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CHAPTER 4 LOCAL GOVERNMENT REDUCTION MEASURES

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

Purpose of the Municipal Operations Strategy

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

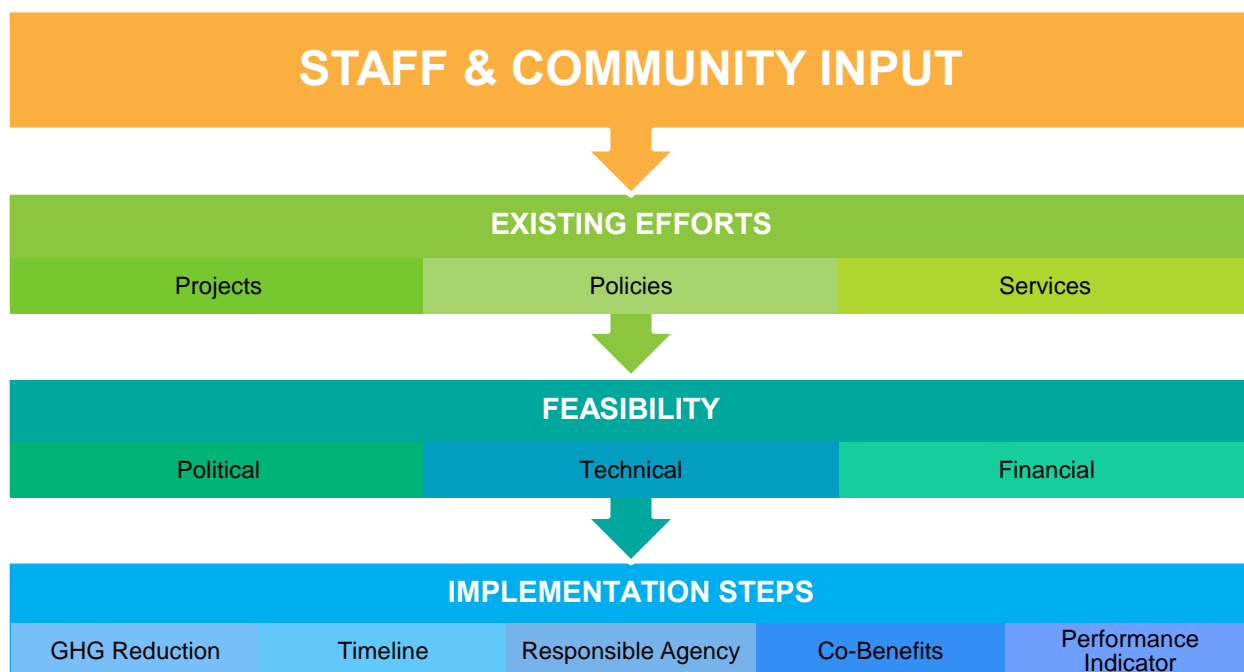
Measure Development Process

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



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

Figure 4.1 – Municipal Operations Measure Development Considerations



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

**Table 4.1
Existing City Emissions Reduction Initiatives**

FACILITIES

Existing Building Energy and Water Retrofits

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

New Building Energy Performance

- Green Building Standards
- Building Energy Use Benchmarking

Conservation / Energy Management through Behavior

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

Public Realm Lighting Efficiency

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

Landscape Water Conservation

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

VEHICLE FLEET

Efficient and Alternative Fuel Vehicles

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

Behavior / Fuel Conservation

- Anti-Idling Driver Policy

SOLID WASTE

Waste Reduction

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

Food Scrap and Compostable Paper Diversion

- Municipal Collection and Composting Program

Landscape Waste Diversion

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

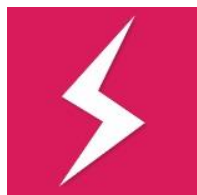
Construction and Demolition (C&D) Waste Diversion

- C&D Waste Diversion Ordinance – 50% Diversion

Reduction Strategies

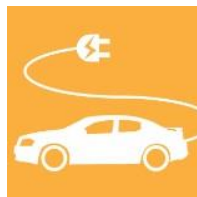
The municipal reduction strategy is designed to achieve the City’s 2020 target for emissions reductions 15% below its 2010 baseline level, as described in Chapter 2. As with the community-wide strategy presented in Chapter 3, the municipal operations strategy is organized into strategy areas with goals,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

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



GOAL 1 –IMPROVE FACILITIES:

Transform facilities into models of technology demonstration and conservation.



GOAL 2 –CONVERT VEHICLE FLEET:

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



GOAL 3 – REDUCE SOLID WASTE:

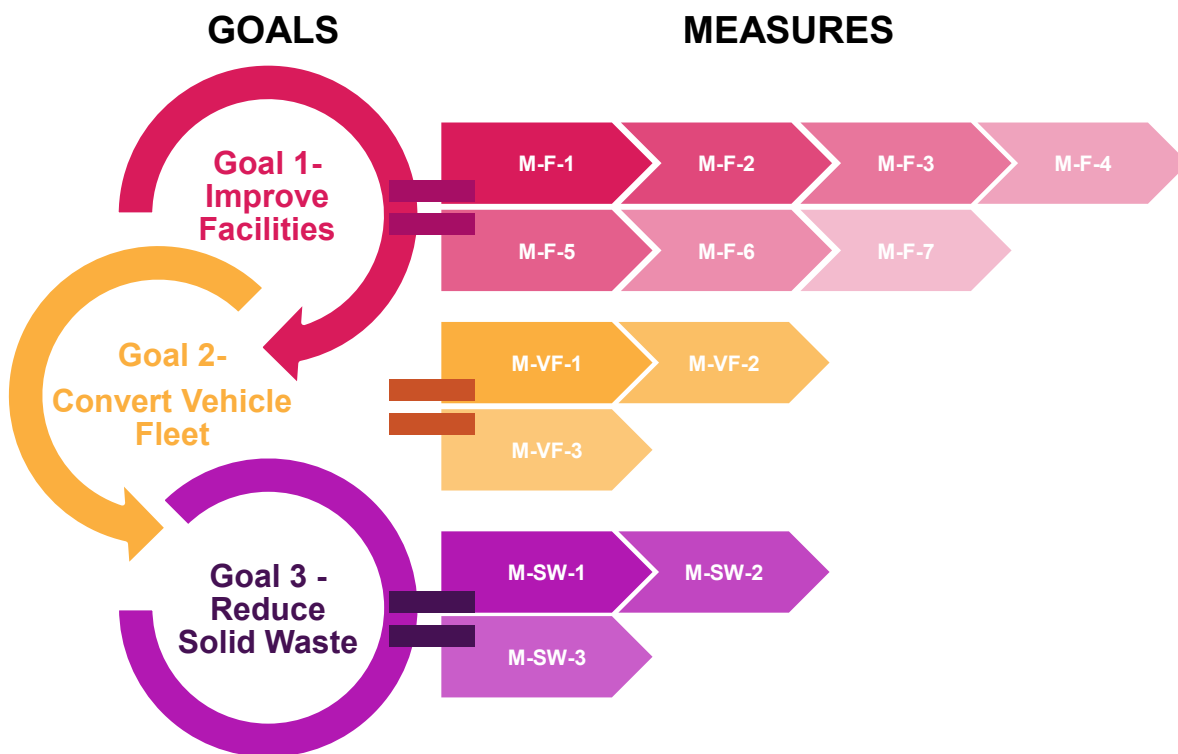
Effectively manage materials to shift behavior, consumption, and lifecycle impacts.

MUNICIPAL OPERATIONS REDUCTION MEASURES

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

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

Figure 4.2 – Hierarchy of Goals, Measure, and Actions



Summary of Reductions

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

Figure 4.3 – Municipal Reduction Measures Contribution by 2020

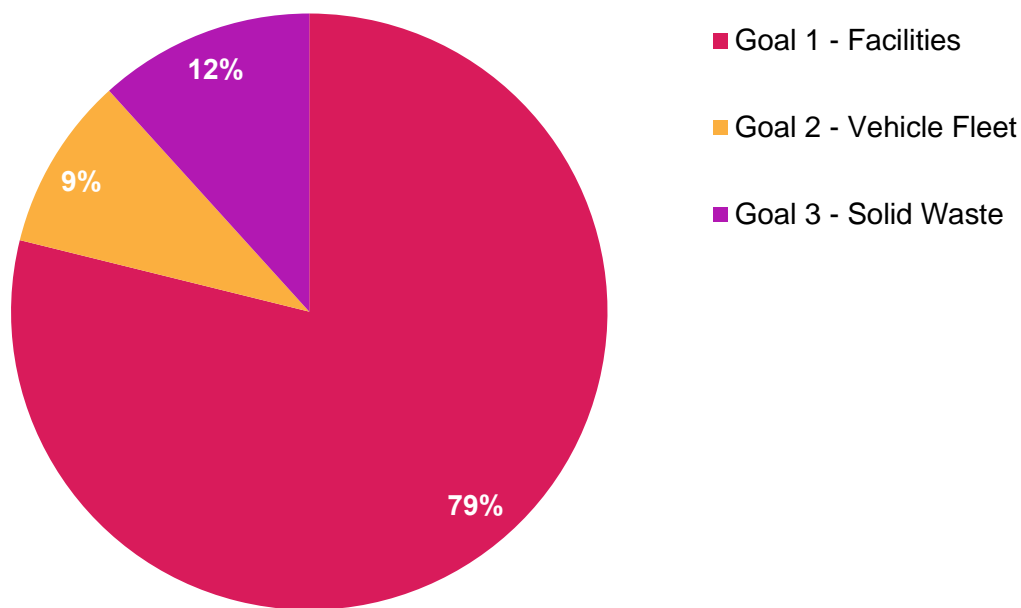


Table 4.2 presents an overview of the 14 proposed municipal CAP measures (including one statewide measure) that are presented in greater detail later in this chapter. Where possible, emissions reduction estimates have been provided. In some instances, it was not possible to calculate the specific impact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

