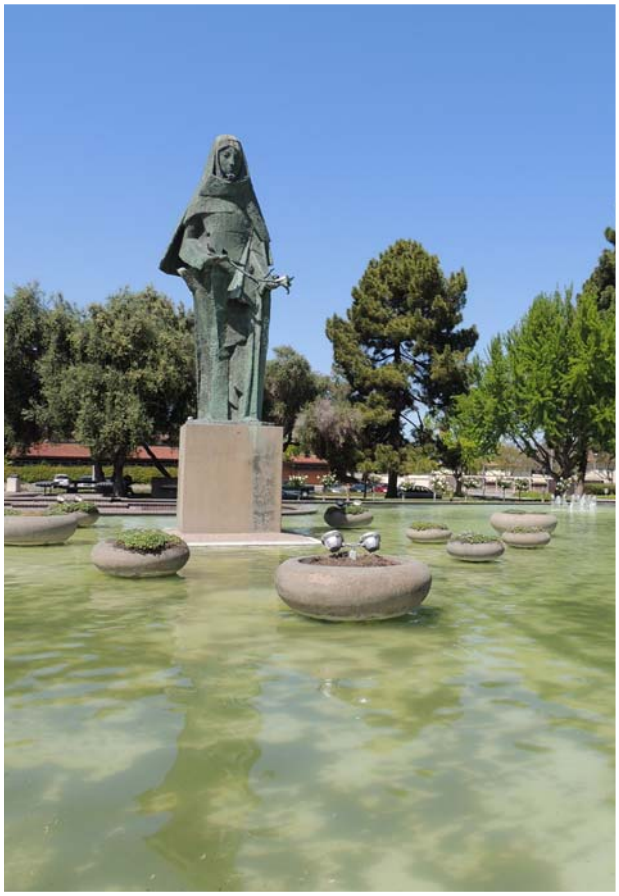
City of Santa Clara
Climate Action Plan



Santa Clara Climate Action Plan

Adopted
December 3, 2013

Table of Contents

List of Figures

List of Tables

Abbreviations

Abbreviation	Definition
AB	Assembly Bill
ABAG	Association of Bay Area Governments
BAAQMD	Bay Area Air Quality Management District
btu	British thermal units
CALGreen	California Green Building Standards Code
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
EPA	Environmental Protection Agency
EV	electric vehicle
GHG	greenhouse gas
GWP	global warming potential
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
kW	kilowatt
kWh	kilowatt-hour
LGOP	Local Government Operations Protocol
MG	million gallons
$MTCO_2e$	metric tons of carbon dioxide equivalents
MW	megawatt
MWh	megawatt hours
N_2O	nitrous oxide
OPR	California Governor's Office of Planning and Research
PG&E	Pacific Gas and Electric Company
PV	photovoltaic
RASS	Residential Appliance Saturation Study
RPS	Renewables Portfolio Standard
SB	Senate Bill
SCCC	Santa Clara City Code
SCVWD	Santa Clara Valley Water District
SVP	Silicon Valley Power
TDM	transportation demand management
UWMP	Urban Water Management Plan
VMT	vehicle miles traveled
VTA	Santa Clara Valley Transportation Authority

Executive Summary

This Climate Action Plan (CAP; Plan) defines the City of Santa Clara's path toward creating a more sustainable, healthy, and livable community. The strategies outlined in this Plan will reduce greenhouse gas (GHG) emissions and provide energy, fuel, and monetary savings while improving quality of life for the Santa Clara community.

Organization

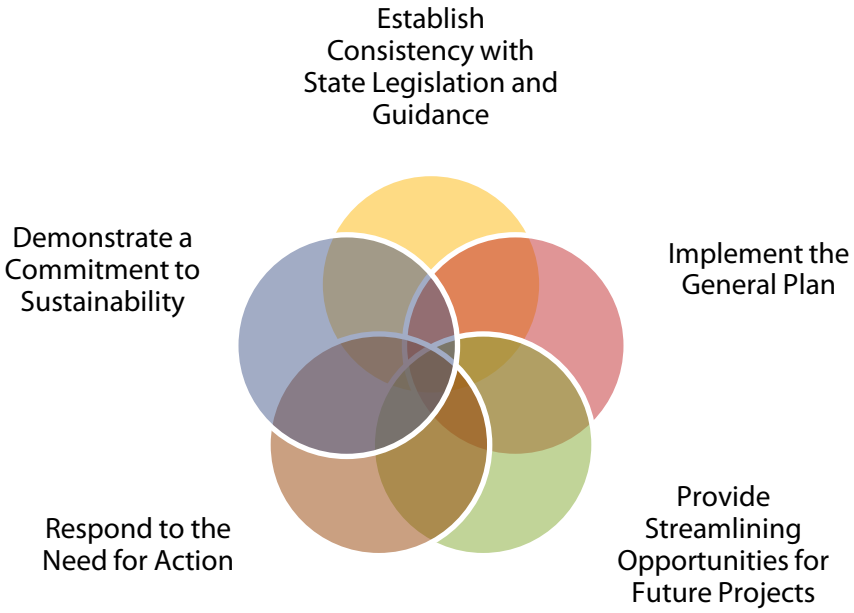
To align with the recommended steps in the climate action planning process, the CAP is broken into the following chapters and appendices:

- An introduction to the regulatory and scientific framework and the City's motivations for preparing this plan (Background – Chapter 1).
- 2008 GHG emissions inventory and 2020 and 2035 forecasts for community sources and government operations (Measuring Our Emissions – Chapter 2).
- An assessment of state and local activities that have been implemented since 2008 to reduce emissions (Tracking Early Success – Chapter 3).
- Santa Clara's proposed future actions to reduce emissions (Reducing Emissions – Chapter 4).
- The path necessary to successfully implement this CAP (Achieving Our Goals – Chapter 5).
- Technical memo on GHG emissions inventory results and methodologies (Appendix A).
- Summary of methodology and assumptions for GHG quantification (Appendix B).

Climate Action Plan Motivations

This CAP celebrates Santa Clara's past efforts to integrate sustainable practices into community life, and demonstrates the City's continued commitment to be a leader in sustainability and to reduce GHG emissions. **Chapter 1** identifies Santa Clara's CAP motivations and provides a brief overview of climate change and the climate action planning process. As identified in **Figure ES-1**, motivating forces for the City of Santa Clara to prepare a CAP include consistency with state guidance, mitigating future projects, implementing the General Plan, promoting environmental leadership, and providing educational resources.

Figure ES-1: Climate Action Plan Motivations



Background

Environmental Leadership

Santa Clara has a proven history of environmental commitment as evident in the "Green, Greener, Greenest" publication,[1] and this CAP will further embed the City's environmental responsibility efforts in everyday practice. In addition, the CAP may also allow the City to streamline future environmental review of development projects in Santa Clara by following the California Environmental Quality Act (CEQA) Guidelines and meeting the Bay Area Air Quality Management District's (BAAQMD) expectations for a Qualified GHG Reduction Strategy. The CAP identifies how the City will achieve the state-recommended GHG emissions reduction target of 15% below 2008 levels by the year 2020 (equivalent to 1990 emissions). The CAP provides

[1] http://santaclaraca.gov/index.aspx?page=1218

goals and emissions reduction measures to address energy use, transportation, land use, water, solid waste, and off-road equipment.

The City has a long-standing commitment to implementing environmental programs and proactively working to reduce GHG emissions. The adoption and implementation of this Plan will reinforce and build upon these policies and programs.

Imperative to Act

Members of the Intergovernmental Panel on Climate Change (IPCC) assert that the atmospheric carbon dioxide (CO_2) concentration must be at or below 350 parts per million to maintain an environment similar to the one humans have thrived in. Atmospheric concentrations of CO_2 have not been near 350 parts per million since 1990, and surpassed 400 parts per million in May 2013.

Leaders in Sustainability

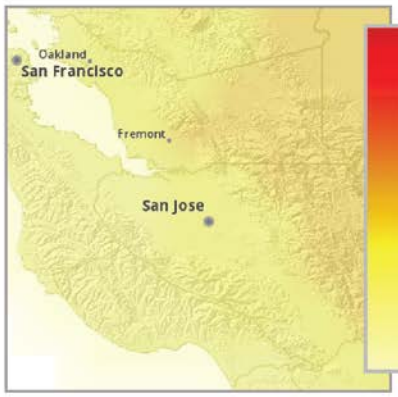
Actions taken by City leadership to demonstrate Santa Clara's commitment to addressing climate change include:

- *Joining more than 1,000 other U.S. Mayors in signing the U.S. Mayors Climate Protection Agreement.*
- *Joining more than 850 CEOs of Silicon Valley companies in signing a pledge to promote clean energy at a 2006 "CEO Summit on Alternative Energy."*
- *Participating in Sustainable Silicon Valley. A coalition of businesses, governments and non-government organizations to reduce regional emissions.*

Research suggests that failing to decrease atmospheric concentrations of GHG emissions will have a profound impact both globally and locally. California will experience hotter and drier conditions, reduced winter snow, and increased winter rain, sea level rise, changes to the water cycle, and more extreme weather events. These conditions will affect economic, ecological, and social systems throughout California communities. While uncertainty surrounds the scale, timing, and duration of long-term climate change effects, most climate models identify a best-case scenario, if the global community were to immediately stop emitting GHG emissions, and a worst-case scenario, if emissions continue to increase at historic rates. The anticipated long-term effects of climate change in Santa Clara County under both low- and high-emissions scenarios are described in **Figure ES-2.**

Figure ES-2: Long-Term Climate Change Effects in Santa Clara County

Temperature



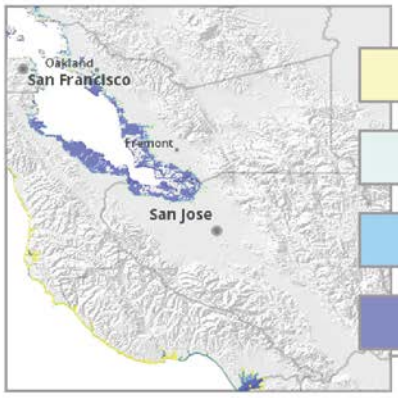
+7.3 °F

+4.8 °F

Projected increases in average annual temperature by 2070-2099 compared to historical averages (1960-1991).

Historical Average:	59.5 °F
Low Emissions Scenario:	62.7 °F + 3.2 °F
High Emissions Scenario:	65.1 °F + 5.6 °F

Sea Level Rise



55 inches

39 inches

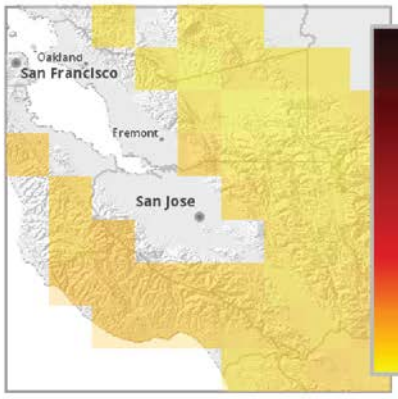
19 inches

Current

Land vulnerable to 100-year flood event by 2100 compared to 2000 levels with a 55 inch rise in sea levels.

Vulnerable Land in 2000:	9,647
Vulnerable Land in 2100:	14,201
Percent Change:	+ 32%

Wildfire Risk



10.0

0.1

Wildfire risk relative to 2010 levels by 2020, 2050, 2085

Year:	2020	2050	2085
Low Emissions Scenario:	1.04	1.01	0.83
High Emissions Scenario:	1.05	0.98	0.88

Source: CalAdapt 2013.

The detrimental effects of climate change are already being observed around the globe. While weather events such as drought, flooding, and severe storms have been a normal occurrence in many parts of the world, the increased concentrations of GHG emissions have increased the frequency and severity of these events, and are expected to have additional detrimental effects in the future if the concentration of global emissions are not stabilized and reduced.

A Sustainable Step for Santa Clara

With the adoption of the General Plan in 2010, the City set into motion a Major Strategy to promote sustainability through the conservation of resources and reducing the impacts of both existing and new development on the local and regional environment. As part of the General Plan phasing schedule, the development of a climate action plan is a required prerequisite for Phase II. The CAP will be integrated into Appendix 8.13 upon completion.

As a member of the global community, Santa Clara has a responsibility to reduce future GHG emissions and be a leader in addressing the effects of climate change. As a first step, implementing this CAP will position Santa Clara to decrease emissions consistent with California's Global Warming Solutions Act of 2006 (Assembly Bill (AB) 32).

As a municipal utility, the City is uniquely positioned to lead community efforts to reduce GHG emissions. Eliminating the use of electricity from GHG-intensive sources such as coal from Silicon Valley Power's (SVP) electric portfolio is an important first step. The advantages of Santa Clara's coal-free energy portfolio would be numerous. By using more renewable energy sources, the City can improve future energy security as fossil fuel supplies drop and associated prices rise.

Some U.S. (Seattle, Boulder, Austin) and international communities have set their sight on or adopted goals to become completely carbon-neutral, or to eliminate GHG-emitting sources from their energy portfolio. While Santa Clara has committed to reducing GHG emissions, the City's role as an electricity provider for the community, its significant investments in energy infrastructure, need for technology advancements, and regulations outside of the City's control make adopting a carbon-neutral goal infeasible at this time.

Community Engagement

Community members were engaged throughout the climate action planning process in a variety of ways. The events held provided a forum for community members to voice their ideas about emissions reduction and ways to make Santa Clara a more environmentally sustainable place to live and work. The events were hosted by staff to solicit input from the community and are listed in **Figure ES-3.**

Figure ES-3: Community Input Opportunities

Measuring Our Emissions

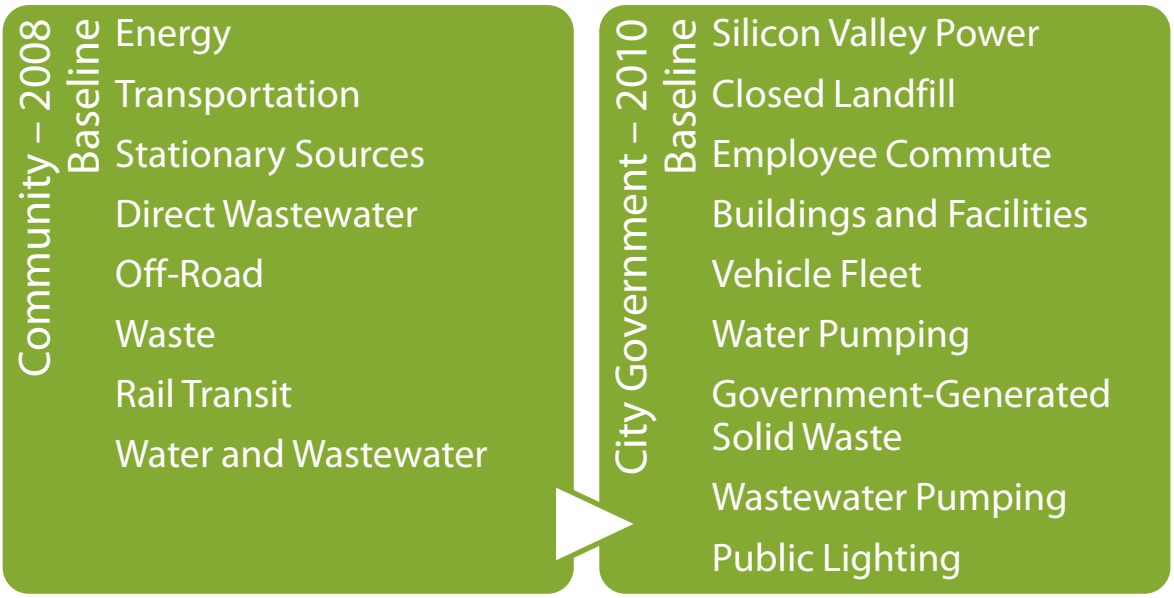
The GHG emissions inventory and forecast lays the groundwork for the entire CAP planning process. The inventory catalogues community GHG emissions for 2008 and City government emissions for 2010, and projects total emissions levels for 2020 and 2035. The inventory was prepared using protocols and best practices identified within the Local Government Operations Protocol, the ICLEI-Local Governments for Sustainability (ICLEI) Community-wide Protocol, and BAAQMD's GHG Plan Level Guidance. The inventory considers the community and City government sources presented in **Figure ES-4**.

Calculating Emissions

Due to the varying degrees of influence over different GHG emissions sources, there is often overlap in accounting for GHG emissions. For the City of Santa Clara, this overlap occurs between the direct emissions produced at facilities generating electricity for SVP, and again indirectly as SVP electricity is used in homes and businesses. SVP's direct emissions are calculated and included in the baseline inventory and forecast in two different ways, maintaining consistency with national GHG emissions protocols. First, the direct emissions associated with the two power plants located within city limits are calculated using verified emissions numbers from the California Air Resources Board (CARB). Second, the indirect emissions associated with each business and household consuming SVP electricity are calculated based on the amount of electricity consumed, whether or not it is generated within the city limits.

To avoid double-counting these emissions, the direct emissions from the power plants located within the city are excluded from future discussions of the government operations inventory.

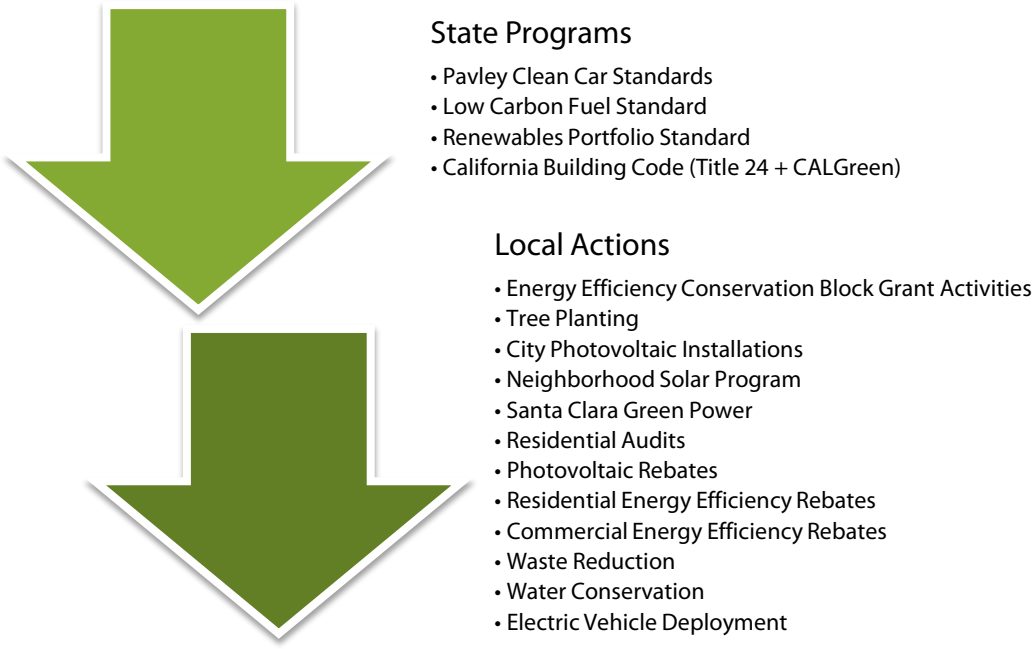
Figure ES-4: Greenhouse Gas Emissions Inventories and Activities



Tracking Early Success

The City and the State of California have proud track records of supporting environmental initiatives and reducing emissions. **Chapter 3** builds on the emissions inventories and forecasts, identifying activities and requirements implemented at the state and local levels since 2008 and their benefits to reducing local emissions. As identified in **Figure ES-5**, these activities and requirements have already set the City on a path to achieve its GHG reduction goals.

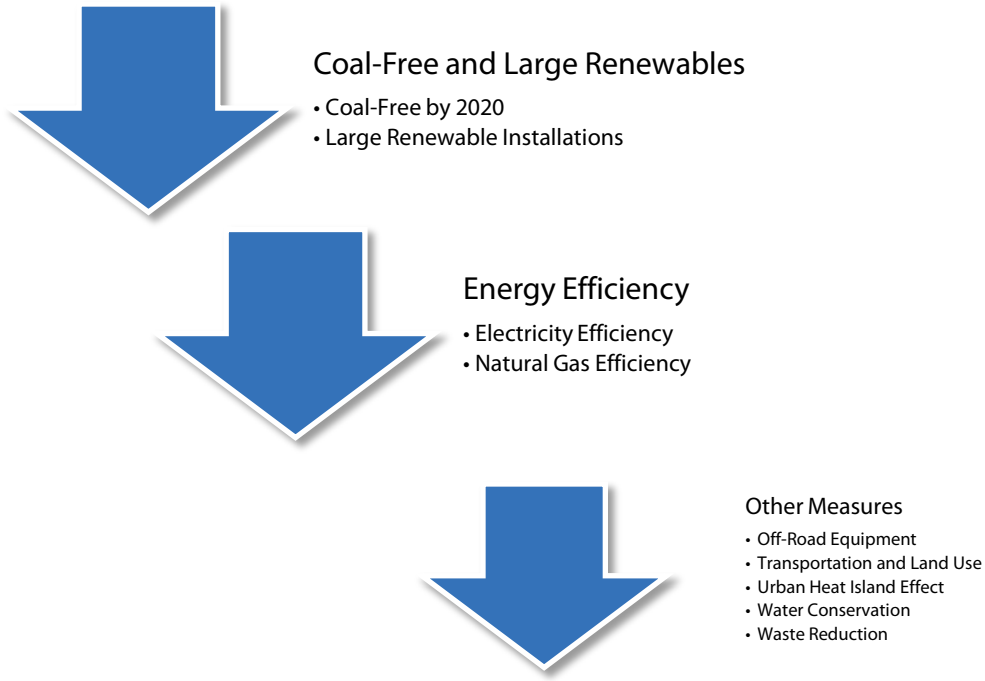
Figure ES-5: State Programs and Local Actions to Reduce Emissions



Reducing Emissions

The reduction measures included in this plan are a diverse mix of incentives, education, and regulations applicable to both new and existing development. The measures are designed to reduce emissions from each source to avoid relying on any one strategy or sector to achieve the target. **Chapter 4** describes the process used to develop, refine, and quantify the emissions reduction goals, measures, and actions identified to achieve Santa Clara's reduction targets. The measures included in the CAP are grouped into three main categories, which are identified in **Figure ES-6**.

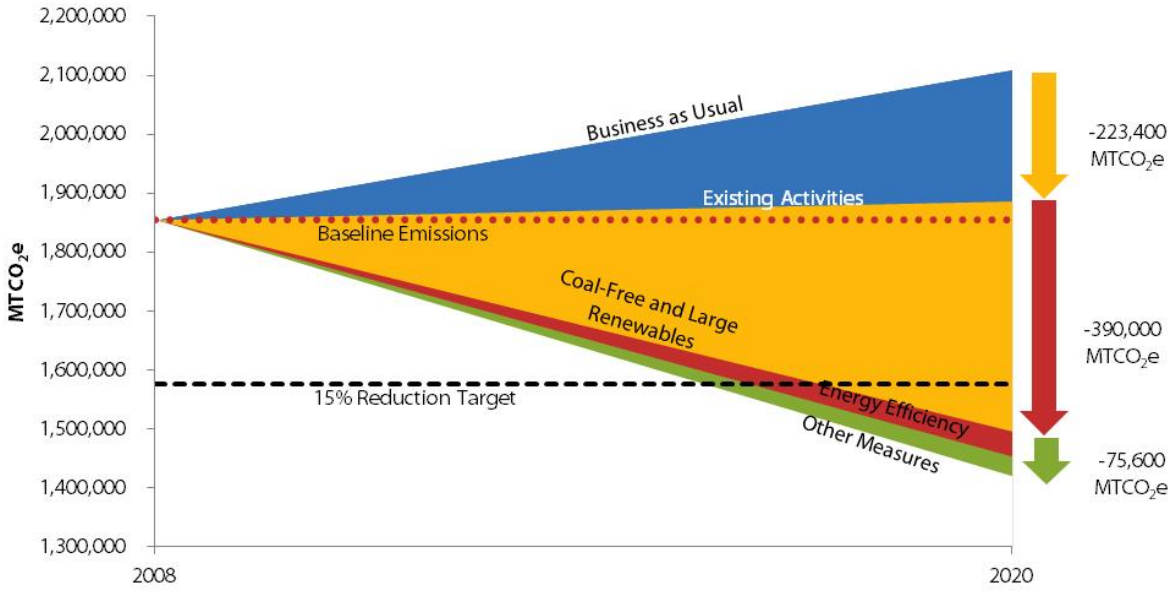
Figure ES-6: Emissions Reduction Focus Areas



Reduction Summary

Implementing the CAP measures would enable the community to reduce emissions by 23.4% below 2008 levels by 2020. **Figure ES-7** illustrates the City's ability to achieve and exceed the reduction target by 2020.

