	Medium-term, FY "Year"

MEASURE C-T-2	Bikeshare Program		
Explore feasibility of developing local bikeshare program.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Continue to operate municipal bike fleet for City employee use and encouragement of bike fleets at large employers	Sustainability Division, Staff person	On-going, FY "Year"
B.	Evaluate potential demand for city-wide bikeshare program; discuss expansion opportunities with Bay Area Bike Share	Sustainability Division, Staff person	Medium-term, FY "Year"
C.	If participation in Bay Area Bike Share is deemed infeasible, discuss potential for locally-operated system with that organization to identify likely barriers to successful bike share network in Cupertino (e.g., infrastructure limitations, locational disadvantages, land use concerns, low potential user/destination densities)	Sustainability Division, Staff person	Long-term, FY "Year"

MEASURE C-T-3	Transportation Demand Management	
Provide informational resources to local businesses subject to SB 1339 transportation demand management program requirements and encourage additional voluntary participation in the program.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
Transportation Demand Management Program		
A. Support regional efforts to implement SB 1339 commute benefit requirements for employers with more than 50 employees)	Sustainability Division, Staff person	Near-term, FY "Year"
B. Work with VTA and/or 511.org on outreach campaigns targeting employers with fewer than 50 employees to encourage voluntary participation in TDM program activities, including pre-tax deductions for alternative travel mode expenses, transit pass subsidies, and new vanpool development; share best-practices in TDM programs with local businesses to identify options that have been successful at small scale	Sustainability Division, Staff person	Medium-term, FY "Year"
Parking Cash Out		
C. Work with Cupertino Chamber of Commerce to conduct informal survey of businesses that lease employee parking spaces	Sustainability & Economic Divisions, Staff person	Long-term, FY "Year"
D. Develop program to work with businesses that lease parking spaces to describe benefits of parking cash-out programs for businesses and employees	Sustainability & Economic Divisions, Staff person	Long-term, FY "Year"
Carpool / Rideshare Program		
E. Partner with 511.org and employers to leverage new ride-matching technologies and promote rideshare among employees	Sustainability Division, Staff person	Medium-term, FY "Year"
Guaranteed Ride Home		
F. Work with other Santa Clara County partners to develop Guaranteed Ride Home program for employees who work in Santa Clara County and commute to work via alternative travel options (e.g., public transit, carpool/vanpool, biking, walking)	Sustainability Division, Staff person	Medium-term, FY "Year"
Progress Indicator	**Year**	
10% of total employees in 2020 participate in TDM program that offers rideshare promotion, telecommuting/ alternative schedules, and subsidized transit fares	2020	
20% of total employees in 2020 participate in TDM program that offers rideshare promotion, telecommuting/ alternative schedules, and subsidized transit fares	2035	

MEASURE C-T-3 Transportation Demand Management

Provide informational resources to local businesses subject to SB 1339 transportation demand management program requirements and encourage additional voluntary participation in the program.

Tracking Mechanisms

Goal: Identify VMT reductions associated with TDM programs offered throughout the community.

Transportation emissions are not based on empirical data, which makes tracking the implementation success of transportation measures challenging. The City should work with MTC to develop tracking mechanisms specifically related to implementation of SB 1339 requirements in Cupertino. Based on the assumptions developed in that methodology, the City could "spot-check" the results by working with local employers subject to the regulations (i.e., employers with 50 or more employees) to verify that they are experiencing the level of employee participation as estimated by MTC. This could be administered through voluntary commuter surveys and/or analysis of participation in the employer's TDM offerings (e.g., parking cash out, transit pass subsidies, alternative work schedules). The City can also request relevant participation information from VTA, Santa Clara County, or the local Chamber of Commerce.

At the macro-level, the City can align major CAP updates / revisions cycles with updates to the General Plan and its underlying transportation model. As noted in Chapter 7 of the CAP, direct comparisons of inventory updates from one year to the next can be problematic, especially if the underlying transportation model used to generate the transportation emissions assumptions are different. The state may provide better guidance in the future for how to manage the numerous assumptions and unknowns related to transportation sector emissions and reduction estimates. However, at this time, the City's best option is to collect empirical data related to employee participation in various TDM strategies and track long-term trends in participation. The City could also hire a transportation consultant with knowledge of local TDM and commuter benefits programs to develop a more detailed tracking mechanism, and/or perform an analysis of this measure's implementation success and barriers. Alternatively, the City could hire a transportation consultant to update the transportation sector emissions, taking into account participation in the various TDM programs available to its residents. This emissions update could be incorporated into the total community-wide inventory update, and reductions related to this measure could be removed with the assumption that the revised transportation sector emissions include their contributions (i.e., resulting in lower transportation emissions than would otherwise have occurred in lieu of this measure).

MEASURE C-T-4	Transit Route Expansion		
Explore options to develop local community shuttle or community-wide car sharing to fill gaps in existing transit network.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Conduct feasibility study that evaluates potential for community shuttle between Cal Train, Civic Center, major employment / retail centers in Cupertino, and DeAnza Community College	Sustainability & Economic Divisions, Staff person	Long-term, FY "Year"
B.	Research possible funding strategies with business improvement districts, major employers, community organizations, and other appropriate partners	Sustainability Division, Staff person	Long-term, FY "Year"
C.	Support further development of private car share options for residents and daytime employee population, such as through efforts to identify adequate parking locations for shared vehicles (e.g., ZipCar) or working with local business community to increase knowledge of available options	Sustainability Division, Staff person	Long-term, FY "Year"

MEASURE C-T-5 Transit Priority		
Improve transit service reliability and speed.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
Transit Signal Priority		
A. Work with VTA to identify local roadways on which traffic congestion frequently leads to impacted transit reliability or timing	Transportation Division, Staff person	Medium-term, FY "Year"
B. Consider opportunities for transit-priority signal integration along these routes that would not further contribute to congestion problems	Transportation Division, Staff person	Long-term, FY "Year"
Transit Intersection Queue Jumps		
C. Based on work with VTA to identify congestion problems along primary transit routes, also investigate opportunities for integration of intersection queue jump lanes (in conjunction with priority signals) to further facilitate on-time transit service	Transportation Division, Staff person	Long-term, FY "Year"

MEASURE C-T-6	Transit-Oriented Development		
Continue to encourage development that takes advantage of its location near local transit options (e.g., major bus stops) through higher densities and intensities to increase ridership potential.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Through City's General Plan process, identify areas that could support net increase in population or employment through land use changes within 1/4 mile walking distance of priority transit stops Planning Department	Planning Division, Staff person	Long-term, FY "Year"
B.	Evaluate infrastructure capacity for higher-density/intensity development in transit areas, and develop prioritization and funding strategies to complete necessary improvements	Planning Division, Staff person	Long-term, FY "Year"
C.	Continue to consider off-street parking requirements for transit-oriented and mixed-use developments, for developments providing shared parking, and for developments that incorporate travel demand management measures	Planning Division, Staff person	On-going, FY "Year"

MEASURE C-T-7 Community-Wide Alternative Fuel Vehicles		
Encourage community-wide use of alternative fuel vehicles through expansion of alternative vehicle refueling infrastructure.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
Alternative Fuel Vehicle Charging / Refueling Infrastructure		
A. Continue to explore cost-effective ways to increase alternative vehicle charging / refueling infrastructure within City for public use; review permitting and inspection process to identify potential barriers to installation and define strategies to reduce or remove barriers through SGC grant or other means)	Transportation Division, Staff person	Medium-term, FY "Year"
B. Develop Alternative Fuel Infrastructure Siting Plan focused on strategic development of EV charging stations and municipal CNG fueling stations based upon demand analyses and feasibility studies; EV station siting plans will identify appropriate locations for Level 1 (slow charge), Level 2 (fast charge), and Level 3 and DC (rapid charge) charging stations in community and will analyze different models for charging station ownership/management (i.e., public vs. private sector)	Sustainability & Transportation Divisions, Staff person	Near-term, FY "Year"
C. Work with MTC and Bay Area local governments to develop informational brochures and technical support for developers / contractors interested in providing public electric vehicle (EV) charging ports in new projects	Sustainability Division, Staff person	Near-term, FY "Year"
D. Identify regional partners for collaboration on multi-family EV charging station retrofit program to develop strategies for installing EV chargers in existing multi-family buildings/apartment developments	Sustainability & Planning Divisions, Staff person	Near-term, FY "Year"
EV Charging Station Pre-wiring Requirements for New Residential Construction (SFR and MFR)		
E. Continue to enforce pre-wiring for at-home/business electric vehicle charging ports in new construction per City's existing ordinance and evaluate additional building code and zoning code revisions recommended through SGC Grant	Planning Division, Staff person	On-going, FY "Year"
Alternative Fuel Vehicle Public Outreach Program		
F. Pursue local incentives, partnerships, and funding mechanisms guided by SGC Grant; Provide links on City's website to sources of cash rebates or other financial incentives for purchase and/or lease of alternative fuel vehicles	Sustainability Division, Staff person	Near-term, FY "Year"
G. Continue to provide links to existing maps identifying Bay Area alternative fuel charging and refueling infrastructure	Sustainability Division, Staff person	On-going, FY "Year"
H. Share information regarding City's efforts to transition its municipal fleet towards alternative fuel vehicles, including plans for additional installation of recharging / refueling infrastructure that would be open to public use	Sustainability Division, Staff person	Medium-term, FY "Year"

MEASURE C-T-7	Community-Wide Alternative Fuel Vehicles

Encourage community-wide use of alternative fuel vehicles through expansion of alternative vehicle refueling infrastructure.

Progress Indicator	Year
Community-wide motor vehicle profile shifts as follows: 5% of gasoline passenger vehicles shift to plug-in hybrid electric (PHEV); 5% of diesel passenger vehicles shift to PHEV; 5% of gasoline light-duty trucks shift to PHEV; 3% of gasoline heavy-duty trucks shift to CNG; 3% of diesel heavy-duty trucks shift to CNG; 40% of diesel buses shift to CNG, 20% shift to PHEV	2020
Community-wide motor vehicle profile shifts as follows: 8% of gasoline passenger vehicles shift to plug-in hybrid electric (PHEV); 2% shift to battery-electric (BEV); 5% shift to CNG 8% of diesel passenger vehicles shift to PHEV; 2% shift to battery-electric (BEV); 5% shift to CNG 8% of gasoline light-duty trucks shift to PHEV; 2% shift to battery-electric (BEV); 5% shift to CNG 25% of gasoline heavy-duty trucks shift to CNG; 25% of diesel heavy-duty trucks shift to CNG; 45% of diesel buses shift to CNG, 30% shift to PHEV	2035

Tracking Mechanisms

Goal: Track community-wide shift towards alternative fuel vehicles.

As with Measure C-T-3, tracking the transition of the community-wide vehicle mix towards greater numbers of alternative fuel vehicles will also be a challenge given the lack of readily-available data. The baseline level of community-wide vehicle composition was developed using the Air Resources Board's EMFAC model for Santa Clara County, and then scaled to Cupertino. This provided a modeled (i.e., not empirical) understanding of the community's fleet make up. The vehicle fleet transition estimates shown as Progress Indicators by vehicle and fuel type were then prepared based on industry estimates for technology adoption in the future.

Assuming the Department of Motor Vehicles will not provide data to the City detailing the number and type of vehicles registered to Cupertino addresses, the City could attempt to collect this information voluntarily. An online, voluntary community survey that asks residents about their personal vehicles could provide some insights. Questions might include:

- What are the number and type of vehicles owned / leased in your household?

- What are the ages of your vehicles?

- Would you consider purchasing an alternative fuel vehicle as your next personal vehicle?

- If no, what would prevent you from considering alternative fuel vehicles as an option?

- Are you aware of the refueling / recharging options available to you within Cupertino for alternative fuel vehicles?

MTC, ABAG, the County Office of Sustainability, ARB, or other organizations may have their own on-going studies related to this topic, which could also be analyzed and used as a proxy for empirical data. The City could also partner with the Chamber of Commerce and local businesses to perform informal surveys of employees' alternative fuel vehicles, based on use of EV charging stations, priority parking areas, or other employee-offered incentive programs.

The City could also advocate for ARB to develop vehicle characterization studies for cities, counties, and/or regions of the state using empirical Department of Motor Vehicle data, assuming it could be aggregated sufficiently to avoid data privacy concerns.

MEASURE C-W-1 SB-X7-7

Implement water conservation policies contained within Cupertino's Urban Water Management Plan to achieve 20 percent per capita water reductions by 2020.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Develop public information campaign that highlights/advertises City projects and landscaping practices that conserve water (e.g., drought-tolerant landscaping, efficient irrigations systems)	Sustainability Division, Staff person	Medium-term, FY "Year"
B. Work with local water providers to identify opportunities for water use data tracking and reporting at community-wide level; if successful, share this information through CAP's annual progress reporting procedures, aligned with required General Plan implementation annual reports	Sustainability Division, Staff person	Near-term, FY "Year"
C. Partner with community/neighborhood groups to promote existing water conservation programs and participation in voluntary turf-removal programs	Sustainability Division, Staff person	Near-term, FY "Year"

Progress Indicator	Year
20% per capita water use reduction of 2010 baseline use	2020
20% per capita water use reduction of 2010 baseline use	2035

Tracking Mechanisms

Goal: Track per capita water use compared to 2010 baseline levels.

The City's urban water providers (i.e., San Jose Water Company and California Water Service Company) should document progress towards and achievement of the SB-X7-7 legislation goals in future Urban Water Management Plan updates. Reductions associated with this measure are based on the assumption that both water providers would achieve the goals by 2020, and that water conservation targets would not be increased after 2020. UWMP are updated on five-year cycles, so the City will need to work with its water providers to estimate annual water savings for intermediary years (i.e., between UWMP updates). As described in the CAP, the City should work with its water providers to establish an aggregated water consumption reporting program to allow easier tracking of annual community-wide water consumption. These consumption levels can then be compared against each other to track actual water use reductions, as well as increased water efficiency in the form of declining per capita water use.

The City should also continue to monitor state and local efforts at water conservation, particularly if they result in mandates or incentive-based programs that aim to exceed the current requirements of SB-X7-7. Additional water conservation beyond the levels shown in the Progress Indicator would likely result in greater emissions reductions than those estimated in the CAP.

MEASURE C-W-2	Recycled Water Irrigation Program		
Explore opportunities to use recycled water for irrigation purposes to reduce potable water demands.			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Conduct feasibility analysis to determine potential for recycled water systems in Cupertino; map locations of large irrigation water users (now and likely future users) to identify feasible extent of new system	Grounds & Fleet Division, Staff person	Long-term, FY "Year"
B.	Continue to monitor regional discussions regarding expansion of existing recycled water systems in neighboring jurisdictions	Sustainability Division, Staff person	On-going, FY "Year"
C.	Identify City-owned site to install educational demonstration project that showcases water-efficient landscaping strategies, alternative irrigation options, and/or low-impact landscape design techniques	Sustainability, Grounds & Fleet Divisions, Staff person	Short-term, FY "Year"

MEASURE C-SW-1 Zero Waste Goal			
Maximize solid waste diversion community-wide through preparation of a zero-waste strategic plan			
	Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A.	Continue to implement City's goal to divert 75% of community-wide solid waste through franchise waste hauling contract	Environmental Division, Staff person	Near-term, FY "Year"
B.	Prepare residential and commercial waste characterization studies to identify Cupertino-specific opportunities for additional waste diversion; use study results to develop outreach campaigns that increase participation in City's existing waste management programs, targeting specific waste types and/or sources	Environmental Division, Staff person	Medium-term, FY "Year"
C.	Establish timeline and funding mechanism to perform periodic Waste Characterization Study updates to evaluate efficacy of new outreach programs	Environmental Division, Staff person	Long-term, FY "Year"
D.	Develop robust outreach campaign to ensure community-wide understanding of materials management service offerings, drive behavior change focused on lifecycle of materials (i.e., source reduction, materials reuse, end-of-life), and facilitate access to emerging materials management support tools (i.e., those focused on sharing economy and collaborative consumption)	Environmental Division, Staff person	Long-term, FY "Year"

MEASURE C-SW-2 Food Scrap and Compostable Paper Diversion

Continue to promote the collection of food scraps and compostable paper through the City's organics collection program.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Continue to implement the City's organics collection program outreach campaign, including outreach to Cupertino's business community regarding upcoming commercial food waste ordinance	Environmental Division, Staff person	On-going, FY "Year"
B. Provide information to local elementary schools on existing organics collection program for incorporation into on-going recycling program curriculum	Environmental Division, Staff person	Medium-term, FY "Year"
C. Work with franchise waste haulers, the Cupertino Chamber of Commerce, and other local business organizations to increase voluntary participation in City's organics collection program; provide technical assistance based on best practice examples to overcome collection bin storage / placement barriers	Environmental Division, Staff person	Medium-term, FY "Year"

Progress Indicator	Year
Households divert 40% of food scraps and compostable paper; 10% of businesses divert 20% of food scraps and compostable paper; Households and businesses divert 85% of yard waste	2020
Households divert 60% of food scraps and compostable paper; 30% of businesses divert 20% of food scraps and compostable paper; Households and businesses divert 90% of yard waste	2035

Tracking Mechanisms

Goal: Track the percentage of compostable food and paper that are diverted from the solid waste stream.

The most accurate implementation monitoring strategy would include the preparation of residential and commercial solid waste characterization surveys to identify the specific ratios of various waste categories present in the community's trash. The reduction estimates prepared for this measure are based on the State's 2008 Waste Characterization Study. However, it is likely that the city's actual waste profile is different than that of the statewide average given the character of the community and existing waste diversion programs that have already been implemented.

StopWaste.org prepared community residential waste characterization surveys for participating cities in the East Bay, and would be a good reference to determine associated survey costs and appropriate update timelines. The City's contract waste hauler may also provide this type of service, along with tailored recommendations for how to increase diversion rates.

If financially viable, the City should prepare waste characterization surveys as part of the emissions inventory update process for the three target years (i.e., 2020, 2035, 2050), with additional interim surveys prepared when possible. The City can also solicit voluntary input on participation in waste diversion programs through partnerships with the Chamber of Commerce, local elementary schools, community events, and/or online questionnaires.

MEASURE C-SW-3 Construction & Demolition Waste Diversion Program

Continue to enforce diversion requirements in City's Construction & Demolition Debris Diversion and Green Building Ordinances.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Continue to implement City's 60% C&D diversion requirement for applicable projects as defined in City's Construction and Demolition Debris Diversion Ordinance	Environmental Division, Staff person	On-going, FY "Year"
B. Work with franchise waste haulers to evaluate capability of area landfill operators to maximize C&D waste diversion (e.g., 75% diversion)	Environmental Division, Staff person	Long-term, FY "Year"
C. Consider increasing City's diversion requirements to 75% diversion to support zero-waste goal (see SW-1); alternatively, only target scrap lumber with 75% diversion requirement, if found to be feasible	Environmental Division, Staff person	Long-term, FY "Year"
D. Consider developing Construction and Demolition Debris Diversion Deposit Program to help enforce C&D ordinance, in which deposit is paid to City prior to issuance of building permit and refunded to applicant following submittal / approval of applicable waste diversion documentation	Environmental Division, Staff person	Long-term, FY "Year"

Progress Indicator	Year
60% of construction and demolition waste diverted, per City's ordinance – approximately 2,600 tons/yr	2020
75% of construction and demolition waste diverted – approximately 3,500 tons/yr	2035

Tracking Mechanisms

Goal: Track the percentage of construction and demolition waste that is diverted from the solid waste stream.

See Tracking Mechanism description in Measure C-SW-2

In addition to the previously described waste characterization surveys, the City could develop a Debris Diversion Deposit Program to allow tracking of C&D waste diversion participation. This type of program, popular in San Diego County jurisdictions, would require payment of a deposit prior to receipt of a building permit. The deposit could be based on a $/sqft ratio or a percentage of total project costs. Following project completion, the applicant may submit documentation (prepared by their contractor or landfill / recycling center staff) demonstrating compliance with the City's C&D diversion ordinance to receive a full deposit refund.

The reduction estimates associated with this measure assumes full implementation of the City's existing C&D diversion ordinance. If the City should begin requiring debris diversion documentation, it should be analyzed to identify the total tons of lumber diverted annually through implementation of this measure since lumber is an organic construction material that would otherwise generate methane emissions in a landfill environment. The CAP indicates the estimated tonnage of lumber diversion for the target years, which can be compared to actual diversion amounts. It should be noted, that simply entering this lumber tonnage value into ICLEI's GEM software will generate emissions reduction estimates that are incompatible with those used in the CAP because the GEM program is based on the EPA's WARM methodology, while the CAP utilized the ARB's first-order decay methodology.

MEASURE C-G-1 Urban Forest Program

Support development and maintenance of a healthy, vibrant urban forest through outreach, incentives, and strategic leadership.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Continue implementing landscaping requirements in City's Development Standards, Design Guidelines, and other regulatory documents	Planning Division, Staff person	On-going, FY "Year"
B. Partner with neighborhood groups, community organizations, and business community to encourage voluntary tree planting on private property within Cupertino; identify opportunities for such organizations to assist City with maintenance of street trees planted within public rights-of-way	Sustainability Division, Staff person	Long-term, FY "Year"
C. Consider developing strategic, long-range plan to identify policies and strategies to proactively manage and grow the City's street tree population	Trees & Right-of-Way Division, Staff person	Long-term, FY "Year"
D. Evaluate opportunities to expand current ordinances and codes to prioritize expansion of City's green and cool roofs, as well as pervious and cool pavement	Sustainability Division; Planning Division, Staff person	Medium-term, FY "Year"
E. Assess opportunities to expand Cupertino's network of community gardens, demonstration gardens, and edible schoolyards through Stevens Creek Corridor Maser Plan process, targeted Green@Home or Green@School campaign, and strengthened Rotary Club partnership	Recreation and Community Services Department, Staff person	Medium-term, FY "Year"
F. Expand community and school gardens, and evaluate opportunities to develop prevalent demonstration garden that incorporates water-sensitive design and advanced irrigation control technology (if irrigation system is necessary)	Recreation and Community Services Department, Staff person	Medium-term, FY "Year"
G. Pair expanded garden network with new naturalist and education programs and trainings to build community knowledge of gardening techniques and associated health, environmental, and financial benefits	Recreation and Community Services Department, Staff person	Medium-term, FY "Year"
H. Install informational placards or signs at new gardens that quantify emissions reductions from local food sources and water saving potential from native plants and refer public to additional informational resources	Recreation and Community Services Department, Staff person	Medium-term, FY "Year"

Progress Indicator	Year
2,500 net new trees planted in the city from 2015 onward	2020
2,800 net new trees planted in the city from 2015 onward	2035

MEASURE C-G-1 Urban Forest Program

Support development and maintenance of a healthy, vibrant urban forest through outreach, incentives, and strategic leadership.

Tracking Mechanisms

Goal: Count the number of net new trees planted community-wide.

The emissions reduction estimates for this measure are primarily based on the assumption that the nearly 2,400 net new trees to be planted as part of the Apple 2 Campus will actually occur. The City should continue to work closely with the project applicant to verify the actual final number of net new trees that are planted during project construction.

The remaining approximately 100 trees assumed to be planted by 2020 would occur in the remainder of the community. Since a building permit is not required to plant a tree, there is likely limited opportunity for City interaction with these remaining 100 trees. The City should maintain relationships with neighborhood organizations or non-profits that may lead local tree-planting campaigns, and ask for reports on program results.

Similarly, the City can check-in with its PG&E community representative annually to request results associated with utility shade tree planting campaigns. While no related programs are currently offered by PG&E, they may be offered again in the future.