**Table 4.2
Municipal Operations Measures and Quantified Reductions**

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

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

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

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

IMPACT OF PAST CITY ACTIONS

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

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

**Table 4.3
Impact of Past City Actions 2010-2014**

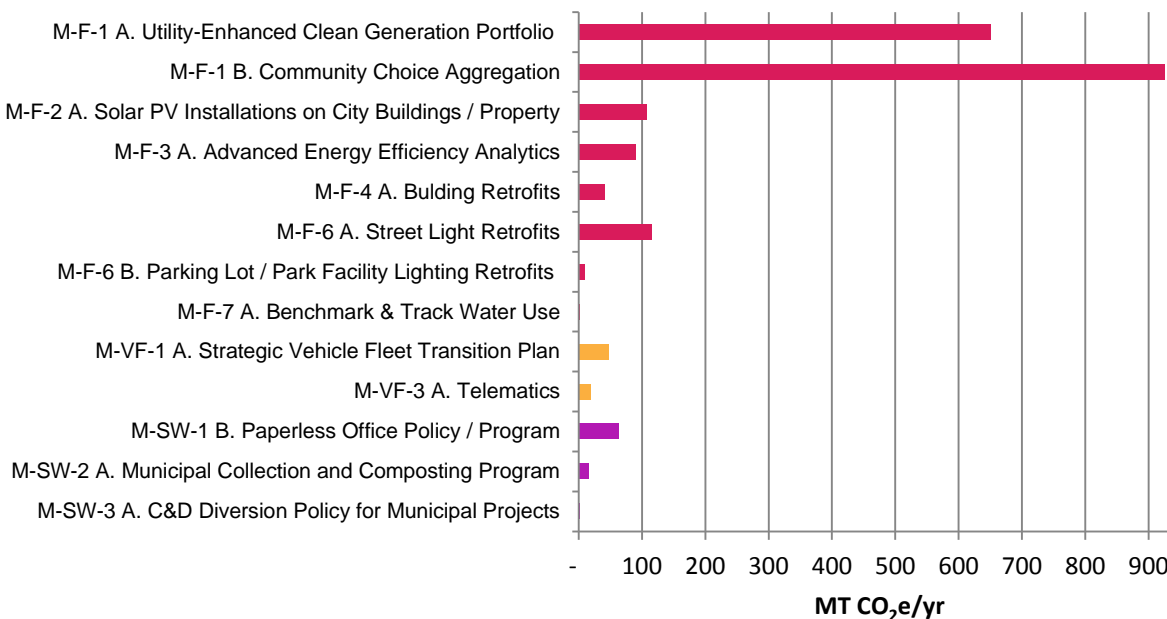
Reduction Measure / Action	2020 Reductions (MT CO ₂ e/year)	Contribution to 2020 Target
IMPROVE FACILITIES	167	48%
M-F-4 Existing Building Energy Retrofit		
<i>A. Building Retrofits</i>	41	12%
M-F-6 Public Realm Lighting Efficiency		
<i>A. Street Light Retrofits</i>	115	33%
<i>B. Parking Lot and Park Facility Lighting Retrofits</i>	10	3%
M-F-7 Landscape Water Conservation		
<i>A. Irrigation System Improvements</i>	1	0%
CONVERT VEHICLE FLEET	5	1%
M-VF-1 Low Emission and Alternative Fuel Vehicles		
<i>A. Strategic Vehicle Fleet Transition Plan</i>	5	1%
REDUCE SOLID WASTE	1	0%
M-SW-3 Construction and Demolition Waste Diversion		
<i>A. C&D Diversion Policy for Municipal Projects</i>	1	0%
TOTAL REDUCTIONS from PAST CITY ACTIONS	173	49%

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

IMPACT OF NEW MUNICIPAL REDUCTION ACTIONS

Table 4.2 and Figure 4.3 both show that the Facilities measures have the largest emissions reduction potential for 2020, which corresponds to its share of the emissions inventory (e.g., 70% of total emissions in 2010). Figure 4.4 below shows the relative impact of the specific quantified actions presented later in this chapter. Facilities sector measures are anticipated to reduce emissions by approximately 550 MT CO₂e/year. This estimate surpasses the 2020 target, and represents nearly one-third of reductions needed to achieve the City's 2050 target. Though not included in the 2020 total reduction estimate, the actions associated with Measure M-F-1 would result in cleaner electricity used in municipal operations, and provide the greatest opportunity for large-scale emissions reductions. The Solid Waste measures contribute approximately 90 MT CO₂e/year, or one-quarter of the 2020 target. The Vehicle Fleet sector measures are anticipated to reduce emissions by approximately 50 MT CO₂e/year, or 13.0% of total reductions needed by 2020.

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



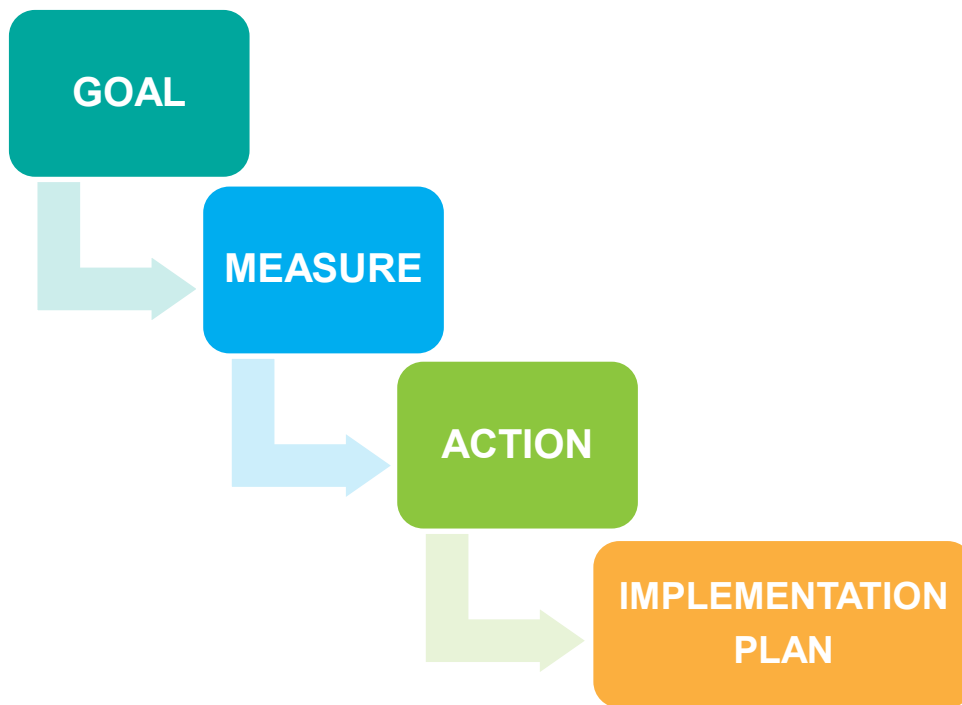
Emissions Reduction Measures

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

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

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

Figure 4.5 – Reduction Strategy Hierarchy



IMPLEMENTATION STEPS, STATUS, AND DEPARTMENT RESPONSIBILITY

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

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

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



Existing City Actions



Proposed New Actions

GHG REDUCTION POTENTIAL

The estimated annual emissions reduction potential of each quantifiable action is provided for 2020 in MT CO₂e/yr. Measures or actions identified as “Supporting” contribute to GHG reductions and are an important component of this CAP, but currently lack a methodology to quantify their individual emissions reduction potential.

PROGRESS INDICATORS

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

CO-BENEFITS

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

Figure 4.6 – Municipal Operations Measure Co-Benefits

	Improves air quality		Increases natural habitat
	Reduces energy use		Creates local jobs
	Reduces vehicle fuel consumption		Reduces waste; Extends landfill lifespan
	Reduces water use; Extends community water supply		Improves local energy independence
	Provides long-term savings from municipal operations		Increases operational knowledge; Raises community awareness
	Conserves natural resources		Reduces landfill methane

IMPLEMENTATION TIMELINE

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



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



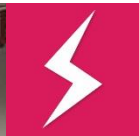
Near-term items are those that should be pursued immediately, within a 1-2 year timeframe following CAP adoption.



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



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



FACILITIES STRATEGY

GOAL 1 – IMPROVE FACILITIES:

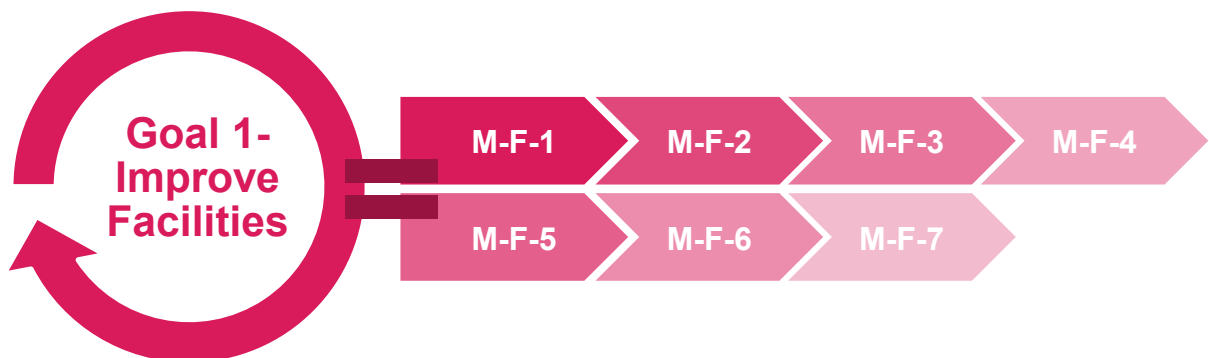
Transform facilities into models of technology demonstration and conservation.

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

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

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

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



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

If the City pursues Measure M-F-1 to purchase 100% of municipal electricity from clean sources, it would reduce emissions by approximately 875 MT CO₂e/yr. If Measures M-F-2 through M-F-7 are pursued instead, their total reduction potential would be approximately 550 MT CO₂e per year (including reductions from the Renewable Portfolio Standard).



MEASURE M-F-1 SUSTAINABLE ENERGY PORTFOLIO

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

2020 GHG Reduction Potential: Up to 869 MT CO₂e/yr (*Note: Not included in progress toward 2020 target calculations*)

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

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




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

Measure M-F-1 would be further supported by other CAP measures and existing City actions that reduce electricity demand, either through energy-efficiency improvements or educational programs that promote energy conservation. Total reductions in electricity demand would lower the cost to participate in Actions A or B since the City would be purchasing less electricity at a premium price (e.g., the additional cost to purchase cleaner electricity from PG&E). Implementation of this measure could reduce emissions by as much as 869 MT CO₂e/year in 2020, depending on which measure the City selects and what proportion of clean electricity it chooses to buy. However, since the City's past actions combined with the Renewable Portfolio Standard are estimated to provide reduction levels that achieve the 2020 target it is assumed the City will not pursue implementation of Measure M-F-1 prior to 2020. However, a phased approach could be taken in which the City pursues M-F-1 Action A (i.e., participation in PG&E's Green Option program) in the near-term, while working on the longer-term implementation of M-F-1 Action B (i.e., development of a local Community Choice Energy program). The emissions reduction potential of the two actions is provided for informational purposes, and illustrates how effective clean electricity sources are at achieving reduction targets.

