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.

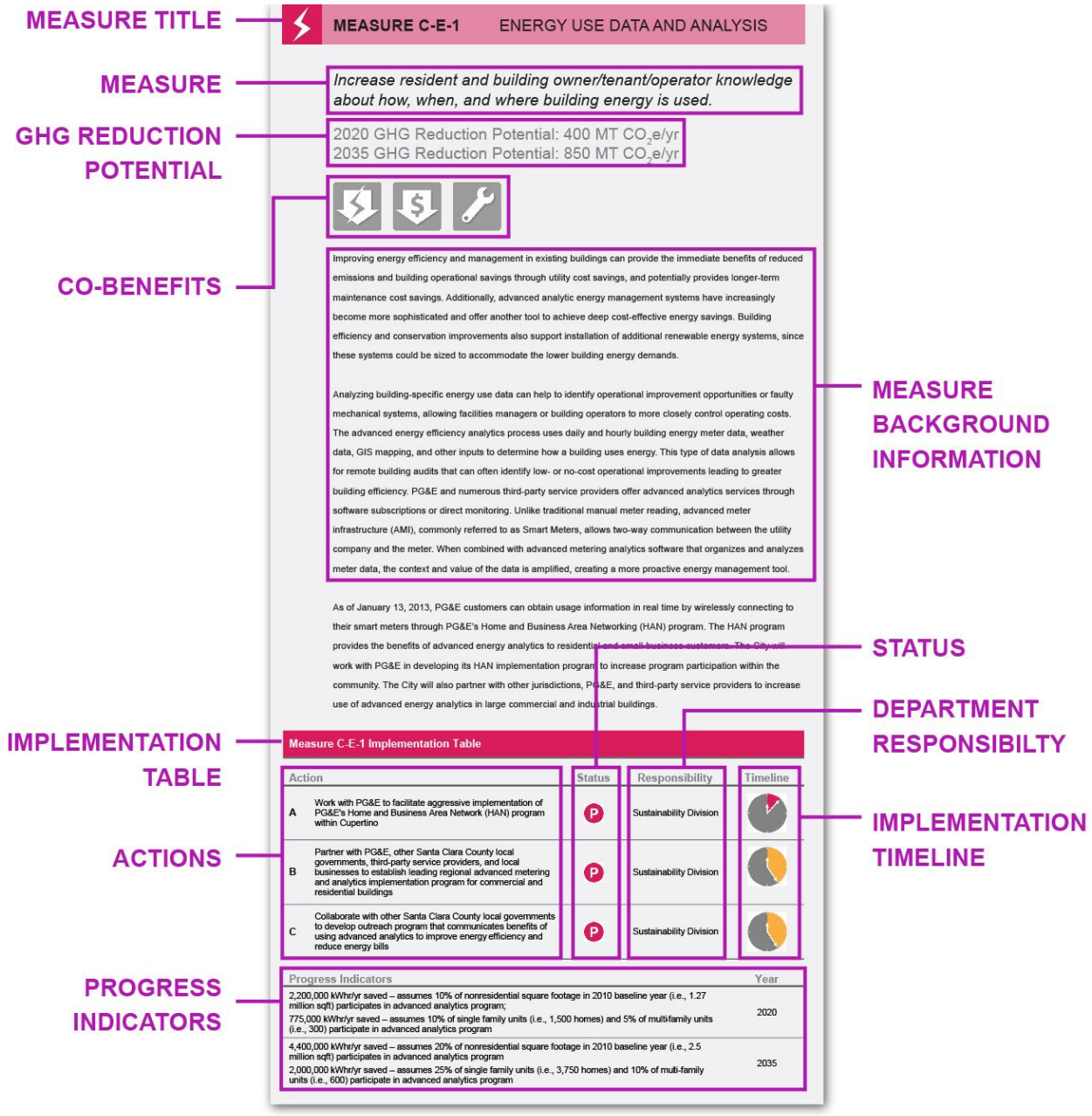
Measure

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

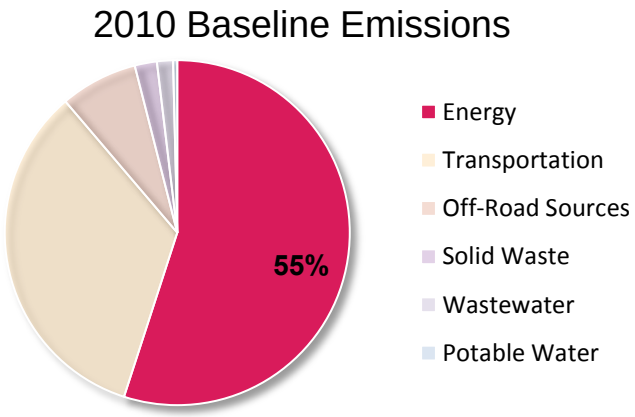
Progress indicators describe the specific action that is being quantified to estimate the reduction potential. These indicators enable City staff, the City Council, and the public to track implementation and monitor overall CAP progress. Progress indicators are provided for both 2020 and 2035, and are 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

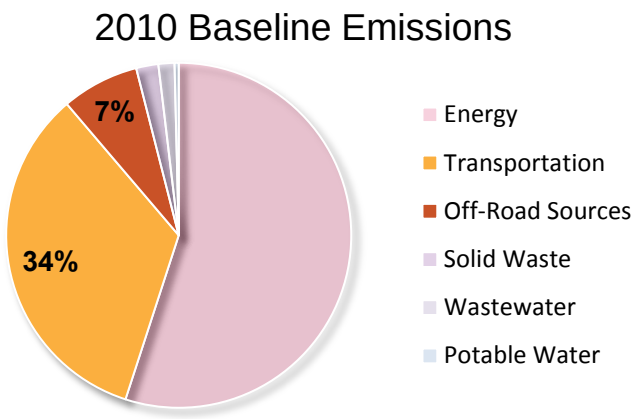