Finally, the City should develop a CAP data collection program and procedure to gather relevant data from City departments on an annual basis. The Public Works Department or Parks Department may plant new trees each year along streets and in parks (beyond replacements for dead or diseased trees), which would also count towards the remaining 100 trees estimated in the measure reduction calculations.

MEASURE M-F-1 Sustainable Energy Portfolio

Procure low-carbon electricity through utility-based programs or participation in a Community Choice Energy District.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Support Utility-Enhanced Clean Generation Portfolio		
▪ Conduct feasibility study of PG&E Green Option financial costs (per kilowatt hour (kWh) costs have not been finalized yet as part of program development) for City to purchase part or all of its electricity from renewable sources ▪ Develop resolution to opt into PG&E Green Option program for municipal electricity purchases (Note: program is currently capped at 272 MW and as 5 year pilot program; it is currently unknown how enrollment decisions will be made should program become fully subscribed)	Sustainability Division, Staff person	Near-term, FY "Year"

Progress Indicator	Year
Assumes 100% of municipal electricity use in 2020 comes from 75% renewable (or zero carbon) sources via PG&E Green Option	2020

Tracking Mechanisms

Goal: Track portion of municipal electricity that comes from renewable sources.

Gather information on source(s) of municipal electricity (e.g, PG&E, CCE program) and each sources' emissions factor (i.e., MT CO_2e/kWh) annually

Monitor portion of municipal electricity that is generated from emissions-free sources on annual basis and compare to previous years in annual CAP update reports

Calculate total kWh that come from standard grid electricity (e.g., not generated on site through solar PVs, not provided through PG&E Green Option program or participation in a CCE); use this value when revising RPS emissions reductions for future CAP updates to accurately account for portion of municipal electricity use that would be affected by the RPS

B. Create Community Choice Energy Option		
▪ Continue to monitor CCE efforts within Santa Clara County, City of San Francisco, and East San Francisco Bay cities; if local support exists to further consider CCE options within Cupertino, pursue the following steps: ○ Identify potential jurisdictional partners for development of CCE (e.g., Sunnyvale, Mountain View) ○ Conduct feasibility study to assess viability of CCE program in Cupertino (can be conducted jointly with other jurisdictional partners) ○ Based on results of feasibility study, pursue development of (or participation in) CCE per state requirements ○ Adopt resolution for City to participate in CCE ○ Determine feasibility of City to purchase electricity for municipal operations from CCE, based on approved CCE rate structure; CCE may provide options for level of participation (e.g., 50% clean electricity, 100% clean electricity)	Sustainability Division, Staff person	Near-term, FY "Year"

MEASURE M-F-1	Sustainable Energy Portfolio
Procure low-carbon electricity through utility-based programs or participation in a Community Choice Energy District.	
Progress Indicator	**Year**
Assumes 100% of municipal electricity use in 2020 comes from 100% renewable (or zero carbon) sources via CCE program	2020
Tracking Mechanisms	
Same as M-F-1 A	

MEASURE M-F-2 Renewable or Low-Carbon Electricity Generation

Develop renewable energy facilities at municipal buildings and facilities.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Install Solar PV Installations on City Buildings / Property		
▪ Based on results of City's previous solar feasibility study, pursue PV installations at City Hall complex, Quinlan Community Center, Cupertino Library, Corporation Yard, and Civic Center carports through Santa Clara County Regional PPA or other financing option (e.g., City procurement, lease-to-own) ▪ Review future potential for additional PV installations at sites associated with implementation of Civic Center Master Plan (e.g., Teen Center, new City Hall, Sheriff's Office)	Capital Improvement Program Division, Staff person	On-going, FY "Year"

Progress Indicator	Year
Assumes five solar sites are developed for total installed capacity of 508 kW generating 818,000 kWh/yr	2020

Tracking Mechanisms

Goal: Calculate total electricity generation capacity of municipal solar PV systems.

Collect PV system installation data from renewable energy project contracts (or meters) and analyze to gauge progress toward goals:

- What was the total installed generation capacity (in kW) for the photovoltaic systems?

- How many kWh/yr of electricity are estimated to be generated from the photovoltaic systems (prior to installation)?

- How many kWh/yr of electricity are actually generated from the system (following one-year of system operation)?

Per Appendix B, emissions reductions were calculated by multiplying kWh/yr generated by PG&E's estimated 2020 emissions factor. The City can perform this same simple math annually to provide accurate estimates of emissions reductions associated with PV installations as they begin to occur. Should the City install a lower total capacity than estimated or the systems generate less electricity than estimated, revisions to the CAP's reduction totals can be prepared using empirical data. Similarly, should electricity generation be higher than estimated, then emissions reductions will also be higher (assuming the increased electricity is used by municipal buildings / facilities to offset grid-provided electricity, and not just sold back to the utility company).

B. Install Solar Thermal Installations on City Facilities		
▪ Following implementation of other energy audit improvement opportunities, conduct further feasibility analysis for primary solar thermal systems identified in audit (i.e., Blackberry Farm Pool and Sports Center) ▪ Identify funding / financing source to implement cost-effective solar thermal options at opportunity sites, either through ESCO contract or direct City install ▪ As part of the Capital Improvement Program (CIP), annually review hot water usage at City buildings and facilities to identify additional cost-effective opportunities for solar thermal installations; City could additionally consider developing a Green CIP that aggregates findings and recommendations from this CAP into one document mirroring existing CIP process	Facilities, Capital Improvement Program, and Sustainability Divisions, Staff person	Long-term, FY "Year"

MEASURE M-F-2	Renewable or Low-Carbon Electricity Generation

Develop renewable energy facilities at municipal buildings and facilities.

Progress Indicator	Year
Assumes no solar thermal systems are pursued prior to 2020	2020

Tracking Mechanisms

Goal: Calculate total energy use avoided through installation of solar hot water heaters.

The CAP assumes that no solar hot water systems will be installed on municipal buildings / facilities prior to 2020. When these systems are installed in the future, the City should collect installation data from renewable energy project contracts (or meters) and analyze it to calculate associated emissions reductions:

- How many therms of natural gas are estimated to be reduced by the solar hot water systems (prior to system installation)?

- How many therms are actually reduced by the system (following one-year of system operation)?

- In the case of electric hot water heaters, how many kWh are reduced following installation of the system?

- Based on the actual system results, are there other opportunity sites for additional solar hot water system installations?

MEASURE M-F-3 Advance Energy Management Activities

Reduce energy consumption in existing municipal buildings through data analysis, interactive management systems, employee education, and building operation and maintenance policies.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Develop Advanced Energy Efficiency Analytics		
▪ Identify appropriate energy analytics firm with which to partner; this could be regional implementation opportunity to secure discounted large group rate - consult other area jurisdictions when pursuing this option ▪ Create operating framework that allows facilities managers to implement findings into building operations ▪ Use high-resolution data from analytics (e.g., appliance end-use) to inform development of targeted energy efficiency retrofit programs [see M-F-4]	Facilities & Sustainability Divisions, Staff person	Medium-term, FY "Year"
Progress Indicator	**Year**	
Assumes 14.5% reduction in 2010 baseline building electricity use (i.e., 410,000 kWh/yr saved) and 14.3% reduction in 2010 baseline building natural gas use (i.e., 6,900 therms/yr saved)	2020	
Tracking Mechanisms		
Goal: Track energy savings from advanced energy analytics program participation. Work with selected energy analytics firm to generate annual results summaries that show electricity and natural gas savings by building; set up data collection system to calculate year-over-year changes (e.g., additional 5,000 kWh saved in 2018) as well as provide total energy savings since program inception Compare total energy savings across all buildings / facilities to CAP's 2010 baseline levels to calculate progress toward measure estimates (i.e., Progress Indicator)		
B. Benchmark & Track Consumption Data Collected per Facility		
▪ Work with PG&E to install additional electricity and gas meters (where applicable) to allow improved facility-level energy use analysis; when feasible, combine similar end uses into one meter (e.g., park unit's lighting combined into one meter, park unit's buildings provided on separate meters) to allow monitoring of specific energy efficiency improvements or comparison of annual energy benchmarking ▪ After installation of additional meters, organize PG&E data by facility and City department (e.g., Meters 1, 2 and 3 represent Memorial Park) ▪ Benchmark all eligible municipal facilities using ENERGY STAR Portfolio Manager ▪ Implement process to track and report municipal energy usage through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system	Facilities & Sustainability Divisions, Staff person	Long-term, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		

MEASURE M-F-3	Advance Energy Management Activities	
Reduce energy consumption in existing municipal buildings through data analysis, interactive management systems, employee education, and building operation and maintenance policies.		
C. Install Energy Management Systems		
▪ Work with energy analytics firm and City IT department to identify additional opportunities for office system EMS to automate control and monitoring of office equipment (e.g., computers, monitors, printers), beyond those already installed, including strategy for advanced power strip purchases and use in City buildings ▪ Work with energy analytics firm to review existing advanced lighting controls/monitoring systems (e.g., automatic dimmers), ensure proper operation, and identify opportunities for additional installations in other City buildings/facilities	Facilities & Sustainability Divisions, Staff person	On-going, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		
D. Introduce Retro-Commissioning Program		
▪ Formalize program that requires all major systems (e.g., HVAC) in existing buildings / facilities to be retro-commissioned at 5-year intervals ▪ Sync regular retro-commissioning efforts with services provided by existing building systems maintenance contracts	Facilities & Sustainability Divisions, Staff person	Medium-Term, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		
E. Design / Implement Facilities & Equipment Energy Management Policy		
▪ Research and collect facility-related energy conservation policies and procedures from cities locally and nationally ▪ Develop draft Policy and Procedure that outlines facility energy and water conservation goals, employee responsibilities, operating equipment procedures, and purchasing guidelines, to ensure consistency with City's Environmentally Preferable Procurement Policy ▪ Implement Procedure and track progress to achieve utility cost and resource savings on periodic basis ▪ Adjust Procedure as best practices evolve and new technologies are introduced to achieve larger financial and utility conservation gains over time ▪ Identify third-party certification programs and rating criteria to recognize Cupertino's utility conservation efforts	Facilities & Sustainability Divisions, Staff person	Near-Term, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		
F. Bolster Employee Behavior Change through Information / Education		
▪ Install energy use dashboards in City Hall and primary municipal buildings (e.g., public-facing and high energy use); work with PG&E to install individual building meters, as necessary, to allow building-specific energy use reporting (see M-F-3 B)	Sustainability Division, Staff person	Medium-Term, FY "Year"

MEASURE M-F-3	Advance Energy Management Activities	
Reduce energy consumption in existing municipal buildings through data analysis, interactive management systems, employee education, and building operation and maintenance policies.		
▪ Provide facility managers with training on advanced building operations systems in order to maximize effectiveness of City's building systems ▪ Set specific department-level energy use targets and encourage employees in the buildings to participate in energy efficiency achievement (may need additional PG&E meters installed, per M-F-3 B, to accurately track this) ▪ Continue to distribute and refer staff to City's handbook with instructional guides to help implement ENERGY STAR purchasing requirements; existing handbook also serves as user-friendly resource to guide City purchases of "green" products, such as furniture, carpeting / flooring, paints, packaging materials, etc., which further supports Measure M-SW-1 C		
No Tracking Mechanisms – Supports implementation of Action A		

MEASURE M-F-4	Grow Existing Building Energy Retrofit Efforts	
Reduce energy consumption in existing municipal buildings through energy efficiency improvements.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Complete Building Retrofits		
▪ Use results from advanced analytics program (see M-F-3 A) to identify appliances and building systems that are underperforming from energy use perspective, and develop prioritization plan for equipment replacement / building retrofits; work with PG&E to identify available rebates, incentives, or on-bill financing opportunities for various improvements ▪ Continue to make progress on implementing efficiency opportunity findings from City's Detailed Energy Audit; establish budget priority for Energy Audit update in next five years	Facilities & Sustainability Divisions, Staff person	On-going, FY "Year"
Progress Indicator	**Year**	
Assumes 254,000 kWh/yr saved as result of interior lighting retrofits and occupancy sensors, and 59,000 kWh/yr saved as a result of plug load controllers (assumed 200 controllers installed)	2020	
Tracking Mechanisms		
Goal: Track energy use reductions associated with building retrofits. There will possibly be some overlap among reductions associated with Measures M-F-3 and M-F-4. While total municipal energy use reductions are the primary goal, the purpose of this appendix is to provide a framework that supports measure-specific implementation tracking to gauge the success and opportunities for growth of certain measures. The City already has energy use reduction estimates associated with the prescribed building retrofits, which were included in the City's Detailed Energy Audit. The City should record the associated buildings' /facilities' electricity use prior to installation of the interior lighting retrofits and occupancy sensor installations, and record the resulting electricity use post-installation to roughly estimate the measure's energy savings. If other retrofit projects or advanced building energy analytics programs happened concurrently, these individual energy reductions should be calculated separately, to the extent feasible. The City may find it useful to create building / facility-specific Excel spreadsheets to track annual electricity and natural gas use; identify associated utility account numbers; and track all associated energy conservation project installations, including project date, estimated savings, actual savings (one year post-installation), and pre- and post-energy use levels		
B. Establish Energy Efficiency Fund		
▪ Evaluate the potential for and requirements (e.g., size, terms, etc.) of a self-sustaining City energy efficiency revolving loan fund to implement findings of various City energy efficiency and renewable energy development opportunity studies; City of San José used this approach as one source of multiple project financing sources ▪ Develop fund parameters that support continual replenishment of funding pool (e.g., 80% of cost savings resulting from project implementation are returned to fund for 5 years after which additional savings accrue to project's implementing department) ▪ Allocate or secure funding for long-term energy	Sustainability Division, Staff person	Long-term, FY "Year"

MEASURE M-F-4	Grow Existing Building Energy Retrofit Efforts	
Reduce energy consumption in existing municipal buildings through energy efficiency improvements.		
efficiency fund (from EECBG program, municipal bond, etc.) ▪ Assign manager to support and coordinate fund and its projects ▪ Discuss opportunities and potential program structure for regional revolving loan fund with neighboring jurisdictions, which could provide access to additional seed funding sources		
No Tracking Mechanisms – Supports implementation of Action A		
C. Set Standards and Targets		
▪ Continue to implement City's Green Building Ordinance as it relates to municipal building retrofits ▪ Consider developing additional guidance for municipal building retrofits that encourages pursuit of energy- or water conservation-related points towards achievement of required LEED certification to prioritize these building efficiency outcomes; alternatively, City could define explicit energy efficiency performance levels or design feature expectations for new projects	Facilities & Planning Divisions, Staff person	Long-term, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		
D. Adopt a Demonstration Policy		
▪ Draft City Technology Demonstration Policy to assist local businesses with testing and demonstrating functionality of emerging technologies ▪ Implement the policy and revise based on industry best practices and trends as they arise ▪ Pursue grant opportunities that expand technology demonstration opportunities in municipal facilities and through local business partnerships, coordinated with the City's Economic Development Office (e.g., CEC Electric Power Investment Charge Grants (EPIC) - http://www.energy.ca.gov/research/epic/)	Facilities & Planning Divisions, Staff person	Medium-term, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		

MEASURE M-F-5	Expand New Building Energy Performance	
Establish energy efficiency targets for new municipal buildings.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Update Green Building Standard – Energy Performance Guidance		
▪ Continue to implement City's Green Building Ordinance as it relates to new municipal building construction ▪ Consider developing additional guidance for new municipal building projects that encourages pursuit of energy- or water conservation-related points towards achievement of required LEED certification to prioritize these building efficiency outcomes; alternatively, City could define explicit energy efficiency performance levels or design feature expectations for new projects ▪ Build recommendations into City's Capital Improvement Program ▪ Identify opportunities for passive solar design and consider solar orientation for active solar installments in new construction ▪ Consider including solar-ready construction requirements for new municipal buildings with appropriate solar orientation, roof size, etc.	Facilities, Capital Improvement Program & Sustainability Divisions, Staff person	Long-term, FY "Year"
Progress Indicator	**Year**	
All new municipal construction complies with the City's Green Building Ordinance	2020	
Tracking Mechanisms		

Goal: Calculate energy savings related to implementation of City's Green Building Ordinance.

The CAP does not include reductions associated with this measure because it was too speculative at the time of plan development to estimate the exact nature of future new municipal construction projects. However, the City has adopted a Green Building Ordinance, which will likely result in reduced energy use over a typical baseline scenario.

As part of the LEED certification process, a project needs to model the proposed building's energy use under a baseline scenario and demonstrate how achievement of certain LEED design requirements will result in a building with a reduced modeled energy use.

As the City pursues construction of new municipal buildings in the future, the proposed building's baseline modeled energy use should be recorded, as well as the estimated energy use from the final design. This information should be recorded in the same place as the building retrofit data described in Measure M-F-4 A (i.e., in a comprehensive Excel file that tracks energy use of each municipal building / facility). After one full year of building occupancy, the building's actual energy use should be recorded as well. The difference between the modeled baseline energy use and the actual occupied building energy use should be converted to MT CO_2e/yr, and can be included in future CAP updates as a new reduction source. This reduction would take credit for any energy use savings resulting from the difference between a building constructed without the City's Green Building Ordinance and one constructed to its requirements.

MEASURE M-F-6	Complete Citywide Public Realm Lighting Efficiency	
Upgrade public realm lighting to more efficient technology.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Complete Street Light Retrofits		
▪ Consider best practices in lighting technology at time of bulb and / or fixture replacement or repair ▪ Ensure that new street light installations achieve comparable or better efficiency level as achieved through previous street light retrofit program.	Streets Division, Staff person	On-going, FY "Year"
Progress Indicator	**Year**	
Achieved! – 872,000 kWh/yr saved through street light retrofit program	2020	
Tracking Mechanisms		
Goal: Track electricity savings from street light retrofits. The City already implemented street light retrofits and quantified their resulting electricity savings through its Detailed Energy Audit. Should the City's street light service expand in the future into currently un-lighted areas, then the City should estimate the new lights' energy use under two scenarios. In Scenario 1, the City would install lights comparable to those used throughout the City prior to the street light retrofit program (e.g., high-pressure sodium lights). In Scenario 2, the City would install its selected new street lights. The difference in these two scenarios could represent an additional reductions source. Before applying this reduction to future CAP updates though, the City should first verify that the new street light energy use falls within the estimated street light emissions sector growth shown on Table 2.5 of the CAP (e.g., 16 MT CO_2e/yr between 2010 and 2020). If it does, then this new reduction source can be applied. If it doesn't, then the future year Public Lighting energy use estimates would need to be revised upward to accommodate this new emissions source (e.g., the Scenario 1 energy use) before the reductions estimate could be applied.		
B. Retrofit Remaining Parking Lot and Park Facility Lighting		
▪ Identify City-owned parking lot lighting that has not yet been converted to LED, magnetic induction, or similar highly-efficient technology ▪ Identify park lighting (e.g., pathways, restroom facilities, area lighting, sport field lighting) that has not yet been converted to LED, magnetic induction, or similar high-efficiency technology ▪ Identify appropriate energy-efficient lighting technologies for sports fields / courts that still provide lighting levels required for applicable sporting use ▪ Develop implementation timeline and funding program; contact City's PG&E account representative regarding availability of rebate programs and / or on-bill financing options to cover retrofit program ▪ Consider updating City's Standard Provisions or other lighting guidance documents to specify efficiency levels to be achieved in new installations or lighting retrofit projects.	Streets Division, Staff person	Near-term, FY "Year"

MEASURE M-F-6	Complete Citywide Public Realm Lighting Efficiency	
Upgrade public realm lighting to more efficient technology.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
Progress Indicator	**Year**	
Achieved! – 75,000 kWh/yr saved through park unit parking lot and pathway light retrofit program	2020	
Tracking Mechanisms		

Goal: Track electricity savings from park light retrofits.

The City already implemented some park light retrofit opportunities, and quantified their resulting electricity savings through its Detailed Energy Audit.

If the City decides to pursue additional park unit parking lot and / or pathway lighting retrofits in the future, it should prepare electricity savings estimates and compare those estimates to actual results following installation. This post-installation monitoring may be a challenge, depending on whether or not the lights in question are on their own utility meter or can easily be disaggregated from their larger unit. If the light data cannot be easily disaggregated, it may be possible to measure lighting retrofit efficacy by measure pre- and post-installation electricity use for the associated utility meter. If the other electricity uses contributing to that meter are static (i.e., do not fluctuate day to day) and do not undergo their own retrofits at the same time, the difference between pre- and post-installation could serve as a proxy for actual retrofit project energy savings.