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

Action A. Support Utility-Enhanced Clean Generation Portfolio

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

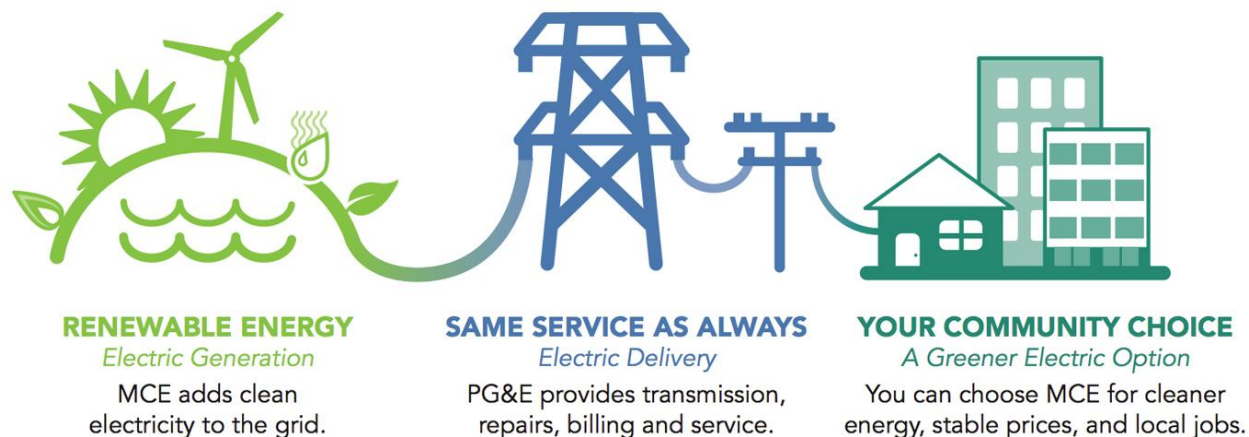
M-F-1 Action A. Support Utility-Enhanced Clean Generation Portfolio		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Conduct feasibility study of PG&E Green Option financial costs (per kilowatt hour (kWh) costs have not been finalized yet as part of program development) for City to purchase part or all of its electricity from renewable sources Develop resolution to opt into PG&E Green Option program for municipal electricity purchases (Note: program is currently capped at 272 MW and as 5 year pilot program; it is currently unknown how enrollment decisions will be made should program become fully subscribed) 	<p>P</p> <p>P</p>	Sustainability Division
Progress Indicator (2020) Assumes 100% of municipal electricity use in 2020 comes from 75% renewable (or zero carbon) sources via PG&E Green Option	Reduction Potential (MT CO ₂ e/yr) 651	
Co-Benefits  	Implementation Timeline 	

Action B. Create Community Choice Energy Option




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

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

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



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

M-F-1 Action B. Create Community Choice Energy Option		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to monitor CCE efforts within Santa Clara County, City of San Francisco, and East San Francisco Bay cities; if local support exists to further consider CCE options within Cupertino, pursue the following steps: <ul style="list-style-type: none"> Identify potential jurisdictional partners for development of CCE (e.g., Sunnyvale, Mountain View) Conduct feasibility study to assess viability of CCE program in Cupertino (can be conducted jointly with other jurisdictional partners) Based on results of feasibility study, pursue development of (or participation in) CCE per state requirements Adopt resolution for City to participate in CCE Determine feasibility of City to purchase electricity for municipal operations from CCE, based on approved CCE rate structure; CCE may provide options for level of participation (e.g., 50% clean electricity, 100% clean electricity) 	<div style="background-color: #c00040; color: white; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">P</div>	Sustainability Division
Progress Indicator (2020) Assumes 100% of municipal electricity use in 2020 comes from 100% renewable (or zero carbon) sources via CCE program	Reduction Potential (MT CO ₂ e/yr) 869	
Co-Benefits  	Implementation Timeline 	

***Develop renewable energy facilities at municipal buildings and facilities.***

2020 GHG Reduction Potential: 108 MT CO₂e/yr

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

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

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

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







The following two actions help to outline a pathway towards increased use of building-scale renewable energy systems. Implementation of this measure could reduce emissions nearly 110 MT CO₂e/year by 2020.



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







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

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

M-F-2 Action A. Install Solar PV Installations on City Buildings / Property		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Based on results of City’s previous solar feasibility study, pursue PV installations at City Hall complex, Quinlan Community Center, Cupertino Library, Corporation Yard, and Civic Center carports through Santa Clara County Regional PPA or other financing option (e.g., City procurement, lease-to-own) Review future potential for additional PV installations at sites associated with implementation of Civic Center Master Plan (e.g., Teen Center, new City Hall, Sheriff’s Office) 	<p>E</p> <p>P</p>	<p>Capital Improvement Program Division</p>
<p>Progress Indicator (2020)</p> <p>Assumes five solar sites are developed for total installed capacity of 508 kW generating 818,000 kWh/yr</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>108</p>	
<p>Co-Benefits</p> <div style="display: flex; justify-content: space-around; align-items: center;">      </div>	<p>Implementation Timeline</p> <div style="text-align: center;">  </div>	

Action B. Install Solar Thermal Installations on City Facilities

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

M-F-2 Action B. Install Solar Thermal Installations on City Facilities		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Following implementation of other energy audit improvement opportunities, conduct further feasibility analysis for primary solar thermal systems identified in audit (i.e., Blackberry Farm Pool and Sports Center) Identify funding / financing source to implement cost-effective solar thermal options at opportunity sites, either through ESCO contract or direct City install As part of the Capital Improvement Program (CIP), annually review hot water usage at City buildings and facilities to identify additional cost-effective opportunities for solar thermal installations; City could additionally consider developing a Green CIP that aggregates findings and recommendations from this CAP into one document mirroring existing CIP process 	<div style="display: flex; flex-direction: column; align-items: center; gap: 10px;"> <div style="background-color: #009688; color: white; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">E</div> <div style="background-color: #d32f2f; color: white; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">P</div> <div style="background-color: #d32f2f; color: white; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">P</div> </div>	Facilities, Capital Improvement Program, and Sustainability Divisions
Progress Indicator (2020)	Reduction Potential (MT CO ₂ e/yr)	
Assumes no solar thermal systems are pursued prior to 2020	0	
Co-Benefits	Implementation Timeline	
<div style="display: flex; justify-content: space-around; gap: 10px;">      </div>		

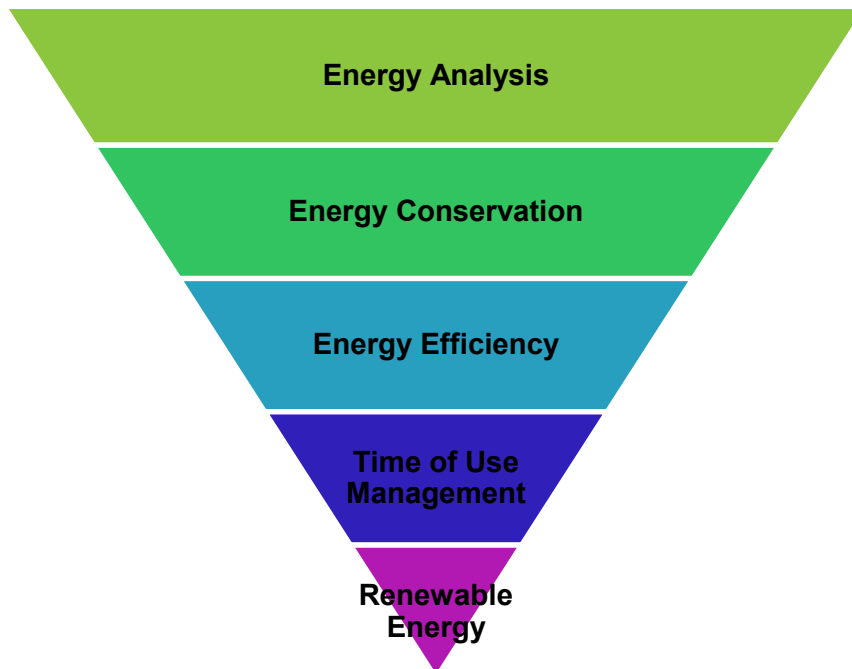


Reduce energy consumption in existing municipal buildings through data analysis, interactive management systems, employee education, and building operation and maintenance policies.

2020 GHG Reduction Potential: 91 MT CO₂e/yr

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

Figure 4.7 – Energy Strategy Loading Order







The City already uses building energy benchmarking and energy audits to track and compare energy use and identify operational or mechanical problems and opportunities for system improvements. The actions included within this measure are intended to reinforce the City's previous energy efficiency activities, identify the next candidates for retrofit programs (see Measure M-F-4), facilitate scheduled collection of energy use data at a building or facility level, provide policy guidance for regular building system commissioning, and elevate energy conservation awareness across all levels of City employees. As with the previous measures, project financing is a primary consideration. Implementation of this measure could reduce emissions by approximately 90 MT CO₂e/year by 2020.

Action A. Develop Advanced Energy Efficiency Analytics

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

M-F-3 Action A. Advance Energy Management Activities




Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Identify appropriate energy analytics firm with which to partner; this could be regional implementation opportunity to secure discounted large group rate - consult other area jurisdictions when pursuing this option Create operating framework that allows facilities managers to implement findings into building operations Use high-resolution data from analytics (e.g., appliance end-use) to inform development of targeted energy efficiency retrofit programs [see M-F-4] 	<p>P</p> <p>P</p> <p>P</p>	Facilities & Sustainability Divisions
Progress Indicator (2020)	Reduction Potential (MT CO₂e/yr)	
Assumes 14.5% reduction in 2010 baseline building electricity use (i.e., 410,000 kWh/yr saved) and 14.3% reduction in 2010 baseline building natural gas use (i.e., 6,900 therms/yr saved)	91	
Co-Benefits	Implementation Timeline	
  		

Action B. Benchmark & Track Consumption Data Collected per Facility

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

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



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

M-F-3 Action B. Benchmark & Track Consumption Data Collected per Facility		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Work with PG&E to install additional electricity and gas meters (where applicable) to allow improved facility-level energy use analysis; when feasible, combine similar end uses into one meter (e.g., park unit's lighting combined into one meter, park unit's buildings provided on separate meters) to allow monitoring of specific energy efficiency improvements or comparison of annual energy benchmarking After installation of additional meters, organize PG&E data by facility and City department (e.g., Meters 1, 2 and 3 represent Memorial Park) Benchmark all eligible municipal facilities using ENERGY STAR Portfolio Manager Implement process to track and report municipal energy usage through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system 	<p>P</p> <p>P</p> <p>P</p> <p>P</p>	<p>Facilities & Sustainability Divisions</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> <div style="display: flex; gap: 10px;">   </div>	<p>Implementation Timeline</p> 	

Action C. Install Energy Management Systems

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



M-F-3 Action C. Install Energy Management Systems

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> • Work with energy analytics firm and City IT department to identify additional opportunities for office system EMS to automate control and monitoring of office equipment (e.g., computers, monitors, printers), beyond those already installed, including strategy for advanced power strip purchases and use in City buildings • Work with energy analytics firm to review existing advanced lighting controls/monitoring systems (e.g., automatic dimmers), ensure proper operation, and identify opportunities for additional installations in other City buildings/facilities 	<p>P</p> <p>P</p>	<p>Facilities & Sustainability Divisions</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action D. Introduce Retro-Commissioning Program

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

M-F-3 Action D. Introduce Retro-Commissioning Program

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Formalize program that requires all major systems (e.g., HVAC) in existing buildings / facilities to be retro-commissioned at 5-year intervals Sync regular retro-commissioning efforts with services provided by existing building systems maintenance contracts 	<p>P</p> <p>P</p>	Facilities & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO₂e/yr) -	
Co-Benefits 	Implementation Timeline 	



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

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



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

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




M-F-3 Action E. Design / Implement Facilities & Equipment Energy Management Policy		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Research and collect facility-related energy conservation policies and procedures from cities locally and nationally Develop draft Policy and Procedure that outlines facility energy and water conservation goals, employee responsibilities, operating equipment procedures, and purchasing guidelines, to ensure consistency with City's Environmentally Preferable Procurement Policy Implement Procedure and track progress to achieve utility cost and resource savings on periodic basis Adjust Procedure as best practices evolve and new technologies are introduced to achieve larger financial and utility conservation gains over time Identify third-party certification programs and rating criteria to recognize Cupertino's utility conservation efforts 	<p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p>	<p>Facilities & Sustainability Divisions</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO_{2e}/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action F. Bolster Employee Behavior Change through Information / Education

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

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

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

M-F-3 Action F. Bolster Employee Behavior Change through Information / Education		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> • Install energy use dashboards in City Hall and primary municipal buildings (e.g., public-facing and high energy use); work with PG&E to install individual building meters, as necessary, to allow building-specific energy use reporting (see M-F-3 B) • Provide facility managers with training on advanced building operations systems in order to maximize effectiveness of City’s building systems • Set specific department-level energy use targets and encourage employees in the buildings to participate in energy efficiency achievement (may need additional PG&E meters installed, per M-F-3 B, to accurately track this) • Continue to distribute and refer staff to City’s handbook with instructional guides to help implement ENERGY STAR purchasing requirements; existing handbook also serves as user-friendly resource to guide City purchases of "green" products, such as furniture, carpeting / flooring, paints, packaging materials, etc., which further supports Measure M-SW-1 C 	<p>P</p> <p>P</p> <p>P</p> <p>E</p>	Sustainability Division
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO ₂ e/yr) -	
Co-Benefits  	Implementation Timeline 	

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

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

2020 GHG Reduction Potential: 41 MT CO₂e/yr

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

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

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

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

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

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

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

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






The following four actions support implementation of this measure and build upon the City's past successes in building retrofits. This measure would contribute reductions of approximately 41 MT CO₂e/yr by 2020.