Figure ES-7: Emissions Reduction Scenario and Target Achievement



Reach Measures

Recognizing that the challenges presented by GHG emissions will continue beyond 2020, the City has also identified next steps or reach measures to reduce emissions beyond 2020 levels. Proposed CAP measures and associated performance metrics identify emissions reductions to be achieved by 2020. Recognizing the need to look beyond 2020, the City has established a series of reach measures that will be implemented after 2020 to continue decreasing the City's emissions. These reach measures are described in **Chapter 4.**

Achieving Our Goals

To ensure successful achievement of the City's reduction target, **Chapter 5** identifies implementation strategies and supporting actions. The chapter includes an implementation work plan, which details emissions reductions, lead departments, and community partners by measure. **Chapter 5** provides critical tools for monitoring the City's implementation progress.

1. Background

Climate Change

Scientists agree that the world's population is releasing greenhouse gases (GHGs) faster than the earth can absorb by its natural systems, resulting in higher measured and projected surface temperatures.[2] GHGs occur naturally within earth's atmosphere. Without them, the earth's average surface temperature would be at about freezing levels.[3] **Figure 1** illustrates how GHGs trap incoming solar radiation and infrared radiation from the earth's surface in the atmosphere. While natural levels of GHGs bring the earth to comfortable temperatures, GHGs are also byproducts of fossil fuel combustion, waste disposal, energy use, land use changes, and other human economic activities. The continued release of GHGs at or above current rates will increase average global surface temperatures and will alter our planet's climate, creating substantial long-term local, regional, and global effects.

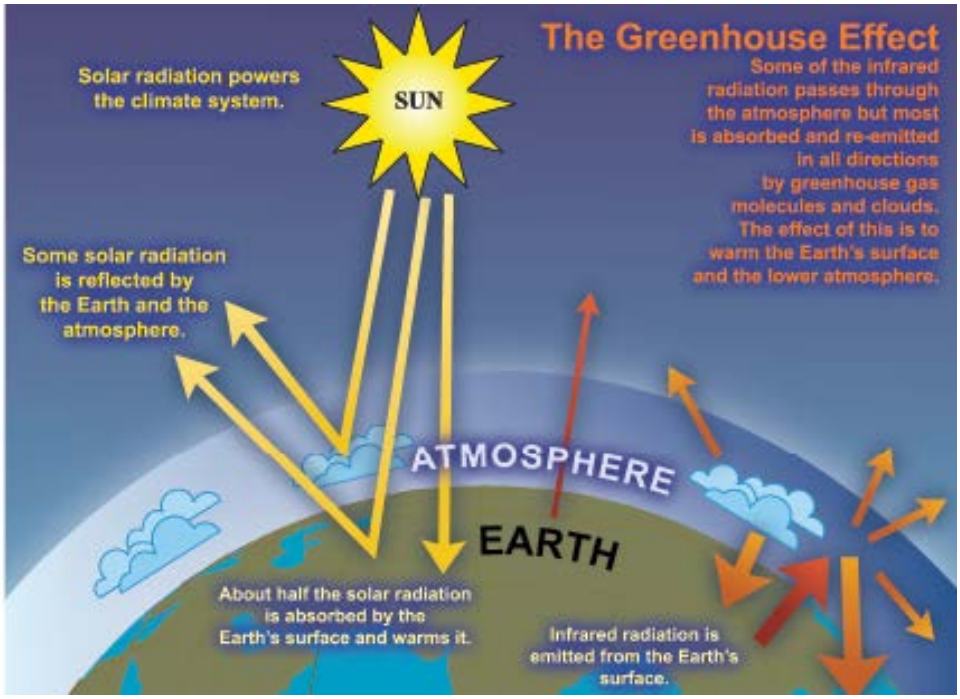
[2]A recent study of nearly 12,000 peer-reviewed journal articles on climate change concluded that 97% of climate change scientists endorsed the consensus position that humans are causing climate change.

[3] Without GHGs, Earth's annual average surface temperature would be zero degrees Fahrenheit.

Imperative to Act

Members of the Intergovernmental Panel on Climate Change (IPCC) assert that the atmospheric carbon dioxide (CO_2) concentration must be at or below 350 parts per million to maintain an environment similar to the one humans have thrived in.[4] Atmospheric concentrations of CO_2 have not been near 350 parts per million since 1990, and surpassed 400 parts per million in May 2013. Without local action, continued GHG emissions will induce changes in the global climate system, posing greater risks to our state and community. This Climate Action Plan represents the City of Santa Clara's local response to climate change.

Figure 1: The Greenhouse Effect



Source: Intergovernmental Panel on Climate Change 2007.

Global Climate Change Effects

The IPCC's Fourth Assessment Report provides a comprehensive summary of the world's best climate models. Assuming current emission patterns, the IPCC projects a wide range of global climate change effects, including the following:

- Warmer days, fewer cold days and nights, and more frequent hot days and nights
- Increased frequency of warm spells/heat waves
- Increased frequency of heavy precipitation events
- Increased area affected by drought

[4] Parts per million is an air quality standard measurement used to describe the amount of pollutants per million molecules of air.

- Increased intense tropical cyclone activity
- Increased incidence of high sea levels

These effects will worsen extreme weather events and can lead to further effects such as shifting agricultural zones, increased disease vectors, and altered animal migration patterns. If trends remain unchanged, GHG emissions above current rates will induce further warming of the global climate system and pose greater risks. Given the scientific basis of climate change and expected trends, it is imperative that the City prepare for climate change and mitigate GHG emissions through deliberate action.

Localized Climate Change Effects

While uncertainty surrounds the scale, timing, and duration of long-term climate change effects, most climate models identify a best-case scenario, if the global community were to immediately stop emitting GHG emissions, and a worst-case scenario, if emissions continue to increase at historic rates. **Figure 2** summarizes the potential long-term climate change effects in Santa Clara County under low- and high-emissions scenarios. Overall, research suggests that California will experience hotter and drier conditions, reduced winter snow, and increased winter rain, sea level rise, changes to the water cycle, and more extreme weather events. These conditions will affect economic, ecological, and social systems in California communities.

Figure 2: Long-Term Climate Change Effects in Santa Clara County

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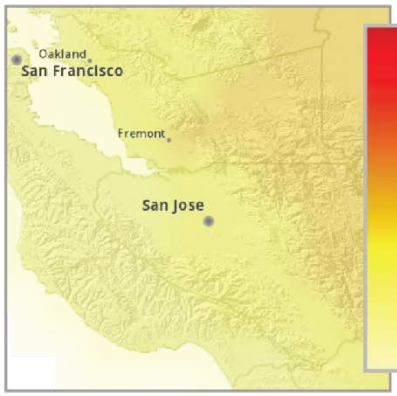

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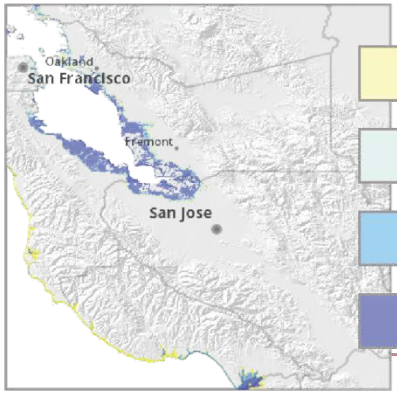

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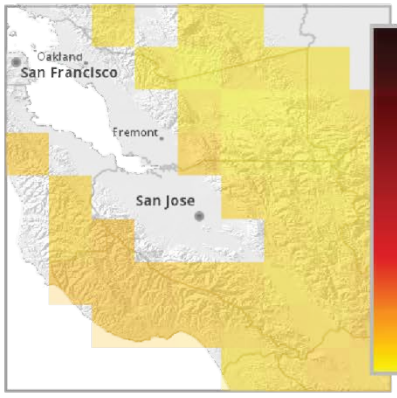

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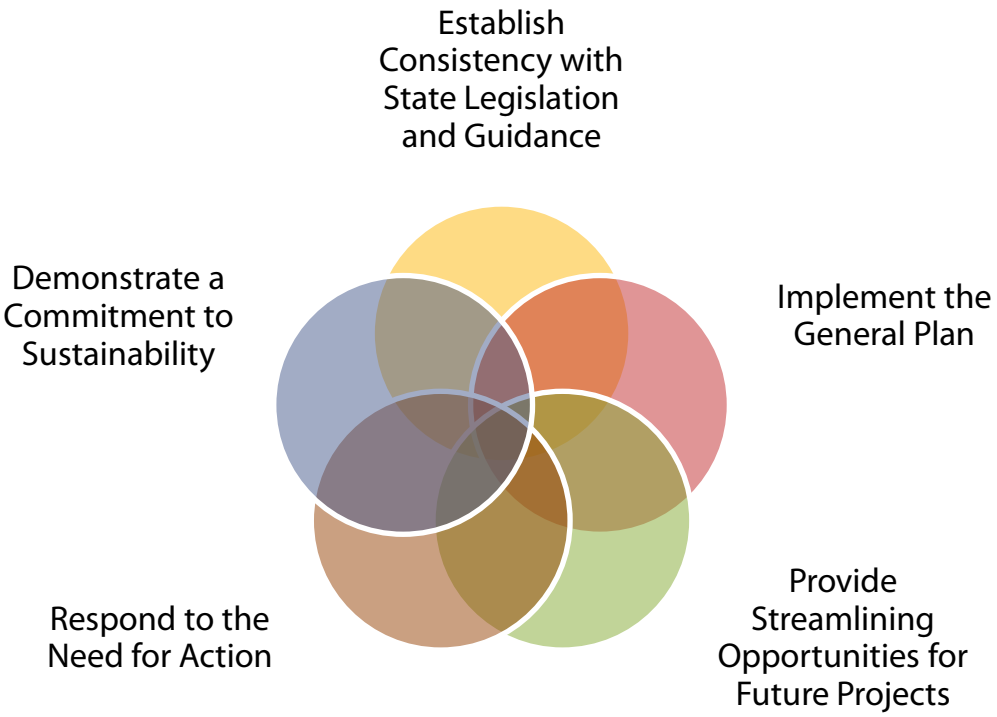
Low Emissions Scenario:	1.04	1.01	0.83
High Emissions Scenario:	1.05	0.98	0.88

Source: CalAdapt 2013.

Climate Action Plan Motivations

In developing this CAP, the City recognizes the compelling need for a locally based approach to reduce emissions within the community and from government operations. **Figure 3** identifies some of the City's motivations to prepare the CAP. With this plan, the City charts a comprehensive strategy to reduce emissions in a manner consistent with state guidelines and regulations, and to afford cost-effective opportunities to existing and future residents, businesses, and development projects to contribute to a more sustainable community.

Figure 3: Climate Action Plan Motivations



State Legislation and Guidance

State Assembly Bill (AB) 32 (2006), the Global Warming Solutions Act, directs public agencies in California to support the statewide goal of reducing GHG emissions to 1990 levels by 2020. Preparing a CAP supports AB 32 at the local level. The CAP provides a policy framework for how Santa Clara can do its part to reduce emissions. While compliance with AB 32 is not a requirement for local jurisdictions, demonstrating consistency with statewide reduction goals can help Santa Clara to qualify for incentives such as grant funding. Efforts to address climate change, reduce consumption of resources, and improve energy efficiency led by state legislation or programs are briefly described below and identified in **Figure 4**.

Assembly Bill 32 – California Global Warming Solutions Act of 2006

AB 32, known as the California Global Warming Solutions Act, was approved by the legislature and signed by Governor Schwarzenegger in 2006. The landmark legislation requires the California Air Resources Board (CARB) to develop regulatory and market mechanisms that will reduce GHG emissions to 1990 levels by 2020. Mandatory actions under the legislation to be completed by CARB include:

- Identification of early action items that can be quickly implemented to achieve GHG reductions. These early action items were adopted by CARB in 2007 and include regulations affecting landfill operations, motor vehicle fuels, car refrigerants, and port operations, among other regulations.
- Development of a scoping plan to identify the most technologically feasible and cost-effective measures to achieve the necessary emissions reductions to reach 1990 levels by 2020. The scoping plan employs a variety of GHG reduction measures that include direct regulations, alternative compliance mechanisms, incentives, voluntary actions, and market-based approaches like a cap-and-trade program. The plan identifies local governments as strategic partners to achieving the state goal and translates the reduction goal to a 15% reduction of current emissions by 2020.
- Creation and adoption of regulations to require the state's largest industrial emitters of GHGs to report and verify their emissions on an annual basis.

Senate Bill 97 – California Environmental Quality Act Guideline Amendments of 2007

Senate Bill (SB) 97 was adopted in 2007 by the State of California and directed the Governor's Office of Planning and Research (OPR) to amend the California Environmental Quality Act (CEQA) Guidelines to address GHG emissions. The CEQA Guidelines prepared by OPR were adopted in December 2009 and went into effect March 18, 2010. Local governments may use adopted plans consistent with the CEQA Guidelines to assess the cumulative impacts of projects on climate change, if the adopted plan includes a certified environmental impact report (EIR) or adoption of an environmental document. In order to benefit from the streamlining provisions of the CEQA Guidelines, a plan for the reduction of GHG emissions must accomplish the following:

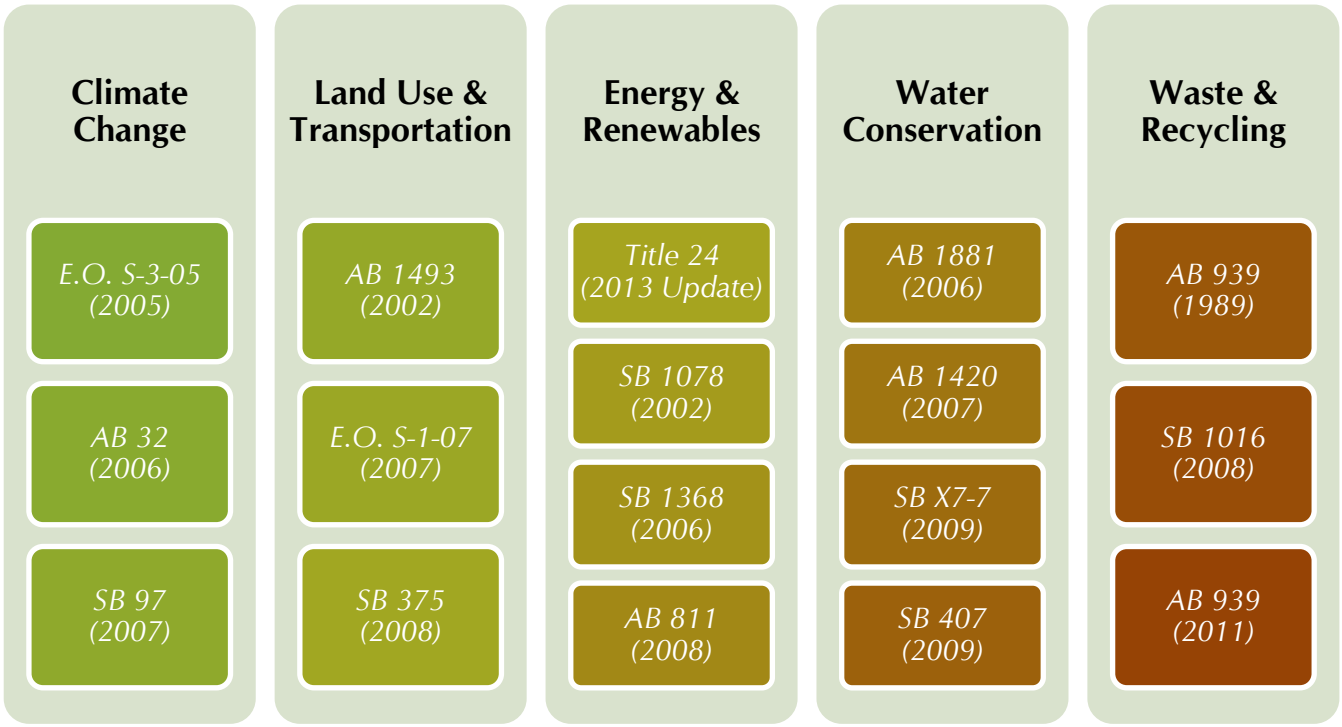
- Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area.
- Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable.
- Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area.
- Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require an amendment if the plan is not achieving specified levels.
- Be adopted in a public process following environmental review.

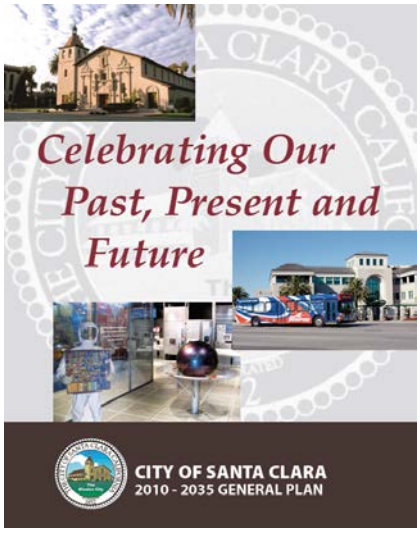
In response to the updated CEQA Guidelines, the Bay Area Air Quality Management District (BAAQMD) has adopted thresholds of significance for GHG emissions. These thresholds may be used in the environmental review process for plans and projects by local governments in the Bay Area.

SB 375 – Sustainable Communities and Climate Protection Act of 2008

SB 375 builds off of AB 32 and aims to reduce GHG emissions by linking transportation funding to land use planning. It requires metropolitan planning organizations (MPO) to create a sustainable communities strategy (SCS) in their regional transportation plans (RTP) for the purpose of reducing urban sprawl. The SCS will demonstrate how the region will achieve the GHG emissions reduction target set by CARB for 2020 and 2035.

Figure 4: Regulatory Framework for Climate Change





Implementing the General Plan

Santa Clara's 2010–2035 General Plan includes goals, policies, and programs to address climate change and improve environmental sustainability, including a requirement to develop this CAP. City policies that further the City's sustainability goals are in Appendix 13 of the General Plan.

Upon adoption of the CAP, the City intends to amend the General Plan to fully integrate the goals and policies. Similar to other portions of the General Plan, the City will implement CAP goals, measures, and actions and monitor its progress over time.

Streamlining Environmental Review

Developing a CAP can also provide streamlined environmental review for new projects subject to CEQA. SB 97 (2007) directed OPR to amend the State CEQA Guidelines to address GHG emissions. OPR adopted the CEQA in December 2009 and they went into effect March 18, 2010. The updated guidelines include provisions for local governments to use adopted plans for the reduction of GHG emissions to address the cumulative impacts of individual future projects on GHG emissions (see State CEQA Guidelines Section 15183.5(b)(1)).

In response to the updated CEQA Guidelines, BAAQMD amended Section 4 of the BAAQMD Air Quality CEQA Guidelines, allowing a lead agency to prepare a Qualified GHG Reduction Strategy that reduces emissions to a level that is not cumulatively considerable. If the local agency then determines that a project is determined to be consistent with an adopted Qualified GHG Reduction Strategy, the project is assumed to not have a significant GHG emissions impact under CEQA.

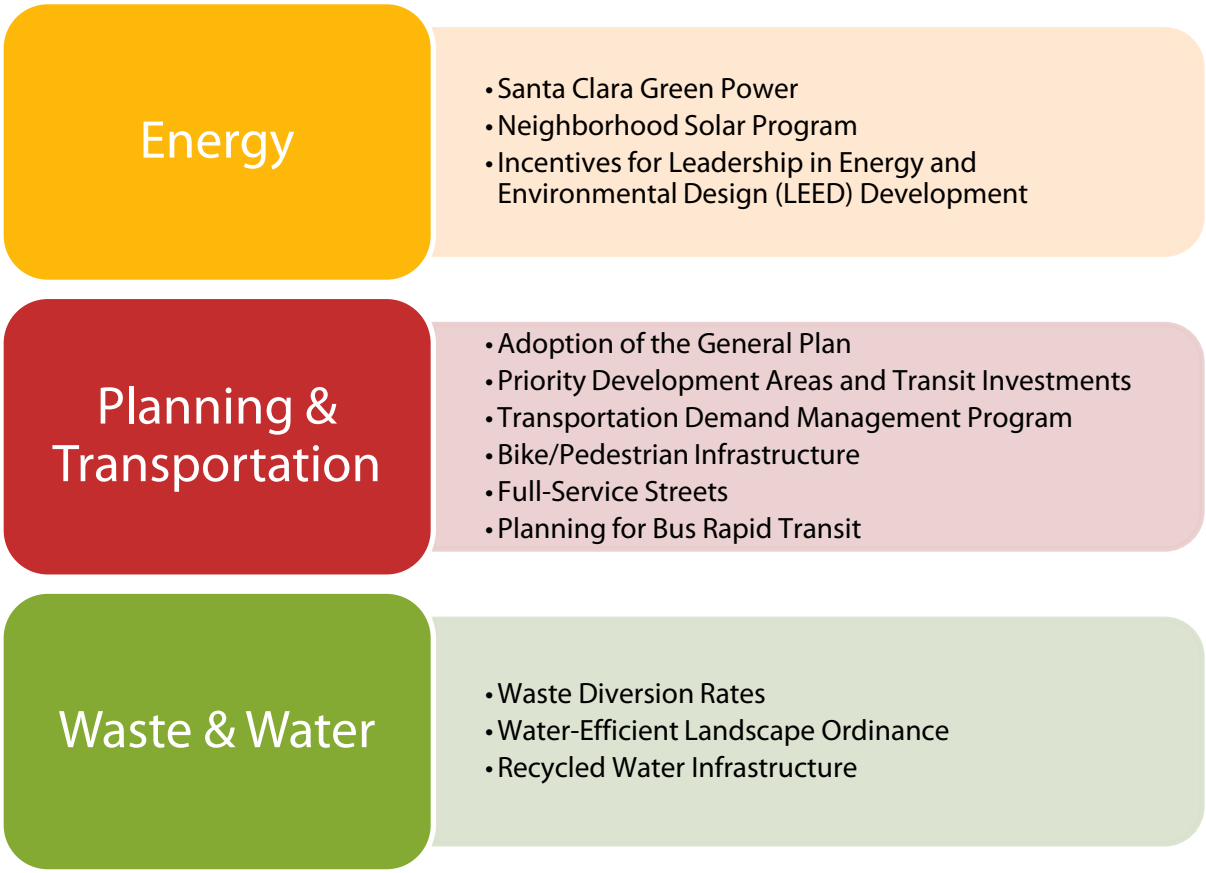
The Santa Clara CAP and accompanying environmental documentation are consistent with the guidelines set forth by BAAQMD for a Qualified GHG Reduction Strategy (which parallel and elaborate upon criteria established in State CEQA Guidelines Section 15183.5(b)(1)), as presented in the chapters referenced below.

- Quantify emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area (see **Chapter 2**).
- Establish a level, based on substantial evidence, below which the contribution of emissions from activities covered by the plan would not be cumulatively considerable (see **Chapter 2**).
- Identify and analyze the emissions resulting from specific actions or categories of actions anticipated within the geographic area (see **Chapter 3** and **Chapter 4**).
- Specify measures or a group of measures, including performance standards that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level (see **Chapter 4**).
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specific levels (see **Chapter 5**).
- Adopt the GHG Reduction Strategy in a public process following environmental review.

Commitment to Sustainability

Recognizing the need to comply with state requirements and a desire to serve as environmental leaders in the community, the City and its electric utility, Silicon Valley Power, have provided leadership on issues that affect the natural and built environments within the city and throughout the region. Specific actions taken by the City to support environmental sustainability are described in **Figure 5** and quantified in **Chapter 3**.