MEASURE M-F-7 Conserve Water Through Efficient Landscaping

Implement best management practices in landscaping design and share City successes community-wide to lead by example in water conservation action.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Utilize Weather-Track System to Reduce Park & Median Water Use		
▪ Continue to use weather-based irrigation technology in City irrigation practices to prevent unnecessary or excessive water in public spaces ▪ Continue to provide training on the City's irrigation technology to existing and new staff to ensure proper use of the system	Grounds & Fleet Division, Staff person	On-going, FY "Year"
Progress Indicator	**Year**	
Achieve Bay Area Climate Compact's goal for 20% water savings by 2018 over 2008 baseline Assumes 27.5 million gallons of water saved per year over 2008 baseline of 138 million gallons	2020	
Tracking Mechanisms		
Goal: Track municipal water use and conservation efforts. Establish reporting framework to collect water use data from all municipal accounts into one location for use in annual CAP progress reports; report consumption by end use, if possible (e.g., park irrigation, median/roadway irrigation, indoor water use by building / facility) If historical data is available, compare municipal water user on annual basis beginning in 2008 (i.e., baseline year for Bay Area Climate Compact water reduction goal); track changes in water consumption by end use to identify unexplained consumption increases		
B. Benchmark & Track Water Use per Meter		
▪ Establish operational framework for tracking and reviewing water use at the meter level to allow identification of improper irrigation system use, leaks, or other wasteful water activities ▪ Incorporate water use reporting into overarching annual CAP reporting procedure described in Chapter 7	Sustainability, Grounds & Fleet Divisions, Staff person	On-going, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		
C. Adopt Water Budget & Green Grounds Policy		
▪ Develop landscaping policy that promotes efficient watering schedules, high- and low-priority water zones (for use during pre-drought conditions), water-efficient and climate-sensitive plant selection, and compost-friendly landscape maintenance ▪ Evaluate alternative or maintain existing water-efficient irrigation technology systems, particularly in areas of high irrigation use (e.g., turf playing fields), with ET sensors and integration with weather station data streams to automate watering schedules based on current and near-term environmental conditions ▪ Train maintenance crews in use and maintenance of irrigation systems and implementation of Green	Sustainability, Trees & Right of Way, and Grounds & Fleet Divisions, Staff person	Near-term, FY "Year"

MEASURE M-F-7	Conserve Water Through Efficient Landscaping	
Implement best management practices in landscaping design and share City successes community-wide to lead by example in water conservation action.		
Grounds policy ▪ Consider use of water budgets for irrigated landscape areas Create education stations or post information to City's website that describe City's green grounds practices		
No Tracking Mechanisms – Supports implementation of Action A		
D. Use Bay-Friendly Landscaping Techniques across Parks & Medians; Install Demonstration Gardens		
▪ Adopt city-wide policy that requires specification of Bay-Friendly, drought-tolerant landscapes in any new City project or private project receiving City funds to include landscaped areas as project element ▪ Expand Parks & Recreation Green Policies, which focus on water-efficient landscaping, across all departments to prioritize Bay-friendly and efficient irrigation practices and technologies to maintain City's landscaped facilities, parks, medians, and streetscapes, and to become more resilient to water shortages; Couple implementation of these goals with projects that also minimize impervious surfaces and ensure adequate soil drainage ▪ Develop implementation and funding schedule to update public landscapes, including turf conversion and hydrozoning projects, to designs that more closely align with Bay-friendly landscaping techniques ▪ Provide maintenance specifications and procedures to support staff's pruning, pest-control, irrigation, and general oversight of these new plant materials ▪ Pursue project third-party certification through Bay-Friendly Rated Landscapes, where applicable, or build landscaping water conservation initiatives into future site-wide comprehensive rating program applications (e.g., LEED, California Green Business Program) ▪ Install informational placards or signs at new landscaping installations that quantify water saving potential from new designs and refer public to additional informational resources ▪ Develop informational materials based upon City's practices and lessons learned to support effective implementation of City's Water Efficient Landscaping Ordinance	Sustainability, Grounds & Fleet Divisions, Staff person	On-going, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		
E. Install Graywater and Rainwater Catchment Systems in New Construction and Major Retrofit Projects		
▪ Incorporate graywater plumbing and/or rainwater catchment systems in new municipal buildings, where appropriate ▪ Develop public-facing informational placards/signs that explain these systems and quantify their potable water-savings potential	Facilities, Capital Improvement Program & Sustainability Divisions, Staff person	On-going, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		

MEASURE M-F-7	Conserve Water Through Efficient Landscaping	
Implement best management practices in landscaping design and share City successes community-wide to lead by example in water conservation action.		
F. Recognize Staff "Water Wise" Practices		
▪ Research municipal operations-oriented behavior change and utility conservation incentives programs to create model for Cupertino ▪ Develop outreach and engagement tools to notify employees of campaign and support their program enrollment and continued involvement ▪ Educate and train staff by sharing strategies to save water indoors and out so they may effectively participate in program ▪ Launch "Water Wise" program and offer ongoing coaching and support ▪ Accept "Water Wise" nominations for leading practices and employees; Collect user-generated data (e.g., checklists) and City water utility data to inform awardee selection ▪ Recognize leaders and efforts through civic media assets, intranet, and through Council Proclamation ▪ Survey staff following distribution of rewards to determine what worked best and where improvements can be made; This could also serve to assess what conservation measures were most frequently taken	Sustainability Division, Staff person	On-going, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		

MEASURE M-VF-1 Low Emission and Alternative Fuel Vehicles		
Transition City vehicle fleet to fuel-efficient and alternative-fuel vehicle models.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Update Green Purchasing Policy and Vehicle Replacement Schedule to Prioritize Alternative Fuel Vehicles and Infrastructure		
▪ Develop municipal fleet low-carbon target; defined as A) Total vehicle fleet composed of X% zero- or lower-carbon vehicles; or, B) Total vehicle fleet emissions reduction target (can be achieved through combination of reduced VMT, vehicle technology, mode shift, etc.) ▪ Define vehicle fleet transition pathway to achieve Bay Area Climate Compact's Action Area Goal #10 to increase the number of zero emission and other advanced ultra-low emission light duty vehicles to 10% of municipal fleets by the end of 2013, and to 25% by the end of 2018; extend goal to 28% of municipal fleet by 2020 ▪ Review existing vehicle fleet lifespan to identify number and type of vehicles to be replaced by 2020, and which could be replaced with existing models of zero- or low-emissions vehicles ▪ At time of replacement, shift passenger vehicle purchases toward EV, hybrid-electric, hydrogen fuel cell, or CNG models; consider new vehicles' carbon emissions and fuel efficiency as regular procurement criterion ▪ Fully implement fleet management software to: o benchmark agency fleet size and composition; o track fleet vehicle fuel usage, mileage, location, maintenance schedule; o provide maintenance diagnostic data; and o activate online reservation system to expand pool opportunities. ▪ Develop vocational specifications to pair with revised Vehicle Replacement Schedule and Policy ▪ Perform staff training needs assessment to support driver and mechanic transition to alternative fuel vehicles ▪ Prioritize funding for mechanic training in advanced fuel automotive technologies and offer trainings for drivers and first responders ▪ Confirm fleet-parking designations to mitigate staff concerns and maximize public parking opportunities in areas with high parking congestion; Designating locations for parking, as well as fleet vehicle charging, will create further staff-level efficiencies by enabling quick facility access upon returning from fieldwork ▪ Explore joint procurement options with other area jurisdictions to leverage regional shift towards cleaner municipal fleets into lower per vehicle costs; To facilitate this, reconnect with Public Fleet Supervisors Association as access point for piggybacking opportunities, competitive vendor pricing, and industry best management practices	Grounds & Fleet Division, Staff person	Long-term, FY "Year"

MEASURE M-VF-1 Low Emission and Alternative Fuel Vehicles		
Transition City vehicle fleet to fuel-efficient and alternative-fuel vehicle models.		
Note: Implementation of this action is budget- and technology-dependent; emergency vehicles could be excluded from fleet target calculations and progress monitoring		
Progress Indicator	**Year**	
Achieve Bay Area Climate Compact's goal for 25% of vehicle fleet to comprise zero- or low-emissions light duty vehicles by 2018. Assumes the following vehicle replacements: 5 passenger vehicles replaced with hybrid-electric models; 12 light-duty trucks replaced with hybrid-electric SUV models; 2 heavy-duty trucks replaced with more fuel-efficient heavy-duty truck models; In addition to existing 3 hybrid-electric passenger vehicles, and 2 hybrid-electric SUVs	2020	
Tracking Mechanisms		

Goal: Track composition of municipal fleet by vehicle type / fuel type.

The City already has a municipal fleet inventory. This inventory should be maintained to include accurate information on:

- vehicle age and target replacement year / lease duration

- fuel type and efficiency level (i.e., mpg)

- annual fuel consumption

- annual mileage

- vehicle ID #, departmental ownership

- use, specialized duties / tasks

In addition to the above information, the inventory should include the current composition of the fleet based on vehicle type (e.g., hybrid electrics, CNGs, fuel cells), as well as an indication for which vehicles should be replaced next and suitable replacement vehicle options. The fleet composition and target composition numbers should be included in the annual CAP progress reports.

B. Expand City Bike Fleet, Training, and Promotion		
▪ Continue to pursue implementation of municipal bike fleet in instances where vehicle trips can safely and easily be replaced with trips via bicycle; comprehensive bike fleet could result in opportunities to downsize municipal vehicle fleet or reduce VMT to help achieve fleet emissions target	Sustainability Division, Staff person	On-going, FY "Year"

MEASURE M-VF-1 Low Emission and Alternative Fuel Vehicles		
Transition City vehicle fleet to fuel-efficient and alternative-fuel vehicle models.		
No Tracking Mechanisms – Supports implementation of Action A		
C. Promote Vehicle Alternatives to Reduce Car-Travel to City-Sponsored Events		
▪ Continue to pursue implementation of municipal car share program, which like municipal bike fleet could allow City to downsize its municipal vehicle fleet ▪ Consider opportunities to expand municipal bike fleet and / or car share program as part of municipal fleet transition strategy and at time of regular vehicle replacement (e.g., could tasks performed by retired vehicle be performed with shared vehicle?) ▪ Ensure that community-wide shuttle, car share, bike share assessment includes consideration of City staff commutes and special-event opportunities	Sustainability, Grounds & Fleet Divisions, Staff person	On-going, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		

MEASURE M-VF-2 Increase Alternative Fuel Infrastructure

Increase availability of alternative refueling infrastructure to support municipal fleet transition.

Actions and Implementation Steps	Department/Staff Responsible	Phasing
A. Install Electric Vehicle Charging Stations		
▪ Develop City-owned EV Charging Station Procedure to ensure proper finance, training, maintenance, and reporting functions are established for effective staff oversight ▪ Develop Alternative Vehicle Fueling Infrastructure (AVFI) standards and plan to define prospective locations and siting criteria (e.g., design guidelines, standard drawings, specifications) to facilitate on-street and off-street applications ▪ Install additional electric vehicle charging stations for municipal fleet use; as share of electric vehicles in fleet increases, ensure adequate access to charging stations for municipal vehicles through additional installations or controlled access ▪ Install portion of electric vehicle charging stations in areas accessible to community members, such as Civic Center parking lots; consider new electricity load created from EV charging stations during building design phase of Civic Center Master Plan to provide opportunities to offset this increased load through additional installation of rooftop PV systems	Transportation, Grounds & Fleet, and Sustainability Divisions, Staff person	Medium-term, FY "Year"

Progress Indicator	Year
Assumes 10 dual-port electric vehicle charging stations installed	2020

Tracking Mechanisms

Goal: Track installation of alternative vehicle refueling infrastructure as compared to vehicle fleet composition targets.

The following implementation tracking approach would apply to EV charging ports, fuel cell stations, and CNG refueling stations.

As part of the City's strategic vehicle fleet transition plan, the Grounds and Fleet Division should establish alternative fuel vehicle recharging infrastructure targets to support continued transition of the fleet. For example, it may be determined that one additional EV charging port is required to accommodate every four hybrid electric vehicles.

As part of the vehicle fleet inventory described in Action A above, the City should also inventory its alternative fuel vehicle infrastructure, including refueling stations designated for municipal use and stations available for public use (but that City vehicles would regularly use). These refueling stations should be linked to the alternative fuel vehicles in the City's fleet to identify deficiencies in refueling options.

Based on the existing refueling infrastructure, the current vehicle fleet composition, and the near-term estimated fleet composition, the City should establish alternative refueling infrastructure targets that align with the expected growth in municipal alternative fuel vehicles.

B. Evaluate Fuel Cell Fueling Station		
▪ Continue exploring opportunities to develop local fuel cell fueling station for municipal and community use ▪ Share information with neighboring jurisdictions to determine interest and feasibility of joint procurement	Transportation & Sustainability Divisions, Staff person	Long-term, FY "Year"

MEASURE M-VF-2 Increase Alternative Fuel Infrastructure		
Increase availability of alternative refueling infrastructure to support municipal fleet transition.		
through local vendors ▪ Due to current limited vehicle model availability, consider model types and cost when estimating fuel cell vehicles' future role in municipal fleet transition strategy (see M-VF 1 A) ▪ Pending feasibility analysis, construct fuel cell fueling station for municipal and / or community-wide use		
See Tracking Mechanism described in Action A		
C. Evaluate CNG Fueling Station		
▪ Research opportunities for development of municipal CNG refueling station; look for partnerships with neighboring cities or local employers with large vehicle fleets for cost-share opportunities of joint-use facility ▪ Pending results of CNG feasibility study, identify funding and pursue development of CNG refueling station for municipal and public use; transition municipal fleet diesel vehicles to CNG, as appropriate, as bridge technology until cleaner heavy-duty vehicle models become widely available for integration into fleet; if better heavy-duty vehicle options become available before development of CNG station, reconsider if there is long-term role for CNG vehicles in municipal fleet	Transportation & Sustainability Divisions, Staff person	Long-term, FY "Year"
See Tracking Mechanism described in Action A		

MEASURE M-VF-3 Promote Behavior/Fuel Optimization		
Encourage and promote fuel efficient driving.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Implement Telematics to Improve Route and Fuel Optimization		
▪ Continue use of route optimization practices by Building Department for inspections ▪ Evaluate opportunities for additional route optimization of municipal vehicles that have standard operating routes (e.g., Parks Department landscaping crews); identify VMT reduction potential through new routes ▪ Develop telematics program (e.g., vehicle tracking) for City fleet to optimize vehicle operations	Grounds & Fleet, Sustainability Division, Staff person	Medium-term, FY "Year"
Progress Indicator	**Year**	
Assumes 10% fuel savings over 2010 baseline for all passenger and light-duty trucks (i.e., 2,100 gallons of gasoline saved per year); assumes full implementation of Measure VF-1, Action A assumptions	2020	
Tracking Mechanisms		
Goal: Track fuel savings in vehicles equipped with telematics hardware and/or route optimization practices. Identify vehicles to use route optimization strategies and / or telematics hardware. Using vehicle fleet inventory data (collected annually, as described in Measure M-VF-1), track changes in annual fuel consumption for identified vehicles following implementation of telematics strategies.		
B. Update Vehicle Use Policy to Prioritize Fuel-Efficient Operations and Maintenance		
▪ Establish vehicle fleet efficiency policy (i.e., operation and maintenance) that includes formal vehicle maintenance check-list targeting fuel efficiency tune-ups and fuel-efficient driving training (e.g., no speeding, idling, excessive tools/gear in vehicles); fuel-efficient driving could be monitored through vehicle fleet telematics program ▪ Continue implementation of City's anti-idling policy (with exemptions for emergency vehicles) ▪ Provide anti-idling outreach city-wide through partnership with neighborhood and community groups, with specific campaigns targeting idling in School Zones; partner with Cupertino Chamber of Commerce on anti-idling campaign in commercial districts	Grounds & Fleet, Sustainability Division, Staff person	Medium-term, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		
C. Expand Commuter Benefits Program		
▪ Conduct employee commuter benefits survey to evaluate areas of priority and highest use ▪ Develop commuter benefits program expansion options, budget, and resource needs; Evaluate vendor proposals if applicable ▪ Create outreach plan and materials for communicating new unified program and benefits to employees; Develop carpool/bike/walk matching activities; Design	Sustainability & Human Resources Division, Staff person	Medium-term, FY "Year"

MEASURE M-VF-3 Promote Behavior/Fuel Optimization		
Encourage and promote fuel efficient driving.		
additional incentives (e.g., recognition program) ▪ Launch program, implement outreach plan, and track participation/employee feedback; Adjust as needed		
No Tracking Mechanisms – Supports implementation of Action A		
D. Introduce Fuel Saving Recognition Program for Employees/Departments		
▪ Establish inter-departmental fuel savings recognition program (excluding emergency vehicles) that tracks annual fuel use by department and provides departmental employee rewards for annual improvement (either total reduction compared to a department historic average or per employee efficiency) ▪ Implement process to track and report municipal vehicle fuel usage through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system	Sustainability Division, Staff person	Medium-term, FY "Year"
No Tracking Mechanisms – Supports implementation of Action A		

MEASURE M-SW-1 Waste Reduction		
Reduce municipal waste through procurement policies, waste diversion goals, and waste stream monitoring and analysis.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Establish Stretch Waste Reduction and Diversion Goals		
▪ Establish specific zero-waste goal for municipal operations (target to be included in Zero Waste Strategy update) that achieves Bay Area Climate Compact's Action Area Goal #9 to increase solid waste diversion from landfills to 75% by end of 2013 and achieve zero waste by end of 2020; City's goal is to achieve 75% diversion by 2016 ▪ In conjunction with municipal waste audits (see M-SW-1 D), establish waste reduction / diversion goals by building or department (whichever is easier to track) as means to achieving overarching zero-waste goal; re-evaluate building or department goals as part of regular waste audits ▪ Implement process to track and report municipal solid waste generation through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system	Environmental Division, Staff person	Long-term, FY "Year"
Progress Indicator	**Year**	
Assumes 80% reduction in organic waste (e.g., food scraps and compostable paper, landscape debris/trimmings, scrap lumber, paper/cardboard) from 2010 baseline; emissions reductions are shown next to actions that address specific organic waste sources (i.e., M-SW-1 B, M-SW-2 A, M-SW-3 A)	2020	
Tracking Mechanisms		

Goal: Track reductions in municipal solid waste disposal by waste category.

As described previously in community-wide measure C-SW-2, the best method for tracking solid waste diversion success is through waste characterization studies. Regular studies would allow the City to track increased diversion by category over time. Alternatively, one study prepared to support each target horizon year inventory update would still provide City-specific data points that can be compared against the State's 2008 Waste Characterization Study (which was used as a proxy for the City's baseline waste disposal rates by category in the emissions inventory).

The City should prepare a comprehensive waste characterization study and identify the amount of waste disposed in the solid waste stream among the following categories:

- food scraps and compostable paper

- landscape debris / trimmings

- scrap lumber

- mixed office paper / cardboard

The City can work with its solid waste auditor and / or its franchise waste hauler to identify additional waste diversion strategies to target these specific waste categories.

If possible, the waste study should provide results per City building / facility to identify specific locations for improvement.

MEASURE M-SW-1 Waste Reduction		
Reduce municipal waste through procurement policies, waste diversion goals, and waste stream monitoring and analysis.		
B. Create Paperless Office Policy/Program		
▪ Continue to implement and monitor success of office paper reduction strategies ▪ Work with IT Department to install printer-tracking software that allows printer analytics ▪ Conduct analysis of paper use per department to establish data trends (e.g., reams used per year, pages printed per month) ▪ Establish City-wide paper use reduction goals based on printing analysis ▪ Meet with individual departments to discuss results of analysis and identify additional opportunities for printing reduction and / or conversion of some file types from hard copy forms to electronic ▪ Establish "dry" recycling collection for paper and cardboard products, as opposed to co-mingled collection for these items, to ensure highest value during recycling	Sustainability & Environmental Division, Staff person	Long-term, FY "Year"
Progress Indicator	**Year**	
Assumes 80% diversion of municipal office paper over 2010 baseline levels	2020	
See Tracking Mechanisms description in Measure M-SW-1 A		
C. Revise Green Procurement & Event Specifications, Pair with Implementation Handbook		
▪ Continue to implement City's Environmentally Preferable Procurement Policy and refinement of staff handbook to serve as user-friendly resource to guide City purchases of "green" products, such as furniture, carpeting / flooring, paints, packaging materials, energy-efficient appliances, etc. ▪ Design purchasing specifications that give preference to recycled products, recyclable and compostable products, products derived from renewable materials, and other products that produce lower waste across the product's lifecycle ▪ Include reference to City's ENERGY STAR appliance procurement policy, or include as part of new Green Purchasing Guide to provide one comprehensive guidance document	Sustainability & Environmental Division, Staff person	Long-term, FY "Year"
No Tracking Mechanisms – Supports implementation of Actions A and B		
D. Conduct Waste Characterization Audits and Track Materials/Diversion		
▪ Continue to perform waste audits at various City facilities to: o determine type / quantity of waste being produced, o measure effectiveness of existing waste diversion practices, o identify opportunities for new waste diversion practices,	Environmental Division, Staff person	Near-term, FY "Year"

MEASURE M-SW-1 Waste Reduction		
Reduce municipal waste through procurement policies, waste diversion goals, and waste stream monitoring and analysis.		
○ establish baseline data for measuring progress towards waste reduction and diversion goals using CalRecycle data or EPA ReTrac Tool ▪ Establish regular waste audit cycle to track implementation of various waste reduction practices		
No Tracking Mechanisms – Supports implementation of Actions A and B and Measure M-SW-2 A		

MEASURE M-SW-2 Food Scrap and Compostable Paper Diversion		
Continue to divert food scraps and compostable paper from municipal waste stream.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Expand Municipal Collection and Composting Program		
▪ Continue implementation of food scrap / compostable paper collection program at municipal buildings ▪ As part of municipal waste audits (see M-SW-1 D), identify City buildings or facilities (e.g., parks) where substantial amount of compostable waste is still disposed of in general waste bins; develop additional employee educational materials (or community materials in case of public facilities) explaining how composting program works, what items can be collected, and benefits of City action in this area ▪ If participation within City buildings indicates room for improvement, consider holding annual competitions (by building or department) to achieve lowest amount of compostable waste in landfill waste bins; competition could be timed with waste audits	Environmental Division, Staff person	Medium-term, FY "Year"
Progress Indicator	**Year**	
Assumes 90% diversion of municipal food waste and plant waste over 2010 baseline levels	2020	
See Tracking Mechanisms description in Measure M-SW-1 A		

MEASURE M-SW-3 Construction and Demolition Waste Diversion		
Enhance construction and demolition waste diversion rates for municipal projects.		
Actions and Implementation Steps	**Department/Staff Responsible**	**Phasing**
A. Set C&D Diversion Policy for Municipal Projects		
▪ Consider amending Green Building Ordinance to require 75% diversion of C&D waste in all municipal construction projects and major retrofits (this would exceed state requirements of 50% diversion, and Cupertino's existing requirements for 60% diversion); discuss implementation feasibility with landfill operator	Environmental Division, Staff person	Long-term, FY "Year"
Progress Indicator	**Year**	
Assumes City continues to achieve 60% diversion of construction and demolition waste from municipal projects	2020	
See Tracking Mechanisms description in Measure M-SW-1 A		

CUPERTINO

CITY OF CUPERTINO

CLIMATE ACTION PLAN

APPENDIX D – Climate Action Planning Best Management Practices

As described in the CAP, reduction strategies were developed as part of a regional effort among other Santa Clara County participating jurisdictions. The strategy development process began with a review of best management practices (BMP) in emissions reductions from other jurisdictions within California and around the world. These BMPs were then compared against existing or planned City actions, policies, and programs to identify opportunities for expansion of existing City actions as well as opportunities for new action.

The following table shows the BMP list used to initiate the strategy development process. The table is organized into community-wide and municipal operations strategy areas (e.g., Energy, Transportation), and then further into sub-strategy areas. The BMPs are presented in the left hand column as “Measures”. The next four columns indicate if a particular BMP was determined to be “Existing” within the City, “Planned” for future implementation, or an opportunity to “Expand” existing City actions or develop “New” actions. The right hand column then presents notes describing the City’s existing and planned BMPs. Those BMPs for which none of the four columns are marked indicate strategies that have not yet been implemented within the City and were not considered priority opportunities at this time.

Some of the BMP strategies or sub-strategies do not apply to the Cupertino context (e.g., Airport Ground Operations), but are included in the table because this work was prepared as part of the previously-mentioned regional framework and was designed to be broadly applicable to a variety of jurisdictions within Santa Clara County.

This table provides a snapshot of the initial strategy development process, and represents the first filter of potential opportunities for the City’s CAP. Additional meetings with City staff and community engagement sessions resulted in the refined list of final opportunities presented in Chapters 3 and 4 of the CAP.