Action A. Complete Building Retrofits

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

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




M-F-4 Action A. Complete Building Retrofits

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Use results from advanced analytics program (see M-F-3 A) to identify appliances and building systems that are underperforming from energy use perspective, and develop prioritization plan for equipment replacement / building retrofits; work with PG&E to identify available rebates, incentives, or on-bill financing opportunities for various improvements Continue to make progress on implementing efficiency opportunity findings from City's Detailed Energy Audit; establish budget priority for Energy Audit update in next five years 	<p>P</p> <p>E</p>	<p>Facilities & Sustainability Divisions</p>
<p>Progress Indicator (2020)</p> <p>Assumes 254,000 kWh/yr saved as result of interior lighting retrofits and occupancy sensors, and 59,000 kWh/yr saved as a result of plug load controllers (assumed 200 controllers installed)</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>41</p>	
<p>Co-Benefits</p> <div style="display: flex; gap: 10px;">     </div>	<p>Implementation Timeline</p> 	

Action B. Establish Energy Efficiency Fund

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



M-F-4 Action B. Establish Energy Efficiency Fund

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Evaluate the potential for and requirements (e.g., size, terms, etc.) of a self-sustaining City energy efficiency revolving loan fund to implement findings of various City energy efficiency and renewable energy development opportunity studies; City of San José used this approach as one source of multiple project financing sources Develop fund parameters that support continual replenishment of funding pool (e.g., 80% of cost savings resulting from project implementation are returned to fund for 5 years after which additional savings accrue to project's implementing department) Allocate or secure funding for long-term energy efficiency fund (from EECBG program, municipal bond, etc.) Assign manager to support and coordinate fund and its projects Discuss opportunities and potential program structure for regional revolving loan fund with neighboring jurisdictions, which could provide access to additional seed funding sources 	<p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p>	<p>Sustainability Division</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p>  	<p>Implementation Timeline</p> 	

Action C. Set Standards and Targets

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




M-F-4 Action C. Set Standards and Targets

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to implement City's Green Building Ordinance as it relates to municipal building retrofits Consider developing additional guidance for municipal building retrofits that encourages pursuit of energy- or water conservation-related points towards achievement of required LEED certification to prioritize these building efficiency outcomes; alternatively, City could define explicit energy efficiency performance levels or design feature expectations for new projects 	<p>E</p> <p>P</p>	<p>Facilities & Planning Divisions</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action D. Adopt a Demonstration Policy

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

M-F-4 Action D. Adopt Demonstration Policy

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> • Draft City Technology Demonstration Policy to assist local businesses with testing and demonstrating functionality of emerging technologies • Implement the policy and revise based on industry best practices and trends as they arise • Pursue grant opportunities that expand technology demonstration opportunities in municipal facilities and through local business partnerships, coordinated with the City’s Economic Development Office (e.g., CEC Electric Power Investment Charge Grants (EPIC) - http://www.energy.ca.gov/research/epic/) 		Facilities & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO ₂ e/yr) -	
Co-Benefits 	Implementation Timeline 	

MEASURE M-F-5 EXPAND NEW BUILDING ENERGY PERFORMANCE

Establish energy efficiency targets for new municipal buildings.

Supporting Measure – Not Quantified



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

Action A. Update Green Building Standard – Energy Performance Guidance

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

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

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

M-F-5 Action A. Expand New Building Energy Performance		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to implement City's Green Building Ordinance as it relates to new municipal building construction Consider developing additional guidance for new municipal building projects that encourages pursuit of energy- or water conservation-related points towards achievement of required LEED certification to prioritize these building efficiency outcomes; alternatively, City could define explicit energy efficiency performance levels or design feature expectations for new projects Build recommendations into City's Capital Improvement Program Identify opportunities for passive solar design and consider solar orientation for active solar installments in new construction Consider including solar-ready construction requirements for new municipal buildings with appropriate solar orientation, roof size, etc. 	<div style="display: flex; flex-direction: column; align-items: center; gap: 10px;"> E P P P P </div>	Facilities, Capital Improvement Program & Sustainability Divisions
Progress Indicator (2020)	Reduction Potential (MT CO₂e/yr)	
All new municipal construction complies with the City’s Green Building Ordinance	-	
Co-Benefits	Implementation Timeline	
		



Upgrade public realm lighting to more efficient technology.

2020 GHG Reduction Potential: 125 MT CO₂e/yr




Lighting efficiency upgrades typically represent one of the most cost-effective solutions for energy conservation, providing lower utility costs and, often, lower maintenance costs due to less frequent lamp replacements. Public realm lighting in Cupertino includes traffic and streetlights, municipally-owned parking lot lights, and public park lights. The City has already upgraded its traffic signal lights from incandescent bulbs to LEDs and retrofitted its streetlights to high-efficiency induction technology. The City also initiated parking lot and pathway lighting retrofits in various City parks. The actions implementing this measure take credit for past successes in lighting upgrades, and address the remaining opportunities in City-owned parking lots and public parks. Implementation of this measure would reduce emissions by 125 MT CO₂e/year by 2020.

Action A. Complete Street Light Retrofits

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



M-F-6 Action A. Complete Public Realm Lighting Efficiency

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Consider best practices in lighting technology at time of bulb and / or fixture replacement or repair Ensure that new street light installations achieve comparable or better efficiency level as achieved through previous street light retrofit program 	<p>P</p> <p>P</p>	Streets Division
Progress Indicator (2020) Achieved! – 872,000 kWh/yr saved through street light retrofit program	Reduction Potential (MT CO ₂ e/yr) 115	
Co-Benefits  	Implementation Timeline 	

Action B. Retrofit Remaining Parking Lot and Park Facility Lighting

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





The City’s remaining seven parks may present a future opportunity for additional parking lot and pathway lighting retrofits, similar to those identified in the energy audit. There may also be opportunities for retrofits to athletic field and tennis court lighting; provided a high-efficiency option is available that still achieves the lighting requirements for sports play. Additionally, there may be retrofit opportunities at other City-owned parking lots (beyond the park units and



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

City buildings described here). These additional lighting retrofit opportunities could also be pursued through an ESCO, as with the street light retrofits, or pursued independently as funding permits. To support future energy conservation in public lighting, the City could also update its Standard Provisions for new public lighting to specify that new lights should be LED, induction, or an equivalent technology.

M-F-6 Action B. Complete Parking Lot and Park Facility Lighting Retrofits

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Identify City-owned parking lot lighting that has not yet been converted to LED, magnetic induction, or similar highly-efficient technology Identify park lighting (e.g., pathways, restroom facilities, area lighting, sport field lighting) that has not yet been converted to LED, magnetic induction, or similar high-efficiency technology Identify appropriate energy-efficient lighting technologies for sports fields / courts that still provide lighting levels required for applicable sporting use Develop implementation timeline and funding program; contact City's PG&E account representative regarding availability of rebate programs and / or on-bill financing options to cover retrofit program Consider updating City's Standard Provisions or other lighting guidance documents to specify efficiency levels to be achieved in new installations or lighting retrofit projects 	<p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p>	<p>Streets Division</p>
<p>Progress Indicator (2020)</p> <p>Achieved! – 75,000 kWh/yr saved through park unit parking lot and pathway light retrofit program</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>10</p>	
<p>Co-Benefits</p> <div style="display: flex; gap: 10px;">    </div>	<p>Implementation Timeline</p> 	

MEASURE M-F-7 CONSERVE WATER THROUGH EFFICIENT LANDSCAPING

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

2020 GHG Reduction Potential: 1 MT CO₂e/yr

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





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

The following actions describe a framework to support the City’s water conservation practices and help identify additional opportunities. Implementation of this measure could reduce emissions by approximately 1 MT CO₂e/year, though as previously stated, the real benefit will arise through the conservation of this limited resource.



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

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

M-F-7 Action A. Utilize Weather-Track System to Reduce Park & Median Water Use		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to use weather-based irrigation technology in City irrigation practices to prevent unnecessary or excessive water in public spaces Continue to provide training on the City’s irrigation technology to existing and new staff to ensure proper use of the system 	<p>P</p> <p>P</p>	<p>Grounds & Fleet Division</p>
<p>Progress Indicator (2020)</p> <p>Achieve Bay Area Climate Compact’s goal for 20% water savings by 2018 over 2008 baseline Assumes 27.5 million gallons of water saved per year over 2008 baseline of 138 million gallons</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>1</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action B. Benchmark & Track Water Use per Meter

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



M-F-7 Action B. Benchmark & Track Water Use per Meter		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Establish operational framework for tracking and reviewing water use at the meter level to allow identification of improper irrigation system use, leaks, or other wasteful water activities Incorporate water use reporting into overarching annual CAP reporting procedure described in Chapter 7 	<p>P</p> <p>P</p>	Sustainability, Grounds & Fleet Divisions
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO₂e/yr) -	
Co-Benefits 	Implementation Timeline 	

Action C. Adopt Water Budget & Green Grounds Policy

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

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






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

M-F-7 Action C. Adopt Water Budget & Green Grounds Policy		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Develop landscaping policy that promotes efficient watering schedules, high- and low-priority water zones (for use during pre-drought conditions), water-efficient and climate-sensitive plant selection, and compost-friendly landscape maintenance Evaluate alternative or maintain existing water-efficient irrigation technology systems, particularly in areas of high irrigation use (e.g., turf playing fields), with ET sensors and integration with weather station data streams to automate watering schedules based on current and near-term environmental conditions Train maintenance crews in use and maintenance of irrigation systems and implementation of Green Grounds policy Consider use of water budgets for irrigated landscape areas Create education stations or post information to City’s website that describe City’s green grounds practices 	<p>P</p> <p>E</p> <p>E</p> <p>P</p>	<p>Sustainability, Trees & Right of Way, and Grounds & Fleet Divisions</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

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

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



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

M-F-7 Action D. Use Native, Drought-Tolerant, Bay-Friendly Landscaping Techniques Across Parks, Medians & Fields		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Adopt city-wide policy that requires specification of Bay-Friendly, drought-tolerant landscapes in any new City project or private project receiving City funds to include landscaped areas as project element Expand Parks & Recreation Green Policies, which focus on water-efficient landscaping, across all departments to prioritize Bay-friendly and efficient irrigation practices and technologies to maintain City's landscaped facilities, parks, medians, and streetscapes, and to become more resilient to water shortages; Couple implementation of these goals with projects that also minimize impervious surfaces and ensure adequate soil drainage Develop implementation and funding schedule to update public landscapes, including turf conversion and hydrozoning projects, to designs that more closely align with Bay-friendly landscaping techniques Provide maintenance specifications and procedures to support staff's pruning, pest-control, irrigation, and general oversight of these new plant materials Pursue project third-party certification through Bay-Friendly Rated Landscapes, where applicable, or build landscaping water conservation initiatives into future site-wide comprehensive rating program applications (e.g., LEED, California Green Business Program) Install informational placards or signs at new landscaping installations that quantify water saving potential from new designs and refer public to additional informational resources Develop informational materials based upon City's practices and lessons learned to support effective implementation of City's Water Efficient Landscaping Ordinance 	<p>P</p> <p>E</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p>	Sustainability, Grounds & Fleet Divisions
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO ₂ e/yr) -	
Co-Benefits    	Implementation Timeline 	