Figure 5: Recent Sustainability Efforts in Santa Clara

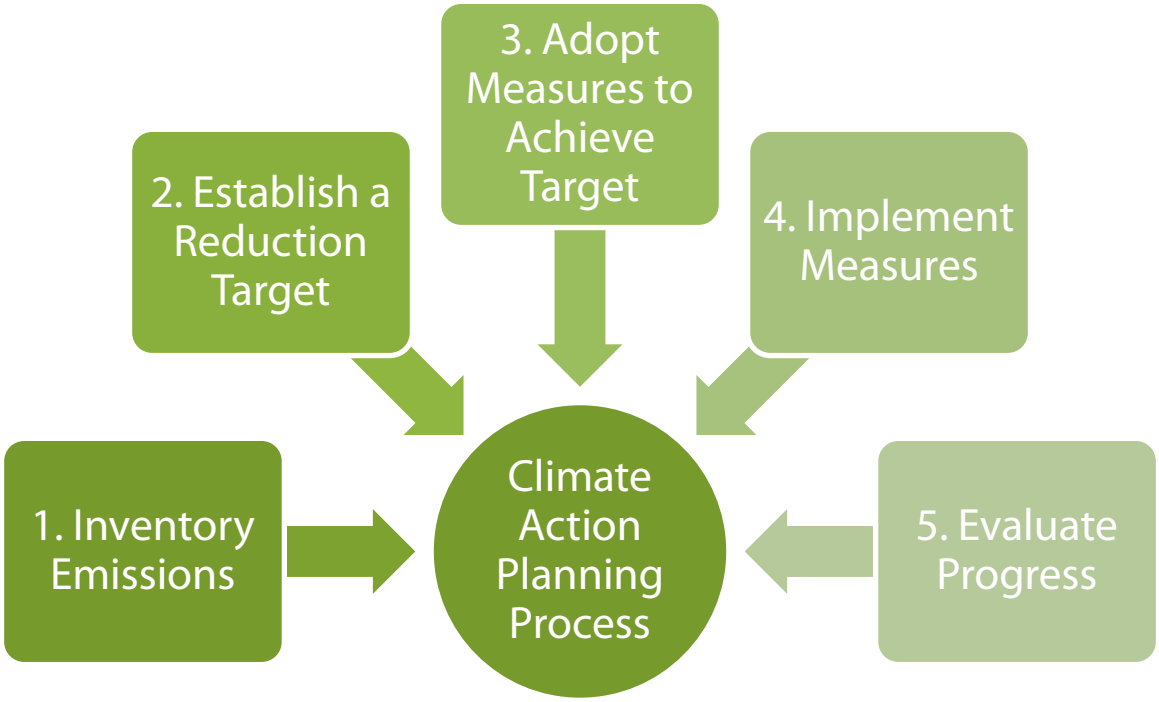


Climate Action Planning Process

The City developed this CAP using the internationally accepted[5] and iterative five-step process described in **Figure 6**. The initial chapters fulfill steps one through three and provide a structure to complete steps four to five. Step five is essential to a successful CAP as is the point when the City estimates the effectiveness of the CAP determines if additional measures need to be implemented.

[5]See ICLEI's Five Milestones for Climate Mitigation (http://www.icleiusa.org/action-center/getting-started/iclei2019s-five-milestones-for-climate-protection)

Figure 6: Five-Step Climate Action Planning Process



Community Engagement

Community members were engaged throughout the climate action planning process in a variety of ways. Events held to engage Santa Clara residents and businesses included pop-up workshops, stakeholder meetings, an online survey, an open house, and several study sessions and public hearings before the Planning Commission and City Council. These events provided a forum for community members to voice their ideas to reduce emissions and to make Santa Clara a more environmentally sustainable place to live and work.

Community Input Opportunities

Pop-Up Workshops

The City hosted two mobile workshops at the Senior Center and the Public Library on Tuesday, February 19, 2013. At each mobile workshop, participants were asked to provide feedback on the CAP through interactive posters, a children's activity, and a community survey. The mobile workshops gave the public an opportunity to learn about and participate in the project.

Throughout the day, 70 adults and 45 children interacted with the project team in some way. **Figure 7** describes comments received and results from activities at the pop-up workshops.

Figure 7: Pop-Up Workshop Key Takeaways

Participants already:

- Carpool, ride the bus, bicycle, or walk from home
- Replace older fixtures, bulbs, or appliances with more energy-efficient models
- Recycle common materials (office paper, cardboard, plastic, glass)

Participants are willing to:

- Collect stormwater or install a greywater system
- Replace or remove water-intensive landscaping
- Install alternative energy devices on their roof or property

Business Stakeholder Meeting

The City hosted multiple business stakeholder meetings throughout the CAP development process. Interested stakeholders from the business community were invited to participate in events held on Thursday, March 28, 2013 and Thursday, July 25, 2013.

Figure 8 describes the topics discussed at each meeting and identifies key themes expressed during the meetings.

Figure 8: Business Stakeholder Meeting Key Takeaways

Discussion Topics:

- Energy efficiency
- Liquid-cooled server
- Renewable energy
- Commute programs
- Water and waste

Key Takeaways:

- Incentivize innovation and creativity
- Offer alternatives to on-site renewable energy
- Recognize efforts already under way
- Recognize gains in efficiency from new technology
- Emphasize cost-saving opportunities/payback

Website and Online Survey

For those that were not able to participate in the CAP through an in-person meeting, the City created a web page where meeting materials and an online survey were posted. The City promoted the webpage and survey using SVP customer utility billings, announcements at public hearings, and notifications from the City's social media outlets. **Figure 9** summarizes survey responses and key takeaways.

Figure 9: Online Survey Key Takeaways

Respondents:

- 68 respondents
  - 55 residents
  - 29 employed in Santa Clara

Key Takeaways:

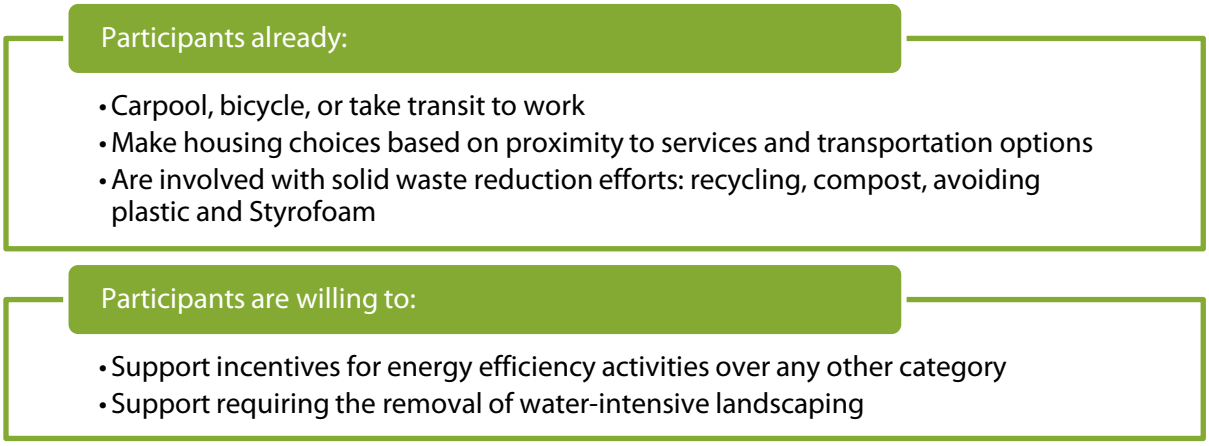
- Improve access to affordable and efficient transit or active transportation
- Provide incentives for clean, renewable energy
- Support electric vehicle charging stations
- Expand waste reduction programs

Community Open House

The City hosted a community open house in advance of a regularly scheduled Planning Commission meeting on Wednesday, April 10, 2013. Open house participants provided feedback on the CAP using interactive posters and a community survey.

A number of community members participated in the activities and filled out the community survey during the open house. In addition, community members who attended the Planning Commission meeting received a summary presentation describing the project. No public comments or questions were discussed during the Planning Commission meeting. Key takeaways from open house participants are described in **Figure 10**.

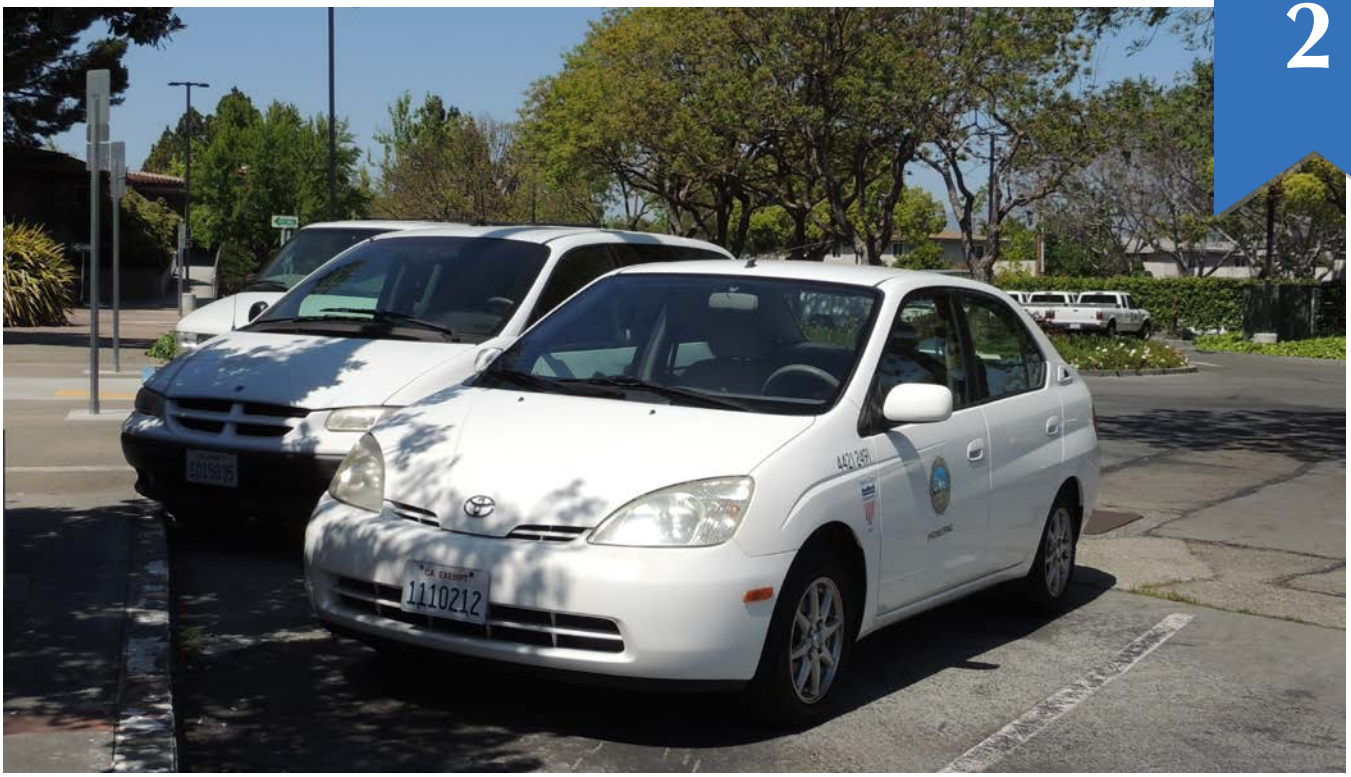
Figure 10: Community Open House Key Takeaways



Key Findings

The Santa Clara community provided valuable input through a variety of communication methods during the climate action planning process. This input and feedback assisted staff with developing a plan that not only meets the criteria for a qualified GHG reduction strategy, but created greater support for the goals and measures of the CAP. The following measures were included as a direct result of community input:

- Requirements for electric vehicle charging stations (see **Measure 6.3**)
- Improve access to affordable and efficient transit or active transportation (see **Measure 6.1**)
- Provide incentives for clean, renewable energy (see **Measure 2.4**)
- Expand waste reduction programs (see **Measures 4.1** and **Measure 4.2**)
- Recognize efforts already under way (see **Chapter 3**)
- Recognize gains in efficiency from new technology (see **Measures 2.1-2.3**, and **Measure 2.5**)
- Emphasize cost-saving opportunities/payback (see **Measure 2.5)**
- Install alternative energy devices on their roof or property (see **Measure 2.4**)



2. Measuring Our Emissions

A GHG emissions inventory and forecast lays the groundwork for the entire CAP planning process. This inventory catalogues community GHG emissions for 2008 and City government emissions for 2010, and projects total emissions levels for 2020 and 2035. Consistent with state guidance, the City has identified an emissions reduction target for the forecast years (see **Chapter 3**). The difference between the emissions forecast and the reduction target represents the necessary reduction in GHG emissions and sets the focus for the reduction measures presented in **Chapter 4**. Additional information on the inventory is provided in **Appendix A.**

Inventory Background and Methods

This inventory was prepared using protocols and best practices identified within the Local Government Operations Protocol, the ICLEI-Local Governments for Sustainability (ICLEI) Community-wide Protocol, and the BAAQMD GHG Plan Level Guidance. The inventory considers the community and City government emissions sources presented in **Figure 11**.

Figure 11: Community and City Government GHG Emissions Sectors

Community – 2008 Baseline

- Energy – Residential, commercial, and industrial electricity and natural gas consumed in the community.
- Transportation – Vehicle miles traveled (VMT) to, from, or within the community.
- Stationary Sources* – Direct emissions from industrial, commercial, and office processes in the community that are permitted by BAAQMD.
- Direct Wastewater – Methane and nitrous oxide emissions from wastewater treatment.
- Off-Road – Emissions from construction and from lawn and garden equipment used in the community.
- Waste – Methane emissions from waste sent to landfills from the community.
- Rail Transit* – Emissions from Caltrain and Santa Clara Valley Transportation Authority (VTA) light rail transit use by community residents and employees.
- Water and Wastewater – Energy required to extract, filter, move, and treat water consumed and/or treated in the community.

City Government – 2010 Baseline

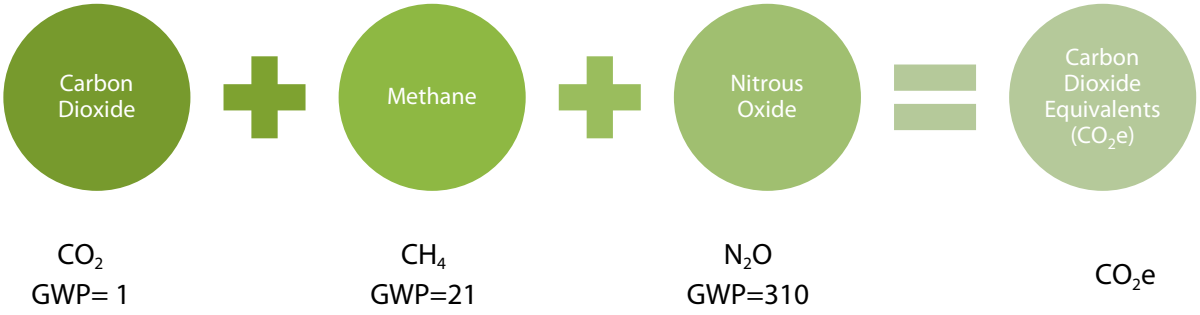
- Silicon Valley Power – Natural gas and other stationary fuels used to generate electricity for the Santa Clara community.
- Closed Landfill – Direct methane emissions from the closed landfill owned by the City.
- Employee Commute – Commute travel to and from work by City employees.
- Buildings and Facilities – Electricity, natural gas, and other stationary fuels used in City-owned and operated buildings and facilities.
- Vehicle Fleet – Diesel and gasoline use in City-owned vehicles.
- Water Pumping – Energy used by City-owned wells, distribution pumps, and irrigation systems.
- Government-Generated Solid Waste – Solid waste generated by City employees or community members at City facilities.
- Wastewater Pumping – Energy used to collect and distribute wastewater and stormwater to the San Jose/Santa Clara Water Pollution Control Plant.
- Public Lighting – Electricity used for outdoor street lighting, traffic signals, parks, and other community facilities.

**These emissions are presented as information items. They are excluded from the community-wide forecast and target.*

Emissions Calculations

Each activity identified in **Figure 11** has a corresponding emissions factor that estimates the emissions generated per unit of activity. For more detail on the emissions factors used for each emissions source, see Appendix A. Emissions factors are typically reported on an annual basis for each type of GHG. Greenhouse gas emissions trap heat in the earth's atmosphere and include CO_2, methane (CH_4), and nitrous oxide (N_2O). CO_2e is the common unit used to equate the different GHGs and is calculated by converting each gas into an equivalent unit of CO_2 using its global warming potential. Each GHG has a different global warming potential as identified in **Figure 12**. For example, CH_4 has a GWP of 21 which means that the emissions of one CH_4 molecule is equivalent to releasing 21 CO_2 molecules in terms of potential to heat the atmosphere.

Figure 12: Global Warming Potentials



Baseline Community Emissions

Community sources created 2,037,800 metric tons of carbon dioxide equivalent emissions ($MTCO_2e$) in baseline year 2008. As shown in **Table 1**, nonresidential energy was the largest contributor, producing approximately 1,110,100 $MTCO_2e$. Transportation was the next largest contributor, generating approximately 523,000 $MTCO_2e$. Emissions from community point sources represented the third largest source, generating approximately 173,500 $MTCO_2e$. Residential energy, off-road equipment, waste, rail transit, water and wastewater energy, and direct wastewater accounted for the remaining 11% of inventoried emissions in 2008.

Table 1: 2008 Community Emissions by Sector

Sector	2008 $MTCO_2e$	Percentage of Total
Nonresidential Energy	1,110,100	54%
Transportation	523,000	26%
Community Point Sources	173,500	9%
Residential Energy	153,200	8%
Off-Road Equipment	31,300	2%
Waste	27,500	1%
Rail Transit	10,000	<1%
Water and Wastewater Energy	7,400	<1%
Direct Wastewater	1,800	<1%
Total	**2,037,800**	**100%**
** Due to rounding, the total may not equal the sum of component parts.*		

Table 1 includes community point source emissions, and rail transit emissions, which are considered informational items. Point sources are fixed emitters of air pollutants, such as industrial manufacturing plants, stationary generators, petrochemical plants, and other heavy industrial sources. Proxy data for 2010 is used for point source emissions, as 2008 baseline information was not available. Since community point source emissions are influenced by market forces beyond the City's local influence and are best regulated by BAAQMD or through federal and state programs, they are reported in this inventory as informational items. As the agency responsible for regulating community point sources of air pollution in the San Francisco Bay Area Air Basin, BAAQMD's primary objective is to ensure the region meets the health-protective air quality

standards set by the state and federal government through the permitting and regulation of industrial sources throughout the region.

Rail transit emissions are also included as informational items because the City has little to no control over the operation of Caltrain and the Santa Clara Valley Transportation Authority (VTA) light rail system. The inventory guides future local policy decisions that relate to emissions within the City's influence; therefore, community point sources, and rail transit are excluded from further discussion. **Figure 13** and **Table 2** reflect Santa Clara's jurisdictional baseline of 1,854,300 $MTCO_2e$.

Due to the varying degrees of influence over different GHG emissions sources, there is often overlap in accounting for GHG emissions. For the City of Santa Clara, this overlap occurs between the direct emissions produced at facilities generating electricity for SVP, and again indirectly as SVP electricity is used in homes and businesses. SVP's direct emissions are calculated and included in the baseline inventory and forecast in two different ways, maintaining consistency with national GHG emissions protocols. First, the direct emissions associated with the two power plants located within city limits are calculated using verified emissions numbers from CARB. Second, the indirect emissions associated with each business and household consuming SVP electricity are calculated based on the amount of electricity consumed, whether or not it is generated within city limits.

To avoid double-counting these emissions, the direct emissions from the power plants located within the city are excluded from future discussions of the government operations inventory.

Figure 13: 2008 Community Jurisdictional Emissions by Sector

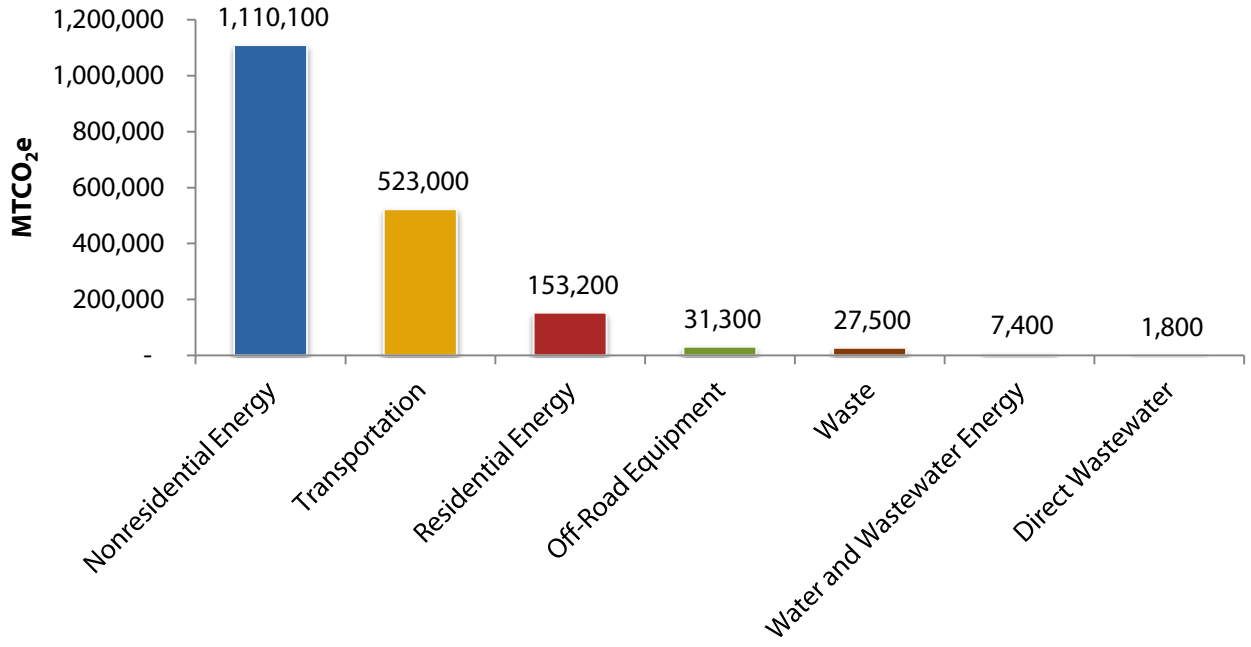


Table 2: 2008 Community Jurisdictional Emissions by Sector

Sector	2008 $MTCO_2e$	Percentage of Total
Nonresidential Energy	1,110,100	60%
Transportation	523,000	28%
Residential Energy	153,200	8%
Off-Road Equipment	31,300	2%
Waste	27,500	1%
Water and Wastewater Energy	7,400	<1%
Direct Wastewater	1,800	<1%
Total*	**1,854,300**	**100%**
*** Due to rounding, the total may not equal the sum of component parts.**		

Baseline City Government Emissions

Emissions from City government operations totaled 247,900 $MTCO_2e$ in the baseline year 2010.[6] As shown in **Table 3**, SVP contributed 222,300 $MTCO_2e$ to City government emissions. The remaining emissions, about 25,600 $MTCO_2e$, came from other City government operations including energy use at buildings and facilities, public lighting, water pumping, wastewater pumping, vehicle fleet fuel use, employee commutes, and government-generated solid waste.

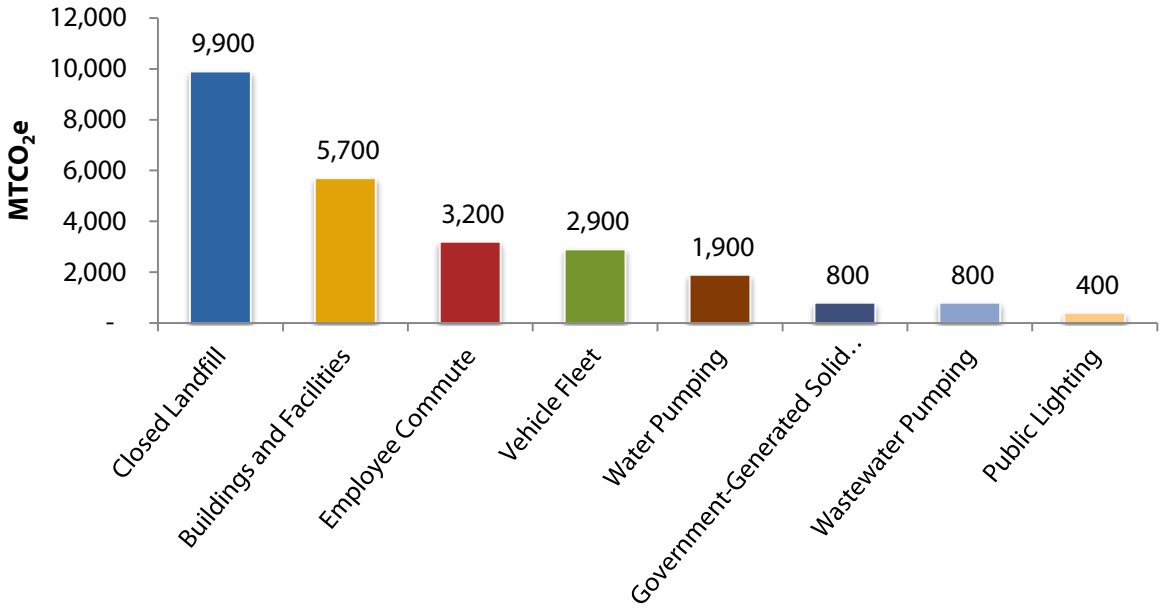
Table 3: 2010 City Government Emissions by Sector

Sector	2010 $MTCO_2e$	Percentage of Total
Silicon Valley Power – Energy Generation	222,300	90%
Closed Landfill	9,900	4%
Buildings and Facilities	5,700	2%
Employee Commute	3,200	1%
Vehicle Fleet	2,900	1%
Water Pumping	1,900	<1%
Government-Generated Solid Waste	800	<1%
Wastewater Pumping	800	<1%
Public Lighting	400	<1%
Total*	**247,900**	**100%**
** Due to rounding, the total may not equal the sum of component parts.*		

6 This is not consistent with the community baseline year as the City Government baseline was prepared as part of a program initiated by Join Venture Silicon Valley.