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
COMMUNITY-WIDE BEST MANAGEMENT PRACTICES						
ENERGY						
E-1	**Consumer Behavioral Economics Program**					
A	Comparative Use Billing	X				**Existing:** Through PG&E online billing statements.
B	Sub-Metering Requirements for MFR and Commercial Units				X	
E-2	**Retrofit Financing**					
A	Property Assessed Clean Energy (PACE)		X			**Planned:** Council in support of City joining SCC program development.
B	On-Bill Financing (PG&E)	X				**Existing:** Through PG&E; significant marketing /outreach through PG&E and Green Biz.
C	Revolving Loan Fund for Energy Efficiency Improvements					
D	Retrofit Rebate Programs	X				**Existing:** Through PG&E; significant marketing /outreach through PG&E and Green Biz.
E	Weatherization Assistance Programs	X				**Existing:** Through Energy Upgrade SV, Green@Home, and Rebuilding Together Silicon Valley.
F	Energy Service Company (ESCO) Promotion / Energy Performance Contracting				X	
E-3	**Retrofit Promotion**					
A	Energy Efficiency Audit Programs	X				**Existing:** Through Energy Upgrade SV, Green@Home, Rebuilding Together SV, and GreenBiz.
B	Retrofit Outreach Campaign	X				**Existing:** Through Energy Upgrade SV, Green@Home, Rebuilding Together SV, and GreenBiz.
E-4	**Retrofit Related Regulations**					
A	Residential Energy Conservation Ordinance (RECO) (Point of Sale)					
B	Commercial Energy Conservation Ordinance (CECO) (Point of Sale or Point of Lease)					
C	Point-of-Sale Home Energy Rating / Energy Performance Certificates (SFR)				X	
D	Point-of-Sale Benchmarking and Reporting / Energy Performance Certificates (COM and MFR)					
E	Annual Benchmarking and Disclosure				X	
F	Mandatory Retro-Commissioning (Annual or Biannual)				X	

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
E-5	**Lighting Efficiency**					
A	Building Owner/Tenant Lighting Efficiency Outreach Campaign	X				**Existing:** Green Biz strong focus on lighting efficiency.
B	Mandatory Non-Residential Lighting Upgrades (Point-of-Sale or Tenant Improvement)					
C	Parking Lot Light Retrofit Ordinance				X	
E-6	**Energy Efficient Appliances**					
A	Appliance Efficiency Outreach Campaign	X				**Existing:** Through Energy Upgrade SV, Green@Home, Rebuilding Together SV, and GreenBiz.
B	Mandatory ENERGY STAR (Major Appliances)				X	
E-7	**Energy Efficient New Construction**					
A	Energy Efficiency Performance Standard Above Code	X				**Existing:** City adopted a Green Building Ordinance.
B	Energy Efficiency Rating System for New Buildings	X				**Existing:** City has Green Building Ordinance.
C	Reduced Permitting Fees for Energy Efficient Construction		X			**Planned:** General Plan policy to offer reduced permit fees for projects that exceed Title 24 as an energy efficiency incentive.
D	Individual Unit Temperature Controls in MFR Buildings				X	
E	Mandatory Commissioning in New Buildings				X	
E-8	**Smart Grid Integration**					
A	Building Owner/Tenant Smart Grid Outreach Campaign (Energy Management Systems)				X	
E-9	**Building Shade Trees**					
A	Building Shade Tree Outreach Campaign	X				**Existing:** City has deep urban street trees program that includes shade trees - goal to plant 1600 trees in 3 years. Also certified as a Tree City USA. City offers free shade trees to residents that complete an energy audit or businesses that complete GreenBiz.
B	Shade Tree Requirement for New Construction				X	

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
E-10	**Communitywide Solar Photovoltaic Development**					
A	Streamlined (or Eliminated) Distributed Solar Permitting	X				**Existing:** City's permit process is simple and very efficient; fees are listed online and permit will be online in June.
B	Renewable Energy Outreach Campaigns (PV, Solar Hot Water, Ground-Source Heat Pumps)	X				**Existing:** Through Energy Upgrade SV, Green@Home, Rebuilding Together SV, and GreenBiz.
C	Solar Service Provider PPA Promotion				X	
D	Community Shared Solar Promotion				X	
E	Solar Empowerment Zones				X	
E-11	**Other Communitywide Renewable Energy Development**					
A	Heat Pump Assistance / Coordination	X				**Existing:** Through Energy Upgrade, Rebuilding Together SV and GreenBiz.
B	Public Right-of-Way Ground Source Heat Pump Fields (Urban Density Areas)				X	
E-12	**Community Choice Aggregation**					
A	Community Choice Aggregation Feasibility Study				X	
TRANSPORTATION						
T-1	**Pedestrian Environment Enhancements**					
A	Traffic Calming	X				**Existing:** City has installed traffic calming projects.
B	Pedestrian Master Plan	X		X		**Existing:** City adopted a Pedestrian Transportation Plan in 2002. **Expand:** Existing Pedestrian Transportation Plan is over 10 years old; should be updated to reflect existing conditions, community priorities, and new improvement opportunity areas.
C	Complete Streets	X				**Existing:** City has requirements for sidewalk construction with redevelopments; some areas include aesthetic pavers and landscape strips.
T-2	**Bicycle Infrastructure Expansion (Paths, Lanes, Routes)**					
A	Planned Bicycle Infrastructure Expansions	X				**Existing:** Designated Bicycle Friendly Community (Silver); Bicycle Master Plan defines routes, paths, bike lanes to be implemented over time.
B	Bicycle Master Plan	X				**Existing:** City adopted a Bicycle Transportation Plan in 2011.

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
T-3	**Bicyclist Accommodations**					
A	Bike Parking	X				**Existing:** Require commercial offices to designate certain percentage of parking for bicycles.
B	Bike Commute Facility Requirements for New Construction	X				**Existing:** Part of Green Building Ordinance.
C	Bike Access to Transit	X				**Existing:** Bicycle connectivity to transit through streets, which all have bike lanes.
D	Bikes on Transit	X				**Existing:** VTA Program
T-4	**Bicycle Outreach Program**					
A	Bike Safety Education Program	X				**Existing:** Through Public Safety Commission Boltage Agreement.
B	Local Bike Routes Map / Signage	X				**Existing:** City prepared Cupertino Bikeways Map.
C	Bicycle Advisory Committee and/or Bike Program Manager	X				**Existing:** City has a Bicycle Pedestrian Commission and City's bike fleet. Traffic Engineer manages all other bike/ped projects. Designated Bicycle Friendly Community.
T-5	**Bikeshare**					
A	Bikeshare Program	X	X			**Existing:** City bike fleet for employees; encourage large employers in offering bikes to employees (fairly successful). **Planned:** Would expand to Community-wide if funding was available.
T-6	**Transportation Demand Management**					
A	Transportation Demand Management Program				X	
B	Transit Fare Subsidies					
C	Parking Cash Out				X	
D	Carpool / Rideshare Program			X		**Existing:** State law with implementation supported by BAAQMD. City is developing for municipal employees.
E	Telecommuting / Flexible Hours	X				**Existing:** Offers 9/80 schedule.
F	Guaranteed Ride Home				X	
G	Park and Ride Facilities	X				**Existing:** VTA facilities.
H	Safe Routes to School / School Rideshare Programs	X	X			**Existing/Planned:** Cupertino School District has received funds in past and continues to apply.
T-7	**Transit Route Expansion**					
A	Community Bus / Shuttle				X	

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
T-8	**Transit Priority**					
A	Transit Signal Priority		X	X		**Planned:** Currently in development along Stevens Creek Blvd **Expand:** Increases speed and convenience of bus transit on congested corridors. Expand to all buses on such corridors.
B	Transit Intersection Queue Jumpers			X		**Expand:** Increases speed and convenience of bus transit on congested corridors. Expand to such corridors.
T-9	**Transit Ridership Facilitation**					
A	Transit Stop Amenities	X	X			**Existing/Planned:** Considering requirement for developers to install bus shelters and walking/transit amenities.
T-10	**ITS Strategies**					
A	Traffic Signal Coordination	X	X			**Existing:** StreetWise used city-wide; will be expanded in the future. **Planned:** Member of the SV ITS Group for future shared traffic data and cross-jurisdictional traffic signal coordination.
T-11	**Transit-Oriented Development**					
A	Transit-Oriented Development Land Use and Zoning Designations				X	
B	Transit-Oriented Development Design Guidelines				X	
C	High Speed Rail Station Planning					
T-12	**Mixed-Use Development**					
A	Mixed-Use Land Use and Zoning Designations	X	X			**Existing/Planned:** General Plan and Zoning supports mixed-use.
T-13	**Alternative Fuel Vehicles**					
A	Public Electric Charging Infrastructure	X		X		**Existing:** Stations at City Hall. **Expand:** Reduces participation barrier to electric vehicle ownership/use by reducing range anxiety.
B	Charging Infrastructure Permit Streamlining (Residential and Commercial)	X				**Existing:** Easy to get an EV permit; fees listed online, application will be available online by June.
C	Charging Pre-wiring Requirements for New Residential Construction (SFR and MFR)				X	
D	CNG Fueling Station Promotion/Pilot Program				X	

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
WATER						
W-1	**Consumer / Behavior Pricing Programs**					
A	Water Metering	X				**Existing:** Water meters required for all residential and commercial customers.
B	Tiered-Rate Pricing	X				**Existing:** Tiered-rate water pricing for residential and commercial customers.
C	Consumer Education Billing Program (e.g., comparative use indicators on water bills)			X		**Expand:** Done through GreenBiz, but with little support from water companies to access this data.
W-2	**New Construction Water Efficiency Performance Program**					
A	Mandatory Water Efficiency Performance Standard Above Code	X				**Existing:** Water Efficient Landscape Ordinance; Green Building Ordinance.
W-3	**Existing Building Water Efficiency Program**					
A	Indoor Water Efficiency Outreach Campaigns	X	X			**Existing/Planned:** Ongoing to support UWMP 2010 conservation programs; also through GreenBiz, Green@Home and Growing Greener Blocks.
B	Water Efficiency / Leakage Audit Programs	X	X			**Existing/Planned:** Ongoing to support UWMP 2010 conservation programs; also through GreenBiz, Green@Home and Growing Greener Blocks.
C	Water Conservation Ordinance (point-of-sale or tenant improvement)				X	
D	Rebate Programs	X	X			**Existing/Planned:** Promotes rebates offered through SCVWD
E	Efficiency Fixture Fitting Direct Install (Commercial and Residential)	X				**Existing:** Through GreenBiz, Green@Home, and Rebuilding Together SV.
W-4	**New Landscapes Water Efficiency Performance Program**					
A	Water Efficient Landscape Ordinance	X	X			**Existing/Planned:** Ordinance effective as of 2010.
B	Mandatory Irrigation System Efficiency Requirements	X	X			**Existing/Planned:** Through ordinance effective as of 2010.
C	Landscape Watering Limits			X		**Existing:** City enforces limits during drought periods (3 days/week); interested in expanding.
W-5	**Existing Landscapes Water Efficiency Program**					
A	Landscape Retrofit Outreach Campaigns	X				**Existing:** Through GreenBiz, Green@Home and Growing Greener Blocks programs.
B	Irrigation Efficiency Direct Install Program	X				**Existing:** Through GreenBiz, Green@Home and Growing Greener Blocks programs.
C	Lawn Conversion Cash Incentive Program	X				**Existing:** Through SCVWD.
D	Irrigation Efficiency Incentives	X				**Existing:** Through SCVWD.
E	Landscape Watering Limits (time of day, days per week)	X				**Existing:** Through ordinance effective as of 2010.
F	Water Efficient Landscape and Irrigation System Ordinance for Large Retrofits	X				**Existing:** Through ordinance effective as of 2010.
G	Rainwater Collection Barrel Subsidy		X			**Existing/Planned:** Through Green@Home and Growing Greener Blocks programs.
H	Graywater Development Guidelines and Technical Support				X	

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
W-6	**Recycled Water Irrigation Program**					
A	Recycled Water Infrastructure Development Program				X	
B	Recycled Water Infrastructure Requirements for New Construction				X	
C	Recycled Water Use Ordinance				X	
SOLID WASTE						
SW-1	**Zero Waste Goal**					
A	Zero Waste Plan			X		**Expand:** Part of Franchise agreement with Recology.
SW-2	**Consumer / Behavior Pricing Programs**					
A	Tiered-Rate Waste Collection Fee Program					
SW-3	**Food Scrap and Compostable Paper Diversion**					
A	Food Scrap and Compostable Paper Collection Program	X	X	X		**Existing/Planned:** accepted in Yard Waste Bins through Recology. **Expand:** Participation in existing food scrap diversion program should be maximized (Morgan Hill has a successful model); perform residential waste audits to determine current participation rates and develop outreach program to improve upon audit findings.
B	Residential Food Scrap and Compostable Paper Diversion Ordinance	X				**Existing:** City has ordinance.
C	Commercial Food Scrap and Compostable Paper Diversion Ordinance	X				**Existing:** City has ordinance.
D	Outreach Campaign to Encourage Food Scrap and Compostable Paper Diversion	X	X			**Existing/Planned:** Promoted through Cupertino Scene, Recology Newsletter and Event Tabling.
E	Outreach Campaign to Encourage Home / Business On-Site Composting	X	X			**Existing/Planned:** Promoted through GreenBiz program.
SW-4	**Yard Waste Diversion**					
A	Yard Waste Diversion Outreach Campaign	X	X			**Existing/Planned:** Promoted through Cupertino Scene, Recology Newsletter and Event Tabling.
B	Residential Yard Waste Diversion Ordinance					
C	Commercial Yard Waste Diversion Ordinance					
SW-5	**Construction & Demolition Waste Diversion Program**					
A	Outreach Campaign to Building Industry	X	X			**Existing/Planned:** Promoted through Recology.
B	Construction & Demolition Waste Diversion Ordinance (with specific lumber diversion requirements)			X		**Existing:** C&D policy in place; City would like to expand on lumber diversion requirements.

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
SW-6	**Recycling Program**					
A	Curbside Recycling Collection Program	X	X			**Existing/Planned:** Included in cost of garbage removal.
B	Local Recycling Collection Centers	X	X			**Existing/Planned:** Quarterly Environmental Recycling Day; Apple Computer Electronics Recycling Centers, Bottle Collection/Redemption Centers, Donation Agencies, Reuse-A-Shoe Drop Off Locations, Cartridge World, etc.
A	Comingled Waste Collection Program ("one bin" concept)	X	X			**Existing/Planned:** Recyclables are comingled.
B	Recycling Outreach Campaigns	X	X			**Existing/Planned:** Promoted through Cupertino Scene, Recology Newsletter and Event Tabling.
C	Residential Recycling Ordinance			X		**Expand:** Service offered but not mandated.
D	Commercial Recycling Ordinance			X		**Expand:** Service offered but not mandated.
E	Multi-family Recycling Ordinance			X		**Expand:** Service offered but not mandated.
F	Free-Cycle and Re-Use Networks					
SW-7	**Source Reduction Program**					
A	Voluntary Waste Reduction Audits for Large Waste Generators	X	X			**Existing/Planned:** Through GreenBiz program.
B	Reusable Shopping Bag Ordinance	X				**Existing:** Adopted with implemented scheduled for October.
C	Compostable Carry-Out Container and Disposable Utensil Ordinance		X			**Planned:** Moving forward with EIR.
SW-8	**Waste Hauling Emissions Reduction Program**					
A	Low-Emission Waste and Recycling Trucks	X				**Existing:** Much of Recology's fleet runs on biodiesel, liquefied natural gas, and compressed natural gas.
B	Waste Hauling Route Optimization	X	X			**Existing:** Recology uses fully-automated trucks to increase route efficiency.
SW-9	**Landfill Methane Capture**					
A	Methane Capture System	X				**Existing:** ClimateSmart™ Program Recology captures and destroys methane at its California landfills; Some captured gas is sold to PG&E.

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
GREEN INFRASTRUCTURE						
G-1	**Urban Forest Program**					
A	Urban Forest Master Plan	X	X			**Existing/Planned:** tree specifications included in Heart of the City Master Plan; conceptual plans have streetscape design concepts.
B	Tree Planting Campaign	X	X			**Existing/Planned:** City is designated Tree City USA.
C	Tree Planting Incentives	X	X			**Existing/Planned:** City Tree4Free Program.
D	Mandatory Tree Planting Requirements for New Development	X	X	X		**Existing/Planned:** Street Tree Ordinance (14.12) requires tree in front yard for all new 2-story homes. **Expand:** Shade tree benefits are maximized through proper tree selection, siting, and planting/maintenance; include additional detail in Street Tree Ordinance to help developers/landscapers choose and site shade trees.
G-2	**Habitat Restoration Program**					
A	Landowner Outreach Campaign	X	X			**Existing/Planned:** Promoted through various programs.

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
MUNICIPAL OPERATIONS BEST MANAGEMENT PRACTICES						
FACILITIES						
F-1	**Low-Carbon Grid Electricity**					
A	Utility-Enhanced Clean Generation Portfolio					
B	Community Choice Aggregation				X	
C	Utility-Scale Renewable or Low-Carbon Electricity Generation				X	
F-2	**Site-Scale Renewable or Low-Carbon Electricity Generation**					
A	Energy Bonds (CREBS and QECBS)					
B	Solar PV Installations on City / County Buildings, Parking Lots, Land		X	X		**Planned:** Part of the Alameda County PPA **Expand:** City should continue to seek opportunities for solar installations. Site scale PV systems can be installed by a City or solar service provider and assist emissions reduction goals.
C	Solar Thermal Installations on City / County Facilities		X			**Planned:** Being considered at Blackberry Farm Pool via SVEW partnership.
D	Ground Source Heat Pump				X	
E	Fuel-Cell Installations				X	
F	Biogas Capture / Combustion					Managed by Recology (waste) and San Jose (WWTP).
F-3	**Existing Building Energy Retrofit**					
A	Energy Efficiency Fund				X	
B	Building Retrofit Standard (e.g., LEED Silver)		X	X		**Planned:** Per city's Green Building Standards Code amendments (Ordinance No. 12-2099): LEED or LEED EBOM certification required for nonresidential additions or renovations over 35,000 sf **Expand:** City could consider defining desired outcome from LEED certification to help guide building design projects (e.g., focus on energy conservation or water conservation credits)
C	Building Energy Benchmarking				X	
D	Municipal Building Energy Retrofit Targets / Policy (e.g., Reduce Energy Use by XX%)				X	

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
E	Building Energy Audits	X				**Existing:** Major facilities have been evaluated through an ESCO energy audit.
F	Building Energy Audit Targets / Policy (e.g., # of Audits/yr, Audits Required Every 5 yrs.)	X	X	X		**Existing / Planned / Expand:** Program underway as part of Silicon Valley Energy Watch and Right Lights Plus
G	Energy Service Companies (ESCO)	X			X	**Existing:** Major facilities have been evaluated through an ESCO energy audit.
H	Indoor Lighting Retrofits (e.g., Ballast Lighting, Exit Signs)	X				**Existing:** City completed indoor lighting retrofits for all buildings.
I	Exterior Building Lighting Retrofits (e.g., Security Lighting)	X				**Existing:** City completed exterior lighting retrofits for all buildings.
J	Parking Garage Lighting Retrofits					Not applicable
K	Advanced Lighting Controls / Monitoring Systems (e.g., Automatic Dimmers)				X	
L	Building Envelope Retrofits				X	
M	Building Systems Retrofits (e.g., HVAC, MEP)	X	X	X		**Existing / Planned / Expand:** Ongoing following ESCO audit; also part of investment-grade audits.
N	Cool Roof Retrofits				X	
O	Green Roofs				X	
P	Low-Flow Fixtures at Public Facilities (e.g., Pool Showers)	X				**Existing:** City completed low-flow fixture retrofits for all public facilities.
Q	Low-Flow Toilets	X				**Existing:** City completed low-flow toilet retrofits for all buildings/facilities.
F-4	**New Building Energy Performance**					
A	Green Building Standard (with Specific Energy Performance Requirement)		X	X		**Planned:** Per city's Green Building Standards Code amendments (Ordinance No. 12-2099): LEED certification required for new nonresidential construction of 25,000-50,000 sf; LEED Silver required for new nonresidential construction greater than 50,000 sf; **Expand:** City interested in possibly expanding scope of Green Building Standards Code; could consider defining desired outcome from LEED certification to help guide building design projects (e.g., focus on energy conservation or water conservation credits).
B	Passive Energy Design (e.g., Solar Orientation)				X	
C	Solar-Ready Construction				X	

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
F-5	**Behavior / Conservation / Energy Management**					
A	Energy Efficient Procurement Policy (e.g., Requires Energy Star Appliances)	X		X		**Existing:** Part of the Environmental Preferable Purchasing Policy, 2007. **Expand:** Policy update scheduled for 2013.
B	Energy Management Systems - Office Equipment (e.g., Monitors, Printers)	X		X		**Existing:** Part of the Environmental Preferable Purchasing Policy, 2007. **Expand:** Policy update scheduled for 2013.
C	Consumption Data Collected per Facility (e.g., per park unit, not per meter in each park)	X		X		**Existing:** City uses the ENERGY STAR Portfolio Manager 2012. **Expand:** City will switch to using HARA in 2013.
D	Commissioning and Retro-Commissioning Program				X	
E	Interdepartmental Conservation Competitions				X	
F	Employee Information / Education	X		X		**Existing:** On-going email distribution, social media marketing, and written articles. **Expand:** Based on new measures / actions, identify ways to expand information distribution.
F-6	**Public Realm Lighting Efficiency**					
A	Traffic Signal Efficiency Retrofits	X				**Existing:** Completed in 2005.
B	Street Light Efficiency Retrofits	X				**Existing:** Completed in 2011.
C	Solar Street Light Retrofits					
D	Parking Lot Lighting Retrofits	X	X			**Existing / Planned:** On-going as of 2009.
E	Park Facility Lighting Retrofits	X	X			**Existing / Planned:** On-going as of 2009.
F	Public Realm Lighting Efficiency Standards				X	
F-7	**District Heating**					
A	District Energy System					
B	District Energy Feasibility Study Program					
C	District Energy Infrastructure Development Program					
F-8	**Water System Energy Efficiency**					
A	Variable Frequency Drives at Pumping Stations					
B	Water Treatment Plant Process Energy Optimization					

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
F-9	**Landscape Water Conservation**					
A	Water Conservation Plan for Public Parks		X	X		**Planned:** The City does not have a formal plan, but staff is trained to use watering schedules and water efficient irrigation equipment. **Expand:** City interested in best practices examples on this. Mountain View has an adopted Water Conservation Plan for City Properties and landscape water budgets for park units.
B	Climate Sensitive and Water Efficient Irrigation Technology	X		X		**Existing:** Installed 111 hydro point evapotranspirative controllers in 2011. **Expand:** City will follow State's Model Water Efficient Landscape Ordinance.
C	Advanced Irrigation Training for Parks Staff	X				**Existing:** Training related to hydro point installation.
D	Recycled Water Use		X			**Planned:** Recycled water from San Jose scheduled to reach large commercial customers beginning 2013, and expand thereafter.
E	Green Grounds Policy (e.g., Watering Schedules, Plant Selection)				X	
F-10	**Airport Energy Efficiency Retrofits**					
A	Green Building Construction / Retrofit Standard					
B	Lighting Fixture Retrofit					
VEHICLE FLEET						
V-1	**Efficient Vehicles**					
A	Vehicle Fleet Plan (e.g., Transition to Fuel Efficient Vehicles)				X	
B	Fuel-Efficient Vehicle Procurement Policy				X	
C	Fuel-Efficient Operational and Maintenance Policies	X			X	**Existing:** City has maintenance policies in place.
D	Anti-Idling Policy	X		X		**Existing:** City has anti-idling policy in place. **Expand:** City would like to identify ways to strengthen existing policy.