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

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

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

M-F-7 Action E. Install Graywater and Rainwater Catchment Systems in New Construction and Major Retrofit Projects		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Incorporate graywater plumbing and/or rainwater catchment systems in new municipal buildings, where appropriate Develop public-facing informational placards/signs that explain these systems and quantify their potable water-savings potential 	<p>P</p> <p>P</p>	Facilities, Capital Improvement Program & Sustainability Divisions
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO₂e/yr) -	
Co-Benefits 	Implementation Timeline 	



Action F. Recognize Staff “Water Wise” Practices

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

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

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

M-F-7 Action F. Recognize Staff “Water Wise” Practices

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> • Research municipal operations-oriented behavior change and utility conservation incentives programs to create model for Cupertino • Develop outreach and engagement tools to notify employees of campaign and support their program enrollment and continued involvement • Educate and train staff by sharing strategies to save water indoors and out so they may effectively participate in program • Launch “Water Wise” program and offer ongoing coaching and support • Accept “Water Wise” nominations for leading practices and employees; Collect user-generated data (e.g., checklists) and City water utility data to inform awardee selection • Recognize leaders and efforts through civic media assets, intranet, and through Council Proclamation • Survey staff following distribution of rewards to determine what worked best and where improvements can be made; This could also serve to assess what conservation measures were most frequently taken 	<p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p>	<p>Sustainability Division</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	



VEHICLE FLEET STRATEGY

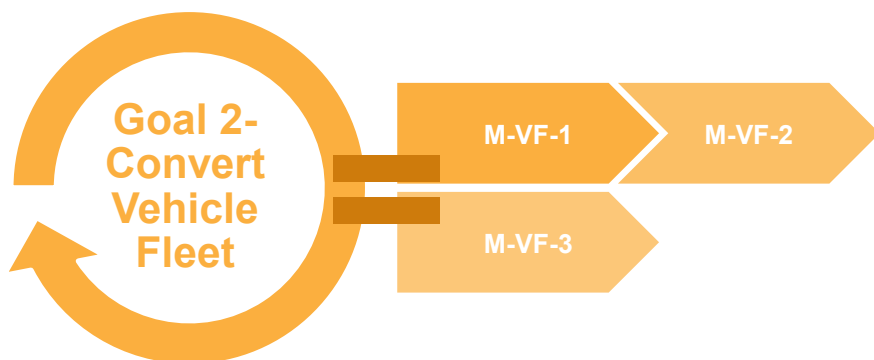
GOAL 2 – CONVERT VEHICLE FLEET:

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

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

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

This sector includes three measures that build upon the City’s preliminary efforts to develop a more efficient, cleaner vehicle fleet. Measures address vehicle fleet efficiency, fuel types and refueling infrastructure, and fleet operational behavior. As with the Facilities sector measures, implementation of Measure M-F-1 will influence the reduction potential of Vehicle Fleet sector measures that include shifting portions of the municipal fleet towards electric or hybrid-electric vehicle models. Providing cleaner electricity as a fuel source for electric vehicles will improve the emissions reduction potential of Vehicle Fleet sector measures. Measures in this sector have the ability to reduce greenhouse gas emissions by approximately 58 MT CO₂e/year.





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

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

2020 GHG Reduction Potential: 48 MT CO₂e/yr

This measure aims to reduce vehicle fleet fuel consumption through replacement of older, less-efficient models with zero-emission or low-emission models, and to increase the proportion of alternative fuel vehicles in the fleet. As a signatory of the Bay Area Climate Compact (BACC), the City is aiming to achieve the BACC's Action Area Goal #10 to "increase the number of zero emission and other advanced ultra-low emission light duty vehicles to 10% of municipal fleets by the end of 2013, and to 25% by the end of 2018." The City is actively working to institutionalize the vehicle lifecycle cost of ownership through its vehicle replacement process, and could make that a standard consideration as part the City's Vehicle Replacement Schedule and Policy. Santa Clara County adopted a similar policy (Santa Clara County Policy 352) that requires preference be given to the lowest emission vehicles available. Development of a strategic vehicle fleet transition plan could also assist the City to achieve the BACC goal in a more cost-effective manner. Though the City maintains a list of all fleet vehicles, including their

model, adding the purchase date age, annual mileage, and fuel consumption will help to prioritize vehicles for replacement and identify opportunities to retire underutilized vehicles. There are currently models of battery electric, hybrid electric, compressed natural gas (CNG), and fuel cell vehicles that can perform many of the functions required of municipal fleet vehicles. While electric and hybrid models of heavy-duty trucks are not yet widely available, CNG options are available that could be used as a bridge technology in the meantime to provide emissions reductions. The City is already investing in electric vehicle charging infrastructure and has plans for additional installations. It is also exploring the possibility of a fuel cell charging station.



The action associated with this measure develops a framework to transition the City's fleet towards higher efficiency and lower emissions vehicles in the future. Implementation of this measure could reduce emissions by approximately 48 MT CO₂e/year.

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

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






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

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

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




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

M-VF-1 Action A. Update Green Purchasing Policy and Vehicle Replacement Schedule to Prioritize Alternative Fuel Vehicles and Infrastructure		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Develop municipal fleet low-carbon target; defined as A) Total vehicle fleet composed of X% zero- or lower-carbon vehicles; or, B) Total vehicle fleet emissions reduction target (can be achieved through combination of reduced VMT, vehicle technology, mode shift, etc.) 	P	Grounds & Fleet Division
<ul style="list-style-type: none"> Define vehicle fleet transition pathway to achieve Bay Area Climate Compact’s Action Area Goal #10 to increase the number of zero emission and other advanced ultra-low emission light duty vehicles to 10% of municipal fleets by the end of 2013, and to 25% by the end of 2018; extend goal to 28% of municipal fleet by 2020 	P	
<ul style="list-style-type: none"> Review existing vehicle fleet lifespan to identify number and type of vehicles to be replaced by 2020, and which could be replaced with existing models of zero- or low-emissions vehicles 	P	
<ul style="list-style-type: none"> At time of replacement, shift passenger vehicle purchases toward EV, hybrid-electric, hydrogen fuel cell, or CNG models; consider new vehicles’ carbon emissions and fuel efficiency as regular procurement criterion 	P	
<ul style="list-style-type: none"> Fully implement fleet management software to: <ul style="list-style-type: none"> benchmark agency fleet size and composition; track fleet vehicle fuel usage, mileage, location, maintenance schedule; provide maintenance diagnostic data; and activate online reservation system to expand pool opportunities. 	P	
<ul style="list-style-type: none"> Develop vocational specifications to pair with revised Vehicle Replacement Schedule and Policy 	P	
<ul style="list-style-type: none"> Perform staff training needs assessment to support driver and mechanic transition to alternative fuel vehicles 	P	
<ul style="list-style-type: none"> Prioritize funding for mechanic training in advanced fuel automotive technologies and offer trainings for drivers and first responders 	P	
<ul style="list-style-type: none"> Confirm fleet-parking designations to mitigate staff concerns and maximize public parking opportunities in areas with high parking congestion; Designating locations for parking, as well as fleet vehicle charging, will create further staff-level efficiencies by enabling quick facility access upon returning from fieldwork 	P	
<ul style="list-style-type: none"> Explore joint procurement options with other area jurisdictions to leverage regional shift towards cleaner municipal fleets into lower per vehicle costs; To facilitate this, reconnect with Public Fleet Supervisors Association as access point for piggybacking opportunities, competitive vendor pricing, and industry best management practices 	P	
<p><i>Note: Implementation of this action is budget- and technology-dependent; emergency vehicles could be excluded from fleet target calculations and progress monitoring</i></p>		

<p>Progress Indicator (2020)</p> <p>Achieve Bay Area Climate Compact's goal for 25% of vehicle fleet to comprise zero- or low-emissions light duty vehicles by 2018. Assumes the following vehicle replacements: 5 passenger vehicles replaced with hybrid-electric models; 12 light-duty trucks replaced with hybrid-electric SUV models; 2 heavy-duty trucks replaced with more fuel-efficient heavy-duty truck models; In addition to existing 3 hybrid-electric passenger vehicles, and 2 hybrid-electric SUVs</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>48</p>
<p>Co-Benefits</p> <div style="display: flex; justify-content: space-around;">     </div>	<p>Implementation Timeline</p> 







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

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

<p>M-VF-1 Action B. Expand City Bike Fleet, Training, and Promotion</p>		
<p>Implementation Steps</p> <ul style="list-style-type: none"> Continue to pursue implementation of municipal bike fleet in instances where vehicle trips can safely and easily be replaced with trips via bicycle; comprehensive bike fleet could result in opportunities to downsize municipal vehicle fleet or reduce VMT to help achieve fleet emissions target 	<p>Status</p> <p>E</p>	<p>Responsibility</p> <p>Sustainability Division</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> <div style="display: flex; justify-content: space-around;">   </div>	<p>Implementation Timeline</p> 	

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

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

M-VF-1 Action C. Promote Vehicle Alternatives to Reduce Car-Travel to City-Sponsored Events		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to pursue implementation of municipal car share program, which like municipal bike fleet could allow City to downsize its municipal vehicle fleet Consider opportunities to expand municipal bike fleet and / or car share program as part of municipal fleet transition strategy and at time of regular vehicle replacement (e.g., could tasks performed by retired vehicle be performed with shared vehicle?) Ensure that community-wide shuttle, car share, bike share assessment includes consideration of City staff commutes and special-event opportunities 	<p></p> <p></p> <p></p>	<p>Sustainability, Grounds & Fleet Divisions</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO_{2e}/yr)</p> <p>-</p>	
<p>Co-Benefits</p> <div style="display: flex; gap: 10px;">   </div>	<p>Implementation Timeline</p> <div style="text-align: center;">  </div>	



MEASURE M-VF-2 INCREASE ALTERNATIVE FUEL INFRASTRUCTURE

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

Supporting Measure – Not Quantified

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



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

Action A. Install Electric Vehicle Charging Stations

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



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

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

M-VF-2 Action A. Install Electric Vehicle Charging Stations		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Develop City-owned EV Charging Station Procedure to ensure proper finance, training, maintenance, and reporting functions are established for effective staff oversight Develop Alternative Vehicle Fueling Infrastructure (AVFI) standards and plan to define prospective locations and siting criteria (e.g., design guidelines, standard drawings, specifications) to facilitate on-street and off-street applications Install additional electric vehicle charging stations for municipal fleet use; as share of electric vehicles in fleet increases, ensure adequate access to charging stations for municipal vehicles through additional installations or controlled access Install portion of electric vehicle charging stations in areas accessible to community members, such as Civic Center parking lots; consider new electricity load created from EV charging stations during building design phase of Civic Center Master Plan to provide opportunities to offset this increased load through additional installation of rooftop PV systems 	<p>P</p> <p>P</p> <p>E</p> <p>P</p>	<p>Transportation, Grounds & Fleet, and Sustainability Divisions</p>
<p>Progress Indicator (2020)</p> <p>Assumes 10 dual-port electric vehicle charging stations installed</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action B. Evaluate Fuel Cell Fueling Station