SVP's energy generation facilities contributed the overwhelming majority of City government emissions in 2010. Since SVP's regulatory requirements differ from those of other City government emissions sources, and to inform meaningful and effective emissions reduction policies, SVP emissions are addressed separately. **Figure 14** shows the breakdown of emissions from City government operations that are not associated with SVP energy generation.

Figure 14: 2010 City Government Emissions for Non-SVP Operations



Community Emissions Forecast

The community emissions forecast estimates how emissions will grow if no reduction efforts are taken at the federal, state, or local level. The Santa Clara emissions forecast assumes energy, transportation, waste disposal, and water use remain at baseline rates through 2020. The forecast uses indicators from the 2010–2035 General Plan to determine how expected population, household, and jobs growth will affect future emissions. On-road transportation is forecast using vehicle miles traveled (VMT) estimates developed by Fehr & Peers Transportation Consultants based on the General Plan. **Table 4** identifies the growth indicators, sectors, and sources used to forecast emissions in Santa Clara.

Table 4: Community 2020 and 2035 Forecast Growth Indicators

Indicator	Emissions Sector	2008	2020	2035	Percentage Change, 2008–2035
Housing Units	Residential Energy, Off-Road	44,166	52,408	60,395	+37%
Population	n/a	115,000	131,000	155,000	+35%
Jobs	Nonresidential Energy	107,000	125,000	153,000	+43%
Service Population	Waste, Water, and Wastewater	222,000	256,000	308,000	+49%
Vehicle Miles Traveled (millions)	On-Road Transportation	1,106	1,191	1,298	+17%

Using the community growth indicators shown above, **Table 5** and **Figure 15** summarize the emissions growth forecast by activity sector. Without actions or policies to reduce GHGs, community emissions in Santa Clara would grow by 16% to 2,148,600 $MTCO_2e$ in 2020 and by 37% to 2,531,400 $MTCO_2e$ in 2035.

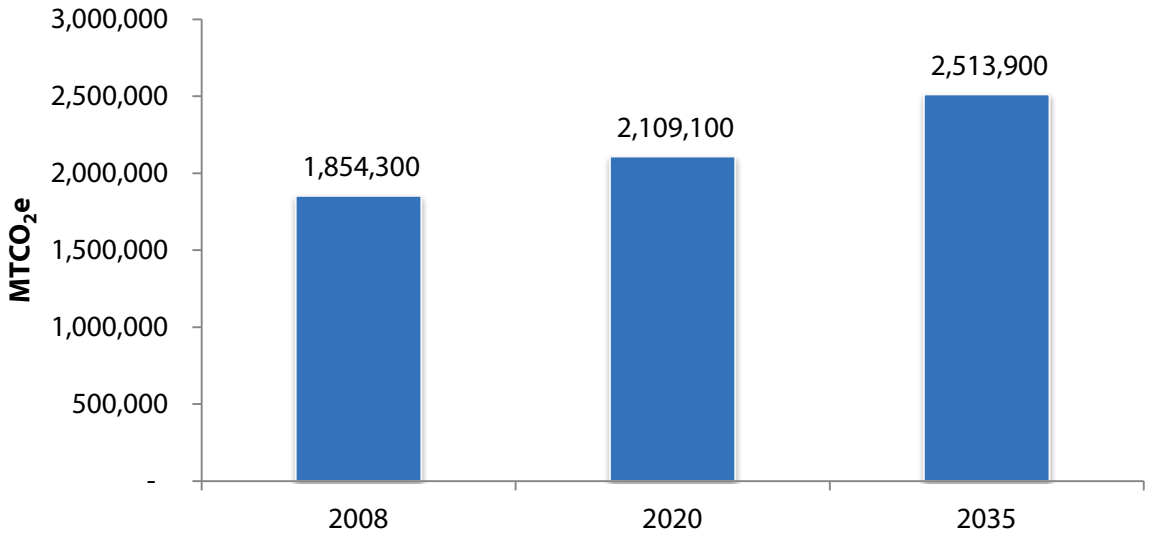
Table 5: 2008–2035 Community Business-as-Usual Emissions by Sector

Sector	2008 $MTCO_2e$	2020 $MTCO_2e$	2035 $MTCO_2e$	Percentage Change, 2008–2020	Percentage Change, 2008–2035
Nonresidential Energy	1,110,100	1,280,100	1,540,200	15%	39%
Transportation	523,000	563,200	660,800	8%	26%
Residential Energy	153,200	182,700	211,200	19%	38%
Off-Road Equipment	31,300	82,400	65,000	163%	108%
Waste	27,500	31,700	44,000	15%	60%
Water and Wastewater	7,400	8,500	10,200	15%	38%
Direct Wastewater	1,800	2,100	2,900	17%	39%
Total*	1,854,300	2,109,100	2,513,900	14%	36%

** Due to rounding, the total may not equal the sum of component parts.*

The large growth in off-road equipment from 2008 and 2020, and slightly decreased growth from 2020 to 2035, results from anticipated increases in housing unit construction over those periods.

Figure 15: 2008–2035 Community Business-as-Usual Emissions by Sector



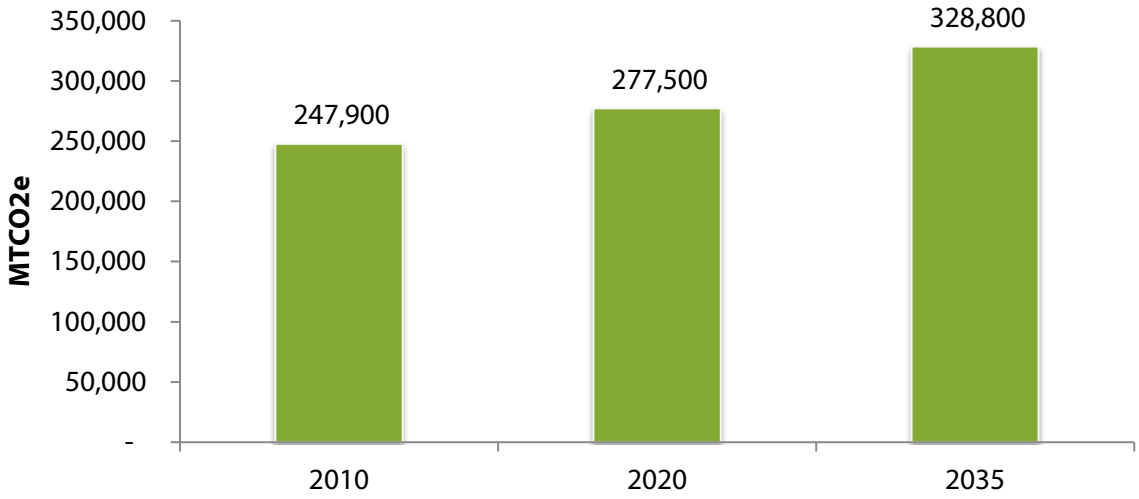
City Government Emissions Forecast

Using service population growth from 2010 to 2035, SVP energy generation, water pumping, and wastewater pumping emissions were forecast to increase. All other sectors would remain static at 2010 levels. **Table 6** and **Figure 16** summarize the emissions growth forecast for City government emissions. Emissions are estimated to grow by 12% to 277,500 $MTCO_2e$ in 2020 and by 33% to 328,800 $MTCO_2e$ in 2035.

Table 6: 2010–2035 City Government Emissions Forecast by Sector

Sector	2010 $MTCO_2e$	2020 $MTCO_2e$	2035 $MTCO_2e$	Percentage Change, 2010–2020	Percentage Change, 2010–2035
Silicon Valley Power – Energy Generation	222,300	251,500	302,600	13%	36%
Closed Landfill	9,900	9,900	9,900	0%	0%
Employee Commute	3,200	3,200	3,200	0%	0%
Buildings and Facilities	5,700	5,700	5,700	0%	0%
Vehicle Fleet	2,900	2,900	2,900	0%	0%
Water Pumping	1,900	2,200	2,300	16%	21%
Government-Generated Solid Waste	800	800	800	0%	0%
Wastewater Pumping	800	900	1,000	13%	25%
Public Lighting	400	400	400	0%	0%
Total*	**247,900**	**277,500**	**328,800**	**12%**	**33%**
** Due to rounding, the total may not equal the sum of component parts.*					

Figure 16: 2010–2035 City Government Emissions Forecast by Sector



3. Tracking Early Success

Before considering new policies or programs to include in the Climate Action Pl, it is important to assess how emissions have already been reduced since 2008 through implementation of state regulations and local reduction efforts. Building upon the emissions inventory and forecasts presented in **Chapter 2**, this chapter identifies and describes activities and requirements implemented at the state and local levels since 2008 and the associated effect on local emissions. These activities and requirements have already set the City on a path toward achieving emissions reduction goals.

State Regulations

The State of California has proactively adopted and implemented legislation to reduce emissions that have local benefits in Santa Clara. These actions include implementation of vehicle fuel efficiency standards (Pavley), statewide building codes and standards (Title 24 updates), and directives to utility providers to increase the amount of renewable energy provided to California consumers.

Quantified State Regulations

Key state programs and requirements that affect local emissions in Santa Clara are described below and credited toward the 2020 emissions reduction target.

Pavley Clean Car Standards

AB 1493 (Pavley, 2002) requires carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. The California Air Resources Board (CARB) anticipates that the Pavley standards will reduce

emissions from passenger vehicles by about 22% in 2012 and by about 30% in 2016, while improving fuel efficiency and reducing costs. These standards for more efficient vehicles would reduce transportation emissions in Santa Clara by 93,300 $MTCO_2e$ in 2020.

Low Carbon Fuel Standard

Executive Order S-01-07 (2007) established the Low Carbon Fuel Standard (LCFS) to reduce the carbon intensity of transportation and construction equipment fuels 10% by 2020. According to the May 2011 Updated BAAQMD CEQA Air Quality Guidelines, the LCFS is likely to reduce emissions locally by 7.2%, due to the exclusion of upstream emissions and reductions. LCFS reductions apply to on-road transportation and off-road equipment. LCFS would reduce transportation emissions in Santa Clara by 43,500 $MTCO_2e$ in 2020.

Renewables Portfolio Standard

Over the last 10 years, several legislative bills have been adopted to set renewable portfolio standards for California's utility providers. While the specific requirements have changed with each bill signed into law, the goal of the renewable portfolio standards is to increase the share of electricity delivered by California investor-owned and publicly-owned utilities from renewable sources like solar, wind, and geothermal.

Adopted in 2002, SB 1078 (2002) required utilities to deliver 20% of their electricity from eligible renewable energy sources no later than 2017. This renewable portfolio requirement was accelerated in 2006 with the adoption of SB 107, moving the 20% requirement deadline up to 2010. In 2011, SB X1-2 (2011) changed the compliance deadlines to 33% by 2020. This Renewables Portfolio Standard (RPS) was extended to municipal and publicly owned utilities (including SVP) by AB 2196 (2012). While SVP is responsible for determining the content of its energy portfolio, because achievement of the 33% RPS is mandated by the State, these emissions reductions are attributed to implementing state legislation. In 2008, Santa Clara's eligible renewable energy sources (as defined by the California Energy Commission) made up 30% of the utility's portfolio. As of 2012, SVP's electricity portfolio consisted of 25.9% renewable energy sources. In 2020, SVP's achievement of the 33% minimum RPS would reduce energy emissions an additional 29,600 $MTCO_2e$ beyond 2008 levels.

California Building Code

Title 24 of the California Code of Regulations is a statewide standard applied by local agencies through building permits. It includes requirements for the structural, plumbing, electrical, and mechanical systems of buildings and for fire and life safety, energy conservation, green design, and accessibility in and around buildings. Part 6 (the California Energy Code) and Part 11 (the California Green Building Standards Code) include prescriptive and performance-based standards to reduce electricity and natural gas use in every new building constructed in California. The GHG reduction benefits of these standards to Santa Clara include the net energy benefit of new Title 24 requirements that did not exist in the 2008 baseline year. As Title 24 standards are regularly updated, anticipated advances in energy efficiency requirements are included. In 2020, energy saved in new buildings resulting from Title 24 would reduce emissions by 10,200 $MTCO_2e$.

State Reduction Summary

As shown in **Table 7**, ongoing implementation of state programs and requirements would reduce emissions by approximately 176,600 $MTCO_2e$ in 2020. Most of these reductions result from implementation of the Pavley

Clean Car standards and LCFS. Achieving a 33% RPS and continuing to implement Title 24 and CALGreen standards would reduce emissions from the community's built environment.

Considering the 2020 business-as-usual emissions forecast of 14% above 2008 baseline emissions levels identified in **Chapter 2**, the local benefit of these state reductions would reduce 2020 emissions in Santa Clara to about 4% above 2008 levels.

Table 7: Local Emissions Reductions from State Activities

	2008 $MTCO_2e$	2020 $MTCO_2e$
Business-as-Usual Forecast	1,854,300	2,109,200
Pavley Clean Car Standards	-	-93,300
Low Carbon Fuel Standard	-	-43,500
Renewables Portfolio Standard	-	-29,600
California Building Code (Title 24 + CALGreen)	-	-10,200
Total State Reductions	-	-176,600
Resulting Emissions Level	**-**	**1,932,600**
Change Since Baseline	**-**	**4%**

Local Accomplishments

Beyond complying with state requirements, the City has undertaken numerous activities to reduce emissions since 2008. This section highlights specific actions taken by the City since 2008 to reduce emissions and quantifies reductions that will result from continued implementation of those actions through 2020. When combined with reductions from state programs, reductions from local accomplishments further reduce emissions in Santa Clara.

Local accomplishments initiated or completed since 2008 that the City can count toward the reduction target include further implementing energy efficiency and renewable energy programs, planting trees to provide shade, and reducing waste and water consumption. Although Santa Clara has reduced emissions through other local accomplishments since 2008, this section describes local accomplishments that can be quantified using existing, generally accepted methods.

Quantified Local Accomplishments

Energy Efficiency and Conservation Block Grant Activities

In 2009, the City was awarded an Energy Efficiency and Conservation Block Grant from the US Department of Energy as part of the American Recovery and Reinvestment Act. The City utilized $1.2 million in grant funding to upgrade various outdoor lighting equipment, retrocommission City facilities, install photovoltaic systems, and weatherize low-income multi-family buildings. These activities have saved 1.3 million kilowatt-hours (kWh) in electricity use annually and will continue to reduce energy emissions by 230 $MTCO_2e$ in 2020.

Tree Planting

While primarily an aesthetic amenity, trees also provide valuable shade and sequestration benefits that reduce energy use and resulting emissions in Santa Clara. The City has planted between 120 and 150 new trees

annually since 2008, totaling 665 new trees to date. These trees will continue to reduce energy emissions by an estimated 10 $MTCO_2e$ in 2020.

City Photovoltaic Installations

Santa Clara has installed photovoltaic technology (PV) or executed power purchase agreements for PV at two City facilities. The systems range in size from 100 kilowatts (kW) at the Jenny Strand R&D Park to 400 kW at the City parking garage. They have a combined capacity of 500 kW, generating an estimated 717,500 kWh per year, and will continue to reduce energy emissions by 120 $MTCO_2e$ in 2020.

Neighborhood Solar Program

As a voluntary program, the Neighborhood Solar Program allows SVP customers to contribute funds as part of their monthly utility bill to install PV systems at nonprofits in Santa Clara. Since 2008, SVP has worked with five organizations to use these funds to install PV systems. These systems have a combined capacity of 60 kW, generating an estimated 85,000 kWh per year, and will reduce energy emissions by 10 $MTCO_2e$ in 2020.

Santa Clara Green Power

While SVP's portfolio consists of more than 30% renewable energy, utility customers can choose to receive 100% of their electricity from renewable sources by participating in the Santa Clara Green Power program. Customers participating in the program pay 1.5 cents more per kWh to participate, which costs the average customer about $7.50 extra per month. Participation in the Green Power program has increased by more than 30% from 58 million kWh sold in 2008 to nearly 83 million kWh sold in 2012. These increases in green power sales will reduce local energy emissions by an additional 32,130 $MTCO_2e$ in 2020.

Solar Santa Clara

Nearly 220 homes and over 20 businesses have installed solar PV in Santa Clara since 2008. The electricity generated from these systems is enough to power about 2,100 homes.

To ensure the energy generation benefits of PV systems installed throughout the city are not outweighed by other environmental impacts, the City is in the process of updating the design guidelines to incorporate best practices to minimize the visual impacts of highly reflective PV systems.

Residential Audits

SVP offers free home energy audits to residential customers, providing information regarding household energy use and identifying opportunities to improve residential energy efficiency. Since 2008, SVP has made 640 house calls and conducted approximately 480 audits. These audits often result in modest energy savings from changes in consumption and can result in greater savings when recommended retrofits are completed. Energy savings from this program since 2008 total about 88,000 kWh, which will continue to reduce energy emissions by 90 $MTCO_2e$ in 2020.

Photovoltaic Rebates and Expedited Permitting

Rebates reduce the overall cost of the equipment needed to generate on-site renewable energy. Through SVP's photovoltaic rebate program, approximately 220 residential and 22 nonresidential customers have installed PV systems. The effectiveness of these rebates is supported by the City's "one-stop" expedited

permitting process for residential and nonresidential PV systems. The combined capacity of systems installed using rebates between 2008 and 2012 is 7,300 kW, resulting in an estimated 10.5 million kWh per year. In 2020, the effect of PV systems installed through these rebates will reduce energy emissions by 1,830 $MTCO_2e$.

Residential Energy Efficiency Rebates

SVP offers a wide variety of additional energy efficiency incentives and rebates to support residential energy conservation. Between 2008 and 2012, SVP provided more than 3,700 rebates to customers. The types of programs and technologies that are incentivized vary from year to year. These rebates have saved an estimated 3 million kWh per year since 2008. Continued implementation of these rebate programs will reduce energy emissions by 570 $MTCO_2e$ in 2020.

Commercial Energy Efficiency Rebates

Similarly, SVP provides incentives and rebates to support commercial and industrial energy conservation. The types of programs and technologies that are incentivized vary from year to year. These rebates have saved an estimated 19 million kWh per year since 2008. Continued implementation of these rebate programs will reduce energy emissions by 3,320 $MTCO_2e$ in 2020.

Waste Reduction

Solid waste disposal accounted for 1% of baseline 2008 community emissions. At that time, the City was able to divert approximately 58% of the total waste generated from landfills through various recycling and green waste collection programs. Since 2008, the community has increased the diversion rate to 65%, decreasing the amount of waste sent to landfills by more than 40,000 tons per year. Continued implementation of a 65% diversion rate through 2020 would decrease waste emissions by 8,190 $MTCO_2e$.

Water Conservation

In coordination with the Santa Clara Valley Water District, the City has implemented water conservation programs described in the 2010 Urban Water Management Plan (UWMP). The UWMP sets a goal of reducing per capita water use 20% by 2020, consistent with state law. Since 2008, the community has saved nearly 202 million gallons per year below projected water consumption, reducing the energy needed to supply and treat water. In 2020, continued implementation of these water savings will reduce water emissions by 110 $MTCO_2e$.

Electric Vehicle Deployment

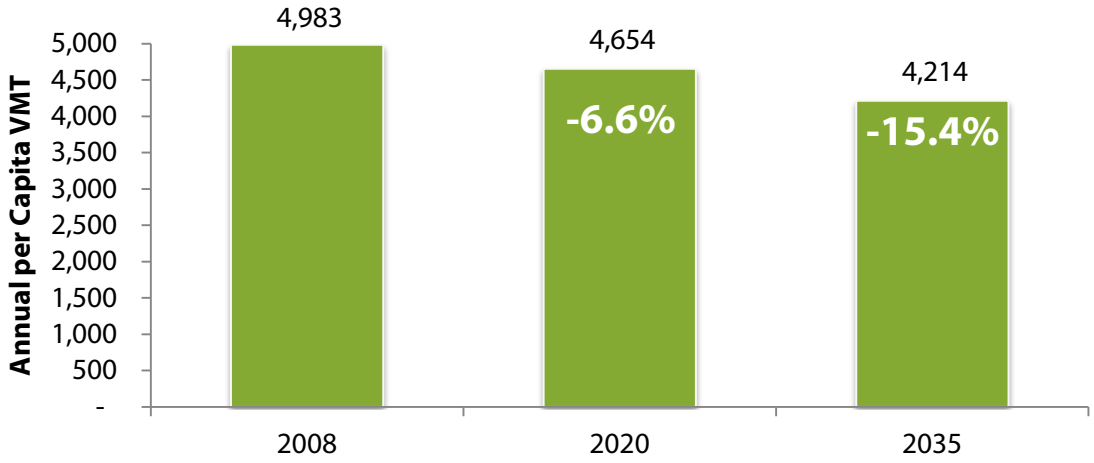
The Center for Sustainable Energy in California, in partnership with the California Air Resources Board, currently tracks the sales of electric vehicles through the Clean Vehicle Rebate Project (CVRP). From June 2011 to December 2012, about 80 electric vehicles (EVs) were sold to customers within the Silicon Valley Power territory. The impact of the use of these EVs in 2020 is the reduction of 180 $MTCO_2e$.

Transportation and Land Use

Numerous General Plan goals and policies will improve the efficiency of the local transportation network and provide expanded transportation options for alternative modes. Santa Clara's Travel Demand Model was used to estimate the cumulative number of vehicle miles traveled in the community in 2008 and the anticipated

amount with implementation of the General Plan through 2035. The travel demand model is based on land use and transportation plans contained in the General Plan and assumes a decrease in per capita VMT of 6.6% by 2020 and 15.4% by 2035 (**Figure 17**). Because many of the sustainability oriented policies associated with land use and transportation are already factored into the growth forecast, they are not separately called out and quantified as an existing accomplishment in this chapter.

Figure 17: Annual per Capita Vehicle Miles Traveled



Local Accomplishments Summary

Continued implementation of local accomplishments described in this chapter will reduce 2020 emissions by approximately 46,800 $MTCO_2e$. When combined with the effects of state programs, these additional reductions will reduce community emissions in 2020 to 2% above baseline 2008 levels. Emissions reduction benefits of each local action are listed in **Table 8**.

Table 8: Emissions Reductions from Local Accomplishments

Existing Accomplishments	2020 $MTCO_2e$
Energy Efficiency Conservation Block Grant Activities	-230
Tree Planting	-10
City Photovoltaic Installations	-120
Neighborhood Solar Program	-10
Santa Clara Green Power	-32,130
Residential Audits	-90
Photovoltaic Rebates	-1,830
Residential Energy Efficiency Rebates	-570
Commercial Energy Efficiency Rebates	-3,320
Waste Reduction	-8,190
Water Conservation	-110
Electric Vehicle Deployment	-180
Total Local Reductions*	-46,800
Resulting Emissions Level	**1,885,800**
Change Since Baseline	**2%**
Total may not equal the sum of component parts due to rounding.	