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
V-2	**Alternative Fuel Vehicles**					
A	Zero Emissions Municipal Fleet Target				X	
B	Vehicle Fleet Plan (e.g., Transition to Alternative Fuel Vehicles)				X	
C	Alternative Fuel Vehicle Procurement Policy				X	
D	Bio-Fuel Production					
E	CNG Fueling Stations				X	
F	Electric Vehicle Charging Stations	X	X			**Existing / Planned:** No notes provided
G	Fuel Cell Fueling Station					
V-3	**Behavior / Fuel Conservation**					
A	Fuel-Efficient Driver Training				X	
B	Route Optimization	X		X		**Existing:** Used for Building Department inspections via neighborhood-based planning (using GIS mapping, or employee knowledge of locations). **Expand:** Could be expanded to other city departments.
C	Telematics				X	
D	Municipal Bike Fleet					
E	Car Share Program					
F	Fuel Saving Recognition Program for Employees / Departments				X	
G	Fleet Reduction Program (e.g., Vehicle Sharing, Bicycle Police Patrols)				X	
V-4	**Airport Ground Operations**					
A	Airport Ground Operations Vehicle Fuel Conversion					
V-5	**Airplane Taxi Efficiency Improvements**					
A	Surface Airplane Congestion Reduction Program					
B	Assisted Airplane Towing					
C	Equipment Fuel Conversion					

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
POWER GENERATION FACILITIES						
P-1	**Generation Efficiency Improvements**					
A	Turbine Efficiency Improvements					
P-2	**Combined Heat & Power**					
A	Co-Generation System					
P-3	**Alternative Fuels**					
A	Biomass					
SOLID WASTE FACILITIES						
S-1	**Waste Reduction**					
A	Green Procurement Specifications	X		X		**Existing:** City has an Environmental Preferable Purchasing Policy. **Expand:** EPP Policy is being updated in 2013.
B	Zero-Waste Strategy		X			**Planned:** City Council's 2008/2009 Work Plan prioritized creation of Zero Waste Policy.
C	Waste Reduction and Diversion Goals (e.g., All City Operations or per Department)				X	
D	Diversion Rate Tracking at Municipal Facilities				X	
E	Hand-Sorted Waste Containers					
F	Waste Audits and Surveys				X	
S-2	**Food Scrap and Compostable Paper Diversion**					
A	Municipal Collection and Composting Program	X		X		**Existing:** City has a food waste composting program. **Expand:** May be opportunities for expanded collection (e.g., locations, items collected).
B	Composting at Airport Terminals					
S-3	**Recyclable Paper Diversion**					
A	Paperless Office Policy / Program	X		X		**Existing:** City has paperless office policy / program. **Expand:** City interested in opportunities to expand policy / program.
S-4	**Landscape Waste Diversion**					
A	On-Site Landscape Waste Reduction Program	X				**Existing:** No notes provided
B	Municipal Landscape Waste Composting Program	X				**Existing:** No notes provided
C	Waste Management Training for Park Department Staff / Groundskeepers	X				**Existing:** No notes provided

MEASURE		EXISTING	PLANNED	EXPAND	NEW	NOTES / RATIONALE
S-5	**Construction and Demolition Waste Diversion**					
A	C+D Diversion Policy for Municipal Projects (e.g., 75% Lumber Diversion)	X		X		**Existing:** No notes provided **Expand:** Could expand diversion requirements for municipal projects to specifically increase lumber diversion requirements.
S-6	**Methane Capture and Combustion**					
A	Landfill Biogas Capture and Flare System					
S-7	**Waste-To-Energy**					
A	Landfill Biogas-to-Energy Facility					
B	Food Waste-Bio digester Energy Facility					
C	Waste-to-Energy Gasification Facility					
D	Anaerobic Digestion at Wastewater Treatment Plant					
WASTEWATER TREATMENT FACILITIES (NON ENERGY-RELATED EMISSIONS)						
W-1	**Methane Capture and Combustion**					
A	Methane Capture and Generation System					
W-2	**Nitrous Oxide Emission Reduction**					
A	Improved Plant Design					
B	Improved Operations					

CUPERTINO

CITY OF CUPERTINO

CLIMATE ACTION PLAN

APPENDIX E – Water Conservation and Energy Efficiency Toolkit

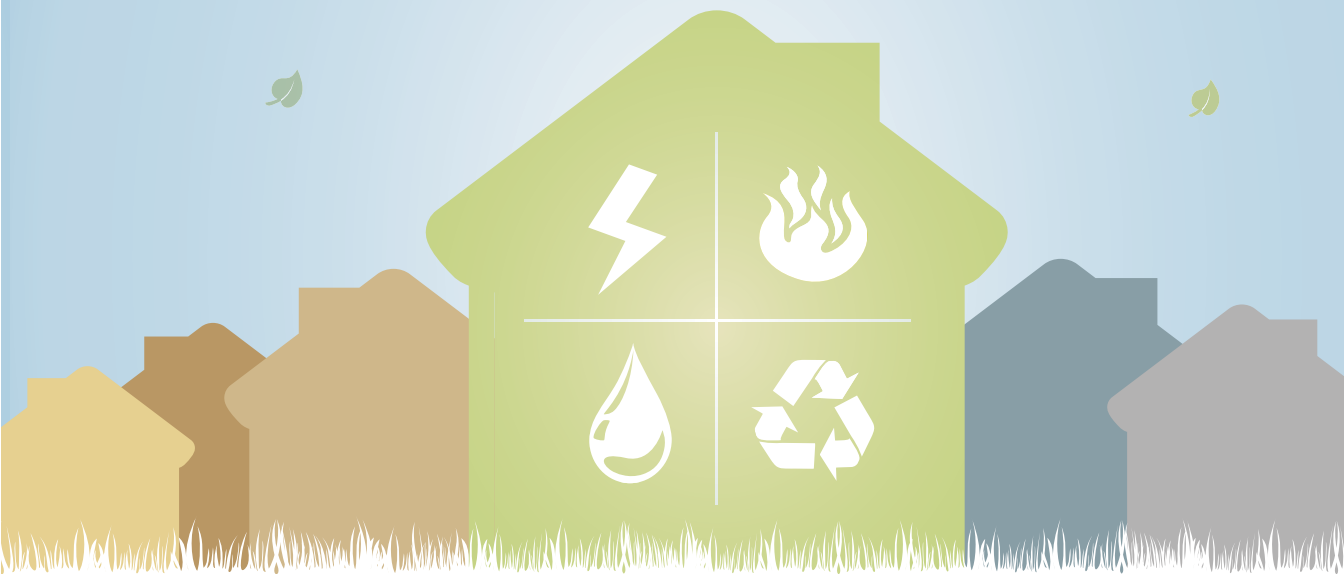
SILICON VALLEY ENERGY WATCH

Do-It-Yourself

Home Energy Saving Toolkit

USER GUIDE

The energy- and water-saving toolkit is designed for library patrons and will help you save money on your utility bills while conserving vital resources.



Participating Libraries

San José Public Library

santa clara county library district

City of Sunnyvale California

Brought to you by:

Silicon Valley energy watch

PG&E Pacific Gas and Electric Company®

City of San José Capital of Silicon Valley Environmental Services

As a part of the State's energy efficiency portfolio funded by California utility customers, Silicon Valley Energy Watch (SVEW) exists to help residents, businesses, and public agencies throughout Santa Clara County save energy easily and cheaply. SVEW is implemented by the City of San José Environmental Services Department in partnership with Ecology Action. This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission. "PG&E" refers to Pacific Gas and Electric Company, a subsidiary of PG&E Corporation.

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Table of Contents

Silicon Valley Energy Watch (SVEW)

SVEW serves residents, businesses, and public entities throughout Santa Clara County with energy efficiency resources and education. SVEW initiatives include the Silicon Valley Energy Map, the Community Energy Champions Grant, and HomeBiz. To learn more, visit **svenergywatch.org**.

Kill-A-Watt Library Lending Program

In 2010, SVEW made the Kill-A-Watt® electricity meters available at all libraries in Santa Clara County for library patrons to borrow at no cost, so that residents, educators, and others could learn more about their energy use and make smarter choices at home and at work. The meters were an instant hit, with wait-lists at most libraries and nearly 400 checkouts in 2012.

Do-It-Yourself (DIY) Home Energy Saving Toolkit Program

In partnership with the City of Cupertino, Santa Clara County Library District, Santa Clara Valley Water District, and Acterra (a local environmental nonprofit), SVEW is implementing another library lending program: SVEW Do-It-Yourself (DIY) Home Energy Saving Toolkit to help you take charge of your home's energy and water use and reduce your utility bills.

The City of Cupertino approached SVEW in 2012 with the idea to create a DIY Home Energy Efficiency Toolkit that would mirror the Acterra Green@Home Program running in their community. Green@Home provides free HouseCalls, where trained volunteers install energy- and water-savings devices in homes throughout the Bay Area. Nearly 250 HouseCalls were conducted in Cupertino, and the City of Cupertino decided to expand the program with a DIY Toolkit that could be checked out from the local library. In partnership with the Santa Clara County Library District, Santa Clara Valley Water District, and Acterra, a Cupertino pilot DIY Toolkit was born. The program is now available countywide as the SVEW DIY Home Energy Saving Toolkit. To learn more about Acterra, or to become a Green@Home volunteer, visit **acterra.org/green@home**. To explore other City of Cupertino environmental programs, visit **cupertino.org/green**.

Now, the Toolkit and User Guide are ready for you! The Guide walks you through each step; enables you to calculate your estimated savings; and provides additional tips for "going green" in your daily life. Whether your goal is to save money, protect the environment, or embark on a fun home project, we invite you to turn the pages and learn all you can.

Let's get started!

As a part of the State's energy efficiency portfolio funded by California utility customers, Silicon Valley Energy Watch (SVEW) exists to help residents, businesses, and public agencies throughout Santa Clara County save energy easily and cheaply. SVEW is implemented by the City of San José Environmental Services Department in partnership with Ecology Action. This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission. "PG&E" refers to Pacific Gas and Electric Company, a subsidiary of PG&E Corporation.

DIY Toolkit Contents

Equipment *- For you to keep and install in your home*

4 Compact Fluorescent Light Bulbs (CFLs) - Use to replace incandescent bulbs in high-use fixtures.

Weatherstripping - Helps seal air gaps in windows and doors.

Outlet Gaskets - Use to seal the void around your outlets and prevent heat loss.

Low-Flow Showerhead - Replace your current showerhead with this 2.0 gallons per minute (gpm) showerhead to save water.

3 Low-Flow Faucet Aerators - The Toolkit provides two 0.5 gpm aerators for your bathroom sinks and one 1.5 gpm aerator for your kitchen sink. These aerators are a standard size (15/16") and will fit most faucets, but may not fit specialty ones.

Water Leak Detection Dye Tablets (not for consumption) - Identify leaks in your toilet tanks.

Tools *- To be returned to the library once you are finished with the kit*

Kill-A-Watt® Meter - Measures the energy use of appliances and equipment, and helps you understand your home's "plug load" as a share of overall energy use.

Infrared Laser Thermometer - Checks for heat loss in trouble spots such as windows, vents, and door jams.

Refrigerator Thermometer - Enables you to monitor the temperature in your refrigerator.

Painter's Tape - Wraps around the Pliers to help prevent scratching the aerators or showerhead during installation.

Thermometer - Checks the temperature of your hot water supply.

Pliers - Replaces old faucet aerators and showerheads with new ones.

Pipe Thread Seal Tape (plumber's tape) - Prevents leaks in your faucets and showerheads.

Water Flow Rate Bag - Measures the true rate of flow in gallons per minute of your faucets and showers.

Also included in the Toolkit is a Data Tracking Sheet. Using the monitoring tools above, you can record your energy use data and actions on this sheet to help you track the energy and water use of your various appliances and equipment. Return one copy to the library so that SVEW can record how much electricity and water the toolkits are helping our community to save.

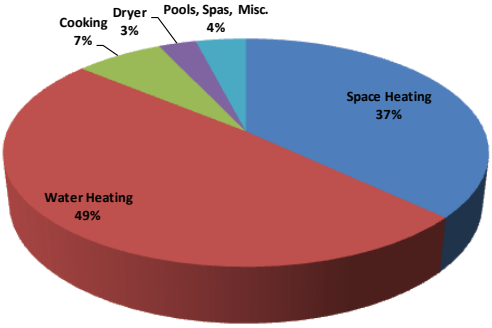
This symbol indicates steps where you will use the Toolkit tools and equipment.

Introduction to Energy Use

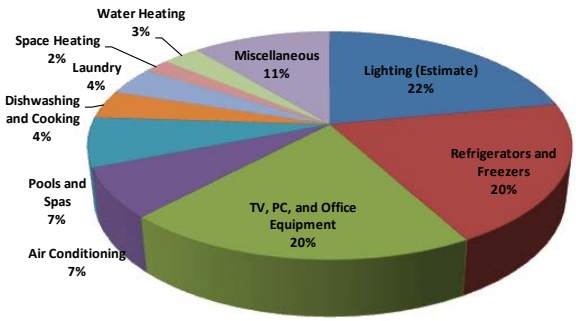
Average Household Use of Energy in California

Knowing how energy is used in your home will help you take steps to reduce your use. These pie charts show how the average household in California uses electricity and natural gas.

Statewide Average Natural Gas Use Per Household
(354 therms per Household)



Statewide Average Electricity Use Per Household
(6,296 kWh per Household)



Source: 2009 California Residential Appliance Saturation Study

How Much Energy Will This Toolkit Help Me Save?

We all use our homes and appliances differently, so predicting the precise amount of energy savings that you can achieve by using this Toolkit is difficult. For example, EnergyStar® estimates that replacing one incandescent bulb with an EnergyStar® Certified CFL or LED bulb can save you anywhere from $40 to $135 in electricity costs over the bulb's life*—the actual amount depends on how often you use the light, your electricity rate, and more.

To get a basic estimate of how much you can save, use the Data Tracking Sheet included in this Toolkit to calculate your expected savings.

*Based on national averages

Energy Literacy: Understanding Units That Measure Energy

Watt (W) - A watt is the basic unit of power used to measure electricity capacity and is equivalent to one joule per second. Incandescent light bulbs are rated on their capacity to produce light—the higher the rating (e.g., 40, 60, 100W), the brighter the light. CFL bulbs use far less watts (e.g., 23 to 30W) to produce the same amount of light.

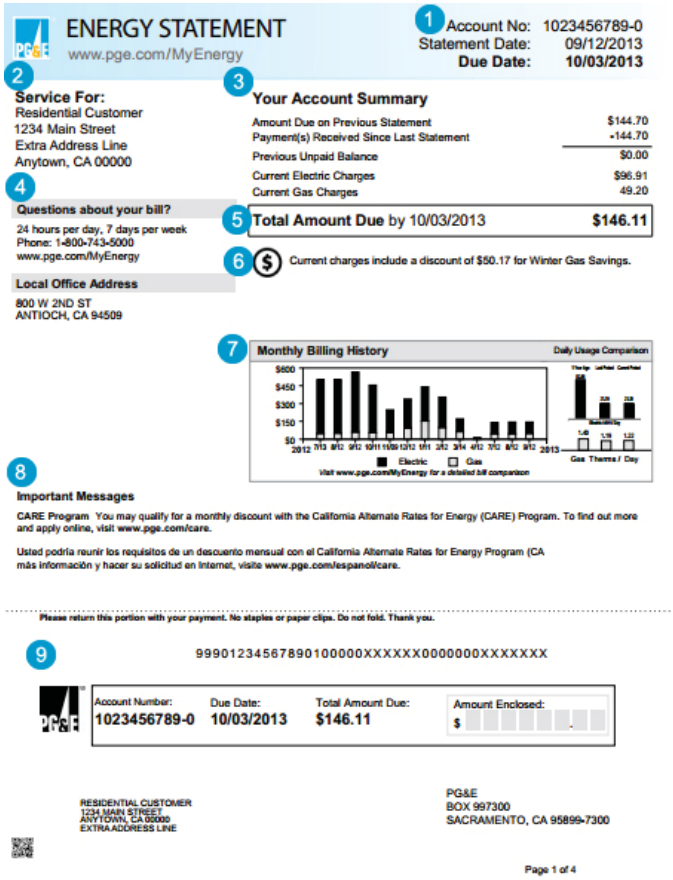
Kilowatt (kW) - A kilowatt is 1,000 watts.

Kilowatt hour (kWh) - A kilowatt hour is 1,000 watts used for one hour (power x time). It is the unit of energy most commonly used on household electricity meters. For example, a 100W incandescent bulb left on for 10 hours is equal to 1 kWh (100W x 10 hrs = 1,000 Wh = 1 kWh). In 2011, the typical PG&E residential customer used 540 kWh per month per household.

Therm - A therm is the energy equivalent of burning 100 cubic feet of natural gas. The typical PG&E residential customer uses an average of 34 therms per month per household.

Understanding Your PG&E Bill

PG&E Bill Features



ENERGY STATEMENT
www.pge.com/MyEnergy

1 Account No: 1023456789-0
Statement Date: 09/12/2013
Due Date: 10/03/2013

2 **Service For:**
Residential Customer
1234 Main Street
Extra Address Line
Anytown, CA 00000

3 **Your Account Summary**

Amount Due on Previous Statement	$144.70
Payment(s) Received Since Last Statement	-144.70
Previous Unpaid Balance	$0.00
Current Electric Charges	$96.91
Current Gas Charges	49.20
5 Total Amount Due by 10/03/2013	**$146.11**

4 **Questions about your bill?**
24 hours per day, 7 days per week
Phone: 1-800-743-5000
www.pge.com/MyEnergy

Local Office Address
800 W 2ND ST
ANTIOCH, CA 94509

6 Current charges include a discount of $50.17 for Winter Gas Savings.

7 **Monthly Billing History**
Daily Usage Comparison
$600 $450 $300 $150 $0
2012 7/13 8/12 9/12 10/11 11/09 12/12 1/11 2/12 3/14 4/12 7/12 8/12 9/12 2013
Electric Gas
Visit www.pge.com/MyEnergy for a detailed bill comparison
Gas Therms / Day

8 **Important Messages**
CARE Program You may qualify for a monthly discount with the California Alternate Rates for Energy (CARE) Program. To find out more and apply online, visit www.pge.com/care.

Usted podría reunir los requisitos de un descuento mensual con el California Alternate Rates for Energy Program (CA más información y hacer su solicitud en Internet, visite www.pge.com/espanol/care.

Please return this portion with your payment. No staples or paper clips. Do not fold. Thank you.

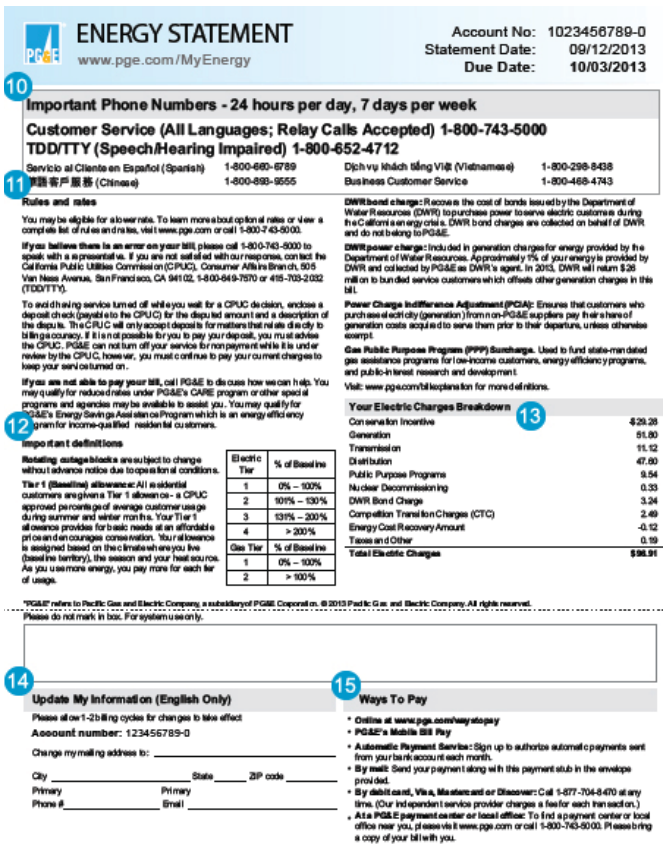
9 99901234567890100000XXXXXX0000000XXXXXX

Account Number:	Due Date:	Total Amount Due:	Amount Enclosed:
1023456789-0	10/03/2013	$146.11	$

RESIDENTIAL CUSTOMER
1234 MAIN STREET
ANYTOWN, CA 00000
EXTRA ADDRESS LINE

PG&E
BOX 997300
SACRAMENTO, CA 95899-7300

Page 1 of 4



ENERGY STATEMENT
www.pge.com/MyEnergy

Account No: 1023456789-0
Statement Date: 09/12/2013
Due Date: 10/03/2013

10 **Important Phone Numbers - 24 hours per day, 7 days per week**
Customer Service (All Languages; Relay Calls Accepted) 1-800-743-5000
TDD/TTY (Speech/Hearing Impaired) 1-800-652-4712

Servicio al Cliente en Español (Spanish)	1-800-660-6789	Dịch vụ khách tiếng Việt (Vietnamese)	1-800-298-8438
11 (Chinese)	1-800-893-9555	Business Customer Service	1-800-468-4743

Rules and rates
You may be eligible for a lower rate. To learn more about optional rates or view a complete list of rules and rates, visit www.pge.com or call 1-800-743-5000.

If you believe there is an error on your bill, please call 1-800-743-5000 to speak with a representative. If you are not satisfied with our response, contact the California Public Utilities Commission (CPUC), Consumer Affairs Branch, 505 Van Ness Avenue, San Francisco, CA 94102, 1-800-649-7570 or 415-703-2032 (TDD/TTY).

To avoid having service turned off while you wait for a CPUC decision, enclose a deposit check (payable to the CPUC) for the disputed amount and a description of the dispute. The CPUC will only accept deposits for matters that relate directly to billing accuracy. If it is not possible for you to pay your deposit, you must advise the CPUC. PG&E can not turn off your service for non-payment while it is under review by the CPUC, however, you must continue to pay your current charges to keep your service turned on.

If you are not able to pay your bill, call PG&E to discuss how we can help. You may qualify for reduced rates under PG&E's CARE program or other special programs and agencies may be available to assist you. You may qualify for PG&E's Energy Savings Assistance Program which is an energy efficiency program for income-qualified residential customers.

12 **Important definitions**
Rotating outage blocks are subject to change without advance notice due to operational conditions.

Tier 1 (Baseline) allowance: All residential customers are given a Tier 1 allowance - a CPUC approved percentage of average customer usage during summer and winter months. Your Tier 1 allowance provides for basic needs at an affordable price and encourages conservation. Your allowance is assigned based on the climate where you live (baseline territory), the season and your heat source. As you use more energy, you pay more for each tier of usage.

Electric Tier	% of Baseline
1	0% – 100%
2	101% – 130%
3	131% – 200%
4	> 200%
Gas Tier	**% of Baseline**
1	0% – 100%
2	> 100%

DWR bond charge: Recovers the cost of bonds issued by the Department of Water Resources (DWR) to purchase power to serve electric customers during the California energy crisis. DWR bond charges are collected on behalf of DWR and do not belong to PG&E.

DWR power charge: Included in generation charges for energy provided by the Department of Water Resources. Approximately 1% of your energy is provided by DWR and collected by PG&E as DWR's agent. In 2013, DWR will return $26 million to bundled service customers which offsets other generation charges in this bill.

Power Charge Indifference Adjustment (PCIA): Ensures that customers who purchase electricity (generation) from non-PG&E suppliers pay their share of generation costs acquired to serve them prior to their departure, unless otherwise exempt.

Gas Public Purpose Program (PPP) Surcharge. Used to fund state-mandated gas assistance programs for low-income customers, energy efficiency programs, and public interest research and development.

Visit: www.pge.com/billexplanation for more definitions.

13 **Your Electric Charges Breakdown**

Conservation Incentive	$-29.28
Generation	51.80
Transmission	11.12
Distribution	47.80
Public Purpose Programs	9.54
Nuclear Decommissioning	0.33
DWR Bond Charge	3.24
Competition Transition Charges (CTC)	2.49
Energy Cost Recovery Amount	-0.12
Taxes and Other	0.19
Total Electric Charges	**$96.91**

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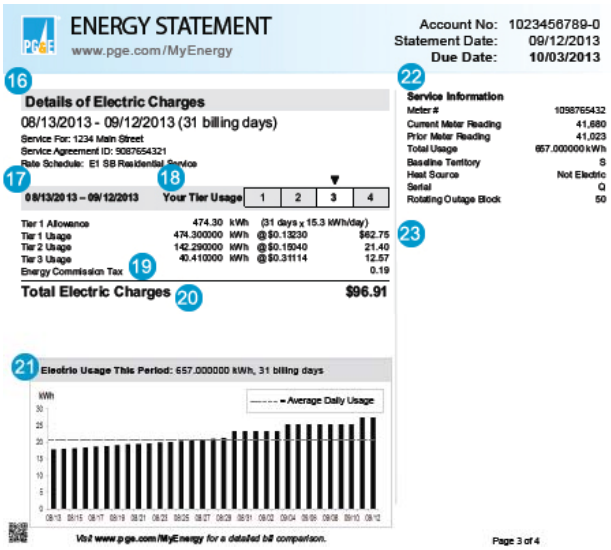
Please do not mark in box. For system use only.