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

M-VF-2 Action B. Evaluate Fuel Cell Fueling Station		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue exploring opportunities to develop local fuel cell fueling station for municipal and community use Share information with neighboring jurisdictions to determine interest and feasibility of joint procurement through local vendors Due to current limited vehicle model availability, consider model types and cost when estimating fuel cell vehicles' future role in municipal fleet transition strategy (see M-VF-1 A) Pending feasibility analysis, construct fuel cell fueling station for municipal and / or community-wide use 	<p>E</p> <p>P</p> <p>P</p> <p>P</p>	<p>Transportation & Sustainability Divisions</p>
<p>Progress Indicator (2020)</p> <p>Assumes no fuel cell fueling stations installed prior to 2020</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action C. Evaluate CNG Fueling Station

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

M-VF-2 Action C. Evaluate CNG Fueling Station

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> • Research opportunities for development of municipal CNG refueling station; look for partnerships with neighboring cities or local employers with large vehicle fleets for cost-share opportunities of joint-use facility • Pending results of CNG feasibility study, identify funding and pursue development of CNG refueling station for municipal and public use; transition municipal fleet diesel vehicles to CNG, as appropriate, as bridge technology until cleaner heavy-duty vehicle models become widely available for integration into fleet; if better heavy-duty vehicle options become available before development of CNG station, reconsider if there is long-term role for CNG vehicles in municipal fleet 	<p>P</p> <p>P</p>	<p>Transportation & Sustainability Divisions</p>
<p>Progress Indicator (2020)</p> <p>Assumes no CNG fueling stations installed prior to 2020</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p>  	<p>Implementation Timeline</p> 	



MEASURE M-VF-3 PROMOTE BEHAVIOR / FUEL OPTIMIZATION

Encourage and promote fuel efficient driving.



2020 GHG Reduction Potential: 19 MT CO₂e/yr

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

The following actions would further support the City’s goal to reduce vehicle fleet emissions by ensuring that the necessary use of municipal vehicles occurs in a safe and efficient manner. Implementation of this measure could reduce emissions by up to 19 MT CO₂e/year.

Action A. Implement Telematics to Improve Route and Fuel Optimization



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

M-VF-3 Action A. Implement Telematics to Improve Route and Fuel Optimization		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue use of route optimization practices by Building Department for inspections Evaluate opportunities for additional route optimization of municipal vehicles that have standard operating routes (e.g., Parks Department landscaping crews); identify VMT reduction potential through new routes Develop telematics program (e.g., vehicle tracking) for City fleet to optimize vehicle operations 	<p>E</p> <p>P</p> <p>P</p>	<p>Grounds & Fleet, Sustainability Division</p>
<p>Progress Indicator (2020)</p> <p>Assumes 10% fuel savings over 2010 baseline for all passenger and light-duty trucks (i.e., 2,100 gallons of gasoline saved per year); assumes full implementation of Measure VF-1, Action A assumptions</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>19</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

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

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

M-VF-3 Action B. Update Vehicle Use Policy to Prioritize Fuel-Efficient Operations and Maintenance

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Establish vehicle fleet efficiency policy (i.e., operation and maintenance) that includes formal vehicle maintenance check-list targeting fuel efficiency tune-ups and fuel-efficient driving training (e.g., no speeding, idling, excessive tools/gear in vehicles); fuel-efficient driving could be monitored through vehicle fleet telematics program Continue implementation of City's anti-idling policy (with exemptions for emergency vehicles) Provide anti-idling outreach city-wide through partnership with neighborhood and community groups, with specific campaigns targeting idling in School Zones; partner with Cupertino Chamber of Commerce on anti-idling campaign in commercial districts 	<p>P</p> <p>E</p> <p>P</p>	<p>Grounds & Fleet, Sustainability Division</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action C. Expand Commuter Benefits Program

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

According to a 2012 survey, 83% of Cupertino employees drive alone to work. Additionally, nearly the same amount of emissions comes from the City’s municipal fleet as are estimated to result from City employee commutes (i.e., 424 and 463 MT CO₂e/yr, respectively). This presents an opportunity for the City to demonstrate another leadership role in emissions reductions, even if those reductions are not counted towards the City’s target achievement since employee commute emissions are not included in the municipal operations inventory. The City can influence this source of emissions by expanding existing commuter benefits in a way that encourages employees to commute using alternative modes other than single occupancy vehicles. In accordance with SB 1339 requirements, Cupertino already provides a suite of alternative commute benefits to its employees, marketed through a flyer and benefits trainings,

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

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

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

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

M-VF-3 Action C. Expand Commuter Benefits Program

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> • Conduct employee commuter benefits survey to evaluate areas of priority and highest use • Develop commuter benefits program expansion options, budget, and resource needs; Evaluate vendor proposals if applicable • Create outreach plan and materials for communicating new unified program and benefits to employees; Develop carpool/bike/walk matching activities; Design additional incentives (e.g., recognition program) • Launch program, implement outreach plan, and track participation/employee feedback; Adjust as needed 	<p>P</p> <p>E</p> <p>P</p>	<p>Sustainability & Human Resources Division</p>
<p>Progress Indicator (2020)</p> <p>Supports implementation of Actions A, B, and D</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	

Co-Benefits






Implementation Timeline



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

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

M-VF-3 Action C. Introduce Fuel Saving Recognition Program for Employees/Departments		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Establish inter-departmental fuel savings recognition program (excluding emergency vehicles) that tracks annual fuel use by department and provides departmental employee rewards for annual improvement (either total reduction compared to a department historic average or per employee efficiency) Implement process to track and report municipal vehicle fuel usage through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system 		Sustainability Division
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO ₂ e/yr) -	
Co-Benefits 	Implementation Timeline 	



SOLID WASTE STRATEGY

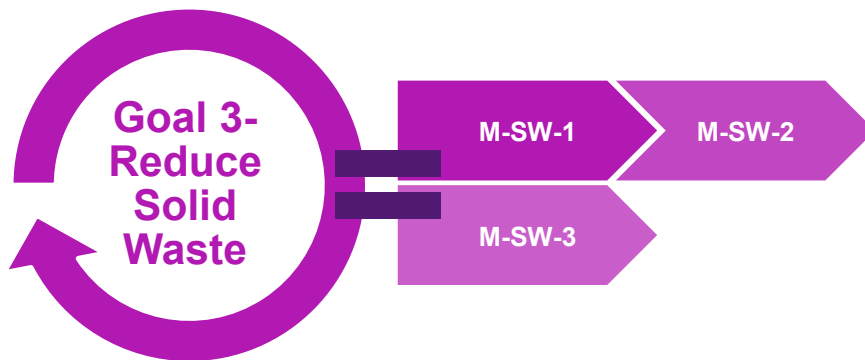
GOAL 3 – REDUCE SOLID WASTE:

Effectively manage materials to shift behavior, consumption, and life-cycle impacts.

The Solid Waste sector emissions are relatively small compared to Facilities and Vehicle Fleet, contributing approximately 5% of total emissions. The City’s solid waste emissions are based on the disposal of waste generated from municipal activities, such as facility operations, park landscaping and maintenance, and other City activities. Waste disposal creates emissions when organic waste (e.g., food scraps, yard clippings, paper and wood products) is buried in landfills and anaerobic digestion takes place, emitting methane. Additionally, the extraction and processing of raw materials for consumer products, distribution to consumers, and eventual disposal of the products, creates emissions as well.

A number of actions have been either planned or implemented to reduce City generated waste. The City has developed a zero-waste strategy with diversion goals and descriptions of diversion programs. Zero-waste strategies typically strive for 90% or greater diversion of waste from the landfill waste stream through recycling, material reuse, or composting. The Bay Area Climate Compact includes a solid waste diversion goal, which instructs signatories to “increase solid waste diversion from landfills to 75% by the end of 2013, and achieve zero waste by the end of 2020.” One diversion strategy to that end has been implementation of the City’s green procurement policy that encourages the purchase of recycled, recyclable, or compostable materials whenever possible. The City also administers a citywide residential and commercial compostable collection program, paperless office practices, on-site landscape waste reduction, and construction and demolition diversion at municipal project sites. Finally, the City has adopted a green indoor and outdoor events policy that defines materials management requirements (e.g., banning use of polystyrene and distribution of single-use bags) and goals for events hosted on city property by the agency or external partners.

The City will continue its efforts to reduce the amount of waste generated from municipal operations, while diverting waste from landfills through composting, recycling, and reuse. This sector includes three measures that expand upon the City’s existing efforts, including establishment of policies, goals, and audits to reduce waste; continuing organic waste diversion activities; and increasing construction and demolition waste diversion. When implemented, the Solid Waste sector measures have the ability to reduce emissions by approximately 80 MT CO₂e/year.





MEASURE M-SW-1 WASTE REDUCTION

Reduce municipal waste through procurement policies, waste diversion goals, and waste stream monitoring and analysis.

2020 GHG Reduction Potential: 64 MT CO₂e/yr

Cities can reduce their contribution of solid waste sent to landfills through careful consideration at the procurement phase of a product’s recyclability, re-use opportunities, useful life expectancy, and comparable substitutes. Green procurement specifications can be enforced through incorporation of Citywide or departmental diversion goals that elevate these considerations during decision-making processes. Similarly, monitoring the implementation of these policies and goals is necessary to evaluate the success of a waste reduction program. This measure includes implementation of existing procurement guidance documents and paperless office strategies, departmental waste diversion goals, and waste monitoring and tracking mechanisms to help the City achieve its zero-waste goal by 2020. Implementation of this measure could reduce emissions by 64 MT CO₂e/year.



Source: West Coast Climate and Material Forum - <http://yosemite.epa.gov/R10/ECOCOMM.NSF/climate+change/wccmmf>

Action A. Establish Stretch Waste Reduction and Diversion Goals

As a signatory to the BACC, the City has already established a zero-waste goal for itself, and has taken several implementation steps towards that goal including development of a Zero-Waste Strategy. The City (with input from its waste diversion staff) could also establish building or department-specific goals that would allow each department to determine the most efficient strategies for goal achievement. Implementation of this action would be enhanced with accurate municipal waste stream data as described in Action D, so building- or department-specific strategies can be developed based on the types of waste present in the dumpsters. To assist in emissions reductions, the Zero-Waste Strategy should include programs to address the remaining organic waste content of the municipal waste stream, including office paper and cardboard, food scraps and compostable paper (e.g., pizza boxes, soiled napkins), yard waste clippings, and lumber from construction projects. In particular, this effort should continue to develop employee training and outreach programs to increase participation in the City's existing organics collection service.