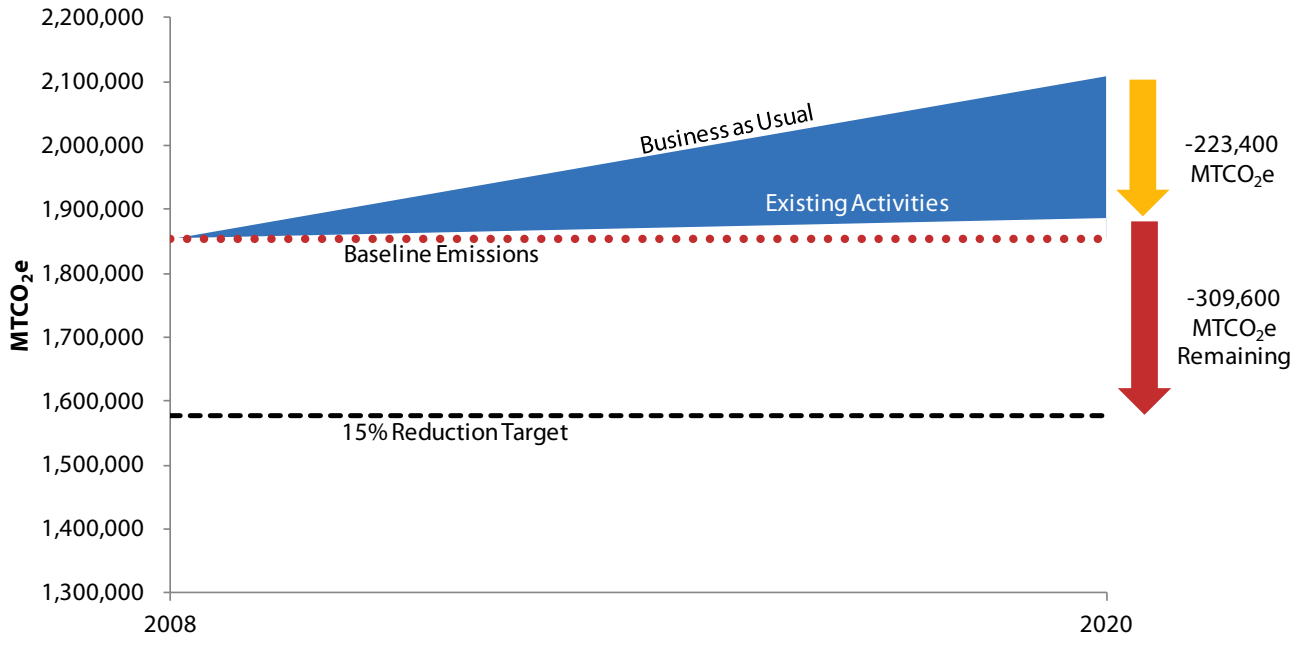
Emissions Reduction Target and Remaining Gap

Prior to identifying new policies to implement, the next step in the climate action planning process is to evaluate emissions reduction target options and determine an appropriate level of emissions reductions to be achieved. Many jurisdictions throughout California have adopted goals and targets to reduce emissions in a CAP or emissions reduction strategy, typically motivated by the community's desire to develop comprehensive sustainability strategies and/or in response to AB 32, Executive Order S-3-05, and SB 375, Attorney General comment letters on general plans, the State CEQA Guidelines, and air district guidance.

Santa Clara reviewed existing targets and emissions reduction actions taken by similar jurisdictions and considered various agency (CARB, California Attorney General's Office, and BAAQMD) recommendations to determine the appropriate emissions reduction target. This CAP recommends a GHG reduction target of 15% below the 2008 baseline level by 2020 and includes measures to exceed the target. **Figure 18** demonstrates the gap to be closed by local CAP measures to reduce emissions from the 2020 forecast levels to 15% below baseline levels by 2020.

Assessing the benefit of state and local accomplishments gives the City credit for steps taken to date and helps the community better understand anticipated emissions reductions from resident, employee, business, and government activities. As listed in **Table 8** and illustrated in **Figure 18**, after accounting for reductions from state regulations and local actions, the Santa Clara community needs to reduce emissions by an additional 309,600 $MTCO_2e$ by 2020 to achieve the emissions target (15% below 2008 baseline levels).

Figure 18: Remaining Gap to Achieve Emissions Reduction Target



4. Reducing Emissions

The reduction measures included in this plan comprise a diverse mix of incentives, public information, and regulations applicable to both new and existing development. This chapter describes the process used to develop, refine, and quantify the emissions reduction goals and measures identified to achieve Santa Clara's emissions reduction target.

Reduction Strategy Structure

Proposed measures to fill the local emissions reduction gap and achieve an emissions reduction target consistent with AB 32 are identified below.

Focus Areas

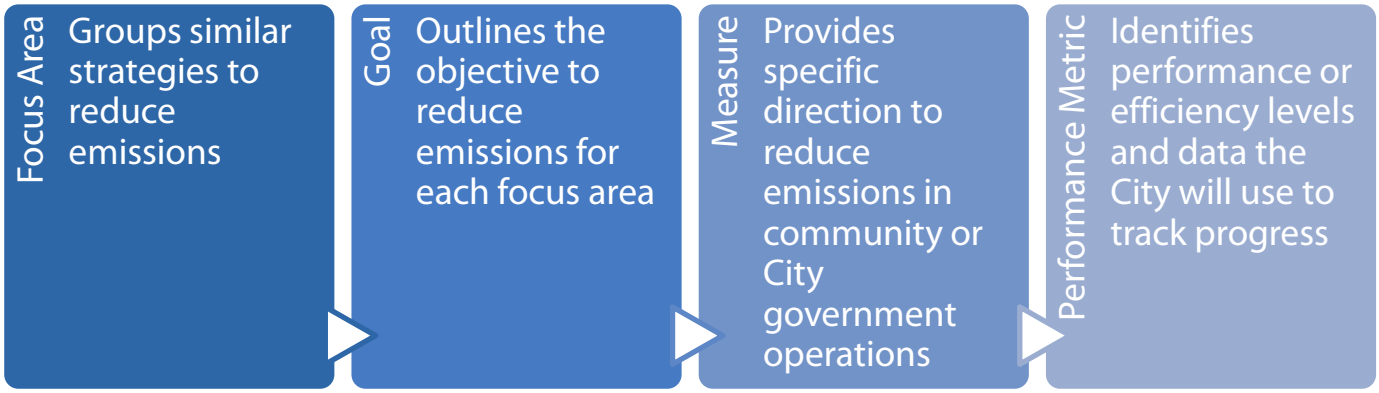
Proposed measures are split into focus areas as follows: Coal-Free and Large Renewables, Energy Efficiency, Water Conservation, Waste Reduction, Off-Road Equipment, Transportation and Land Use, and Urban Heat Island Effect (**Figure 19**). Similar to emissions sectors described in previous chapters, the focus areas group goals and measures into categories.

Figure 19: Climate Action Plan Focus Areas

Goals and Measures

For each focus area, a series of goals and measures is identified. *Goals* outline the general purpose or objective for each focus area. *Measures* address specific topics within each focus area at a greater level of detail than goals (e.g., alternative transportation strategies, energy efficiency programs). Emissions reductions are estimated at the measure level using performance metrics. *Performance metrics* provide specific participation or efficiency levels for implementation of each measure (e.g., number of participating households, total renewable energy installed). **Figure 20** summarizes these components of emissions reduction measures.

Figure 20: Reduction Measure Components



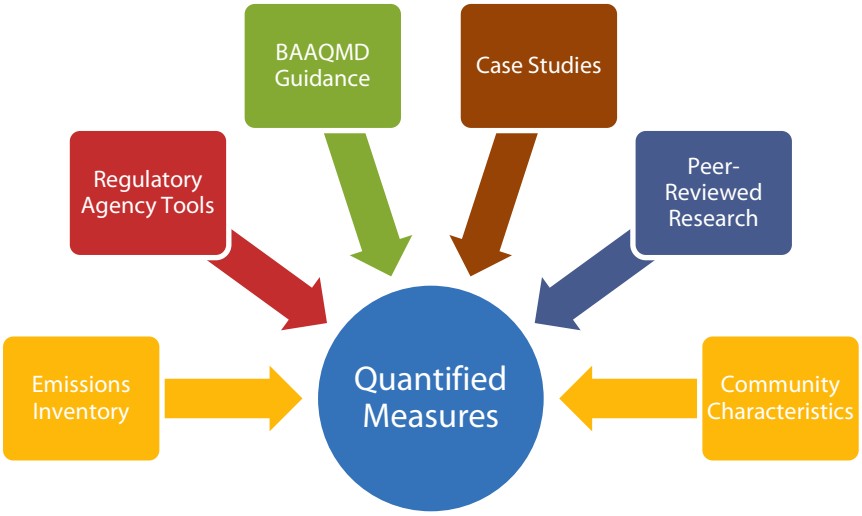
Quantification Methods

Emissions reduction estimates are identified for each measure for the year 2020. The emissions reduction benefit of each measure is determined by changes in operation, activity, or efficiency. In general, three types of reductions are provided by the CAP:

- Avoided emissions (e.g., walk instead of drive)
- Greater efficiency (e.g., drive an electric vehicle)
- Sequestration (e.g., increase carbon storage by planting trees)

Figure 21 summarizes information used to estimate emissions reductions. The 2008 baseline inventory and 2020 forecast serve as the foundation for quantifying reduction measures. Activity data from the inventory (e.g., VMT, kWh of electricity) is used with performance metrics to calculate the emissions reduction potential of each measure. This approach ensures that emissions reductions relate to activities in the community.

Figure 21: Emissions Quantification Sources and Tools



Where possible, emissions reduction estimates are based on tools and reports provided by government agencies such as the US Environmental Protection Agency (EPA), California EPA, California Energy Commission (CEC), CARB, California Air Pollution Control Officers Association (CAPCOA), and BAAQMD. If accurate reduction estimates are not available using these tools, a case study with comparable characteristics may be used. Finally, for more long-range reduction measures that lack actual on-the-ground testing or analysis, current scholarly and peer-reviewed research is combined with knowledge of existing City practices to create a defensible estimate of future emissions reductions.

Measure Evaluation

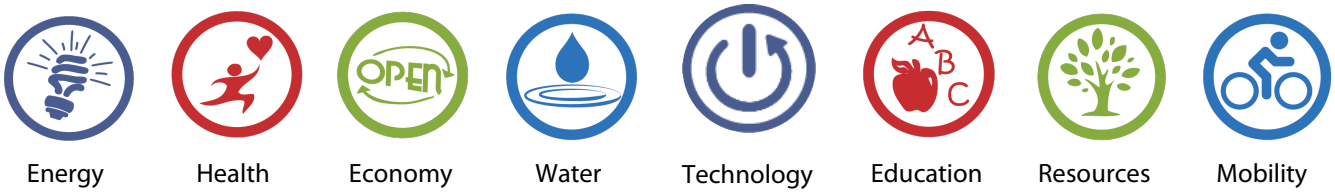
Many methods are used by jurisdictions to reduce GHG emissions. While Santa Clara has considered best practices in similar or nearby communities, the use of a measure by another community does not necessarily mean that it is practical or appropriate for Santa Clara. This is particularly true given Santa Clara's unique emissions profile and role as an electricity provider to residential, commercial, and industrial uses. Therefore, a set of criteria was developed to evaluate each measure and identify those most appropriate for Santa Clara.

1. Effectiveness

The primary goal of the CAP is to identify and quantify the emissions reduction benefit of each measure to achieve the target. The emissions reduction effectiveness of each measure is presented following each measure description. All emissions reduction benefits are identified for the year 2020, unless otherwise noted, and are represented in $MTCO_2e$.

2. Community Benefits

Beyond reducing emissions, many measures can also improve quality of life for residents and businesses in Santa Clara. Additional community benefits are identified for each measure as follows.



3. Lead Department

Specific City departments will implement each CAP measure, as outlined below. Additional staff time and resources may be needed or may already be budgeted to implement each measure.

Electric Utility	Planning & Inspection	Public Works	Water & Sewer Utility	Parks & Recreation

4. Time and Resources

An estimate of the likely expense and staff time that may be necessary to implement each measure can help determine if the measure is a good use of City resources. Three cost ranges are presented for each measure. Additionally, each measure identifies if part or all of a measure is already factored into a department's budget.

Range	Description	Annual Staff Hours
$ Low	Minimal staff effort and no consultant assistance would be needed to complete analytical work, coordinate stakeholder/public outreach, or implement the program.	<500
$$ Medium	Significant staff effort, some consultant assistance, or supplemental funding for operations or capital projects would be needed to complete analytical work, coordinate stakeholder/public outreach, or implement the program.	500–1,000
$$$ High	Major staff effort, consultant assistance, or supplemental funding for operations or capital projects would be needed to complete analytical work, coordinate stakeholder/public outreach, or implement the program.	1,000+

Emissions Reduction Strategies

Focus Area 1: Coal-Free and Large Renewables

Goal: Eliminate coal from SVP's portfolio and increase use of natural gas and renewable energy.

The City of Santa Clara operates Silicon Valley Power, a publicly owned utility that provides electricity for the community of Santa Clara. By operating SVP, the City has control over the emissions associated with the sources of electricity delivered to its customers. The measures in this Coal-Free and Large Renewables focus area concentrate on reducing the GHG intensity of the electricity delivered in Santa Clara.

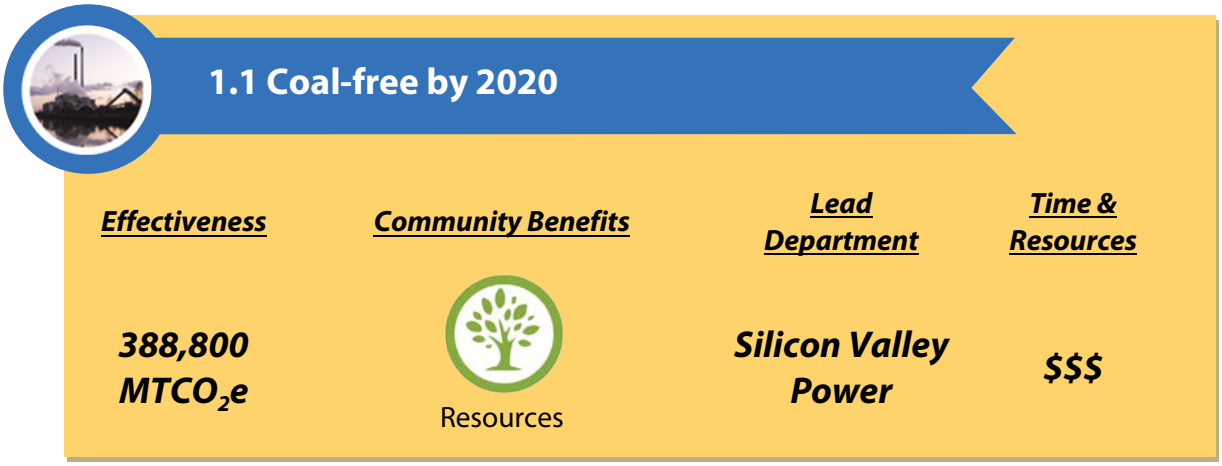
SVP's provision of low-cost electricity to customers plays a critical role in sustaining Santa Clara's industrial and high-tech economy. Opportunities to reduce emissions from energy in the city are focused on reducing overall electricity use and achieving greater reliance on electricity sources with lower GHG intensities. Since nearly half (48%) of Santa Clara's emissions result from electricity use, removing GHG-intensive sources of electricity such as coal are effective approaches to achieving the City's GHG reduction goals.

1.1 Coal-free by 2020

Replace the use of coal in Silicon Valley Power's portfolio with natural gas by 2020.

This measure encapsulates Santa Clara's long-term vision to deliver clean and sustainable electricity. By switching generation capacity from coal (about 136 MW in 2008) to natural gas, SVP would reduce generation emissions by about 40%. In addition, natural gas is one of the cleanest fossil fuel sources of electricity available and would be the sole GHG-emitting source in SVP's portfolio. With implementation of this measure, Santa Clara's electricity portfolio would be one of the cleanest in the state at 380 pounds CO_2/MWh. This measure represents an important first step toward a future where most electricity delivered by SVP comes from renewable or non-GHG emitting sources.

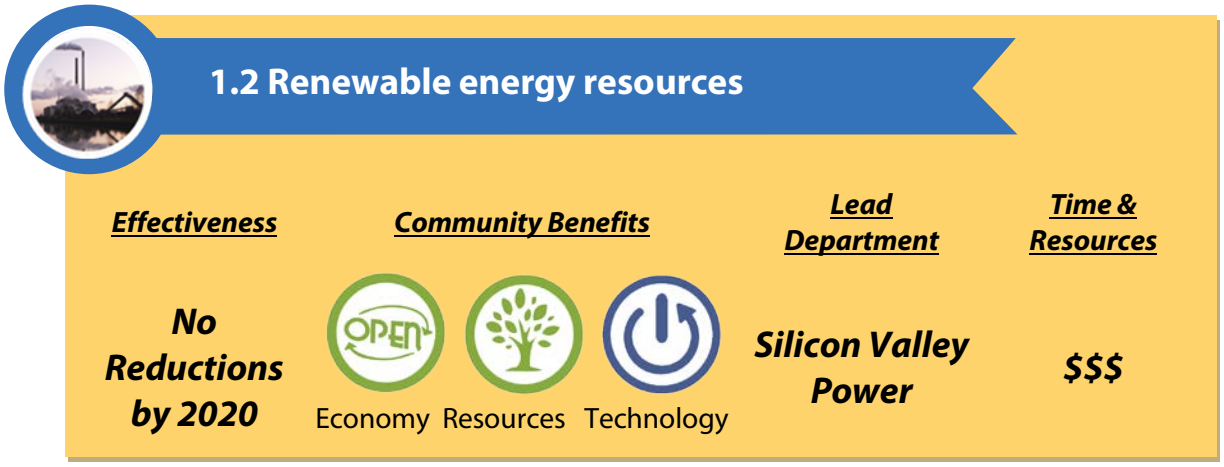
- **Performance metric:** 100% of coal power replaced with natural gas.



1.2 Renewable energy resources

Investigate the use of City-owned property for large-scale renewable energy projects.

The City of Santa Clara owns several properties outside of the city limits that could be used in the future to support large-scale renewable energy projects. The City will investigate such use of these lands through a focused study of the generation capacity, potential environmental effects, and transmission capacity. Any proposed renewable energy project, including PV systems will be designed and installed in a manner that minimizes solar reflectance and is consistent with the City's design guidelines, or with applicable design codes if located outside of the City.

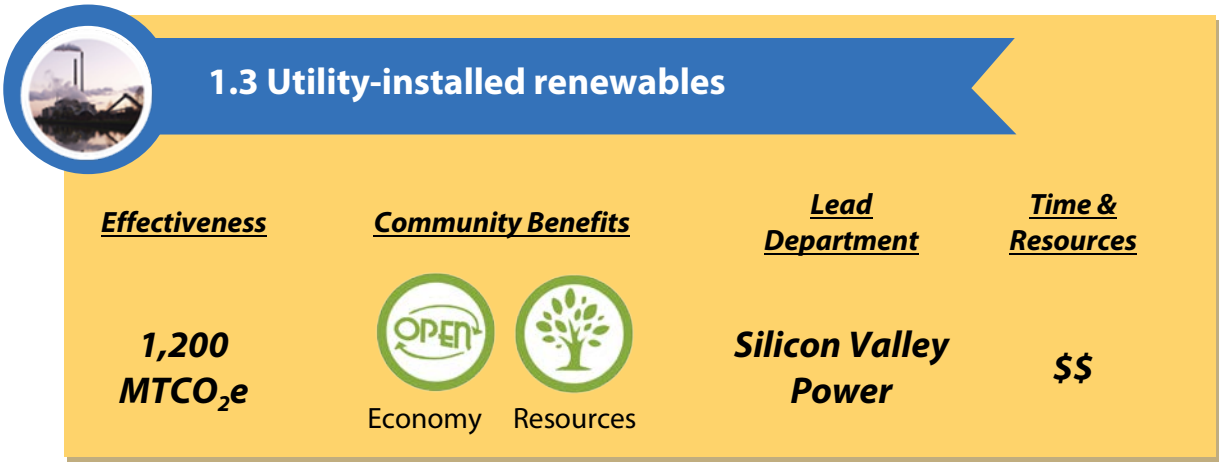


1.3 Utility-installed renewables

Develop up to five solar PV projects with a total installed capacity of 3 to 5 MW.

Another way Santa Clara will reduce the GHG intensity of electricity delivered by SVP is to install up to 5 megawatts (MW) of solar PV systems within the city limits. In order to install these systems by 2020, SVP will develop a feed-in-tariff program or other incentives to encourage installation of distributed renewable generation. Any proposed PV systems will be designed and installed in a manner consistent with the City's design guidelines to minimize solar reflectance. The City should also collaborate with local businesses, organizations, and landowners to identify privately-owned opportunities to meet the 5 MW goal by 2020.

- **Performance metric:** New solar PV projects generating a total of 5 MW.



Focus Area 2: Energy Efficiency Programs

Goal: Maximize the efficient use of energy throughout the community.

Santa Clara will take a mixed approach to reducing energy emissions using the ability of SVP to control sources of electricity and leveraging efficiency. This focus area identifies reductions associated with increasing energy efficiency in existing and new development through incentives, rebates, and new technologies. This focus area also expands beyond electricity use and efficiency to address natural gas use and efficiency.

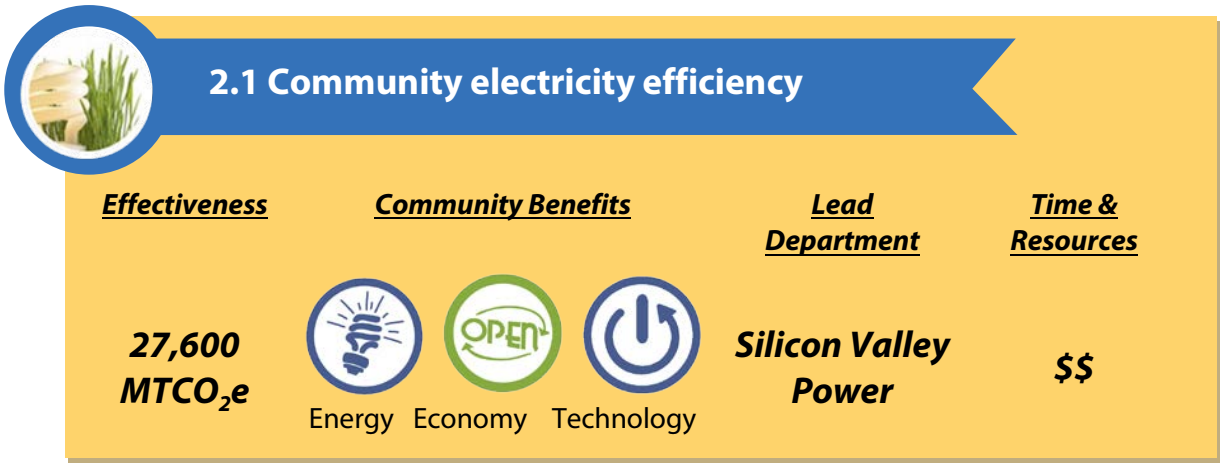
2.1 Community electricity efficiency

Achieve City-adopted electricity efficiency targets to reduce community-wide electricity use by 5% through incentives, pilot projects, and rebate programs.

SVP has established annual electricity efficiency targets for fiscal years 2013–2021, and these targets are updated every three years. On an annual basis, SVP reviews both the residential and nonresidential electricity efficiency programs and evaluates new opportunities to incentivize additional efficiency projects and programs in the community. Rather than dictate specific energy efficiency programs or actions, this measure demonstrates the emissions reduction benefits of SVP achieving the established energy efficiency targets. As currently established, the reduction targets would reduce community-wide electricity use by 5% by 2020.

The City should consider expanding this target reduction to 10% by 2035. The recommended efficiency targets, reductions, and implications relative to the 2035 reduction target are presented in **Table 10**.

- **Performance metric (2020):** 159,100 MWh electricity savings.