	Action	Status	Responsibility	Timeline
A	Work with other Santa Clara County partners to conduct feasibility study of developing multi-jurisdiction CCA program	P	Sustainability Division	
B	If study determines CCA to be feasible and advantageous to Cupertino residents and businesses, work with Santa Clara 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.

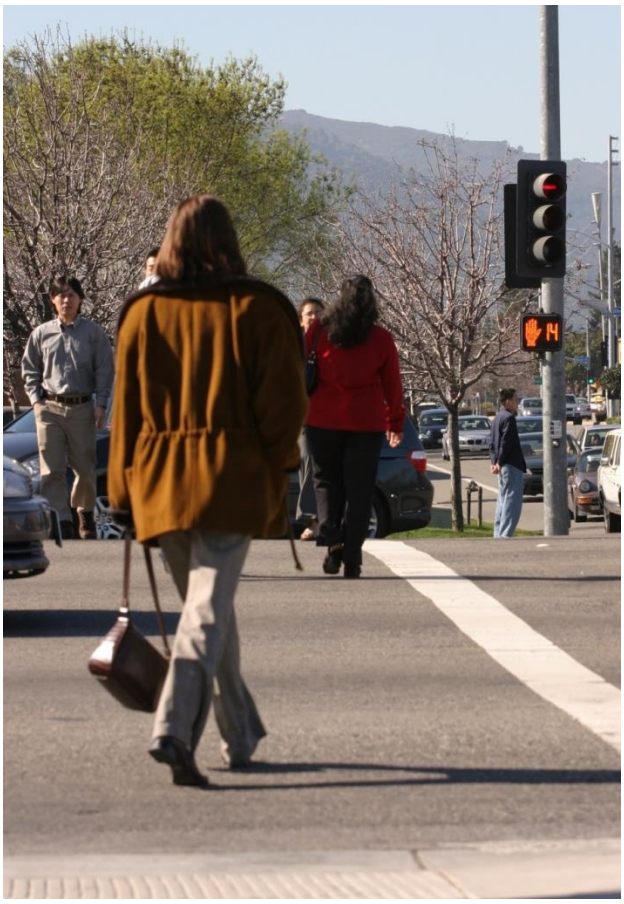
Emissions reductions from the Transportation and Land Use Strategy total 3,350 MT CO_2e/yr in 2020, and 12,600 MT CO_2e/yr in 2035. This represents approximately 21% of total local CAP measure reductions in 2020.