M-SW-1 Action A. Establish Stretch Waste Reduction and Diversion Goals

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Establish specific zero-waste goal for municipal operations (target to be included in Zero Waste Strategy update) that achieves Bay Area Climate Compact's Action Area Goal #9 to increase solid waste diversion from landfills to 75% by end of 2013 and achieve zero waste by end of 2020; City's goal is to achieve 75% diversion by 2016 In conjunction with municipal waste audits (see M-SW-1 D), establish waste reduction / diversion goals by building or department (whichever is easier to track) as means to achieving overarching zero-waste goal; re-evaluate building or department goals as part of regular waste audits Implement process to track and report municipal solid waste generation through quarterly or annual staff reports; explore options to make information publicly available through an open data portal system 	<p>P</p> <p>P</p> <p>P</p>	<p>Environmental Division</p>
Progress Indicator (2020)		Reduction Potential
<p>Assumes 80% reduction in organic waste (e.g., food scraps and compostable paper, landscape debris/trimmings, scrap lumber, paper/cardboard) from 2010 baseline; emissions reductions are shown next to actions that address specific organic waste sources (i.e., M-SW-1 B, M-SW-2 A, M-SW-3 A)</p>		<p>(MT CO₂e/yr)</p> <p>-</p>
Co-Benefits		Implementation Timeline



Action B. Create Paperless Office Policy/Program

Office environments typically generate substantial waste from white paper, mixed office paper, newspaper, and corrugated cardboard. Approximately 90% of all office waste is paper. Enhanced office paper recycling can help reduce emissions associated with organic landfill waste, and help to conserve raw materials. In addition to fully implemented recycling programs, “paperless office” policies can further reduce office waste and lower operating costs by reducing unnecessary printing, minimizing space needed for paper file storage, and improving file management efficiency. As a city in the heart of Silicon Valley, Cupertino should maximize its application of computer technology and digital systems in areas where it can lead to operational cost savings and resource efficiency. The City currently uses paperless practices in the Building Department for building permits and other forms and paperless agendas for its Council and Commissions, an effort led by the City Clerk. Expansion of paperless office practices will require Sustainability Division and IT staff to: investigate print-tracking software compliance problems, establish paper use reduction goals, and develop employee education programs about file management processes and paper use tracking. Paper reduction goals can be tracked through reduced procurement costs for paper, ink, and other printer-related costs, or through municipal waste audits. To ensure that recycled paper and cardboard can be re-used for their highest and best purpose, the City should maintain a “dry” recycling stream to avoid paper-product contamination from liquids and food scraps.

M-SW-1 Action B. Create Paperless Office Policy/Program		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to implement and monitor success of office paper reduction strategies Work with IT Department to install printer-tracking software that allows printer analytics Conduct analysis of paper use per department to establish data trends (e.g., reams used per year, pages printed per month) Establish City-wide paper use reduction goals based on printing analysis Meet with individual departments to discuss results of analysis and identify additional opportunities for printing reduction and / or conversion of some file types from hard copy forms to electronic Establish “dry” recycling collection for paper and cardboard products, as opposed to co-mingled collection for these items, to ensure highest value during recycling 	<p>E</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p>	Sustainability & Environmental Division
<p>Progress Indicator (2020)</p> <p>Assumes 80% diversion of municipal office paper over 2010 baseline levels</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>64</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action C. Revise Green Procurement & Event Specifications, Pair with Implementation Handbook



Green procurement specifications are often developed to prioritize City purchases that generate lower waste across a product’s lifecycle, allow local recycling or composting, incorporate recycled or re-used content, and support healthy working environments (e.g., low VOC paints and carpets). The City already has an Environmentally Preferable Procurement Policy, adopted in 2008 and currently being revised to mirror industry advancements, and has developed a draft user-friendly handbook to support staff procurement decisions. The handbook incorporates previous research efforts on preferred products for use in daily operations or at City-sponsored events, with an emphasis on preference for recycled/recyclable products, compostable products, minimal packaging, and other low-waste options. Given that the agency does not have a single office or individual overseeing purchasing, this handbook can serve as a clearinghouse document for all City procurement policies related to resource conservation. As the City approaches its zero-waste goal, municipal waste audits (see Action D below) may provide insight into the types of materials that are most difficult to eliminate from the waste stream. Specific green procurement alternatives could be added to the handbook to target these specific types of waste.

M-SW-1 Action C. Revise Green Procurement & Event Specifications, Pair with Implementation Handbook		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to implement City’s Environmentally Preferable Procurement Policy and refinement of staff handbook to serve as user-friendly resource to guide City purchases of "green" products, such as furniture, carpeting / flooring, paints, packaging materials, energy-efficient appliances, etc. Design purchasing specifications that give preference to recycled products, recyclable and compostable products, products derived from renewable materials, and other products that produce lower waste across the product's lifecycle Include reference to City's ENERGY STAR appliance procurement policy, or include as part of new Green Purchasing Guide to provide one comprehensive guidance document 	<p>E</p> <p>P</p> <p>P</p>	Sustainability and Environmental Division
<p>Progress Indicator (2020)</p> <p>Supports implementation of Action A</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>-</p>	
<p>Co-Benefits</p> 	<p>Implementation Timeline</p> 	

Action D. Conduct Waste Characterization Audits and Track Materials/Diversion

Analysis of municipal waste volume and composition can provide important data about diversion target feasibility and waste reduction opportunities, as well as provide measurement and verification to track progress of waste reduction/diversion goals described in Action A above. Waste audits and surveys at municipal facilities also provide opportunities to engage

department managers and employees regarding recycling and diversion efforts, potentially leading to higher participation rates and development of new strategies. The City already performs waste audits at municipal buildings and facilities as part of its Green Business Certification, but should increase the regularity and tracking of these efforts moving forward. Audit results could be used to develop a tracking/reporting mechanism to measure diversion target achievements per building or department, as described in Action A, or to help identify problematic waste materials as described in Action C. In order to monitor, track and evaluate effectiveness within each department, a central purchasing coordinator or analyst may be needed in the future.

M-SW-1 Action D. Conduct Waste Characterization Audits and Track Materials/Diversion		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Continue to perform waste audits at various City facilities to: <ul style="list-style-type: none"> determine type / quantity of waste being produced, measure effectiveness of existing waste diversion practices, identify opportunities for new waste diversion practices, establish baseline data for measuring progress towards waste reduction and diversion goals using CalRecycle data or EPA ReTrac Tool Establish regular waste audit cycle to track implementation of various waste reduction practices 	<p>E</p> <p>P</p>	Environmental Division
Progress Indicator (2020) Supports implementation of Action A	Reduction Potential (MT CO₂e/yr) -	
Co-Benefits 	Implementation Timeline 	



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

Continue to divert food scraps and compostable paper from municipal waste stream.

2020 GHG Reduction Potential: 16 MT CO₂e/yr

Food scraps account for approximately 16% of the overall solid waste stream, according to the state’s most recent waste characterization survey.^{xxi} The City already provides food scrap and compostable paper collection at all municipal facilities as part of its citywide organics collection program. Diverting these waste materials from landfills helps to reduce methane emissions

created when organic material decomposes in landfill environments. Expansion of this measure could contribute reductions of approximately 16 MT CO₂e/yr by 2020.

Action A. Expand Municipal Collection and Composting Program

The City currently collects organic waste at all municipal facilities, with the most effectively implemented models at City Hall and Blackberry Farm. Expanding this collection service and staff engagement program to other municipal facilities, particularly public buildings with high visitation rates, would help to capture more of the organic waste stream, and support the City’s zero-waste goal (see M-SW-1). The City could review its facility waste audits to identify the best candidates to further prioritize organics collection. If audits reveal that significant portions of organic waste are still being discarded at facilities with organics collection, the City could focus its efforts on educating City staff and the public on how the diversion program works. Publicly-oriented education campaigns could also serve to increase participation in community-wide organics collection at homes and businesses.

M-SW-2 Action A. Expand Municipal Collection and Composting Program		
Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> • Continue implementation of food scrap / compostable paper collection program at municipal buildings • As part of municipal waste audits (see M-SW-1 D), identify City buildings or facilities (e.g., parks) where substantial amount of compostable waste is still disposed of in general waste bins; develop additional employee educational materials (or community materials in case of public facilities) explaining how composting program works, what items can be collected, and benefits of City action in this area • If participation within City buildings indicates room for improvement, consider holding annual competitions (by building or department) to achieve lowest amount of compostable waste in landfill waste bins; competition could be timed with waste audits 	<div style="margin-bottom: 10px;">E</div> <div style="margin-bottom: 10px;">P</div> <div>P</div>	Environmental Division
<p>Progress Indicator (2020)</p> <p>Assumes 90% diversion of municipal food waste and plant waste over 2010 baseline levels</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>16</p>	
<p>Co-Benefits</p> <div style="display: flex; gap: 10px;">    </div>	<p>Implementation Timeline</p> <div style="text-align: center;">  </div>	



MEASURE M-SW-3 CONSTRUCTION AND DEMOLITION WASTE DIVERSION

Enhance construction and demolition waste diversion rates for municipal projects.




2020 GHG Reduction Potential: 2 MT CO₂e/yr

The California Green Building Code currently requires 50% diversion of construction and demolition (C&D) materials for all new projects, with few exceptions. Many construction materials can be diverted from the waste stream for reuse or recycling, including scrap lumber, concrete and asphalt, bricks, scrap metal, and drywall. As green building practices become more common in the region, landfill operators and contractors will improve their abilities to divert higher percentages of C&D waste in support of project documentation requirements for various green building certification programs (e.g., LEED, Green Point Rated). This measure quantifies the City's existing requirements to exceed the state's C&D diversion requirements. Implementation of this measure could reduce emissions by 2 MT CO₂e/year.

Action A. Set C&D Diversion Policy for Municipal Projects

The City already exceeds the state's C&D diversion requirements for applicable municipal construction projects through Municipal Code 16.72, which requires 60% diversion. As a longer-term strategy (e.g., by 2035), the City could consider increasing its C&D diversion target even further for municipal projects from 60% to 75%. Cupertino's Green Building Ordinance also requires achievement of LEED certification in most new municipal construction projects and major remodels. Similar to Measure M-F-4, which suggests specific energy-efficiency goals be established for new construction or substantial retrofits, this action could be implemented as part of the Green Building Ordinance as well, through voluntary pursuit of waste diversion-related design points. Both measures expand upon existing City actions with a focus on emissions reduction opportunities in construction projects. Prior to revising the City's existing 60% C&D diversion target, City staff should research opportunities and constraints to more stringent requirements, such as the ability of landfill operators to achieve higher diversion rates. The City currently has an agreement with Newby Island Landfill for the sorting and diversion of construction and demolition debris boxes. As of 2010, the facility was reporting diversion rates between 70-80% for C&D debris boxes from Cupertino. The City of San Francisco has required 65% diversion from C&D projects since 2006, also indicating feasibility in the Bay Area to further exceed current statewide requirements.

M-SW-3 Action A. Set C&D Diversion Policy for Municipal Projects

Implementation Steps	Status	Responsibility
<ul style="list-style-type: none"> Consider amending Green Building Ordinance to require 75% diversion of C&D waste in all municipal construction projects and major retrofits (this would exceed state requirements of 50% diversion, and Cupertino's existing requirements for 60% diversion); discuss implementation feasibility with landfill operator 	<p>P</p>	<p>Environmental Division</p>
<p>Progress Indicator (2020)</p> <p>Assumes City continues to achieve 60% diversion of construction and demolition waste from municipal projects</p>	<p>Reduction Potential (MT CO₂e/yr)</p> <p>2</p>	
<p>Co-Benefits</p> <div style="display: flex; gap: 20px;">   </div>	<p>Implementation Timeline</p> 	

Reduction Target Achievement

2020 TARGET ACHIEVEMENT

The purpose of the CAP is to identify measures and actions that the City could take to reduce municipal operation greenhouse gas emissions. This chapter has presented various measures the City could pursue (including continuation and expansion of existing City actions) to reduce its emissions through 2020. As shown in Table 4.4, the City could exceed its 2020 target through implementation of these CAP measures, and achieve reductions of approximately 700 MT CO₂e/yr compared to its target of 346 MT CO₂e/yr. This would represent an emissions level 35% below the 2010 baseline year. This achievement would put Cupertino on a trajectory towards its long-term emissions reduction targets for 2035 and 2050, though additional reductions would still be needed in the future. Figure 4.8 illustrates the City’s 2020 business-as-usual (BAU) emissions forecast, reduction target, and estimated reduction level assuming implementation of these CAP measures.