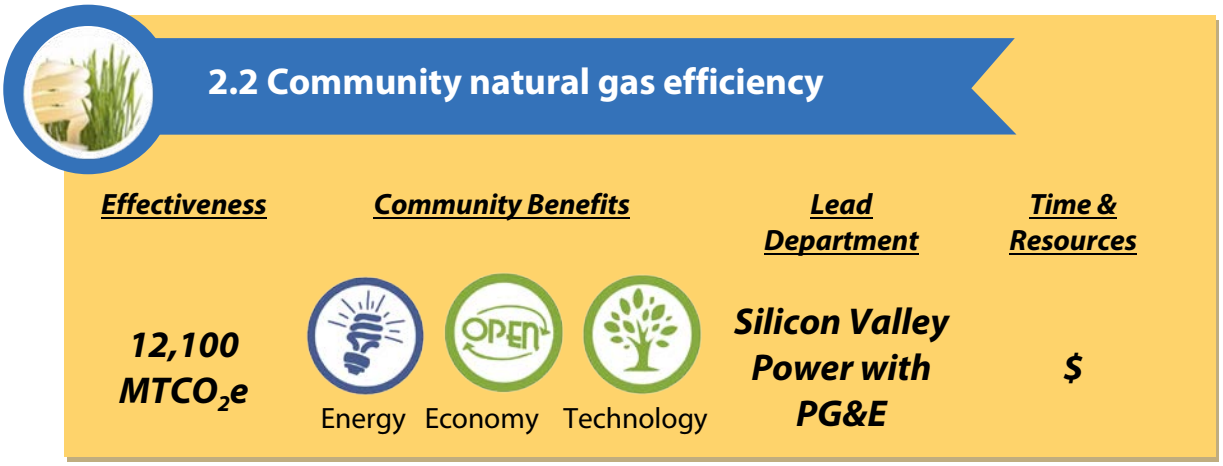


2.2 Community natural gas efficiency

Work with community and social services agencies to provide information from Pacific Gas & Electric (PG&E) to promote voluntary natural gas retrofits in 5% of multi-family homes, 7% of single-family homes, and 7% of nonresidential space through strategic partnerships connecting residents and business owners to available financing resources.

Buildings in Santa Clara use natural gas for heating, cooking, and operating appliances. This measure identifies reductions associated with increasing natural gas efficiency in existing development. The City will achieve these reductions through a multifaceted approach of outreach, education, and advertising rebate programs provided by PG&E (the natural gas utility serving Santa Clara). The City can work with community groups to help actively promote and advertise energy efficiency financing for residential and commercial properties and develop energy efficiency outreach and education programs for renter-occupied households. Another outreach is developing an energy audit checklist property owners can use to identify simple natural gas efficiency upgrades.

- **Performance metric:** 1,700 single-family homes, 1,000 multi-family homes, 410 commercial accounts, and 130 industrial accounts complete natural gas efficiency upgrades.

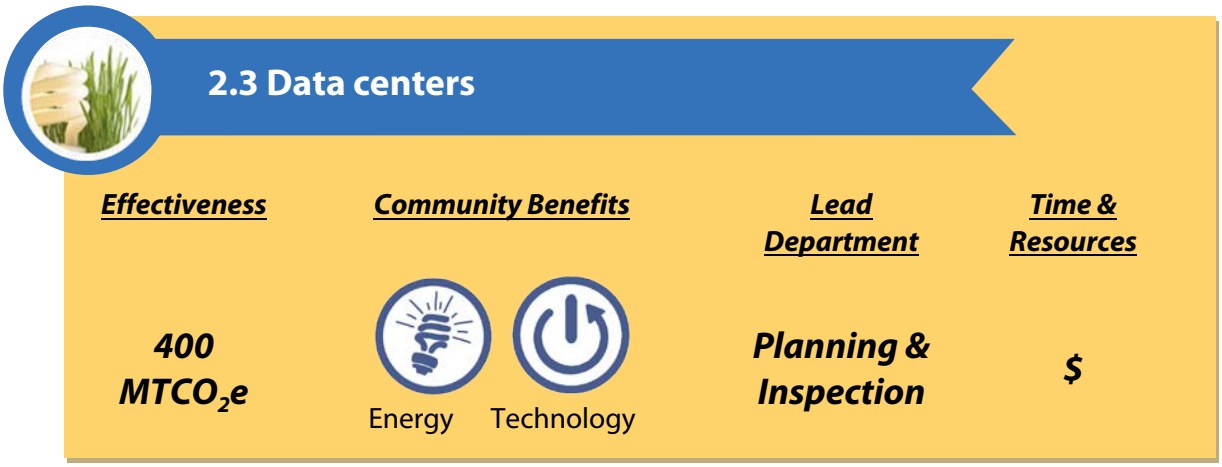


2.3 Data centers

Encourage new data centers with an average rack power rating of 15 kW or more to identify and implement cost-effective and energy-efficient practices.

Data centers constitute a large portion of the electricity used in Santa Clara. On average, 28% of total electricity consumed in the community is used by data centers. Recognizing both the economic benefit and the climate effects of data centers is an essential part of this CAP. To respond to the effects of this electricity use, the City will require new data centers with an average rack power rating of 15 kW or more to complete a feasibility study identifying techniques to achieve a power usage effectiveness (PUE) rating of 1.2 or lower. Where determined feasible, the City will encourage applicants to utilize such techniques. To aid industry stakeholders in this feasibility analysis, the City will provide guidance and examples of successful and feasible techniques, and will evaluate on an annual basis the incentives available through SVP to improve the cost-effectiveness of this measure.

- **Performance metric:** 10% of new data centers utilizing energy-efficient practices.

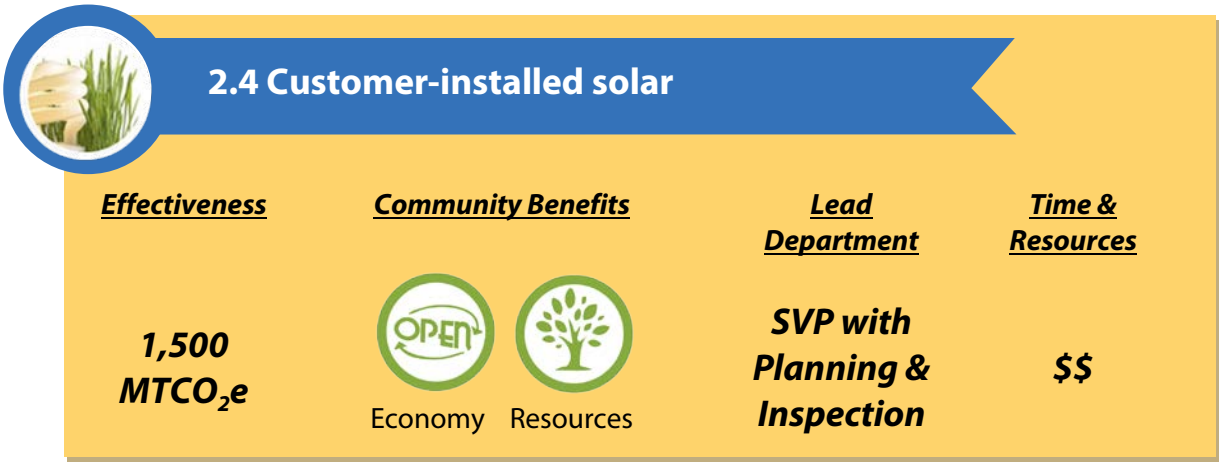


2.4 Customer-installed solar

Incentivize and facilitate the installation of 6 MW of customer-owned residential and nonresidential solar PV projects.

The purpose of this measure is to increase the number of solar PV projects on residential and nonresidential buildings and facilities. Many households and businesses in Santa Clara have installed solar PV panels using SVP's rebate program. This measure directs the City to facilitate additional solar PV installations by providing incentives for and information about the benefits of solar PV to residents and business owners. Information provided by staff to residents and businesses proposing to install solar PV systems will include reference to the City's design guidelines, ensuring that all PV systems are designed and installed in a manner to minimize solar reflectance. The Planning & Inspection Department will continue to assist SVP's incentive program by facilitating the existing "one-stop" expedited permitting process for customer-owned solar PV systems. Similarly, the Planning & Inspection Department can provide outreach to owners of key nonresidential land and businesses ideal for solar PV power, such as parking lots and garages, warehouses, and large retail buildings.

- **Performance metric:** New solar PV projects generating 6 MW in total installed capacity on homes, nonresidential buildings, parking garages, parking lots, and other feasible areas. Equivalent to 900 residential and 330 nonresidential installations.



2.5 Municipal energy efficiency

Reduce municipal electricity use by 10% through comprehensive energy retrofits of existing equipment and implementation of previously identified energy efficiency projects with a benefit-cost ratio of one or greater.

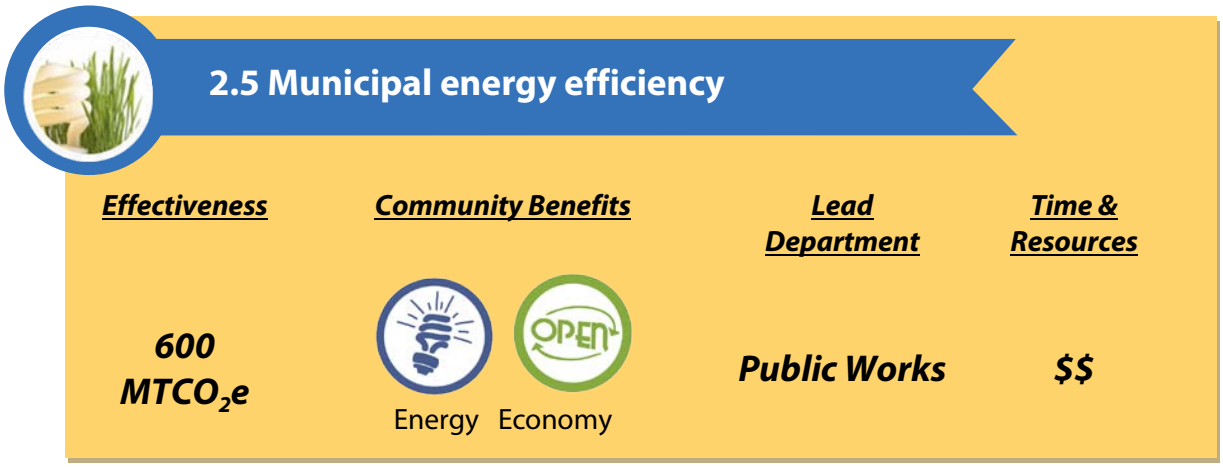
The City government of Santa Clara will serve as an example of energy efficiency in the community by reducing electricity use by 10% by upgrading equipment in City-owned facilities. The City will reach this efficiency goal through a two-tiered approach: (1) tie-up loose ends by completing all cost-effective energy efficiency projects identified in historic energy audits, and (2) continue to upgrade equipment, including computers and packaged HVAC units, to new and efficient models.

The City contracted with energy auditors to identify cost-effective energy efficiency projects in 29 City-owned facilities, and completed projects identified in the audit with a simple payback period of less than three years. In order to reach the emissions reductions identified in this measure, the City will also now implement projects which were not implemented before, and which have a lifetime benefit-cost ratio of one or greater.

The second tier in this energy efficiency measure is the continual replacement of aging and inefficient equipment with new and efficient models. To initiate and sustain successful equipment replacement, the City should:

- Benchmark energy use in City facilities using a normalization process, such as that offered through the EPA's Portfolio Service Manager.
- Identify facilities appropriate for an in-depth energy audit and retrocommissioning site visit.
- Bundle any and all identified projects to reach an attractive payback period, generally less than five years.

- **Performance metric:** Replace inefficient equipment in 50% of municipal buildings and facilities. Complete all previously identified cost-effective identified energy efficiency projects.



2.6 Municipal renewables

Install 1 MW of solar or other renewables at City-owned facilities.

By installing more solar PV systems on City-owned facilities outside of the operations of SVP, the City of Santa Clara will lead the community by example to help meet the 2020 reduction target. The City will pursue 1,000 kW of future solar PV projects on City-owned facilities. In order to successfully complete this task, the Public Works department will need to work closely with SVP to identify proper sites, lock in a sustainable financing mechanism, implement construction, and continually monitor performance to achieve the total potential annual electricity production of the system(s). PV systems proposed for City-owned facilities will be designed and installed in a manner consistent with the community design guidelines to minimize potential for solar reflectance.

- **Performance metric:** New solar PV projects generating 1,000 kW in total installed capacity.

2.6 Municipal renewables

Effectiveness	*Community Benefits*	*Lead Department*	*Time & Resources*
300 $MTCO_2e$	Economy, Resources	***Public Works***	***$$***

Focus Area 3: Water Conservation

Goal: Reduce GHG-intensive water use practices.

Water use in the community requires large amounts of energy to convey and treat water, both before and after it reaches the end-user. The primary goal for this focus area is to minimize the amount of energy used for these purposes through increased conservation efforts, improved water efficiency, and the continued and growing use of recycled water.

3.1 Urban Water Management Plan targets

Meet the water conservation goals presented in the 2010 Urban Water Management Plan to reduce per capita water use by 2020.

The City's 2010 UWMP identifies policies and programs to achieve water conservation targets required by the state's SBx7-7 goals. With implementation of this reduction target, the average annual water use per capita would be 186 gallons. Steps the City should take to reach this reduction target include:[7]

- Promote water conservation in new development through the use of development standards and building requirements.
- Revisit the currently adopted landscape design guidelines to increase efficiency in outdoor water use in new development.
- Provide information to residents and businesses about the economic and environmental benefits of water conservation and low-cost retrofit opportunities.

- **Performance metric:** Achieve 100% compliance of the SB X7-7 reduction goal to save 1,362 acre-feet.

[7] For more actions to reach the City's water conservation goal, see Table 36 in the 2010 UWMP

Focus Area 4: Waste Reduction

Goal: Increase recycling opportunities for all disposed materials.

Waste disposed by the community generates methane as it decomposes after being deposited in landfills. During decomposition, food waste emits twice as much methane per pound than any other material disposed in landfills.[8] The following waste reduction measures focus on efforts to launch a food waste collection program with local restaurants and achieve an 80% waste diversion rate by 2020.

4.1 Food waste collection

Support the expansion of existing food waste and composting collection routes in order to provide composting services to 25% of existing restaurants.

Currently a pilot food waste collection route exists in Santa Clara. This measure expands on this effort to reach 25% of existing restaurants. To successfully do this, the City Street & Auto Services Department will work closely with current food waste collection contractors to identify how to properly expand the existing routes to reach new customers without expanding services beyond a reasonable area. A directed outreach campaign and survey can gauge several key participation factors, including the amount of food waste generated by the prospective business, the restaurant's level of interest, and any existing composting or food waste separation practices. The survey can provide the City a clear idea regarding which restaurants would be most likely to successfully adopt curbside food waste collection.

- **Performance metric:** Participation of 120 restaurants in Santa Clara.

[8] See Table 8 of the California Air Resources Board Landfill Emissions Tool v1.3.

4.2 Increased waste diversion

Work with regional partners to increase solid waste diversion to 80% through increased recycling efforts, curbside food waste pickup, and construction and demolition waste programs.

In 2008, most waste generated within Santa Clara (58%) was diverted from landfills through recycling, green waste, and other collection programs. This measure recommends increasing the waste diversion percentage from 58% to 80%. To do this, the City should:

- Update the Santa Clara City Code (SCCC) to lower the threshold for construction and demolition collection requirements.
- Adopt recycling ordinances that incorporate new standards for trash, recycling, and composting collection enclosures. For example, require enclosures to accommodate two 4-yard containers.
- Work with trash collection providers to increase the types of recyclables and organic materials that collection services will accept for recycling.
- Work with apartment building owners and managers to implement recycling programs.

- **Performance metric:** Increase the waste diversion rate from 58% to 80%.

4.2 Increased waste diversion

Effectiveness	***Community Benefits***	***Lead Department***	***Time & Resources***
20,500 $MTCO_2e$	Education, Resources	***Public Works***	***$$***

Focus Area 5: Off-Road Equipment

Goal: Ensure efficient operations of off-road equipment.

Fuel used in off-road equipment for construction and lawn or garden equipment can be reduced through operations that are more efficient and by transitioning to alternative fuel sources to power off-road equipment. This focus area identifies best practices and opportunities for fuel-efficient equipment operations. BAAQMD currently provides guidance and resources to developers, residents, and businesses on viable and economical ways to retrofit or replace off-road equipment.

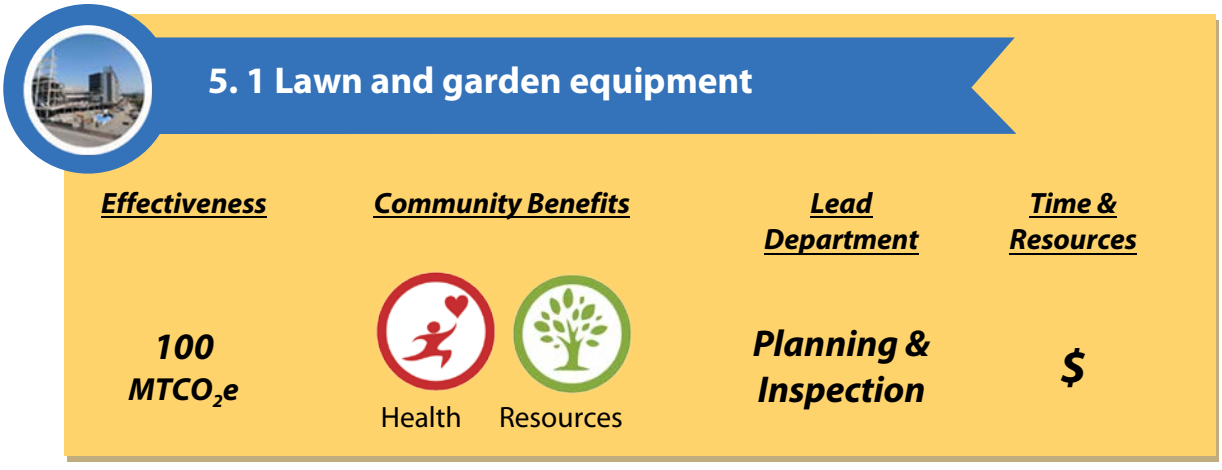
5.1 Lawn and garden equipment

Support and facilitate a community-wide transition to electric outdoor lawn and garden equipment through outreach, coordination with BAAQMD, and outdoor electrical outlet requirements for new development.

Lawn and garden equipment powered by electricity or battery packs has become more advanced and effective over time, but the industry standard still relies on gasoline-powered machinery. The Planning & Inspection Department will work to encourage the turnover of existing lawn and garden equipment, namely lawn mowers and leaf blowers, to electric alternatives. By amending development standards, the City can also ensure that new homes and businesses are equipped with outdoor electrical outlets necessary to use electric lawn and garden equipment. To do this, the City should:

- Encourage and support local and regional retrofit and replacement programs using pamphlet materials and the City's website, and at public events.
- Support BAAQMD efforts to re-establish a voluntary exchange program for residential lawn mowers and backpack-style leaf blowers.
- Require new buildings to provide outdoor electrical outlets in accessible locations to charge or power electric lawn and garden equipment.
- Require the use of on-site grid power and limit the use of diesel generators, with exceptions for projects where grid power is not available or to mitigate unusual circumstances.

    - **Performance metric:** Exchange 1,170 leaf blowers and 130 lawn mowers with electric models.

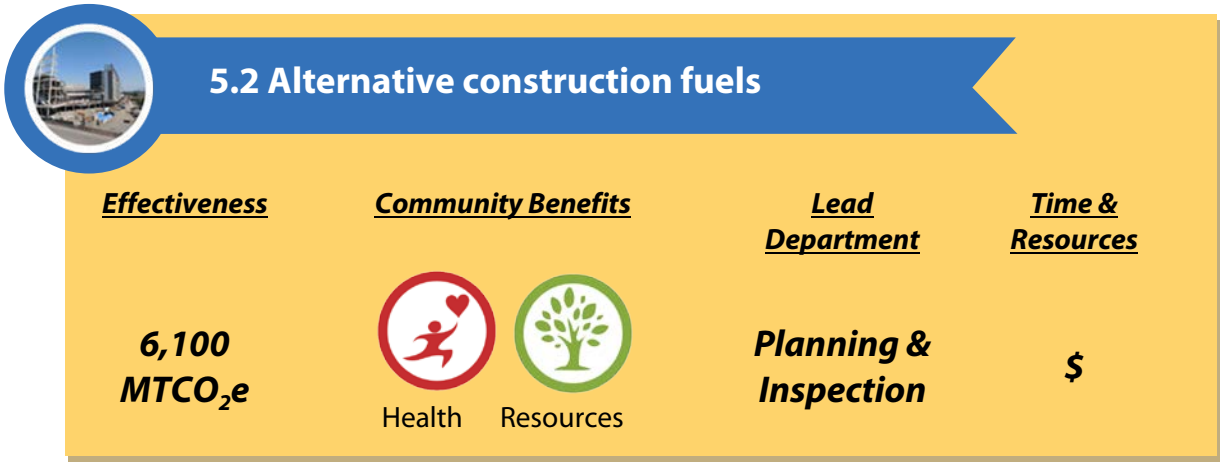


5.2 Alternative construction fuels

Require construction projects to comply with BAAQMD best management practices, including alternative-fueled vehicles and equipment.

Construction vehicles and equipment can be powered by cleaner alternative technologies, including biodiesel, electricity, gasoline hybrid, or compressed natural gas. These alternative options emit fewer GHGs and are consistent with BAAQMD guidelines and requirements. Depending on the scope of a project under CEQA, the City may impose these best management practices as mitigation measures on discretionary projects. BAAQMD-recommended basic construction mitigation measures include limiting idling times to five minutes or less, limiting vehicle speeds to 15 miles per hour or less, and proper equipment maintenance and tuning in accordance with manufacturer specifications. The City will work to implement this measure by relying on existing BAAQMD grant and rebate programs included in the Carl Moyer Memorial Air Quality Standards Attainment Program.

- **Performance metric:** 30% of construction equipment switches from conventional technologies to hybrid, compressed natural gas (CNG), electric, or biodiesel.



Focus Area 6: Transportation and Land Use

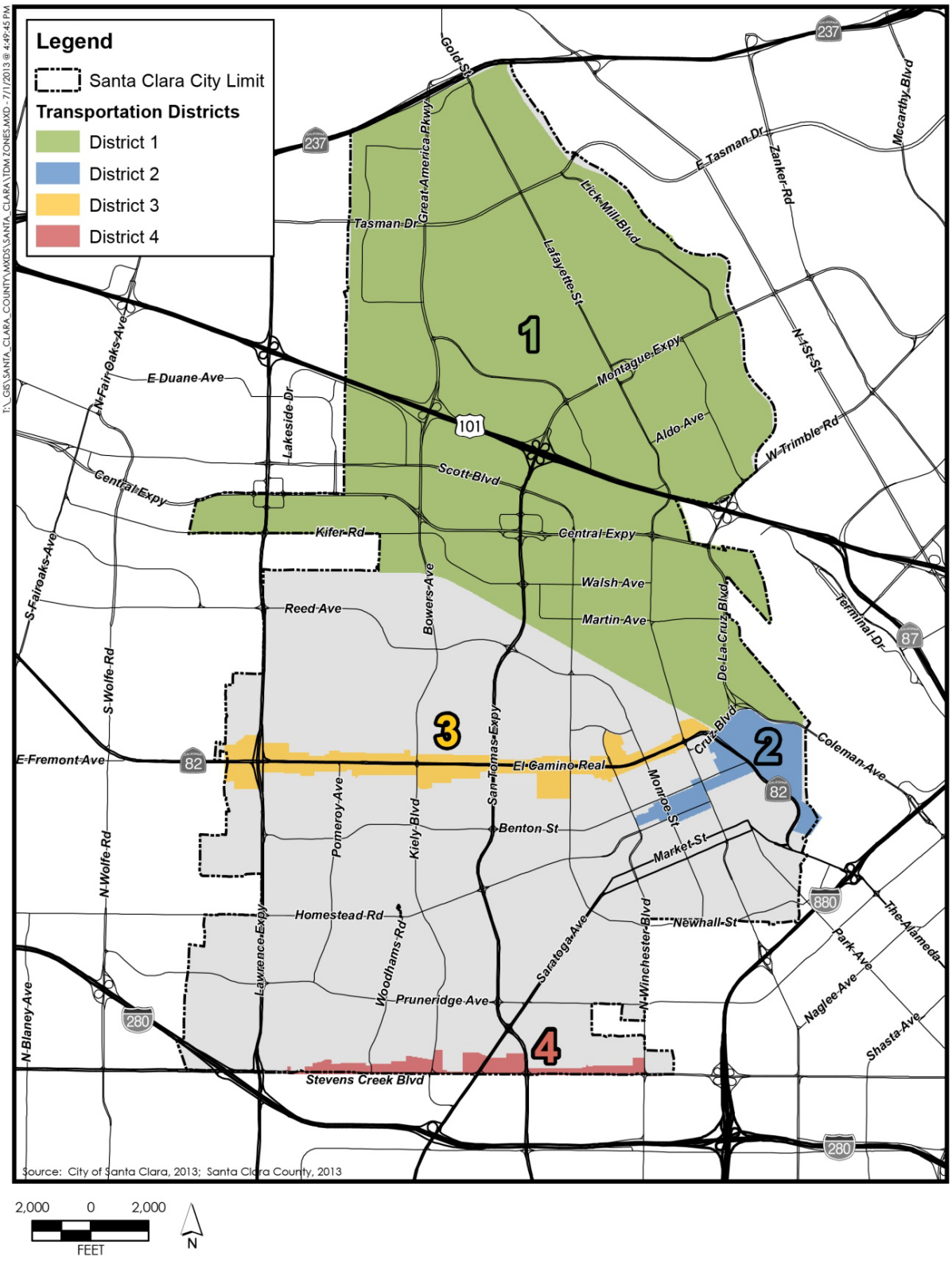
Goal: Establish land uses and transportation options that minimize single-occupant vehicle use.