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.

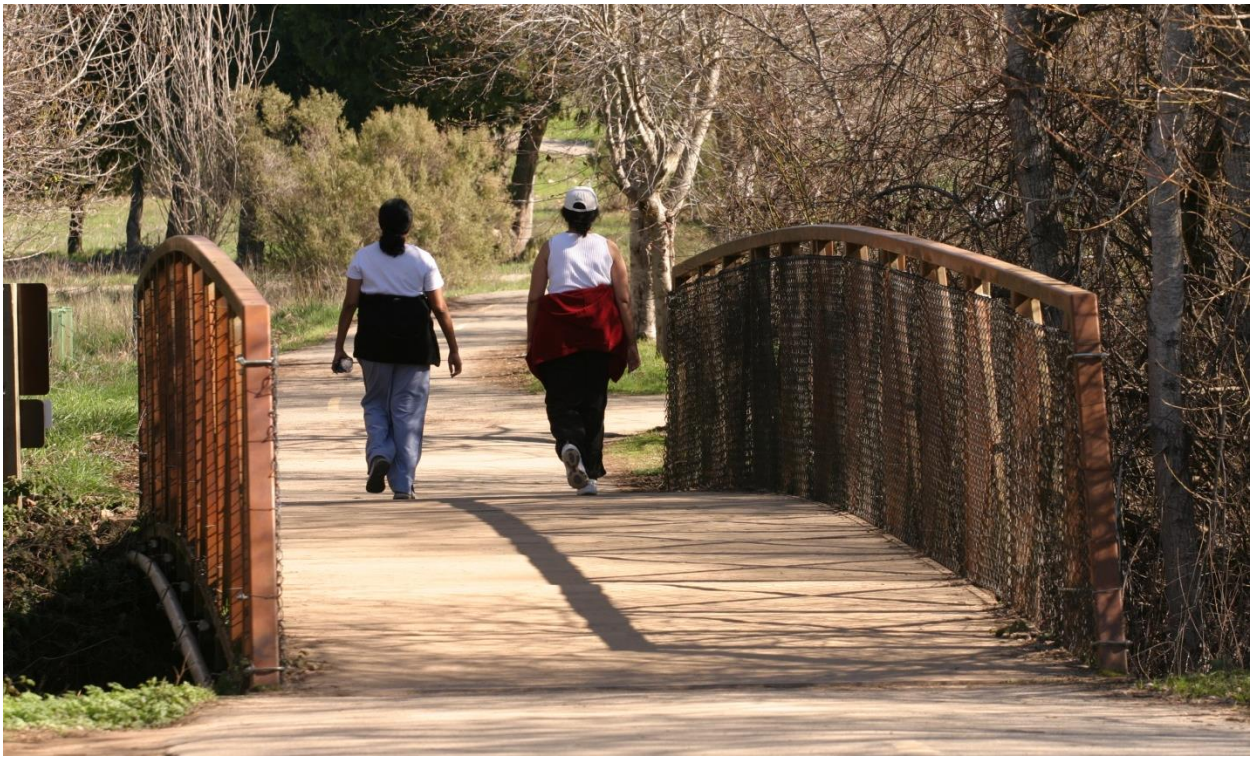


In 2002, Cupertino adopted its Pedestrian Transportation Plan which recommends various capital improvement projects that