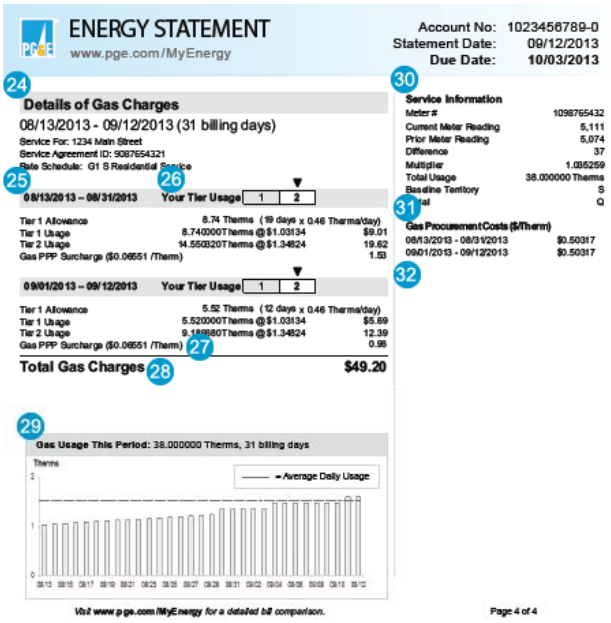
14 **Update My Information (English Only)**
Please allow 1-2 billing cycles for changes to take effect
Account number: 123456789-0
Change my mailing address to: _____
City _____ State ____ ZIP code ____
Primary Phone # _____ Primary Email _____

15 **Ways To Pay**
- Online at www.pge.com/waystopay
- PG&E's Mobile Bill Pay
- **Automatic Payment Service:** Sign up to authorize automatic payments sent from your bank account each month.
- **By mail:** Send your payment along with this payment stub in the envelope provided.
- **By debit card, Visa, Mastercard or Discover:** Call 1-877-704-8470 at any time. (Our independent service provider charges a fee for each transaction.)
- **At a PG&E payment center or local office:** To find a payment center or local office near you, please visit www.pge.com or call 1-800-743-5000. Please bring a copy of your bill with you.

1. **Key Account Data:** 10-digit number unique to each household and due date.
2. **Service Address:** The address where your charges were incurred.
3. **Account Summary:** A snapshot of your bill, includes an overview of charges incurred, payments received, and your total amount due.
4. PG&E Contact Information
5. **Total Amount Due:** Your charges and payment due date, all on one line.
6. **Savings Alert:** Notes about your account and any special programs you participate in that may affect your total charges.
7. **Monthly Billing History:** A chart of your monthly energy charges over the past year.
8. **Important Messages:** Timely information from PG&E.
9. **Remittance Stub:** Return form with your payment to the address indicated.
10. **Important Phone Numbers:** Customer service phone numbers.
11. **Rules and Rates:** Rules for disputing charges.
12. **Important Definitions:** Define key terms.
13. **Your Electric Charges Breakdown:** Line items on your electric bill.
14. **Update My Information:** Fill this out if your information changes.
15. **Ways to Pay:** Options to pay your PG&E bill.



16. **Details of Electric Charges:** Information regarding your rate plan.
17. **Electricity Usage:** Notes your electricity usage during a given timeframe.
18. **Tier Indicator:** Shows the highest tier in which you are being charged.
19. **Taxes and Fees:** State and local governments taxes.
20. **Total electric charges:** Total electricity charges, including taxes and fees.
21. **Daily Usage Chart:** Your electricity usage this month.
22. **Service Information:** Details about the electric meter at your home.
23. **Additional Messages:** Timely information from PG&E.



24. **Details of Gas Charges:** Information regarding your rate plan.
25. **Gas Usage:** Notes your usage by tier during a given timeframe.
26. **Tier Indicator:** Shows the highest tier in which you are being charged.
27. **Taxes and Fees:** State and local governments taxes.
28. **Total Gas Charges:** Total gas charges, including taxes and fees.
29. **Daily Usage Chart:** Your gas usage this month.
30. **Service Information:** Details about the electric meter at your home.
31. **Gas Procurement Cost:** The utility's cost to buy natural gas and transport it to its local pipeline system.
32. **Additional Messages:** Timely information from PG&E.

Accessing Your PG&E Bill

Your energy bill and information about energy use can be found at **pge.com**.

At the website, you can opt for online bill payment. You'll save time and paper, too!

Reducing Energy Use: Plug Loads

Consumer electronic products account for up to 15 percent of electricity consumption in a typical California household. Many small appliances and electronics use energy even when they are turned off—as much as 75 percent may be consumed in standby or off mode! This is known as "vampire" or "phantom" loads, and eliminating them is a great way to save energy.

STEP #1: Use the Kill-A-Watt® Meter

The Kill-A-Watt® meter measures the energy drawn by appliances and electronics in both operating and standby modes. Follow these steps:

1. Plug the meter into an outlet and plug an appliance or electronic device you'd like to measure into the meter. You may need to wait a couple seconds for the energy to register.
2. Push the "down" button until "Watt" appears as the unit.
3. Measure the wattage when the appliance is both on and off
4. Check your PG&E bill to verify your electricity rate.
5. Record your findings on your Data Tracking Sheet.
6. The meter can also help you estimate the cost of electricity used by the appliance or device over time. See the video below for instructions.

Tool: Kill-A-Watt® EZ Meter

Instructional Video: How to Use a Kill-A-Watt® EZ Meter.
Scan the QR code with a smart phone to view the video or visit: http://goo.gl/3Mv1Ku

Average Energy Consumption of Standard Appliances*

Appliance	Watts
Clothes Dryer	1,800-5,000
Clothes Washer	350-500
Clothes Iron	1,000-1,800
Computer	270 awake 60 asleep
Dishwasher	1,200-2,400
Heater	750-1,500
Microwave	750-1,100
Refrigerator	725
Toaster	800-1,400
TV-flatscreen	120
Vacuum Cleaner	1,000-1,440
DVD Player	20-25

*Actual energy usage depends on the age and model of the appliance.

Tips:

- Unplug small appliances (toasters, coffee pots, etc.) when not in use.
- Unplug phone and battery chargers once they are fully charged.
- In your entertainment and computer areas, plug equipment into a Smart Strip, which will shut off equipment when in standby mode.

  NOTE: Unplugging your cable box may reset the system; be sure to consult the operation manual.
- Always look for the EnergyStar® logo when buying new appliances.

Smart Strip

Major appliances may account for a quarter of your household energy costs, and your refrigerator is likely to be the single biggest plug load in your home. Using the Kill-A-Watt® meter, you can compare the energy use of your appliances to the average use as outlined in the table on page 6. Then follow the tips for your appliances outlined below.

STEP #2: Measure the Refrigerator Temperature

Use the Refrigerator Thermometer to help set optimum temperatures for your refrigerator and freezer:

1. Place thermometer in refrigerator between several food items. After 20 minutes, record the temperature on your Data Tracking Sheet.
2. Look and test for cracks in the door seal: Close the door on a piece of paper and tug. If the paper moves easily, then you need to replace the seal.
3. Repeat these actions with the freezer.
4. Adjust temperatures if they are outside the target range: 36-40°F for refrigerator, 0-5°F for freezer.

Tool: Refrigerator Thermometer

DID YOU KNOW?
You Can Save With EnergyStar® Appliances!

EnergyStar® appliances typically use up to 50 percent less energy and water than standard models. Look for the EnergyGuide label; it provides an estimated yearly operating cost and the range of operating costs for similar models.

Rebates! Rebates!

Check with PG&E for rebates on your EnergyStar® appliance purchase. PG&E may also pay to pick up your old refrigerator or A/C unit. Call 1-800-299-7573 or visit http://goo.gl/jTb2Vq for eligibility and pickup.

Tips:

REFRIGERATOR

- Regularly clean the coils on your refrigerator.
- Keep contents organized so you can quickly get what you need; minimizing the amount of time the doors are open will save energy.
- Turn off the condenser feature in the refrigerator.
- If you have a second refrigerator, consider donating it or having it properly disposed of by your waste hauler, and you may be eligible for a PG&E rebate!

WASHER & DRYER

- Wash full loads and use short wash cycles for mildly dirty laundry.
- Use cold water whenever possible.
- Use the washer's high spin cycle to reduce drying time, and try a clothesline instead of the dryer, which is a big energy user.
- Clean the lint trap after every use to ensure safe, efficient drying.

HEATING & COOLING SYSTEMS

- Clean and replace filters regularly.
- Set your winter heating temperature at 68°F; set your summer cooling temperature at 78°F.
- Use window coverings to prevent heat gains.
- Circulate air with ceiling or portable fans.
- Replace older A/C units (more than 10 to 15 years) with EnergyStar® appliances—this could reduce your costs by 20 to 40 percent!

Reducing Energy Use: Lighting

Lighting represents as much as 22 percent of your home's electrical use. You can reduce your energy bill significantly by switching to energy-efficient lighting. The compact fluorescent lightbulbs (CFLs) provided in this kit are roughly 75 percent more efficient than incandescent bulbs and last up to 10 times longer.

STEP #3: Switch Lightbulbs to CFLs

CFLs screw into place the same as incandescent bulbs. Follow these steps as you set out to switch over to CFLs:

1. First replace the incandescent bulbs in fixtures that have the highest use; this will result in the greatest savings for you.
2. Read the packaging to see where the bulb should be used; not all Energy Star qualified CFLs are designed to work in every socket.
3. Match the equivalent wattage of the old bulb (a 60W incandescent should be replaced with a 13W CFL).
4. Calculate your savings using the Data Tracking Sheet to see how much each of your CFLs will save you during the next year.

Equipment: CFL Light Bulb

Tips:

- Dimmable fixtures require a dimmable CFL; these are available at hardware stores. A standard CFL will quickly burn out if used in a dimmable fixture.
- Most photocells, motion sensors, and electronic timers are not designed to work with CFLs. Check the packaging for compatibility.
- Don't frequently turn a CFL on and off (more than every 15 minutes); this may shorten its lifespan.
- Make sure to dust your bulbs at least every six months; a dirty bulb is an inefficient bulb.

Next Steps

- Replace the rest of the incandescent bulbs in your home with CFLs. You can find CFLs in many sizes and shapes at any major hardware store.
- Replace your outside lights as well. CFL flood lights are available.

Go Further with LEDs

Take the next step and look into installing LED light bulbs. LEDs, while more expensive up front, offer similar light quality, last up to 25 times longer than traditional incandescent light bulbs, and use even less energy than CFLs.

How to Handle a Broken Bulb

Incandescent

1. Turn off and unplug the fixture.
2. Put on protective work gloves.
3. Grip metal lip of the bulb with pliers or wrench.
4. Turning counterclockwise, gently unscrew the bulb base.
5. Place bulb and broken glass in a paper bag and place in the trash.

Fun Fact:

Broken incandescent bulbs can be removed using a potato. Simply cut the potato in half, push the flesh into the broken section of the bulb, and twist counterclockwise.

CFL

1. Turn off and unplug the fixture.
2. Open a window or door to the outside environment and leave the room, letting it air out for 10 minutes to let the hazardous chemicals from the bulb dissipate.
3. While continuing to air out room, carefully scoop up glass pieces and powder using stiff paper or cardboard; place into a thick plastic bag.
4. Use sticky tape to pick up remaining fragments (DO NOT VACUUM).
5. Wipe area clean with a damp paper towel; dispose of towel in the trash.
6. Place each CFL in a separate, clear, and sealed plastic bag; bring to a hardware or lighting store that recycles CFLs (typically this service is provided free of charge).
7. For CFL recycling locations, visit **earth911.com**

VIDEO: Removing Broken Incandescent Bulbs

http://goo.gl/eOPnh

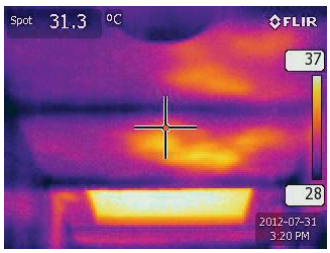
TIPS: Cleaning Up Broken CFLs & Disposing of Spent CFLs

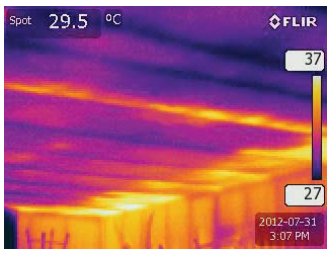
http://goo.gl/tnFx9

Sealing cracks, gaps, and leaks and improving the insulation in your home can save up to 20 percent of your heating and cooling costs. The Infrared Laser Thermometer will help you detect where you may be losing or gaining heat through windows, lighting fixtures, outlets, vents, door jams, and heating and cooling systems.

STEP #4: Use the Infrared Laser Thermometer

The Infrared Laser Thermometer detects heat gain and loss. Turn on and point the thermometer at potential trouble spots in your home. Note any temperature fluctuations that may be caused by air leaks.





These images (taken from an infrared camera) show examples of a home with a poor thermal envelope. The spots in yellow are places where little or no insulation are present. On a warm day, heat is being conducted through the ceiling and walls, making these areas hot.

Tool: Infrared Laser Thermometer

Instructional Video: How to Use an Infrared Laser Thermometer.
Scan the QR code with a smart phone to view the video or visit:
http://goo.gl/bDJj2

Tips:

Heating and cooling can account for up to 50 percent of home energy use; a properly insulated home will reduce this cost and keep your home more comfortable—cooler in the summer and warmer in the winter. Take these steps to reduce leakage in your home envelope:

- Caulk windows (video below).
- Schedule a professional audit or contact a local contractor to address insulation needs around your light fixtures, vents, or other spots. Energy Upgrade California is an excellent resource for this; visit energyupgradeca.org/home_upgrade for information.
- Insulate ceilings, walls, attics, floors, crawl spaces, and basements to recommended standards for optimum savings.
- Common types of insulation are fiberglass, cellulose, rigid foam board, and spray foam.

energy upgrade™ CALIFORNIA

Instructional Video: How to Caulk Windows.
Scan the QR code with a smart phone to view the video or visit: http://goo.gl/pdRsj

You pay for heating your home, so don't just let that heat leak out through gaps in your doors, windows, and outlets. Follow these steps to stop those leaks!

STEP #5: Install Weatherstripping

Use weatherstripping to seal gaps in your doors and window jams.

1. Check for drafts around external doors and window jams. Use the Infrared Laser Thermometer, or if you can see light or slide a piece of paper through an area, then it needs weatherstripping. The entire door or window usually doesn't need weatherstripping—focus on the sections where you feel air or can see light.
2. Clean the application area to ensure a good installation.
3. Cut a length of weatherstripping to match the length of door or window where the strip will be applied. Peel back adhesive strip and apply.
4. Record your action on your Data Tracking Sheet.
5. Please return whatever you do not use in the Toolkit.

Equipment: Weatherstripping

Instructional Video: How to Apply Weatherstripping. Scan the QR code with a smart phone to view the video or visit: **http://goo.gl/XX5fH**

Tip: A door without weatherstripping may not look like a problem, but the amount of exposed area from different locations can add up to a big hole! Consider installing a door sweep to help keep out drafts; you can pick one up at your local hardware store.

STEP #6: Install Outlet Gaskets

Outlet gaskets help prevent air leaks that can result from poor wall insulation.

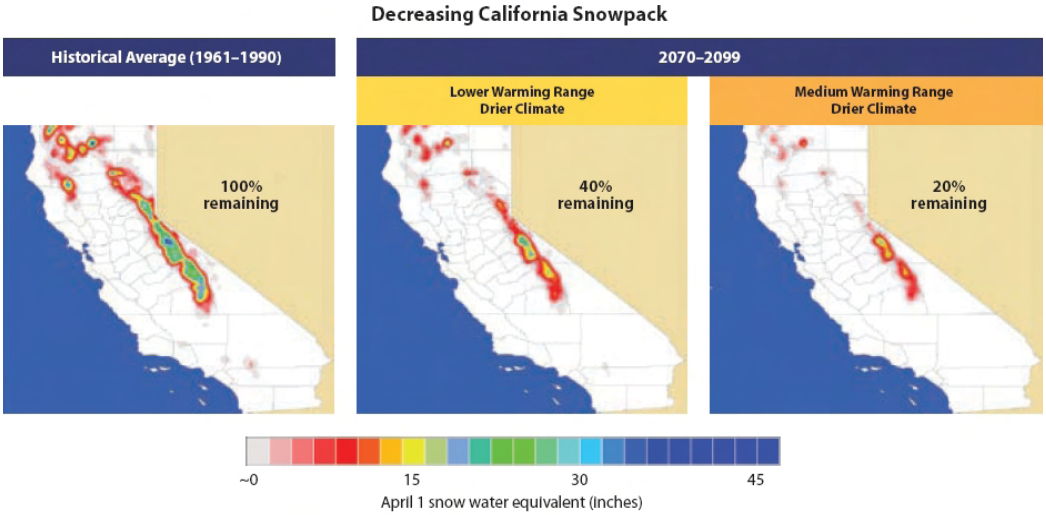
1. Identify exterior walls with the most exposure to draft.
2. Choose an outlet or switch plate to upgrade.
3. Carefully loosen the face plate screw with a screw driver (not provided) and remove faceplate.
4. Place gasket over internal area. If necessary, trim the gasket to fit around the outlet.
5. Replace faceplate cover and tighten screw.
6. Repeat for other outlets or switches throughout your house.

Equipment: Outlet Gaskets

Instructional Video: How to Install Outlet Gaskets. Scan the QR code with a smart phone to view the video or visit: **http://goo.gl/HQ4YW**

Introduction to Water Use

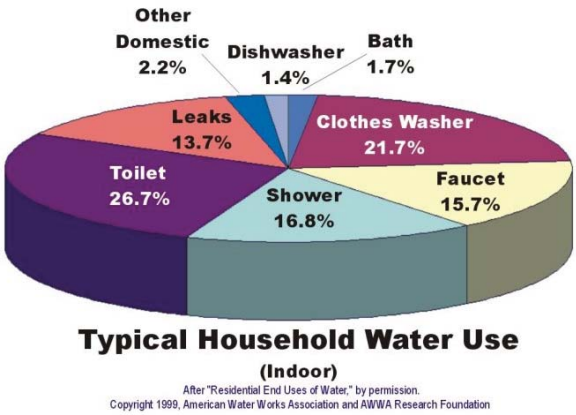
As a necessity for life itself, water is one of our most precious natural resources. In the Bay Area, we receive most of our water from the snowpacks of the Sierra Nevada. But with a changing climate and growing populations, our water resources have been shrinking year by year. While state and local leaders continue to work on long-term solutions to our water challenges, saving water on a daily basis helps stretch supplies and keeps water in reservoirs for the inevitable dry years to come.



Source: Dan Cayan et al. (2006), in the California Climate Adaptation Strategy (2009), p. 80.

How We Use Water?

Indoor Water Use in a Typical Single Family Home



When you save water, you also save energy. That's because a good chunk of California's electricity (20 percent) and natural gas (30 percent) consumption is used simply to pump, transport, and treat water around the state. And up to 49 percent of a typical home's gas usage goes to heating water.

Reducing water use can therefore help lower your energy bills.

STEP #7: Measure the Flow Rate of Faucets

Using the water flow rate bag, you will measure the rate that water flows from your faucets and showerheads.

1. Determine if your existing aerator is already low-flow; this should be printed on the side of the aerator. Low-flow aerators are marked as follows:
   - bathroom sink: 0.5 gpm
   - kitchen sink: 1.5 gpm
   - showerhead: 2.0 gpm.
   If the existing aerator is not marked as above, continue with the following steps.
2. Turn on faucet and fill water flow rate bag for 5 seconds.
3. Record water flow on your Data Tracking Sheet.
4. If your water is flowing at a rate greater than noted in the 1st step, then install one of the Toolkit aerators.
5. Test the flow rate again after the installation and note your findings.

Tool: Water Flow Rate Bag

Think before you dump leftover water; make the most of it by giving it to your indoor or outdoor plants.

Fun Fact: On average, U.S. residents use 69 gallons of water per day per person for indoor use. That's 25,000 gallons a year per person—enough to fill an average home swimming pool!

STEP #8: Replace the Aerators

Check the imprint on the aerator for flow rate, or use the flow rate bag to measure. If the faucet flows at more than 0.5 gpm (bathroom) and 1.5 (kitchen), then you should replace the current aerators with the aerators provided.

Note: Some kitchen faucets are custom sizes and cannot be replaced with the Toolkit's aerator. You can still measure the flow rate and seek alternatives at a local hardware store or online.

1. Close or plug your drain.
2. Unscrew old aerator counterclockwise; if needed, use the pliers to loosen the aerator. Wrap the teeth of the pliers with painter's tape or a towel to avoid scratches to the existing equipment.
3. Clean and dry water pipe threads (grooves at end of faucet).
4. Wrap provided pipe thread seal tape around pipe thread.
5. Screw on new aerator clockwise by hand.
6. Turn on faucet to test for leaks, and tighten with pliers if necessary.

Equipment: Faucet Aerator

Tool: Pipe Thread Seal Tape

Tool: Pliers

Continued on P.14

STEP #8 (Part 2): Replace the Showerhead

Check the imprint on the showerhead for flow rate, or use the flow rate bag to measure. If the showerhead flows at more than 1.5 gpm, then you should replace with the showerhead provided.

Instructions: Identical to Step #8.

Equipment: Low-flow Showerhead

Faucet Aerator

http://goo.gl/ZHDeo

Showerhead

http://goo.gl/qkcxB

Instructional Video: Use your smart phone to follow these QR codes for videos on how to change your faucet aerator and showerhead.

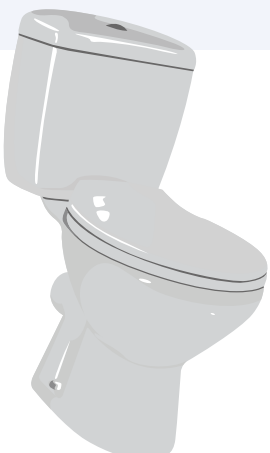
STEP #9: Use the Toilet Leak Detection Tablets

Leaking toilets can contribute to high water bills if undetected. The Detect-A-Leak Toilet Tablets are a simple and inexpensive way to test for leaks on a regular basis.

1. Carefully remove tank lid.
2. Drop 1-2 tablets into exposed tank.
3. Wait 20-30 minutes. Do not flush the toilet during this time.
4. If blue color appears in the toilet bowl you have a toilet leak. Typically, a leaky flapper is the cause for toilet leaks and needs to be replaced.

Equipment: Toilet Leak Detecting Tablets

Water Savings Tips



- Avoid running water while brushing your teeth and shaving.
- A constantly running toilet can waste up to 200 gallons of water per day. That can cost you $250 over the course of a year! Contact the Santa Clara Valley Water District for a free home Water-Wise House Call, covering both in-home and landscaping use. Call 1-800-548-1882 to schedule and appointment.
- Upgrade your old, inefficient toilet (3.5 gallons per flush or more) to a high-efficiency or dual flush toilet.
- Make use of a shower timer, which helps you use less water and save energy at the same time. Try to set is for five minutes or less.

Heating water typically accounts for up to 49 percent of the natural gas use in your home.