Every year, the Santa Clara community drives more than one billion miles on local and regional roads. Transportation by single-occupant vehicle can be reduced through a greater mix and diversity of land uses and expanded options to use alternative modes of travel.

As described in Chapter 3, the 2010–2035 City of Santa Clara General Plan includes forward-thinking land use and transit policies that, when implemented, would reduce per-service population vehicle miles traveled (VMT) by 6.6% by 2020. To identify additional land use-related and transit service measures in this CAP would double-count the estimated VMT reductions. This focus area identifies opportunities, beyond those already identified in the General Plan or captured in the City's travel model, through a suite of recommended transportation demand management (TDM) measures supporting a complete network of multimodal travel options. These measures identify an additional 1% reduction in per-service population VMT. Combined with the policies already contained in the General Plan, implementing these measures would reduce per-service population VMT by 7.6% by 2020.

While many TDM approaches could be implemented throughout the city, each is not necessarily applicable or effective in all locations. To maximize the effectiveness of each approach, the City has identified four transportation management districts, identified in **Figure 22**. The TDM measures applicable to each district vary based on the planned mix of land uses, the transportation services provided, and the estimated effectiveness of each measure in each district. **Table 9** identifies the districts, applicable TDM measures, and the range of anticipated VMT reductions. Each measure is discussed in further detail below.

Figure 22: Santa Clara Transportation Management Districts



The City's General Plan identifies specific land use assumptions that anticipate the type and amount of new development to occur within each district identified in **Figure 22**. The amount and type of new development identified in the General Plan directly correlates to the anticipated increases in VMT with the various districts anticipating an increase in daily VMT by 2020 between 4.2% and 37.5%. A detailed summary of the growth in VMT by district is presented in **Appendix B.**

It is also anticipated that the land uses within each district will vary in their ability and approach to implementing programs that reduce VMT and associated emissions. To facilitate project level implementation of the TDM program, **Table 9** identifies the minimum required VMT reductions by transportation district and General Plan land use designation. Each proposed project located in the transportation districts identified in **Figure 22** consisting of greater than 25 housing units or more than 10,000 nonresidential square feet will be required to achieve a minimum VMT reduction. The VMT reductions may be achieved through project design characteristics, land use, parking, access, or TDM best practices. In most cases, a minimum level of VMT reduction must be achieved through the application of TDM best practices.

Table 9: Minimum Vehicle Miles Traveled Reduction Requirements by Transportation District and Land Use Designation

	General Plan Land Use Designation							
	Medium-Density Residential	High-Density Residential	Regional Commercial	Neighborhood Mixed Use	Community Mixed Use	Regional Mixed Use	Low Intensity Office/R&D	High Intensity Office/R&D
Average trip generation rate [1, 2]	6	7	8	8	8	8	11	7
Transportation Districts	**Minimum % VMT reduction per project [3, 4, 5] (Minimum % VMT reduction per project from TDM) [6, 7]**							
1 - North of Caltrain	15% (5%)	20% (10%)					25% (10%)	20% (10%)
2 - Downtown					20% (10%)			
3 - El Camino Real Corridor		15% (5%)			20% (10%)	20% (10%)		
4 - Stevens Creek Blvd			5% (n/a)		15% (5%)			

Notes:

1. *Average trip generation rates represent the number of daily trips per housing unit (for residential projects) or per 1,000 square feet (for nonresidential projects).*
2. *For commercial and mixed-use designations, average trip generation rates describe employee and resident trips rather than retail visitor trips.*
3. *Highlighted cells indicate that the General Plan land use designation is present in the transportation district.*
4. *The VMT reductions for each land use in each district exceed the total cumulative VMT reductions anticipated for each district in Appendix B, as projects consisting of less than or equal to 25 dwelling units or 10,000 nonresidential square feet would typically be considered exempt.*
5. *All projects subject to minimum vehicle miles traveled reduction requirements are subject to annual reporting requirements.*
6. *Staff retains discretion to require a TDM program as a condition of approval for discretionary projects not located in one of the four identified districts.*
7. *TDM reductions are expressed as minimum requirements. However, staff retains discretion to require greater levels of TDM as a condition of approval for discretionary projects.*

Sources:

City of Santa Clara General Plan. 2010. http://santaclaraca.gov/ftp/csc/pdf/general-plan/SantaClara_Ch8-6_1-3-11_Final.pdf
Fehr & Peers. 2013. VMT+ Tool http://www.fehrandpeers.com/vmt/

6.1 Transportation demand management program

Require new development located in the city's transportation districts to implement a TDM program to reduce drive-alone trips.

The City will require all new developments greater than 25 housing units or more than 10,000 nonresidential square feet to draft and implement a VMT reduction strategy that reduces drive-alone trips. The degree to which each project implements a TDM program as part of the VMT reduction strategy will be based on the location and land use of the proposed project, as shown in **Table 9**.

The City will offer both a prescriptive and a performance method for projects to demonstrate compliance to minimize the need for additional analysis but provide flexibility for projects proposing alternative methods. To help projects comply using the prescriptive method, the City will prepare checklists for representative project types (residential, commercial, mixed use, office/R&D). Each checklist will identify applicable actions and the estimated VMT reductions to occur through implementation. The applicable actions are grouped into the following categories:

- Land Use and Location
- Neighborhood/Site Enhancements
- Parking Policy
- Resident/Commute Trip Reduction Programs

Each project subject to the requirements will be required to submit an annual TDM monitoring report to City staff to evaluate the progress of TDM goals.

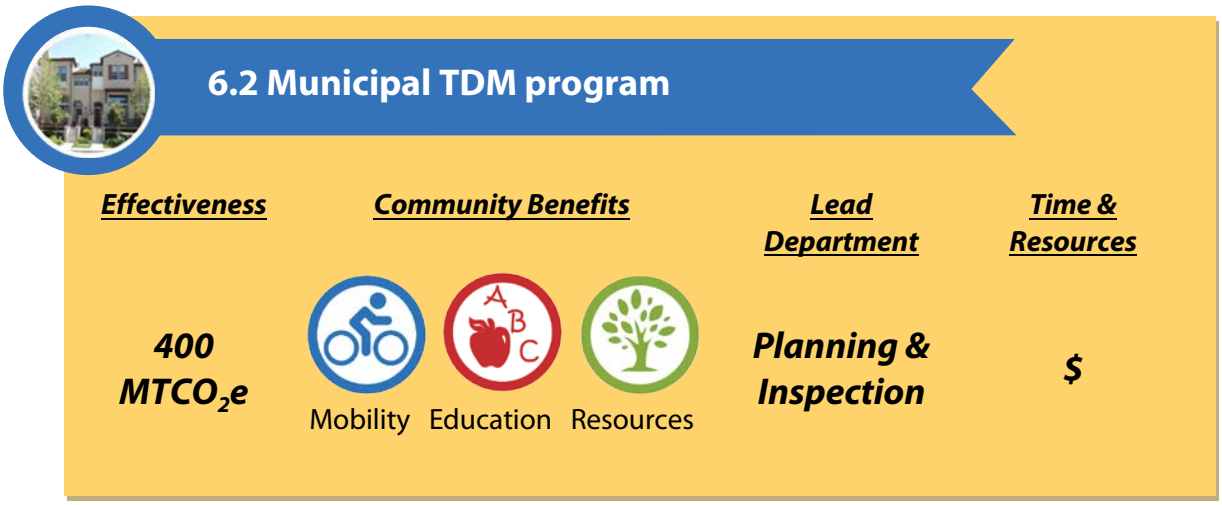
- **Performance metric:** TDM reporting results in a 1% overall reduction in citywide VMT, with individual projects achieving a minimum 5% to 10% reduction in VMT based on implementation of TDM best practices.

6.2 Municipal transportation demand management

Develop and implement a transportation demand management program for City employees to encourage alternative modes of travel and reduce single-occupant vehicle use.

The City has a responsibility to take a leading role in reducing emissions in the community. As transportation is the second leading source of GHG emissions in Santa Clara, the City can help to reduce those emissions by implementing its own TDM program. The TDM program will also serve a dual purpose as an example to other businesses in the community.

- Performance metric: Achieve a 20% reduction in commute-related VMT from City employees.



6.3 Electric vehicle parking

Revise parking standards for new multi-family residential and nonresidential development to allow that a minimum of one parking space, and a recommended level of 5% of all new parking spaces, be designated for electric vehicle charging.

As demonstrated in Chapter 3, many Santa Clara residents are early adopters of new technologies, including electric vehicles. The availability of public electric vehicle (EV) charging stations, and requirements ensuring that new development is equipped to provide such infrastructure in the future, would substantially increase the likelihood of EV adoption, reducing local GHG emissions and other harmful pollutants associated with gasoline and other fuel use. To do this, the City should:

- Install EV charging stations in public parking lots.
- At the time of the next comprehensive Zoning Code update, amend Sections 18.74.020(f) and 18.74.020(i) of the Santa Clara City Code (SCCC) to require a portion of new nonresidential parking spaces to include EV charging facilities, consistent with the SCCC.
- At the time of the next comprehensive Zoning Code update, amend Section 18.18.130 of the SCCC to require that all new multi-family residential and nonresidential development contain at least one new EV charging station and to encourage a recommended maximum of 5% of all new multi-family parking spaces include EV charging stations.

    - **Performance metric:** 430 parking spaces in new commercial, industrial, and multi-family development that utilize EV charging stations.

Focus Area 7: Urban Heat Island Effect

Goal: Mitigate the heat island effect through shading and cooling practices.

Dark pavements and surfaces typically represent up to 25% of a community's land area. These surfaces can contribute to increased temperatures in the community, known as the urban heat island effect, requiring additional energy use to keep buildings cool. Using lighter-colored surfaces, providing shade structures, and planting trees to provide shade near buildings can reduce the degree to which the urban heat island effect increases building energy use.

7.1 Urban forestry

Create a tree-planting standard for new development and conduct a citywide tree inventory every five years to track progress of the requirements.

Trees provide multiple benefits to residents, business owners, and the community at large. If placed strategically near south- or west-facing windows trees can help reduce the amount of air conditioning needed during high-heat days by reducing the greenhouse effect within buildings. This is a long-term strategy, as trees take time to mature before providing maximum benefits. For example, the City of Cupertino operates a Tree4Free program in which the City covers the cost of a new tree for interested residents and businesses. To do this, the City should:

- At the time of the next comprehensive Zoning Code update, amend the SCCC to require a portion of new development to plant shade trees.
- Review other City tree planting programs, and determine whether to implement an incentive program and/or an educational campaign.
- Collaborate with local environmental or community organizations to fund program costs or outreach.
- Identify and promote desirable tree types and locations for plantings to minimize the effect of root systems on infrastructure.

    - **Performance metric:** Each new development incorporates a minimum of two shade trees near south-facing windows for a total tree-planting goal of 2,500.

7.2 Urban cooling

Require new parking lots to be surfaced with low-albedo materials to reduce heat gain, provided it is consistent with the Building Code.

The City will phase in adoption of a requirement for new nonresidential parking lots to mitigate the urban heat island effect. The urban heat island effect occurs when large paved areas, usually dark in color, increase surrounding temperatures. According to the EPA, the urban heat island effect is responsible for 5–10% of peak electricity demand for cooling buildings in cities.[9] Strategies such as requiring or encouraging the use of "cool" surfaces for paving greatly reduce this effect, in turn reducing the energy required to cool nearby buildings. Reducing the urban heat island effect is also an important strategy for climate adaptation, since increasing temperatures are expected to exacerbate the effect.

Cool Roofs

CALGreen, also known as the California Green Building Standards Code, includes the installation of a cool roof as a voluntary measure. Santa Clara could adopt these voluntary measures to go beyond the mandatory building code.

- **Performance metric:** All new uncovered parking lots and spaces utilize light-colored and/or permeable pavements.

7. 2 Urban cooling

Effectiveness	***Community Benefits***	***Lead Department***	***Time & Resources***
10 $MTCO_2e$	Technology Energy	***Planning & Inspection***	***$***

[9] EPA 2013.

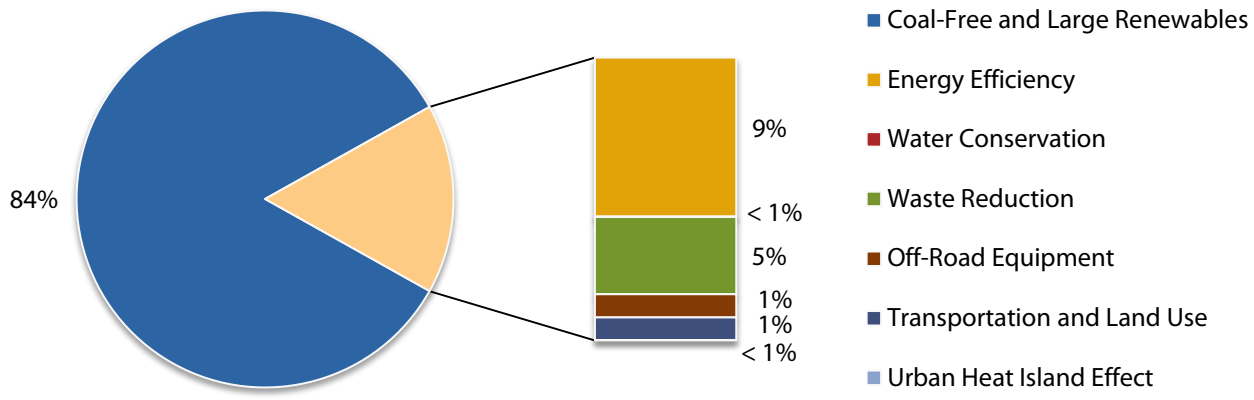
2020 Emissions Reduction Summary

The reduction measures included in this CAP identify policies and programs that can be implemented to reduce emissions and achieve the reduction target by 2020. Most emissions reductions come from the Coal-Free and Large Renewables focus area, which corresponds to the largest sources of emissions in Santa Clara. **Table 10** and **Figure 23** summarize anticipated emissions reductions in 2020.

Table 10: Anticipated 2020 Emissions Reductions from CAP Measures

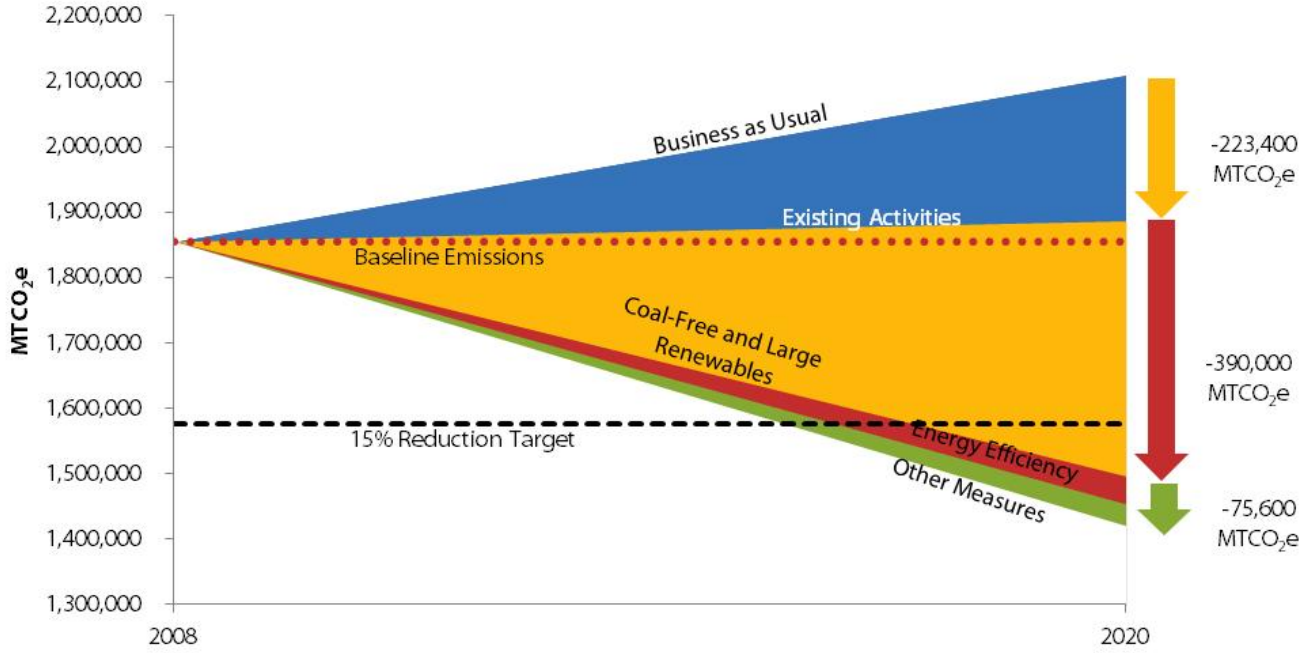
Focus Area	2020 ($MTCO_2e$)
2008 Baseline Emissions	1,854,300
2020 Business as Usual Emissions	2,109,200
State Activities	-176,600
Local Activities	-46,800
2020 Emissions with Existing Activities	1,885,800
Emissions Reduction Measures	
Coal-Free and Large Renewables	-390,000
Energy Efficiency	-42,500
Water Conservation	-140
Waste Reduction	-20,650
Off-Road Equipment	-6,200
Transportation and Land Use	-6,040
Urban Heat Island Effect	-80
Total Reductions from new measures*	**-465,610**
2020 Emissions Level with CAP	**1,420,200**
% Reduction below Baseline	**-23.4%**
*Total may not equal the sum of component parts due to rounding.	

Figure 23: Anticipated 2020 Emissions Reductions by Focus Area



Implementing the CAP measures would enable the community to reduce emissions by 23.4% below 2008 levels by 2020. **Figure 24** illustrates anticipated progress toward achieving and exceeding the reduction target by 2020.

Figure 24: Anticipated 2020 Emissions Reductions



Beyond 2020

Recognizing that the challenges presented by GHG emissions will continue beyond 2020, the City has also identified next steps or reach measures to reduce emissions beyond 2020 levels. Proposed CAP measures and associated performance metrics identify emissions reductions to be achieved by 2020. To continue sustained reductions in GHG emissions, it is recommended that the City adopt a 2035 reduction target. A commonly adopted target for 2035 is 55% below baseline levels and is based on Executive Order (EO) S-3-05, which established a 2050 reduction target for California to reduce GHG emissions 80% below 1990 levels.

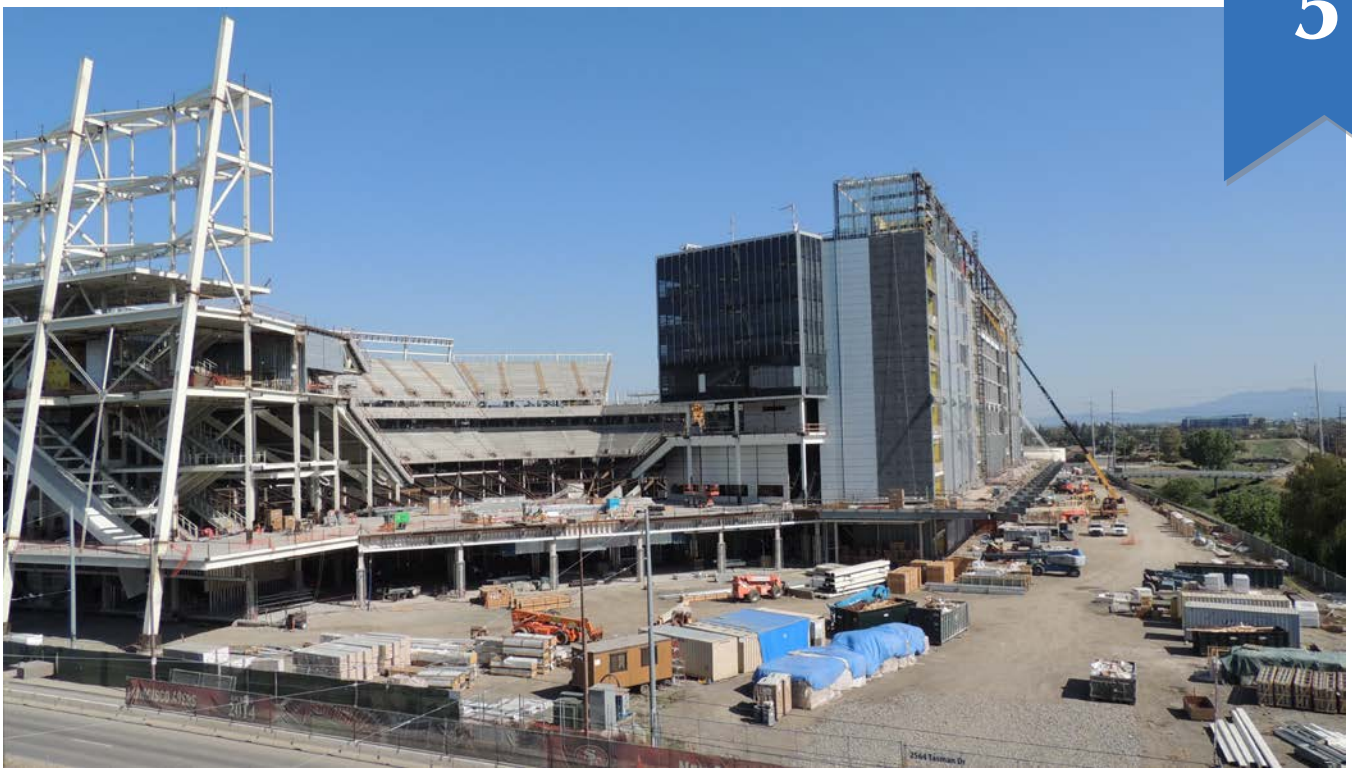
In order to meet this goal, the City would need to facilitate reductions totaling 1,391,800 $MTCO_2e$. Meeting this reduction target by 2035 would result in the emissions of 834,400 $MTCO_2e$ per year. Additional actions must be considered to achieve these reductions by 2035. **Table 11** presents a list of reach measure topics derived from measures proposed for 2020. The reach measure topics rely on increased levels of participation and performance than those proposed for 2020 to achieve greater reductions by 2035.

Table 11: 2035 Reach Measures

#	Measure Topic	CAP Participation Level in 2020	CAP Reductions in 2035 ($MTCO_2e$)	Reach Participation Level in 2035	Reach Reduction in 2035 ($MTCO_2e$)[1]
1.1	Coal-free by 2020	100% of coal power replaced with natural gas	480,100	100% of coal power replaced with an even mix of renewables and natural gas	806,200
1.3	Utility-installed renewables	New solar PV projects generating 5 MW in total installed capacity	1,200	New solar PV projects generating 25 MW or more in total installed capacity	3,100
2.1	Community electricity efficiency	Residential savings: 3,600 MWh Commercial savings: 44,400 MWh Industrial savings: 111,100 MWh	27,600	Residential savings: 7,200 MWh Commercial savings: 88,800 MWh Industrial savings: 222,200 MWh	27,600
2.4	Customer-installed solar	Installation of 6,000 kW of solar on about 1,000 residential homes, nonresidential buildings, parking garages, parking lots, and other feasible areas	1,500	Installation of 10,000 kW of solar on about 2,000 residential homes, nonresidential buildings, parking garages, parking lots, and other feasible areas	1,300
Total CAP Reductions in 2035 =			**510,400**	**Total Reach Reductions in 2035 =**	**838,200**
				Total Reductions Needed to Reach 2035 Target =	**1,408,600**
				Further Reductions Needed =	**570,400**

Notes:

1. As SVP implements ways to reduce emissions associated with the electricity sources contained in their portfolio (measure 1.1), the emissions reduction effectiveness of measures aimed at reducing electricity used decreases (measures 2.1, 2.4).