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	

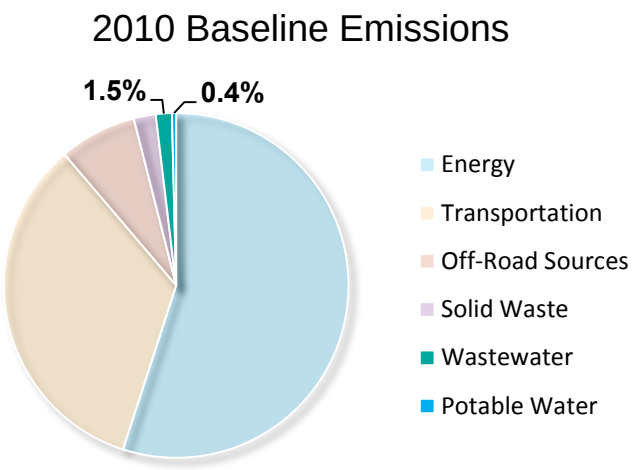
Progress Indicators	Year
Community-wide motor vehicle profile shifts as follows: 5% of gasoline passenger vehicles shift to plug-in hybrid electric (PHEV); 5% of diesel passenger vehicles shift to PHEV; 5% of gasoline light-duty trucks shift to PHEV; 3% of gasoline heavy-duty trucks shift to CNG; 3% 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

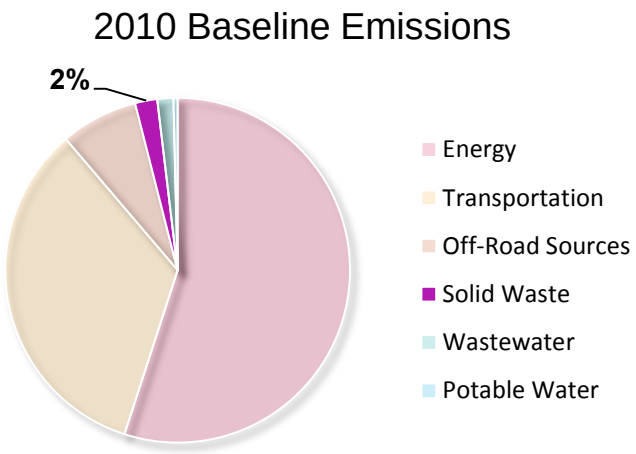
	Action	Status	Responsibility	Timeline
A	Conduct feasibility analysis to determine potential for recycled water systems in Cupertino; map locations of large irrigation water users (now and likely future users) to identify feasible extent of new system	P	Grounds & Fleet Division	
B	Continue to monitor 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