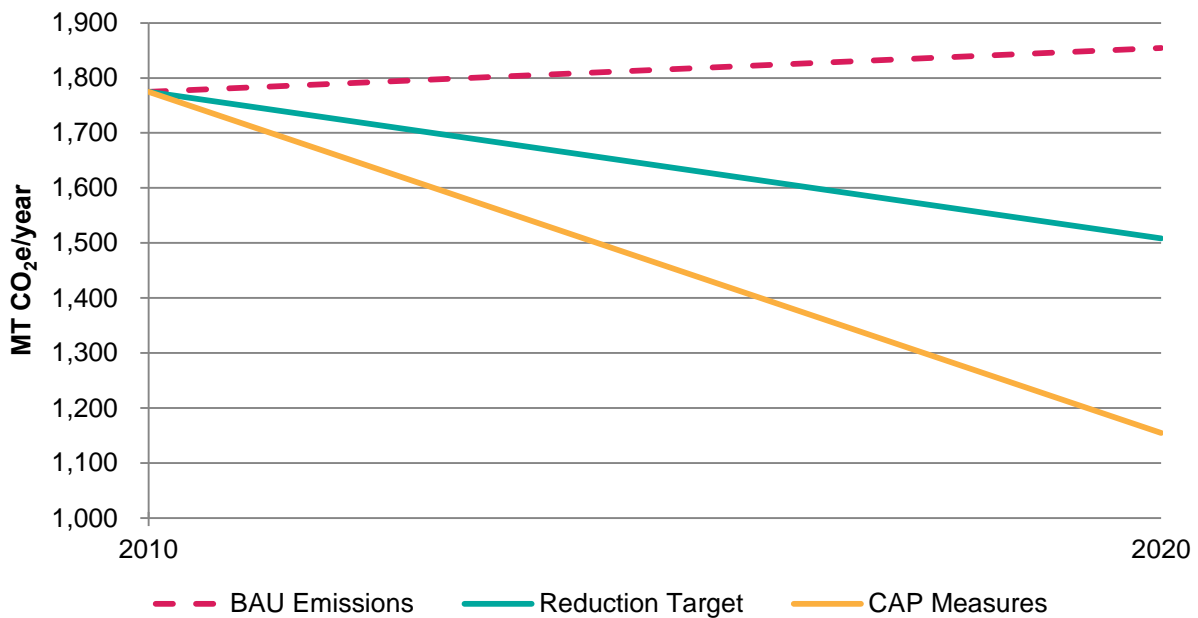
**Table 4.4
Summary of Municipal Operations Reductions**

Reduction Strategies	2020 Reductions (MT CO ₂ e/year)	Contribution to 2020 Target
Facilities Strategy	552 ¹	160%
Vehicle Fleet Strategy	66	19%
Solid Waste Strategy	82	24%
TOTAL 2020 MUNICIPAL OPERATIONS REDUCTIONS	700	202%
Reduction Target	15% below baseline	
Reductions Needed in 2020	346	
Estimated Reduction Level below 2010 Baseline	34.9%	

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

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

Figure 4.8 – CAP Measure Emission Reduction Potential 2010 to 2020



TRAJECTORY TOWARDS 2035 AND 2050 TARGETS

This CAP was primarily developed to identify strategies to help the City achieve its near-term 2020 reduction target. Numerous assumptions go into preparing emissions forecasts and plausible reduction measure participation rates, which make it difficult to accurately predict the City's ability to achieve longer-term reduction targets. For example, if building-related energy emissions grow faster than estimated, additional reductions will be needed to achieve the targets. Similarly, if the City is successful at converting its entire municipal fleet to low-emissions vehicles, other reduction measures may become less important. It is also difficult to predict new technologies and their impact on municipal operations. Despite these various assumptions and unknowns, it is possible to conservatively estimate progress towards the 2035 and 2050 targets, and identify the general measures that would be required to support target achievement in the future.

As shown in Table 4.5, if only the measures described in this chapter are pursued (and are not expanded beyond the implementation levels assumed by 2020), the City would achieve 66% of its 2035 target and 39% of its 2050 target. However, it is likely that additional implementation of these measures would occur after 2020, leading to greater emissions reductions. For example, this CAP assumes the installation of approximately 500 kW of solar PV by 2020. After build out of the Civic Center Master Plan, there may be opportunity to install additional PV systems on new City buildings and parking lots.

**Table 4.5
Impact of 2020 Municipal Operations Reductions on Future Target Achievement**

Reduction Strategies	2020 (MT CO ₂ e/year)	2035 (MT CO ₂ e/year)	2050 (MT CO ₂ e/year)
Total Municipal Operations Reductions	700	700	700
Reduction Target	15% below baseline	49% below baseline	83% below baseline
Reductions Needed	346	1,064	1,774
Portion of Target Achieved	202%	66%	39%

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

The measures and reduction estimates presented in this chapter are based on reasonable assumptions for what is possible and likely to occur between plan adoption and 2020, and have been vetted by City staff to refine their feasibility. However, as mentioned above, the accuracy of emissions projections and reduction estimates becomes less certain the farther into the future they are projected. This section presents a scenario demonstrating what level of City effort would be required in order to achieve the 2050 reduction target (i.e., 83% below 2010 levels).

As shown in Table 4.6, actions that result in cleaner electricity would play an important role in long-term target achievement. Energy-related emissions are estimated to account for nearly 70% of the City's emissions in 2050, the majority of which are related to electricity use. This means that long-term target achievement will not be possible without significant reductions from the Facilities sector. Similarly, water-related emissions and solid waste-related emissions contribute relatively fewer emissions to the City's inventory; forecasted to be less than 6% of total emissions in 2050. This indicates that actions that address water conservation and solid waste diversion, while important for other ecological or financial reasons, cannot be the primary strategy for long-term emissions target achievement.

The City's path to future target achievement is estimated to focus on the use of clean energy sources for building, facility, and vehicle needs. Table 4.6 presents one possible scenario for emissions reductions by 2050 that would achieve the City's long-term target. The table is organized similarly to Table 4.2 presented earlier in this chapter, though the scope of actual measures may differ as technologies change.

**Table 4.6
Municipal Operations Measures and Quantified Reductions**

Reduction Measures	2020 Reductions (MT CO ₂ e/year)	2050 Reductions (MT CO ₂ e/year)	Contribution to 2050 Target
FACILITIES STRATEGY	552	1,203	68%
M-F-1 Sustainable Energy Portfolio	- ¹	979	55%
M-F-2 Renewable or Low-Carbon Electricity Generation	108	173	10%
M-F-3 Advanced Energy Management	91	51	3%
M-F-4 Existing Building Energy Retrofit	41	Replaced by reductions estimated in Measures M-F-1 through M-F-3	
M-F-5 New Building Energy Performance	Supporting Measure		
M-F-6 Public Realm Lighting Efficiency	125		
M-F-7 Landscape Water Conservation	1		
Statewide Actions	186 ²		
VEHICLE FLEET STRATEGY	66	459	26%
M-VF-1 Low Emission and Alternative Fuel Vehicles	48	459	26%
M-VF-2 Alternative Fuel Infrastructure	Supporting Measure	Replaced by reductions estimated in Measure M-T-1	
M-VF-3 Behavior / Fuel Conservation	19		
SOLID WASTE STRATEGY	82	110	6%
M-SW-1 Waste Reduction	64	89	5%
M-SW-2 Food Scrap and Compostable Paper Diversion	16	17	1%
M-SW-3 Construction and Demolition Waste Diversion	2	4	<1%
TOTAL CAP REDUCTIONS	700	1,772	100%
Reduction Target	15% below baseline	83% below baseline	-
Reductions Needed	346	1,774	
Estimated Reduction Level below 2010 Baseline	34.9%	82.9%	

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

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

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

This scenario presented in Table 4.6 assumes that 100% of the City's electricity use will come from emissions-free sources by 2050, and that existing solar PV installations on municipal buildings and facilities will be maintained for ongoing future use. If all electricity comes from clean sources, then building retrofits that conserve electricity no longer have emissions reductions associated with them (i.e., the electricity they save is already emissions free, so there is no net reduction in emissions). Therefore, Table 4.6 shows that emissions reductions associated with Measures M-F-4 through M-F-7 and the statewide reductions from the Renewable Portfolio Standard are supplanted by energy-related reductions in Measures M-F-1 through M-F-3.

The 2050 reduction estimates are based on the same 2020 CAP measures described in this chapter, with increased implementation performance assumptions occurring between 2020 and 2050. Approximately 70% of the City's building-related energy use in 2010 was attributed to electricity use, while the remaining 30% was natural gas. Under the business-as-usual emissions forecast scenario described in Chapter 2, this ratio of energy use is assumed to continue in the future. That means that the 30% of future building energy use attributed to natural gas consumption will not be affected by clean electricity purchases or generation. Therefore, this scenario assumes the future installation of solar thermal systems at the Blackberry Farm Pool and Sports Center, as previously identified in the City's Detailed Energy Audit (see Measure M-F-2 Action B).

In addition to significant emissions reductions from the Facilities sector, this scenario depends upon a widespread transformation of the City's municipal fleet towards alternative-fuel and low-emissions vehicles. This scenario expands upon the assumptions described in Measure M-VF-1 above, and demonstrates potential reductions resulting from a fleet that comprises 100% electric passenger vehicles and light-duty trucks, as well as a shift in heavy-duty trucks towards CNG and electric models. This scenario is dependent upon additional advancements in the vehicle market to provide alternative fuel vehicle models that can perform the tasks required of the municipal fleet.

The remaining emissions reductions are based on an assumption that the City can achieve its zero-waste goal, such that no organic materials are sent to area landfills. This scenario assumes 100% diversion of office paper and paper materials, food scraps and green waste from landscaping activities, and organic components of construction and demolition debris.

It is difficult to establish performance assumptions for horizon years far in the future given unknown budgetary conditions, emergence of new and evolving technologies, and potential state and federal actions. For this reason the CAP does not attempt to define specific municipal operations actions for 2035 or 2050. However, because the CAP is a living document that should be reviewed and revised on a regular basis, possibly in coordination with future General Plan revisions, performance indicators that align with the long-term emissions reduction strategies described here can developed gradually over time.

Given the pathway described above for achievement of the City's 2050 reduction target, emissions reduction progress by 2035 will require implementation of actions at a level somewhere between what is described for 2020 in the measure descriptions earlier in this chapter and this general scenario described for 2050. Due to the numerous variables and unknowns of the future state of the City's emissions, these 2050 reduction estimates are provided for demonstrative purposes only. As described further in Chapter 4, the City will need to regularly assess the effectiveness of CAP measures to ensure future emissions levels are on track to achieve the 2050 target, as well as monitor any new future guidance from the Office of Planning and Research, BAAQMD, or other agencies on the role of local government action in supporting the state's reduction targets.