STEP #10: Adjust the Water Heater

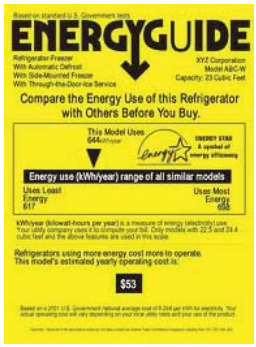
1. Locate your water heater.
2. Locate adjustment dial and mark current setting with a pencil or masking tape.
3. Locate the faucet closest to the water heater.
4. Run water until hot and capture a cupful in a mug.
5. Insert thermometer and wait for it to reach its highest point.
6. Record highest point temperature on your Data Tracking Sheet.
7. Adjust setting so that your hot water runs at 120°F. If your water heater does not have specific temperature settings, this step might take a few tries.

Tool: Thermometer

Instructional Video: How to Adjust Your Water Heater Temperature. Scan the QR code with a smart phone to view the video, or visit this link: **http://goo.gl/DJDKk**

Tips:

- Insulate the pipes leading from the water heater. This helps conserve energy.
- Set your water heater to "Vacation Mode" when you are away for long periods of time to conserve energy.
- Check the EnergyGuide sticker when purchasing a new hot water heater. It provides the estimated cost to run the equipment.
- Do you have a recirculation pump? These pumps can save water, but only if the timer is set correctly.



Rebates! Rebates!
Rebates are available for water-efficient fixtures through the Santa Clara Valley Water District. Visit **valleywater.org** or call **1-877-874-8479**. Additional information may be found at the website of the rebate Bay Area Water Supply and Conservation Agency; visit **bawsca.org**.

Water Savings Tips

- Regularly check for and fix leaks in your irrigation system; leaks can waste thousands of gallons of water annually.
- Consider switching to a drip irrigation system to save water.
- Water between sunset and sunrise when temperatures and wind are the lowest; this reduces evapotranspiration and allows water to soak deeper into your landscaping.
- Pool filters are energy intensive. Consider reducing your filter times in the fall and winter and set timers to avoid peak utility rates. Using a pool cover will save even more energy and water.
- To view water-saving tips and rebates, visit **save20gallons.org**.
- The Santa Clara Valley Water District offers free Water-Wise House Calls for both the home and landscape. Call **1-800-548-1882** to schedule an appointment. If you are a San Jose Water Company customer, please call **(408) 279-7900** to schedule a free Water Watcher Audit.
- The Santa Clara Valley Water District also offers rebates for replacing turf areas with qualifying plants that require less water. Visit **http://goo.gl/Zejtce** for more information.
- Change your irrigation schedule with the season and with local weather conditions. Better yet, consider upgrading to a weather based irrigation controller.

Fun Fact:

Which is more water efficient—a commercial car wash or home car wash?
Compared to a home car wash, a commercial car wash saves water. A home car wash uses 80-140 gallons of water whereas most commercial car washes use 30-45 gallons. Washing your car on your driveway or in the street sends dirty water, soap, heavy metals, oil, and grease into the gutter which flows to local creeks and the Bay. If you wash your car at home, park it over the lawn or a gravel area.

Santa Clara Valley Water District

San Jose Water Company

Cooking & Eating

Kitchen activities often require large amounts of energy. Use these tips to reduce energy use:

Efficient Cooking Habits

- Thaw frozen food to reduce cook times.
- Double your recipe, freezing half for later.
- Heat only as much water as needed.
- Cover pans to reduce cook time and energy.
- Use fewer pots to reduce dish washing needs.
- Use your toaster oven or microwave for small items; unplug appliances when not in use.
- Avoid opening the oven door.

Efficient Dishwasher Habits

- Scrape, don't rinse, dishes.
- Use the short cycle.
- Avoid the "Rinse Hold" setting.
- Air dry dishes by turning off the heat setting and opening the door.
- Upgrade to an EnergyStar® model, saving up to $40 per year. PG&E offers rebates for upgrading to a more efficient model: http://goo.gl/slvjF

Eating Habits that Help the Planet and Your Health

- **Rethink your drink**. Avoid sweetened beverages—one 20-ounce soda contains 17 teaspoons of sugar. To learn more, visit **sccgov.org** and click the Health & Safety tab.
- **Shop your refrigerator first**. In the U.S., 40 percent of our food goes uneaten. Eat what you have before shopping for more by taking EPA's Food Recovery Challenge. Visit **http://goo.gl/XWk0Zf**
- **Eat locally**. Reduce the miles your food travels and support local farmers.
- **Opt for organic**. Avoiding pesticides is better for the environment and your health.
- **Try the veggie option**. Meat production uses an enormous amount of water and energy. On average, it takes 28 calories of fossil fuel energy to produce one calorie of meat, versus 3.3 calories of fossil fuel energy to produce one calorie of protein from grain. Similarly, it takes 4,200 gallons of water daily to support a meat-based diet, versus 300 gallons to support a vegan diet. Going meatless once a week will make a difference.
- **Prepare balanced meals**. The obesity rate in Santa Clara County is 21 percent. Provide meals loaded with fruits and veggies to promote healthy eating habits for you and your kids.

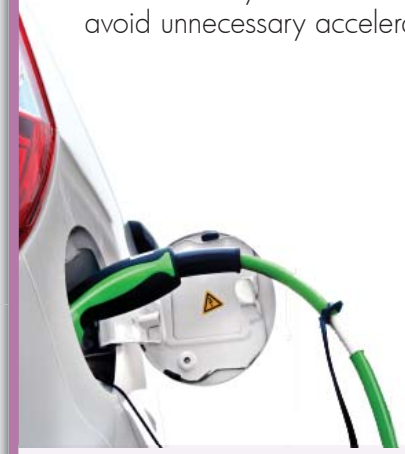
Transportation

Get better gas mileage:

- Regularly maintain your vehicle—a happy car is a more efficient car.
- Under-inflated tires will decrease your miles per gallon, so check the tire pressure when filling your tank. Proper tire pressure levels can be found on the inside of the driver's side door.
- Drive smoothly and at the speed limit; avoid unnecessary acceleration.

Or, ditch the car!

- Consider using alternative transportation at least a couple times a week.
- Walk or bike whenever possible, visit VTA website for bikeways maps
- Try public transportation. Visit **vta.org** for local routes and schedules.
- Safe Routes to School—"cool" your kids commute by walking, biking, scootering, or taking the school bus to school. Visit **http://goo.gl/GggMa** to learn the ways to create a fun, healthy, and safer way to get to school.



WALK & ROLL
safe routes to school in santa clara county

Recycling & Composting

Composting not only provides healthier soil and plants but can save you money by not having to buy soil conditioners, mulch, and fertilizer. Home composting also reduces yard trimming collection and processing; keeps kitchen waste out of the landfill; and turns organic material into a valuable product for gardens and house plants.

Visit **http://goo.gl/OIw2n1** for the latest Composting Workshops in Santa Clara County.

For information about recycling programs for each city in Santa Clara County, visit **http://goo.gl/kg22eV**. This site includes information about landfills, transfer stations, curbside recycling programs, and key contacts for each city.

The Recycling & Waste Reduction Commission at the County of Santa Clara has a Recycle search to find places to recycle and reuse stuff, visit **http://goo.gl/6rKMDq**

Return the DIY Toolkit to the Library

Now that you've used the Toolkit and accomplished the steps to a more energy-efficient home, you have just a few things left to do:

1. The **full-page** Data Tracking Sheet is for you to keep but the **half-sheet** Data Tracking Info Card should be returned to the library—make sure to fill it out, this helps us track how the Toolkit is being used.

2. Make sure all tools (see list on page 2) are in your kit before returning it to the library. Please return the Toolkit as soon as you can so other library patrons can make use of it.

3. Got the energy efficiency bug? Think you missed a few things, or need further assistance? The SVEW team is here to help—contact us at **svenergywatch.org** or call **(408) 535-8550.**

4. Consider amplifying your savings through the whole home performance approach of Energy Upgrade California—visit **energyupgradeca.org** to learn more and get started.

5. Thinking about going solar? Energy efficiency steps should be done first, enabling you to drive down your total energy demand so that you don't buy a bigger solar system than you need. Visit **gosolarcalifornia.org** to learn more about solar options for your home.

6. Spread the word about SVEW and share your experience using the DIY Toolkit.

7. Enjoy the savings from all of your DIY actions!

Congratulations on taking these steps to save vital resources!

CONTACT

Silicon Valley Energy Watch
City of San José - Environmental Service Department
200 East Santa Clara, San José, CA 95113
Phone: (408) 535-8550
energy@sanjoseca.gov

Participating Libraries

San José Public Library

santa clara county library district

City of Sunnyvale California

SILICON VALLEY energy watch

Pacific Gas and Electric Company®

City of San José Capital of Silicon Valley
Environmental Services

As a part of the State's energy efficiency portfolio funded by California utility customers, Silicon Valley Energy Watch (SVEW) exists to help residents, businesses, and public agencies throughout Santa Clara County save energy easily and cheaply. SVEW is implemented by the City of San José Environmental Services Department in partnership with Ecology Action. This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission. "PG&E" refers to Pacific Gas and Electric Company, a subsidiary of PG&E Corporation.

Printed on recycled paper.

Silicon Valley Energy Watch DIY Home Energy Saving Toolkit

Data Tracking Worksheet Page 1

Use this sheet to keep track of the retrofits you've installed and calculate the assumed annual savings from your actions. **This form is yours to keep**. Please complete the card inside the toolkit using the savings amounts you calculate on this sheet and return it to the library when you are done.

Date:_____

Water

Showerhead	Flow Rate (gpm) Before	After	Saved	Daily Use (mins)	Conversion	Savings (gal/year)
Bathroom	_____	2.0	= _____	x _____	x 365	= _____

Water Savings → _____ /748 = _____ Ccf x $ _____ /Ccf* = $ _____

Gas Savings → _____ x 0.005 = _____ therms x $1.4 /therm = $ _____

Annual Cost Savings

Faucet Aerator	Flow Rate (gpm) Before	After	Saved	Daily Use (mins)	Conversion	Savings (gal/year)
Bathroom	_____	0.5	= _____	x _____	x 365	= [1] _____
Bathroom	_____	0.5	= _____	x _____	x 365	= [2] _____
Kitchen	_____	1.5	= _____	x _____	x 365	= [3] _____
					TOTAL [1+2+3]	_____

Water Savings → _____ /748 = _____ Ccf x $ _____ /Ccf* = $ _____

Annual Cost Savings

Lighting

Location	Usage (Watt) Old Bulb	New Bulb	Saved	Daily Use (hours)	Conversion	Savings (kWh/y)
_____	_____	- _____	= _____	x _____	x 365	= [1] _____
_____	_____	- _____	= _____	x _____	x 365	= [2] _____
_____	_____	- _____	= _____	x _____	x 365	= [3] _____
_____	_____	- _____	= _____	x _____	x 365	= [4] _____
					TOTAL [1+2+3+4]	_____

Electricity Savings → _____ kWh x 0.14** = $ _____

Annual Cost Savings

*The average rate for water is currently $2.74/Ccf, not including meter service charges, taxes, or fees. This rate is calculated using an estimated average of residential water rates in the San José area. Check your water bill for a more accurate figure.

**Usage rate is based on the PG&E baseline rate of $0.14/kWh. Your rates might be higher.

–Over–

Silicon Valley Energy Watch DIY Home Energy Saving Toolkit

Data Tracking Worksheet Page 2

Plug Loads

Electronic Devices	Device State	Usage (Watts)		Daily Use (hours)	Conversion	Electricity Usage (kWh/y)	Electric Rate	Electricity Costs
Television	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Cable Box	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
DVD/Blu Ray	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Stereo	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Computer	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Printer/Fax	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Coffee Maker	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Microwave	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Other	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____
Other	Standby	_____	x	_____	x 365 =	_____	x 0.14* =	_____
	On	_____	x	_____	x 365 =	_____	x 0.14* =	_____

*Usage rate is based on the PG&E baseline rate of $0.14/kWh. Your rates might be higher.

Add all your calculation from the "Electricity Usage" column: Total Usage = _____ kWh/y

Add all your calculation from the "Electricity Costs" column: Total Costs = $ _____

I pledge to commit at least one of the following action:

- ☐ Unplug inactive appliances
- ☐ Turn off lights when leaving a room
- ☐ Wash clothes in cold water
- ☐ Set hot water heater no higher than 120F
- ☐ Use sunlight for light
- ☐ Do full loads in dishwasters and clothers washers

Silicon Valley Energy Watch DIY Home Energy Saving Toolkit

Data Tracking Info Card

Please fill in the information below by using your worksheet and return it along with your toolkit to the library.

Checkout Date _____

Library _____

# of people living in your household _____

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

SILICON VALLEY energy watch

PG&E Pacific Gas and Electric Company®

Showerhead

Water Savings $ _____

Gas Savings $ _____

Faucet Aerator

Water Savings $ _____

Lighting

Electricity Savings $ _____

Plug Loads

Electricity Cost $ _____

This information enable us to assess the effectiveness of this program for residents individually and of the program overall. We THANK YOU for ensuring the longevity of our program by completing the form.

CUPERTINO

CITY OF CUPERTINO

CLIMATE ACTION PLAN

APPENDIX F – Green Business Certification

Cupertino.org/greenbiz

Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

Working Partners:

PG&E

Recology

Santa Clara Valley Water District

This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission .

Office/Retail Program Standards

This document serves to provide business owners with a hard copy of the check and balances required in order to become a certified green business in the City of Cupertino. This checklist is for review purposes only. Please contact erinc@cupertino.org when you are ready to apply.

General/Staff Education

General Standards for All Businesses — Required

- ☐ Inform your customers about your business environmental efforts and what you are doing to meet the green business standards. For example: Post the Green Business logo, certification and pledge in a visible location; Post reminders listing steps you are taking to be a Green Business; Offer tours that highlight your Green Business successes; Offer customers green service or amenities options; Highlight your Green Business efforts and/or certification on your website, and link it to the GBP home page.
- ☐ Adopt a written environmentally preferable (or green) purchasing policy. Ask your Green Business Coordinator for templates.
- ☐ Establish a 'green team' that can help guide efforts to green your business.

Solid Waste

Purchase with Recycled Content — Required

- ☐ Paper towels with 35% post-consumer waste
- ☐ Purchase copier/printer paper with at least 30% post consumer waste

Purchase with Recycled Content — Complete at least 3

- ☐ Purchase office/copier paper with 100% post consumer waste
- ☐ Purchase copy, computer and fax paper with minimum 50% post consumer waste
- ☐ Purchase letterhead with the highest recycled content available
- ☐ Purchase envelopes with the highest recycled content available.
- ☐ Purchase toilet seat covers and toilet paper with recycled content.
- ☐ Remodel/build with materials containing recycled content
- ☐ Purchase tissues with the highest recycled content available
- ☐ Purchase business cards with recycled content
- ☐ Purchase carpet, carpet undercushion, or flooring with recycled content.
- ☐ Purchase folders or other paper products with the highest recycled content available.
- ☐ Purchase garbage bags with the highest recycled content available.
- ☐ For retail use or shipping, purchase boxes or bags with recycled content.

Cupertino.org/greenbiz

Required Actions

Additional Measures

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Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

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- [ ] Use refilled or remanufactured laser and copier toner cartridges.
- [ ] Retailers stock/sell products made with recycled content.

Recycle Materials — Required

- [ ] Recycle all paper, glass, metal, cardboard and plastics accepted in your area.
- [ ] Where applicable, provide recycling and composting container(s) at convenient and appropriate locations such as staff lunch or break rooms and near vending machines.

Recycle Materials — Complete at least 1

- [ ] Recycle CDs/DVDs
- [ ] Compost food scraps
- [ ] Compost landscape trimmings (green waste) and debris

Reduce Waste — Required

- [ ] If you provide disposable bags to your customers for items purchased, encourage the reuse of paper or plastic bags by offering discounts on future purchases. Plastic bags should only be provided when absolutely necessary.
- [ ] Eliminate individual bottles of water for employees and guests.
- [ ] Eliminate the use of polystyrene containers. Utilize on of the following options (in orger of preference): paper, paperboard, compostable containers (starch-based sugarcane, rice hulls, and/or corn), or recyclable plastic.
- [ ] Purchase/lease all new copiers and printers with double sided copying capability or ensure that employees are printing on both sides of the page manually (print odd pages, return to printer, then print even pages).
- [ ] Make two sided printing and copying standard practice in your business (set printers and copiers to default to duplex printing). Make single-sided the exception instead of the rule

Reduce Waste — Complete at least 3

- [ ] Set document defaults to smaller fonts and margins.
- [ ] Send and receive faxes directly from computers without printing
- [ ] Keep a stack of previously used paper near printers to use for drafts or internal memos, or designate a draft tray on printers with multiple trays.
- [ ] Centralize purchasing to eliminate unnecessary purchases and ensure that all waste reduction purchasing policies are followed
- [ ] Eliminate paper documents by using electronic forms and contracts.
- [ ] Purchase reusable rather than disposable office items such as refillable pens, erasable white boards & wall calendars.
- [ ] Select products shipped with less packaging.
- [ ] Retailers: Use optical scanners, which give more details about inventory, for more precise ordering.
- [ ] Request that marketing materials be printed on recycled content paper.
- [ ] Subscribe to journals, trade magazines, etc. online rather than receiving hard copies.

Cupertino.org/greenbiz

Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

Working Partners:

PG&E

Recology

Santa Clara Valley Water District

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Reuse Materials — Complete at least 3

- ☐ Request that marketing materials be printed on recycled content paper.
- ☐ Purchase used or refurbished equipment and/or furniture.
- ☐ Donate furniture, supplies, scrap materials, etc., or use a waste exchange program where another business can take your unwanted items.
- ☐ Recycle or reuse plastic wrap/bags
- ☐ Reuse paper or plastic packaging materials in your own shipments.
- ☐ Retailers: Offer incentives for customers who bring their own reusable bags, coffee mugs, etc. (or disincentives such as charging fees for bags)
- ☐ In the lunch/break room, replace disposables with permanent water (mugs, dishes, utensils, etc.) and use refillable containers for sugar, salt & pepper, etc. to avoid individual condiment packets.
- ☐ Lease, rather than purchase computers and printers or upgrade desktop computers instead of purchasing new ones.
- ☐ Recycle wood, including pallets
- ☐ Designate a reuse area for office supplies such as binders, folders and staplers.
- ☐ Have your toner cartridges refilled for reuse.

Energy Conservation

Reduce Your Energy Bill — Required

- ☐ Replace incandescent bulbs with efficient compact fluorescents
- ☐ Replace all T-12 fluorescent lighting with energy-efficient T-8 or T-5 fixtures with electronic ballasts or other equivalent efficacy lighting
- ☐ Complete regularly scheduled maintenance on your HVAC (heating, ventilation and air conditioning) and refrigeration system at least twice a year.
- ☐ Use energy efficient exit signs, such as LEDs

Equipment & Facilities — Complete at Least 5

- ☐ Institute a policy that all electronic devices, lighting and room cooling units be turned off when not in use and use light switch reminders to remind staff to do the same
- ☐ Use ENERGY STAR qualified refrigerators (those over 10 years old should be replaced)
- ☐ Use occupancy sensors to control air conditioning and heat.
- ☐ Properly set and maintain lighting control devices (current time and on/off schedule) such as time clocks, photocells and sensors and adjust for season.
- ☐ Use ENERGY STAR® office equipment and enable energy saving features
- ☐ Set refrigerator temperature to meet minimum health requirements (typically between 38F and 41F for refrigerators and between 10F and 20F for freezers)
- ☐ Apply window film to reduce heat
- ☐ Shade sun-exposed windows and walls using awnings, sunscreens, trees or shrubbery

Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

Working Partners:

This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission .

- ☐ Incandescent bulbs that are not replaced with compact fluorescents are replaces with LEDs.
- ☐ Use a 365 day programmable thermostat to control heating and air conditioning
- ☐ Use task lighting instead of lighting the entire area
- ☐ Use lighting controls such as dual technology occupancy sensors, bypass/delay timers, photocells or time clocks
- ☐ Reduce number of fixtures or lamps per fixture

Water Conservation

Reduce Your Water Bill — Required

- ☐ Install toilets with 1.6 gpf (gallon per flush) or less
- ☐ Check for and repair all leaks, including in toilets
- ☐ Assign a person to monitor water bills for sudden rises in use, and to track use over time. Call your water company should sudden rises occur
- ☐ Install low-flow aerators in faucets and showerheads according to water district specifications.
- ☐ Post signs in restrooms and kitchen to encourage water conservation and to report leaks
- ☐ Use only dry methods to clean outdoor hard surfaces and post instructions for staff.

Reduce Your Water Bill — Complete at least 2

- ☐ Provide additional urinals in men's restroom and reduce number of toilets
- ☐ Replace water-cooled equipment, such as air condition units, with air-cooled.
- ☐ Reduce indoor water pressure to no higher than 50 psi by installing pressure reducing valves.
- ☐ Conduct annual training to educate staff about the benefits of efficient water use at the workplace.
- ☐ Schedule your water company to make a presentation to staff to encourage water conservation at home. (Some water companies offer training and take home conservation kits).
- ☐ Adjust sprinklers for proper coverage—optimizing spacing and avoiding runoff onto paved surfaces. Adjust sprinklers to achieve even water distribution and to eliminate all runoff.
- ☐ Go beyond the 1.9 gpf toilets to 1.28 gpf HETs (high efficiency toilets). Ask your water district about rebates for replacing older toilets >3.5 gpf.

Complete if You Have Landscaping — Required

- ☐ Adjust the irrigation schedule monthly during irrigation season, or as needed
- ☐ Save water by programming the irrigation system to use shorter, repeated cycles of watering (3 start times of 3 minutes each instead of one start time of 10 minutes)
- ☐ Water during early morning, pre-dawn hours

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Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

Working Partners:

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Complete if You Have Landscaping — Complete at least 2

- ☐ Plant drought tolerant plants that will not need pruning at maturity
- ☐ Use reclaimed water, graywater or rainwater for irrigation
- ☐ Install a self-adjusting, weather-based irrigation controller that tailors watering schedules to local weather, plant types, etc.
- ☐ Install rain shut-off devices or moisture sensors that turn off the irrigation during rain
- ☐ Make necessary changes to assure proper hydro-zoning (grouping of plants with similar water needs and sprinkler types) of irrigated areas, for example, separate bed and turf zones.
- ☐ Use drip irrigation
- ☐ Apply mulch or compost in non-turf areas to improve the water holding capacity of the soil

Pollution Prevention

Climate Change Mitigation — Complete at Least 1

- ☐ Complete a CO_2 or eco-footprint calculator to determine your own greenhouse gas emissions
- ☐ Install renewable energy sources, such as solar panels or wind generators. Specify system size
- ☐ Buy renewable energy credits or green tags to offset the CO_2 emissions from your offices use of electricity and natural gas

Recycle/Reuse Potential Pollutants — Required

- ☐ Properly store and recycle Universal Wastes as required by law. Designate a storage area for spent Universal Wastes, posting a sign and notifying employees of this area. Ensure that these are recycled (and not put into the garbage). Universal Wastes are: Spent fluorescent light tubes & bulbs, Electronic equipment (computers, cell phones, pagers, etc.) and Batteries

Recycle/Reuse Potential Pollutants — Complete at least 1

- ☐ Recycle used ink jet cartridges
- ☐ When recycling electronic equipment, take to a certified "e-Steward" for responsible recycling

Reduce Air Emissions — Required

- ☐ Join the Air Districts Spare the Air program and notify employees and customers of Spare the Air days.
- ☐ Encourage commuter alternatives by informing employees, customers and others who visit your office about various transportation options (post bicycle route maps and transit schedules before driving directions).