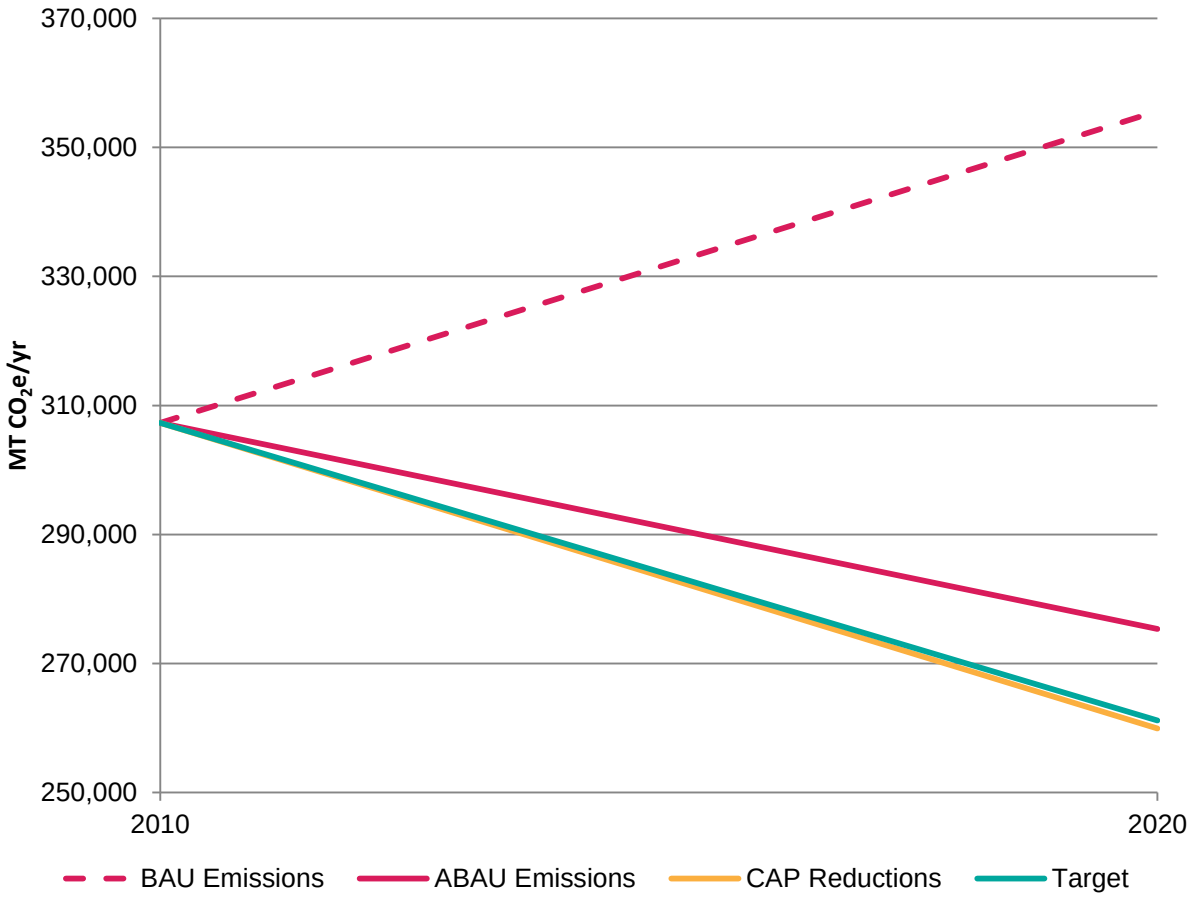
Target Achievement

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.

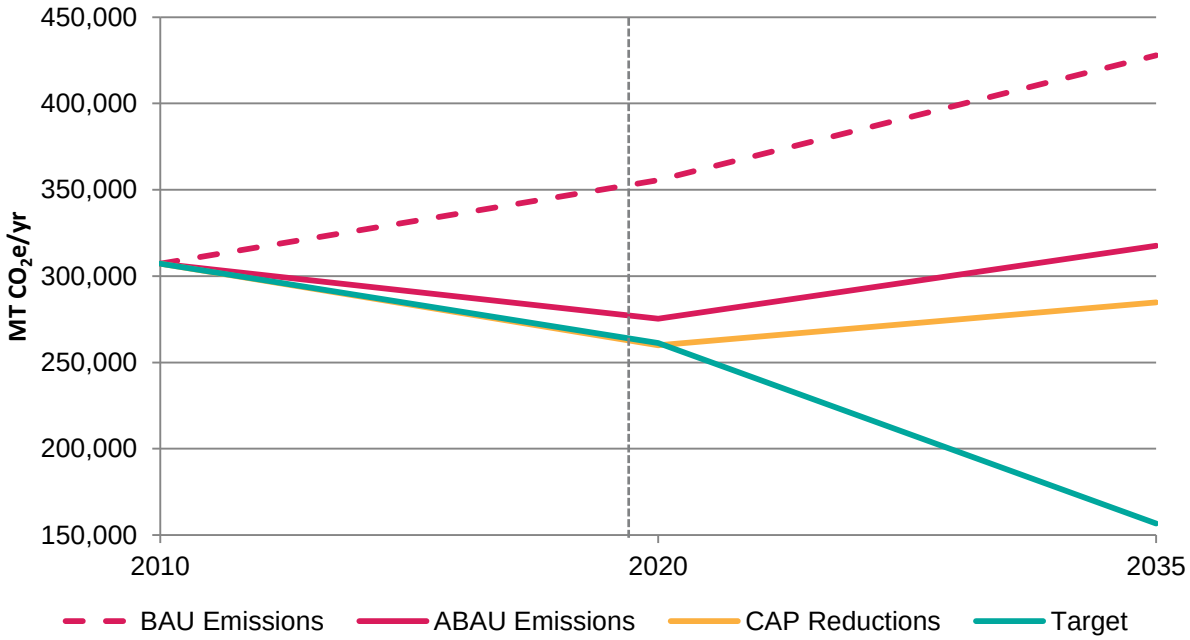
Figure 3.5 – 2020 Community-wide Target Achievement



PROGRESS TOWARD 2035 TARGET

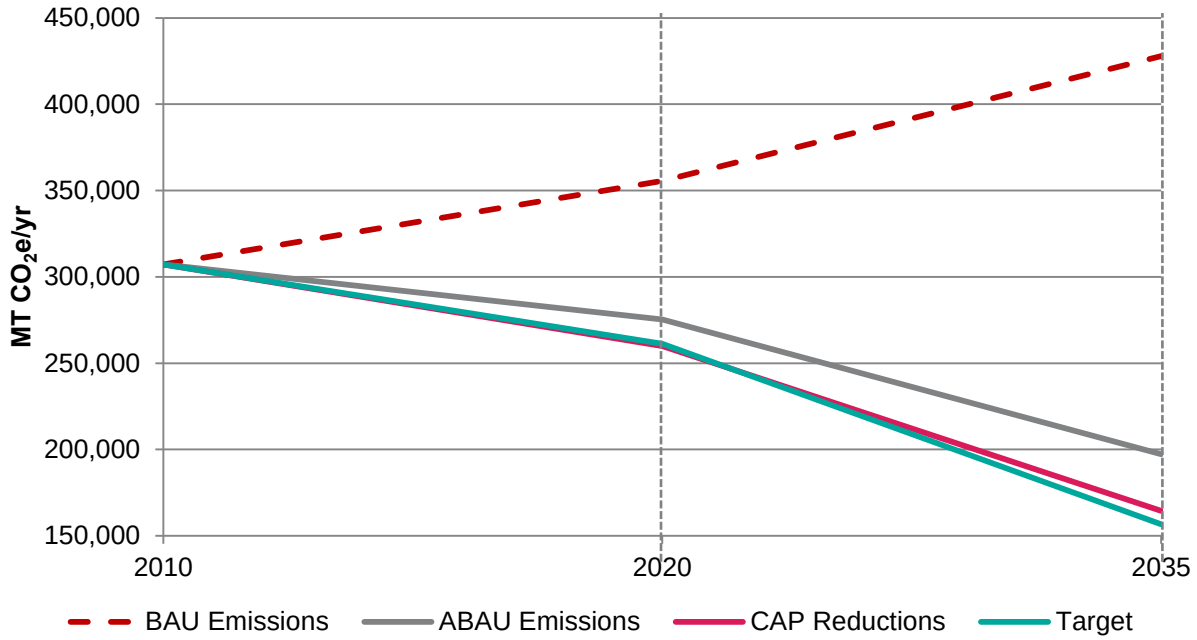
As shown in Figures 3.6 and 3.7, the most important driver for long-term target achievement is statewide action. As described in Chapter 2, the future impact of statewide actions is currently difficult to predict because the Scoping Plan only quantifies emissions reductions through the 2020 horizon year. 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