Reduce Air Emissions — Complete at least 1

- ☐ Hire locally.
- ☐ Offer a shuttle service to and from bus, train and/or light rail stops.
- ☐ Enroll in a car share program
- ☐ Offer telecommuting opportunities and/or flexible schedules so workers can avoid heavy traffic commutes
- ☐ Provide secure bicycle storage for staff and customers

Cupertino.org/ greenbiz

Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

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Working Partners:

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Reduce Chemical Use — Required

- [ ] Reduce chemicals (cleaners, pesticides, paints, etc.) used and stored, safely disposing of any unneeded products at the local Household Hazardous Waste Program
- [ ] Eliminate or reduce pesticides by using good sanitation (keeping kitchen, desks and waste storage areas clean) and making physical changes to keep out pests
- [ ] If contracting with a pest control operator, specify in contracts the use of Integrated Pest Management (including non-chemical pest prevention with no perimeter spraying), or choose a contractor that is certified in IPM, such as those listed at www.EcoWiseCertified.com
- [ ] Use low toxic cleaning products such as those that are SF Approved (www.sfapproved.org), Green Seal certified (www.greenseal.org), or receive at least an 8.1 rating on the GoodGuide (www.goodguide.com), in non-aerosol containers
- [ ] Use no products with added antibacterial agents, such as triclosan. This includes products used for hand washing, dishwashing and cleaning
- [ ] Replace all aerosols with pump dispensers.
- [ ] Assess chemicals used in your business by reviewing Material Safety Data Sheets (MSDS) and Prop.65 warnings on labels. Substitute with less toxic alternatives if available. Track the amounts of hazardous waste generated, and dispose of at local hazardous waste programs.

Reduce Chemical Use — Complete at least 2

- [ ] Replace standard fluorescent lights with low or no mercury fluorescent lights. Provide make and model
- [ ] Eliminate the routine use of all disinfectants and sanitizers, unless needed to comply with Environmental Health.
- [ ] Purchase organically or locally grown foods and beverages for the office kitchen.
- [ ] Do business with other green vendors or services, such as recognized Bay Area Green Businesses
- [ ] Obtain a battery recharger for the office. Use rechargeable (instead of disposable) batteries for flashlights, radios, remote controls, etc.
- [ ] Purchase EPEAT certified (www.EPEAT.net) computers, laptops and monitors.
- [ ] Store any potentially hazardous materials securely, control access and rotate stock to use oldest products first.

Reduce Vehicle Emissions — Complete at least 1

- [ ] Convert company vehicles to low emission vehicles (electric, hybrid, natural gas or alternative fuels)
- [ ] Larger employers: Offer electric vehicle recharge ports for visitors and employees electric vehicles.

Cupertino.org/greenbiz

Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

Working Partners:

This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission .

Wastewater

Storm Water Pollution Prevention — Required

- [ ] Label all storm water drains with No dumping, Drains to Bay message
- [ ] Ensure that no wastewater enters a storm drain.
- [ ] Do not wash cars, equipment, floor mats or other items where run-off water flows straight to the storm drain
- [ ] Keep dumpsters closed and impermeable to rainwater. Keep them from overflowing and keep dumpster/parking areas clean
- [ ] Keep receiving, loading docks, dumpster, landscape, storage and parking areas free of litter, oil drips and debris.
- [ ] Clean private catch basins annually (by October 15th), before the first rain and as needed thereafter.
- [ ] If using water to clean parking or other outdoor areas, hire a BASMAA-certified mobile cleaner. Contractor must use equipment that collects wash water and disposes to sanitary sewer

Storm Water Pollution Prevention — Complete at least 2

- [ ] Store deliveries and supplies under a roof
- [ ] Mulch, use ground cover, or use a barrier to prevent exposed soil from washing landscaped areas into storm drain
- [ ] Regularly check and maintain storm drain openings and basins. Keep litter, debris and soil away from storm drains
- [ ] Clean outdoor surfaces by dry sweeping

Health & Wellness

Benefits — Recommended

- [ ] Offer employee health& wellness benefits and programs such as: health screenings and clinics, nutrition and weight loss services, flexible spending accounts, fitness facilities and discounts, group exercise opportunities, preventative health workshops, flex-time for exercise, informal sports leagues, and more
- [ ] Create bike buddy/bike ambassador program
- [ ] Offer bicycle safety and/or maintenance trainings
- [ ] Introduce bike fleet and/or bike share program
- [ ] Increase bike rack and/or storage capacity
- [ ] Offer employee incentives for alternative commuting (i.e. parking cash-out, subsidized transit passes, tax-free commuter benefits, guaranteed ride home, etc.).
- [ ] Establish a CSA program for employees and/or offer community CSA pick-up location at your business
- [ ] Encourage employees to participate in local CSA program and/or purchase produce at farmers markets
- [ ] Provide healthy vending options (fruit juice, milk, soy alternatives to sugar sweetened beverages and alternatives to candy bars and potato chips)

CUPERTINO

CITY OF CUPERTINO

CLIMATE ACTION PLAN

APPENDIX G – green@school Certification

Cupertino.org/greenbiz

Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

Working Partners:

Recology

Santa Clara Valley Water District

School Program Standards

This document serves to provide business owners with a hard copy of the check and balances required in order to become a certified green business in the City of Cupertino. This checklist is for review purposes only. Please contact erinc@cupertino.org when you are ready to apply.

General/Staff Education

General Standards for All Businesses — Required

- ☐ Inform your customers about your business environmental efforts and what you are doing to meet the green business standards. For example: Post the Green Business logo, certification and pledge in a visible location; Post reminders listing steps you are taking to be a Green Business; Offer tours that highlight your Green Business successes; Offer customers green service or amenities options; Highlight your Green Business efforts and/or certification on your website, and link it to the GBP home page.
- ☐ Provide 3 on-going incentives or training opportunities to encourage management and employee participation in the Green Business Program. For example, incorporate Green Business into performance appraisals, job descriptions, training programs, employee orientations, staff meeting discussions, employee reference material, company newsletter or bulletins and company suggestion and reward programs.
- ☐ Assist at least one other business in learning about becoming a Green Business. Encourage them to enroll in the Green Business Program and provide their contact information to your GBP coordinator.
- ☐ Adopt a written environmentally preferable (or green) purchasing policy. Ask your Green Business Coordinator for templates.
- ☐ Establish a 'green team' that can help guide efforts to green your business.

Solid Waste

Purchase with Recycled Content — Required

- ☐ Paper towels with 35% post-consumer waste
- ☐ Purchase copier/printer paper with at least 30% post consumer waste

Purchase with Recycled Content — Complete at least 2

- ☐ Purchase office/copier paper with 100% post consumer waste
- ☐ Purchase or obtain previously used furniture, supplies or materials.
- ☐ Purchase letterhead with the highest recycled content available
- ☐ Purchase envelopes with the highest recycled content available.
- ☐ Purchase toilet seat covers and toilet paper with recycled content.
- ☐ Remodel/build with materials containing recycled content
- ☐ Purchase tissues with the highest recycled content available
- ☐ Purchase garbage bags with the highest recycled content available

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Required Actions

Additional Measures

 General/Staff Education

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 Health & Wellness

Working Partners:

Recology

Santa Clara Valley Water District

- ☐ Purchase folders or other paper products with the highest recycled content available.
- ☐ Purchase business cards with recycled content.
- ☐ Purchase carpet, carpet undercushion, or flooring. with recycled content.
- ☐ Use refilled or remanufactured laser and copier toner cartridges.
- ☐ Purchase storage bins and recycling containers with recycled content.

Recycle Materials — Required

- ☐ Recycle all paper, glass, metal, cardboard and plastics accepted in your area.
- ☐ Provide recycling containers at convenient and appropriate locations (i.e., lobbies, guest rooms, vending machines, kitchens, next to garbage containers, desks, etc.)

Recycle Materials — Complete at least 1

- ☐ Recycle CDs/DVDs.
- ☐ Compost food waste.
- ☐ Recycle or reuse carpeting.
- ☐ Recycle scrap metal.
- ☐ Recycle wood including pallets.
- ☐ Compost landscape trimmings (green waste) and debris.

Reduce Waste — Required

- ☐ Eliminate the use of polystyrene, such as Styrofoam, in beverages and food service ware.

Reduce Waste — Complete at least 6

- ☐ Buy products in returnable or reusable containers
- ☐ Practice efficient copying by using the size reduction feature (print two pages of a document on one page, set word processing defaults for smaller fonts and narrow margins).
- ☐ Subscribe to journals, trade magazines, etc. online rather than receiving hard copies.
- ☐ Reduce printing of emails, attachments and documents
- ☐ Work with vendors to: Minimize and take back packaging (including empty containers), eliminate polystyrene (Styrofoam, bubble wrap, etc.; or take back used/damaged product for reuse or recycling; to minimize packaging.
- ☐ Use electronic billing methods to invoice customers and receive payment.
- ☐ Eliminate paper documents by using electronic forms and contracts.
- ☐ Send and receive faxes directly from computers without printing
- ☐ Centralize meeting announcements and journals in a single location (bulletin board, white board, email, etc.) to reduce printed copies
- ☐ Lease, rather than purchase computers and printers or upgrade desktop computers instead of purchasing new ones.
- ☐ Leave mowed grass on lawn (grasscycling)

Reuse Materials — Complete at least 3

- ☐ Reuse garbage bag liners.
- ☐ Reuse paper or plastic packaging materials in your own shipments.
- ☐ Reuse envelopes.
- ☐ Have your toner cartridges refilled for reuse.
- ☐ Donate furniture, supplies, scrap materials, etc., or use a waste exchange program where another business can take your unwanted items.
- ☐ Print on the back side of previously printed on paper. Either use a second tray of the printer for such paper or keep it stacked next to the printer for hand loading.

Cupertino.org/greenbiz

Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

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Working Partners:

Recology

Santa Clara Valley Water District

Reduce (City Measure) — Recommended

- ☐ Eliminate individual bottles of water for employees and guests.
- ☐ Default settings: If copiers and printers have duplex printing capability, duplex printing must be enabled. New machines must have duplex printing capability
- ☐ Reduce all unwanted mailings:
  • Eliminate duplicates by returning labels & requesting all but one be removed.
  • Reduce junk mail. Guidance and a PDF kit are at http://stopjunkmail.org Reduce catalogs at www.catalogchoice.org
  • Eliminate duplicates in your own mailing lists
- ☐ Design marketing materials that require no envelope – simply fold and mail.
- ☐ Opt-out of unnecessary publications including Yellow Pages, etc. yellowpagesoptout.com/
- ☐ Serve dishes at office or community events in reusable serving dishes
- ☐ Conduct routine (informal) waste audits. Look in your garbage dumpster annually to see if there are items that could instead be reused by someone else or recycled

Energy Conservation

Reduce Your Energy Bill — Required

- ☐ Replace incandescent bulbs with efficient compact fluorescents
- ☐ Assign staff to track energy bills over time, looking for sudden rises in use
- ☐ Replace all T-12 fluorescent lighting with energy-efficient T-8 or T-5 fixtures with electronic ballasts or other equivalent efficacy lighting

Equipment & Facilities — Complete at Least 4

- ☐ Replace single or package A/C unit with one that exceeds Title 24 building standards
- ☐ If purchasing new computers, buy EPEAT certified (www.EPEAT.net). If purchasing monitors, consider flat-screen LED monitors which consume approximately 1/3 less energy than larger ray tube monitors.
- ☐ Use ENERGY STAR qualified refrigerators (those over 10 years old should be replaced)
- ☐ Use task lighting instead of lighting the entire area.
- ☐ If you are a large business or have a complex network, use power management software programs to automatically activate power management settings in computers and printers.
- ☐ Use ENERGY STAR® office equipment and enable energy saving features
- ☐ Set thermostat to 76F for cooling, 68F for heating; use timing devices to turn system down after hours.
- ☐ Use energy-efficient double paned windows on at least 90% of windows.
- ☐ Apply window film to reduce heat.
- ☐ Institute a policy that all electronic devices, lighting and room cooling units be turned off when not in use and use light switch reminders to remind staff to do the same.
- ☐ Shade sun-exposed windows and walls using awnings, sunscreens, trees or shrubbery.
- ☐ Use a 365 day programmable thermostat to control heating and air conditioning.
- ☐ Clean lighting fixtures, diffusers and lamps twice a year so they are lighting as effectively as possible.

Cupertino.org/greenbiz

Required Actions

Additional Measures

General/Staff Education

Solid Waste

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Working Partners:

Recology

Santa Clara Valley Water District

- ☐ Rearrange workspace to take advantage of areas with natural light and design for increased natural lighting when remodeling.
- ☐ Reduce number of fixtures or lamps per fixture
- ☐ Shade HVAC condensers, especially roof-top units.
- ☐ Use occupancy sensors to control air conditioning and heat.
- ☐ Use and maintain economizers on A/C to increase air circulation.
- ☐ Use a solar water heater or preheater.
- ☐ Use instantaneous hot water heaters (or on demand systems) at point of use.
- ☐ Use weather stripping to seal air gaps around doors and windows.

Water Conservation

Reduce Your Water Bill — Required

- ☐ Install toilets with 1.6 gpf (gallon per flush) or less.
- ☐ Check for and repair all leaks, including in toilets.
- ☐ Assign a person to monitor water bills for sudden rises in use, and to track use over time. Call your water company should sudden rises occur
- ☐ Test irrigation sprinklers quarterly to ensure proper operation and coverage and repair all broken or defective sprinkler heads/nozzles, lines and valves.
- ☐ Post signs in restrooms and kitchen to encourage water conservation and to report leaks.
- ☐ Use only dry methods to clean outdoor hard surfaces and post instructions for staff.
- ☐ Save water by programming the irrigation system to use shorter, repeated cycles of watering (3 start times of 3 minutes each instead of one start time of 10 minutes).
- ☐ Adjust the irrigation schedule monthly during irrigation season, or as needed.
- ☐ Adjust sprinklers for proper coverage, optimized spacing, and eliminated runoff.
- ☐ Water during early morning, pre-dawn hours.

Reduce Your Water Bill — Complete at least 5

- ☐ Schedule your water company to make a presentation to staff to encourage water conservation at home.
- ☐ Indoors, use dry floor cleaning methods, followed by damp mopping, rather than spraying or hosing with water.
- ☐ Change window cleaning schedule from periodic to as required.
- ☐ Provide additional urinals in men's restroom and reduce number of toilets
- ☐ Install low-flow aerators and showerheads (your water company may offer these for free):; As low as 0.5 gpm and no greater than 2.5 gpm for lavatory sinks; 2.0 gpm or less for kitchen sinks; 2.0 gpm or less for showerheads
- ☐ Adjust boiler and cooling tower blowdown rate to maintain TDS (total dissolved solids) at levels recommended by manufactures specifications.
- ☐ Replace water-cooled equipment, such as air conditioning units, with air-cooled.
- ☐ Work with your water company to develop a site-specific water budget. Track your water use to ensure efficient watering.

Working Partners:

Recology

Santa Clara Valley Water District

- ☐ Group plants with similar water requirements together (hydrozone) on the same irrigation line
- ☐ Plant drought tolerant plants that will not need pruning at maturity
- ☐ Use reclaimed water, graywater or rainwater for irrigation
- ☐ Install a self-adjusting, weather-based irrigation controller that tailors watering schedules to local weather, plant types, etc.
- ☐ Install rain shut-off devices or moisture sensors that turn off the irrigation during rain
- ☐ Use drip irrigation
- ☐ Apply mulch or compost in non-turf areas to improve the water holding capacity of the soil.
- ☐ Replace water intensive turf with woodchips, plant based mulch, loose stones or permeable pavers.
- ☐ Reduce indoor water pressure to no higher than 50 psi by installing pressure reducing valves.

Pollution Prevention

Recycle/Reuse Potential Pollutants — Required

- ☐ Properly store and recycle Universal Wastes as required by law. Designate a storage area for spent Universal Wastes, posting a sign and notifying employees of this area. Ensure that these are recycled (and not put into the garbage). Universal Wastes are: Spent fluorescent light tubes & bulbs, Electronic equipment (computers, cell phones, pagers, etc.) and Batteries

Recycle/Reuse Potential Pollutants — Complete at least 2

- ☐ Recycle excess paint/solvents (keep only what is needed for touch ups, then give remainder to hazardous waste collection program, donate to anti-graffiti program, or return to contractor or manufacturer).
- ☐ Recycle used copier toner cartridges.
- ☐ Recycle used ink jet cartridges.
- ☐ When recycling electronic equipment, take to a certified "e-Steward" for responsible recycling.
- ☐ Recycle car fluids from company vehicles.

Reduce Chemical Use — Required

- ☐ Reduce chemicals (cleaners, pesticides, paints, etc.) used and stored, safely disposing of any unneeded products at the local Household Hazardous Waste Program
- ☐ Replace all aerosols with pump dispensers.
- ☐ Use low toxic cleaning products such as those that are SF Approved (www.sfapproved.org), Green Seal certified (www.greenseal.org), or receive at least an 8.1 rating on the GoodGuide (www.goodguide.com), in non-aerosol containers
- ☐ Use no products with added antibacterial agents, such as triclosan. This includes products used for hand washing, dishwashing and cleaning

Reduce Chemical Use — Complete at least 4

- ☐ Use electric (not gas) powered tools.
- ☐ If spraying, use high-efficiency paint spray equipment with high solids paint.
- ☐ Eliminate the routine use of all disinfectants and sanitizers, unless needed to comply with Environmental Health.
- ☐ Offer certified organic, fair trade, sustainably harvested and/or locally grown products.

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Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

Water Conservation

Pollution Prevention

Wastewater

Health & Wellness

Working Partners:

Recology

Santa Clara Valley Water District

- ☐ Use recycled oil for vehicles/equipment.
- ☐ Eliminate the use of chemical and aerosolized air fresheners/deodorizers. To freshen air, open windows or adjust fan speed in restrooms and kitchens.
- ☐ Use route optimization software or have documented delivery plans.
- ☐ Store any potentially hazardous materials securely, control access and rotate stock to use oldest product first .
- ☐ Print promotional materials with vegetable or other low-VOC inks
- ☐ Replace toxic permanent ink markers/pens with water-based ones.
- ☐ Use unbleached and/or chlorine-free paper products (copy paper, paper towels, napkins, coffee filters, etc).
- ☐ Obtain a battery recharger for the office. Use rechargeable (instead of disposable) batteries for flashlights, radios, remote controls, etc.
- ☐ Replace standard fluorescent lights with low mercury fluorescent lights. Approved models can be found at www.sfapproved.org.
- ☐ Use one or a few low-toxicity multipurpose cleaners, rather than many special-purpose cleaners.
- ☐ Do business with other green vendors or services, such as recognized Bay Area Green Businesses (listings at www.greenbiz.ca.gov).

Reduce Vehicle Emissions — Complete at least 3

- ☐ Convert company vehicles to low emission vehicles (electric, hybrid, natural gas or alternative fuels).
- ☐ Use biodiesel (100% or blends) or vegetable diesel in place of petrodiesel in vehicles.
- ☐ Offer lockers and showers for staff who walk, jog or bicycled to work.
- ☐ Encourage employees and customers to bike and use public transit by posting bicycle ride maps and transit schedules/maps.
- ☐ Buy renewable energy credits or green tags to offset the CO_2 emissions from your offices use of electricity and natural gas (see www.green-e.org).
- ☐ Larger Employers: Offer electric vehicle recharge ports for visitors and employees electric vehicles.
- ☐ Install renewable energy sources, such as solar panels or wind generators. Specify system size.
- ☐ Offer a shuttle service to and from bus, train and/or light rail stops
- ☐ Larger Employers: Set aside car/vanpool/rideshare car parking spaces.
- ☐ Larger Employers: Provide commuter van
- ☐ Provide secure bicycle storage for staff and customers
- ☐ Encourage bicycling to work by offering rebates on bicycles bought for commuting, or provide employees a stipend or subsidy for bicycle maintenance
- ☐ Offer telecommuting opportunities and/or flexible schedules so workers can avoid heavy traffic commutes
- ☐ Help employees rideshare by posting commuter ride sign-up sheets and providing other commuter incentive programs (e.g., rideshare incentive programs, guaranteed ride home in emergency situations, etc.) available at www.Rideshare.511.org
- ☐ Patronize services close to your business (e.g., food/catering, copy center, etc.) and encourage employees to do the same.
- ☐ When possible, arrange for a single vendor who makes deliveries for several items.
- ☐ Hire locally.

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Required Actions

Additional Measures

General/Staff Education

Solid Waste

Energy Conservation

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Health & Wellness

Working Partners:

Recology

Santa Clara Valley Water District

Wastewater

Storm Water Pollution Prevention — Required

- [ ] Keep dumpsters closed and impermeable to rainwater. Keep them from overflowing and keep dumpster/parking areas clean
- [ ] Clean private catch basins annually (by October 15th), before the first rain and as needed thereafter.
- [ ] Ensure that no wastewater enters a storm drain.
- [ ] Do not wash cars, equipment, floor mats or other items where run-off water flows straight to the storm drain.
- [ ] If using water to clean parking or other outdoor areas, hire a BASMAA-certified mobile cleaner. Contractor must use equipment that collects wash water and disposes to sanitary sewer.

Storm Water Pollution Prevention — Complete at least 2

- [ ] Provide containment for large amounts of liquid supplies such as cleaners and paints.
- [ ] Store any potentially hazardous materials securely, control access and rotate stock to use oldest material first.
- [ ] Store deliveries and supplies under a roof.
- [ ] Do not apply pesticides or fertilizers before it rains (pollutants may be washed into the storm drain).
- [ ] Maintain green waste or food compost area to prevent leaks or spills to storm drain.
- [ ] Label all storm drains with No dumping, Drains to Bay message.
- [ ] Clean outdoor surfaces by dry sweeping.
- [ ] Routinely check for and address leaks, spills, and emissions of chemicals, paints, and cleaners. Repair any deficiencies.
- [ ] Regularly check and maintain storm drain openings and basins. Keep litter, debris and soil away from storm drains.
- [ ] Use dry cleanup methods as a norm, and sweep prior to mopping floors. If necessary, use spot mopping only.
- [ ] Post signs at targeted trouble spots (e.g., loading docks, dumpster areas, outside hoses) to explain proper practices to prevent pollutants from reaching storm drains.
- [ ] Use pipes or hoses for transferring cleaners or other chemicals to prevent spills and splashes.
- [ ] Mulch, use ground cover, or use a barrier to prevent exposed soil from washing landscaped areas into storm drain.
- [ ] Keep a spill kit handy to catch/collect spills from hazardous materials, grease, or leaking company, employee, or guest vehicles. Make sure there is adequate absorbent material to contain the largest possible spill
- [ ] Locate all potential pollutants away from food preparation, service and storage areas as well as sewer and storm drains.

Health & Wellness

Benefits — Recommended

- [ ] Offer employee health& wellness benefits and programs such as: health screenings and clinics, nutrition and weight loss services, flexible spending accounts, fitness facilities and discounts, group exercise opportunities, preventative health workshops, flex-time for exercise, informal sports leagues, and more

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Working Partners:

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Santa Clara Valley Water District

- ☐ Create bike buddy/bike ambassador program
- ☐ Offer bicycle safety and/or maintenance trainings
- ☐ Introduce bike fleet and/or bike share program
- ☐ Increase bike rack and/or storage capacity
- ☐ Offer employee incentives for alternative commuting (i.e. parking cash-out, subsidized transit passes, tax-free commuter benefits, guaranteed ride home, etc.).
- ☐ Establish a CSA program for employees and/or offer community CSA pick-up location at your business
- ☐ Encourage employees to participate in local CSA program and/or purchase produce at farmers markets
- ☐ Provide healthy vending options (fruit juice, milk, soy alternatives to sugar sweetened beverages and alternatives to candy bars and potato chips)