5. Achieving Our Goals

To ensure the success of this CAP, the City will integrate the goals and strategies of this plan into other local and regional plans, and implement the programs and activities identified herein. As the City moves forward with updating other planning documents such as the General Plan, Santa Clara City Code, or Specific Plans, staff will ensure that these documents support and are consistent with the CAP.

Implementing the CAP will require City leadership to execute these measures and report progress. This plan identifies a responsible department and offers time frames and relative costs associated with each measure. Staff will monitor implementation progress using an implementation and monitoring tool on an annual basis and will report to the Planning Commission and City Council on annual progress. As part of annual progress reports, staff will evaluate the effectiveness of each measure to ensure that anticipated emissions reductions are occurring. In the event that reductions do not occur as expected, the City can modify and add additional measures to the CAP to ensure the reduction target is achieved.

The following programs are designed to ensure City success in implementing the CAP.

Implementation Program 1: Monitor and report progress toward target achievement.

Actions to support Implementation Program 1:

- Identify key staff responsible for annual reporting and monitoring.
- Use the monitoring and reporting tool to assist with annual reports.
- Prepare a progress report for review and consideration by the Planning Commission and City Council.

Implementation Program 2: Update the baseline emissions inventory and Climate Action Plan every five years.

Actions to support Implementation Program 2:

- Prepare a 2013 emissions inventory no later than 2015.
- Update the CAP no later than 2017 to incorporate new technology, and measures to reduce emissions.
- Update and amend the CAP, as necessary, should the City find that specific measures are not achieving intended emissions reductions.

Implementation Program 3: Continue to develop collaborative partnerships with agencies and community groups that support Climate Action Plan implementation.

Action to support Implementation Program 3:

- Continue formal membership and participate in local and regional organizations that provide tools and support for energy efficiency, energy conservation, GHG emissions reductions, adaptation, public information, and implementation of this plan.

Implementation Program 4: Secure necessary funding to implement the Climate Action Plan.

Actions to support Implementation Program 4:

- Identify funding sources and levels for reduction measures as part of annual reporting.
- Include emissions reduction measures in department budgets, the capital improvement program, and other plans as appropriate.
- Pursue local, regional, state, and federal grants to support implementation.

Tracking Success

Implementation and Monitoring Tool

To support effective monitoring and implementation of the CAP, an Excel-based monitoring tool has been developed to identify the lead department and funding needs to implement each measure. It also allows the City to track its progress in reducing emissions, VMT, waste generation, and energy use over time using readily available data. The tool is used to collect data, track GHG emissions, and assess the effectiveness of CAP measures. It enables the City to sort measures based on timing, responsible department, and level of success, progress, or completion.

Work Plan

The work plan in **Table 12** contains information to support staff and community implementation of the measures to effectively integrate them into budgets, the capital improvement program, and other programs and projects. The time frames included in **Table 12** are defined as follows:

Near-Term: 0-2 Years (by 2015)	Mid-Term: 2-6 Years (before 2020)	Long-Term: 6+ Years (after 2020)

Table 12: Implementation Matrix

#	Measure	2020 GHG Reductions ($MTCO_2e$)	City Costs	Budgeted Costs?	Time Frame	Lead Department	Beneficiaries
1.1	Coal-free by 2020	388,800	$$$	Yes	Mid-Term	Silicon Valley Power	☒ Existing Development ☒ New Development ☒ City Government
1.2	Renewable energy resources	No reductions by 2020 – Supportive	$$$	No	Long-Term	Silicon Valley Power	☒ Existing Development ☒ New Development ☒ City Government
1.3	Utility-installed renewables	1,200	$$	No	Mid-Term	Silicon Valley Power	☒ Existing Development ☒ New Development ☒ City Government
2.1	Community electricity efficiency	27,600	$$	Yes	Near-Term	Silicon Valley Power	☒ Existing Development ☐ New Development ☒ City Government
2.2	Community natural gas efficiency	12,100	$	n/a	Near-Term	Silicon Valley Power (in coordination with PG&E)	☒ Existing Development ☐ New Development ☒ City Government
2.3	Data centers	400	$	No	Near-Term	Planning & Inspection	☒ Existing Development ☒ New Development ☐ City Government
2.4	Customer-installed solar	1,500	$$	Yes	Near-Term	Silicon Valley Power, Planning & Inspection	☒ Existing Development ☒ New Development ☐ City Government
2.5	Municipal energy efficiency	600	$$	No	Mid-Term	Public Works	☐ Existing Development ☐ New Development ☒ City Government
2.6	Municipal renewables	300	$$	No	Mid-Term	Public Works	☐ Existing Development ☐ New Development ☒ City Government
3.1	Urban Water Management Plan targets	140	$	Yes	Mid-Term	Water and Sewer Utilities; Planning and Inspection	☒ Existing Development ☒ New Development ☐ City Government
4.1	Food waste	150	$	Yes	Near-Term	Public Works	☒ Existing Development ☒ New Development ☐ City Government
4.2	Increased waste diversion	20,500	$$	Partially	Mid-Term	Public Works	☒ Existing Development ☒ New Development

#	Measure	2020 GHG Reductions ($MTCO_2e$)	City Costs	Budgeted Costs?	Time Frame	Lead Department	Beneficiaries
							☒ City Government
5.1	Lawn and garden equipment	100	$	No	Mid-Term	Planning and Inspection	☒ Existing Development ☒ New Development ☐ City Government
5.2	Alternative construction fuels	6,100	$	No	Near-Term	Planning and Inspection	☒ Existing Development ☒ New Development ☒ City Government
6.1	TDM program	4,240	$$$	No	Near-Term	Planning and Inspection	☐ Existing Development ☒ New Development ☐ City Government
6.2	Municipal TDM	400	$	No	Ongoing	Planning and Inspection	☐ Existing Development ☐ New Development ☒ City Government
6.3	Electric vehicle parking	1,400	$$	Partially	Near-Term	Planning and Inspection	☐ Existing Development ☒ New Development ☒ City Government
7.1	Urban forestry	70	$	Yes	Mid-Term	Planning and Inspection	☒ Existing Development ☒ New Development ☒ City Government
7.2	Urban cooling	10	$	No	Near-Term	Planning and Inspection	☒ Existing Development ☒ New Development ☒ City Government

Glossary

Association of Bay Area Governments (ABAG): The regional planning agency for the nine counties and 101 incorporated cities in the San Francisco Bay Area.

California Environmental Quality Act (CEQA): A state law requiring state and local agencies to regulate activities with consideration for environmental protection. If a proposed activity has the potential for a significant adverse environmental impact, an environmental impact report (EIR) must be prepared and certified as to its adequacy before action can be taken on the proposed project. General plans require the preparation of a program EIR.

California Green Building Standards Code (CALGreen): The 2010 California Green Building Standards Code, commonly referred to as the CALGreen Code, is a statewide mandatory construction code that was developed and adopted by the California Buildings Standards Commission and the Department of Housing and Community Development. The CALGreen standards require new residential and commercial buildings to comply with mandatory measures under the topics of planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. CALGreen also provides voluntary tiers and measures that local governments may adopt that encourage or require additional measures in the five green building topics.

Carbon Dioxide Equivalent (CO2e): A metric measure used to compare the emissions from various greenhouse gases based on their global warming potential (GWP).The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP.

Clean Car Fuel Standards (AB 1493, Pavley): Signed into law in 2002 and commonly referred to as Pavley standards. Requires carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. CARB anticipates that the Pavley standards will reduce emissions from new California passenger vehicles by about 22% in 2012 and about 30% in 2016, all while improving fuel efficiency and reducing motorists' costs.

Construction and Demolition Waste (C&D): C&D materials consist of the waste generated during the construction, demolition, or renovation of buildings, roads, and other construction projects. C&D materials may include heavy, bulky materials such as concrete, glass, wood, and metal, among other materials.

Cool Roof: A roof with high solar reflectivity is considered a cool roof. Cool roofs reduce heat transfer into the indoors and can reduce indoor energy demand.

Eligible Renewables: As defined by the California Energy Commission, the following energy sources may be counted in an electric utility's portfolio to meet the terms of the Renewables Portfolio Standard: solar thermal electric, photovoltaics, landfill gas, wind, biomass, geothermal electric, municipal solid waste, energy storage, anaerobic digestion, small hydroelectric, tidal energy, wave energy, ocean thermal, biodiesel, fuel cells using renewable fuels.

Energy Conservation: Reducing energy waste, such as turning off lights, heating, and motors when not needed.

Energy Efficiency: Doing the same or more work with less energy, such as replacing incandescent light bulbs with compact fluorescent light bulbs or buying an Energy Star appliance to use less energy for the same or greater output.

Global Warming Potential (GWP): An index used to translate the level of emissions of various gases into a common measure in order to compare the relative potency of different gases without directly calculating the changes in atmospheric concentrations. GHGs are expressed in terms of carbon dioxide equivalent.

Greenhouse Gas or Greenhouse Gases (GHG): Gases which cause heat to be trapped in the atmosphere, warming the earth. GHGs are necessary to keep the earth warm, but increasing concentrations of these gases are implicated in global climate change.

Green Waste: Refers to lawn, garden, or park plant trimmings and materials and can be used in home-composts or picked up curbside by municipal waste haulers.

Mixed Use: Properties on which various uses such as office, commercial, institutional, and residential are combined in a single building or on a single site in an integrated development project with significant functional interrelationships and a coherent physical design. A single site may include contiguous properties.

Ordinance: A law or regulation set forth and adopted by a governmental authority, usually a city or county.

Recycled Water: Treatment of wastewater to a quality suitable for non-potable uses such as landscape irrigation; not intended for human consumption.

Reduction Measure: A goal, strategy, program, or set of actions that target and reduce a specific source of GHG emissions.

Renewable Energy: Energy from sources that regenerate and are less damaging to the environment, such as solar, wind, biomass, and small-scale hydroelectric power.

Renewables Portfolio Standard (RPS): A regulation requiring utility companies in California to increase the production of renewable energy from solar CEC Eligible Renewables.

Vehicle Miles Traveled (VMT): A key measure of overall street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve regional air quality goals.

Water Conservation: Reducing water use, such as turning off taps, shortening shower times, and cutting back on outdoor irrigation.

Water Efficiency: Replacing older technologies and practices in order to accomplish the same results with less water; for example, by replacing toilets with new low-water-using models and by installing "smart controllers" in irrigated areas.

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A

A. GHG Inventory & Forecast Technical Appendix

Inventory Update Purpose

In 2010, Sierra Research, Inc. prepared an inventory of 2008 community-wide GHG emissions for the community of Santa Clara as part of the City's General Plan Update and EIR. Also, in 2012, ICLEI created a 2010 inventory of municipal operations GHG emissions. Changes to the regulatory structure since the creation of this initial inventory, including an update to the State CEQA Guidelines, have prompted the City to re-inventory emissions from community-wide and municipal sources. This inventory is an updated assessment of GHG emissions in the community and from municipal operations.

To create a Qualified GHG Reduction Strategy in compliance with the CEQA Guidelines, the City has updated the 2008 community and City government operations baseline inventories. In the process of completing the inventory, new calculations using the most up-to-date tools and resources have been employed.

The General Plan EIR inventory estimated that 1.915 million $MTCO_2e$ were generated in 2008 in Santa Clara. The updated GHG emissions inventory estimates that approximately 1.852 million $MTCO_2e$ were generated in 2008 in Santa Clara (3.2% lower). The primary changes between the inventories include the use of updated emissions factors for the transportation sector, recalculation of the direct wastewater treatment emissions, and exclusion of sources outside of the City's jurisdictional control.

Community Baseline Activity Data

Activity data was obtained from utility providers, state agencies, and City staff to determine the extent to which each activity occurs annually. This activity data was used to calculate GHG emissions for 2008. **Table A1** lists the activity data used in the 2008 baseline inventory analysis along with all activity data, units, and sources. Data sources include PG&E, BAAQMD, the US Department of Housing and Urban Development (HUD), the California Department of Resources Recycling and Recovery (CalRecycle), SCVWD, CEC, and the City of Santa Clara's 2010 Urban Water Management Plan.

Table A1: Community Activity Data and Sources

Sector	Subsector	Activity Data	Unit	Data Source(s)
Nonresidential Energy	Commercial Electricity	95,230,530	kWh	*City of Santa Clara, PG&E*
	Nonresidential Natural Gas	57,176,860	Therms	*PG&E*
	Industrial Electricity	2,502,703,510	kWh	*City of Santa Clara*
Transportation	Gasoline Vehicles	1,055,543,930	VMT	*Fehr & Peers Transportation Consultants*
	Diesel Vehicles	50,697,270	VMT	
Community Point Sources		173,500	*$MTCO_2e$*	*BAAQMD*
Residential Energy	Single-Family Electricity	113,132,050	kWh	*City of Santa Clara, PG&E*
	Multi-Family Electricity	108,862,880	kWh	*City of Santa Clara, PG&E*
	Residential Natural Gas	15,841,850	Therms	*PG&E*
Off-Road Equipment	Construction Equipment	250	Permits Issued	*HUD State of the Cities Data System*
	Lawn and Garden Equipment	44,166	Housing Units	*City of Santa Clara*
Waste	Solid Waste	145,440	Tons	*CalRecycle*
	Green Waste	2,600	Tons	
Rail Transit	*Caltrain*	*100*	*Daily Trips*	*City of Santa Clara*
	VTA Light Rail	680	Daily Trips	
Water and Wastewater Energy	Water Energy Use	7,390	Million Gallons	*City of Santa Clara UWMP*
		13,644,390	kWh Electricity	*CEC, SCVWD*
	Wastewater Energy Use	5,760	Million Gallons	*City of Santa Clara UWMP*
		10,682,490	kWh Electricity	*CEC, SCVWD*
Direct Wastewater		*5,760*	*Million Gallons Treated*	*City of Santa Clara UWMP*

City Government Baseline Activity Data

The majority of the activity data used to calculate the City government baseline inventory for 2010 was provided by ICLEI. This information was updated with new emissions coefficients and additional point source emissions such as the closed landfill. Details on the activity data used in the City government baseline inventory is shown in **Table A2**.

Table A2: City Government Activity Data and Sources

Sector	Subsector	Activity Data	Unit	Data Source(s)
Silicon Valley Power	Cogeneration Plant 1 – Electricity	60,020	kWh	ICLEI, City of Santa Clara
	Cogeneration Plant 1 – Natural Gas Donald Von Raesfeld Power Plant	4,856,050	Therms	
	Gianera Plant – Electricity	100,520	kWh	
Closed Landfill		9,900	$MTCO_2e$	BAAQMD
Buildings and Facilities	Electricity	8,745,190	kWh	ICLEI, City of Santa Clara, PG&E
	Natural Gas	519,850	Therms	
	Backup Generators	190	$MTCO_2e$	
Employee Commute		6,288,470	VMT	ICLEI, City of Santa Clara
Vehicle Fleet	Diesel	102,080	Gallons	ICLEI, City of Santa Clara
	Gasoline	199,050	Gallons	
Water Pumping	Water Delivery Pumps	271,080	kWh	ICLEI, City of Santa Clara
	Sprinklers/Irrigation Control	11,010	kWh	
	Well Pumping	5,927,540	kWh	
Government-Generated Solid Waste		4,620	Tons of Solid Waste	ICLEI, City of Santa Clara
Wastewater Pumping	Wastewater Pumping Electricity	2,566,610	kWh	ICLEI, City of Santa Clara, PG&E
	Wastewater Pumping Natural Gas	120	Therms	
Public Lighting	Streetlighting	98,280	kWh	ICLEI, City of Santa Clara, PG&E
	Park Lighting	865,970	kWh	
	Other Public Lighting	184,190	kWh	

Emissions Factors and Sources

Table A3 shows the emissions factors used to translate activity data into GHG emissions for the community baseline inventory, while **Table A4** shows the same information for the City government inventory. When a specific emissions coefficient is not applicable, the total emissions reported are given for reference.

Table A3: Community Emissions Factors and Sources

Sector	Subsector	Emissions Factor	Unit	Factor Source
Nonresidential Energy	Commercial Electricity	0.000310	$MTCO_2e$/kWh	GP EIR Appendix A
	Nonresidential Natural Gas	0.005320	$MTCO_2e$/Therm	LGOP v1.1
	Industrial Electricity	0.000310	$MTCO_2e$/kWh	GP EIR Appendix A
Transportation	Gasoline Vehicles	0.000431	$MTCO_2e$/VMT	EMFAC 2011
	Diesel Vehicles	0.001344	MTCO2e/VMT	EMFAC 2011
Residential Energy	Single-Family Electricity	0.000310	$MTCO_2e$/kWh	GP EIR Appendix A
	Multi-Family Electricity	0.000310	$MTCO_2e$/kWh	GP EIR Appendix A
	Residential Natural Gas	0.005320	$MTCO_2e$/Therm	LGOP v1.1
Off-Road Equipment	Construction Equipment	29,000	$MTCO_2e$	GP EIR Appendix A
	Lawn and Garden Equipment	0.029073	$MTCO_2e$/Piece	CARB OFFROAD
Waste	Solid Waste	0.186537	$MTCO_2e$/Ton	CARB Landfill Tool
	Green Waste	0.153846	$MTCO_2e$/Ton	CARB Landfill Tool
Rail Transit	Caltrain	0.251359	$MTCO_2e$/Trip	GP EIR Appendix A
	VTA Light Rail	0.003117	$MTCO_2e$/Trip	GP EIR Appendix A
Water and Wastewater Energy	Water Energy Use	1,846.33	kWh/MG	CEC
		0.000310	$MTCO_2e$/kWh	GP EIR Appendix A
	Wastewater Energy Use	1,855	kWh/MG	CEC
		0.000310	$MTCO_2e$/kWh	GP EIR Appendix A
Direct Wastewater		0.303819	$MTCO_2e$/MG	LGOP v1.1

Table A4: City Government Emissions Factors and Sources

Sector	Subsector	Emissions Factor	Unit	Factor Source
Buildings and Facilities	Electricity	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
	Natural Gas	0.00532	$MTCO_2e/Therm$	LGOP v1.1
	Backup Generators	0.01027	$MTCO_2e/Gallon$ of Diesel	LGOP v1.1
Public Lighting	Streetlighting	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
	Park Lighting	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
	Other Public Lighting	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
Water	Water Delivery Pumps	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
	Sprinklers/ Irrigation Control	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
	Well Pumping	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
Municipal Fleet	Diesel	0.01078	$MTCO_2e/Gallon$	LGOP v1.1
	Gasoline	0.00924	$MTCO_2e/Gallon$	LGOP v1.1
Employee Commute	Employee Commute	0.00060	$MTCO_2e/VMT$	EMFAC 2011
Waste	Government-Generated Solid Waste	0.18182	$MTCO_2e/Ton$	CARB Landfill Tool
Wastewater	Wastewater Pumping Electricity	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
	Wastewater Pumping Natural Gas	0.00532	$MTCO_2e/Therm$	LGOP v1.1
Silicon Valley Power	Cogeneration Plant 1 – Electricity	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A
	Cogeneration Plant 1 – Natural Gas	0.04576	$MTCO_2e/Therm$	GP EIR Appendix A
	Donald Von Raesfeld Power Plant			GP EIR Appendix A
	Gianera Plant – Electricity	0.00031	$MTCO_2e/kWh$	GP EIR Appendix A

B. Quantification Appendix

Overview and Purpose

This appendix summarizes data sources, assumptions, and performance metrics used to calculate GHG emissions reductions for the City of Santa Clara CAP. The sources and metrics are organized by measure and rely on four primary types of data and research: (1) the City's GHG emissions inventory and forecast, (2) government agency tools and reports, (3) case studies in similar jurisdictions, and (4) scholarly research.

Further, the quantification approaches are consistent with guidance provided by BAAQMD for development of a Qualified GHG Reduction Strategy. The baseline GHG inventory and forecast serve as the foundation for the quantification of the City's GHG reduction measures. Activity data from the inventory forms the basis of measure quantification, including VMT, kWh of electricity or therms of natural gas consumed, and tons of waste disposed. Activity data was combined with the performance targets and indicators identified by the City and consultants. The activity data and performance targets and indicators were used throughout the quantification process to calculate the emissions reduction benefit of each measure. This approach ensures that Santa Clara's GHG reductions are tied to the baseline and to future activities occurring within the city.

Common Emissions Factors

Table B1 lists common emissions factors used to quantify emissions reductions in the CAP. With the exception of the coal-free electricity factor, coefficients are for 2020 after existing state and local programs have been implemented. For example, the on-road transportation factor represents the emissions from vehicles in 2020 after the Pavley standards are implemented.

Table B1: Common Emissions Factors

Applicability	Value	Unit	Source
On-Road Transportation with Pavley Implemented	3.60E-04	$MTCO_2e$ per mile driven (with Pavley)	EMFAC 2011
Electricity with RPS Implemented	3.01E-04	$MTCO_2e$/kWh	General Plan EIR Appendix A
Electricity with Measure 1.1 Implemented (Coal-Free)	8.68E-05	$MTCO_2e$/kWh	PMC
Natural Gas	5.32E-03	$MTCO_2e$/Therm	LGOP v1.1
Solid Waste	1.87E-01	$MTCO_2e$ per Ton of Solid Waste	CARB Landfill Emissions Tool v1.3
Green Waste	1.53E-01	$MTCO_2e$ per Ton of Green Waste	

Technical Data for Quantified Measures

1.1 Coal-free by 2020

Replace the use of coal in Silicon Valley Power's portfolio with natural gas by 2020.

Assumptions and Indicators:

Metric	2020	Sources
Percentage of baseline electricity coming from coal	23.6%	SVP Power Content Label
Percentage of baseline electricity coming from natural gas	26.1%	SVP Power Content Label
$MTCO_2e$/MWh for electricity produced from coal	0.324	LGOP v1.1
$MTCO_2e$/MWh for electricity produced from natural gas	0.187	LGOP v1.1
Percent reduction in $MTCO_2e$/MWh	-42%	Calculated
MWh of coal electricity offset	718,300	Calculated
GHG reduction ($MTCO_2e$)	388,800	Calculated
Costs and Savings:		
City costs	$$$	
Budgeted?	Yes	

Method:

This measure calculates the change in SVP's emissions factor ($MTCO_2e$/kWh) when switching from coal to natural gas. There are two changes considered in this quantification: the reduction in CO_2e emissions when moving to natural gas, and the reduction in kWh of electricity use through energy efficiency measures found in other CAP measures. A decrease in $MTCO_2e$ emissions leads to a lower emissions factor. However, a decrease in kWh delivered (an increase in efficiency and conservation) leads to an increase in the emissions factor. The amount of electricity delivered in the baseline year 2008 and in 2020 (with efficiencies taken into account) was used to calculate the kWh delivered by source under the baseline scenario using the power content label provided by SVP. The amount of coal electricity delivered in 2020, under the forecast scenario, equated to 718,000,000 kWh. This same amount was then assumed to be generated by natural gas as described in the measure. When moving this coal electricity over to natural gas, natural gas becomes the only GHG-producing source of SVP electricity. The percentage change in emissions factors from LGOP for coal (mixed electric utility) and natural gas (greater than 1,110 btu) was used to calculate the reduced emissions factor and the resulting reduction in GHG emissions.

Sources:

CARB (California Air Resources Board), et al. 2010. Local Government Operations Protocol. Table G.3

City of Santa Clara. 2013. SVP Power Content Label.

1.2 Renewable energy resources

Investigate the use of City-owned property for large-scale renewable energy projects.

Assumptions and Indicators:

No reductions by 2020 – supportive measure	
Costs and Savings:	
City costs	$$$
Budgeted?	No
Method:	
Supportive Measure – Not Applicable	
Sources:	
Supportive Measure – Not Applicable	

1.3 Utility-installed renewables

Develop up to five solar PV projects with a total installed capacity of 3 to 5 MW.

Assumptions and Indicators:

Metric	2020	Sources
kW installed	5,000	Assumed
kWh produced per kW installed	1,440	National Renewable Energy Laboratory (NREL) PVWatts
kWh produced	7,200,000	Calculated
GHG reduction ($MTCO_2e$)	1,200	Calculated
Costs and Savings:		
City costs	$$	
Budgeted?	No	

Method:

An assumed amount of installed PV solar power, in the unit of kilowatts (kW), was applied to the kWh produced per kW installed factor generated using the NREL PVWatts calculator. This calculator is geographically based and takes DC to AC conversion, weather, precipitation, and other factors into account to generate an accurate portrayal of actual electricity generation in PV systems. The kWh produced by the assumed total size of the systems was applied to the emissions factor generated in Measure 1.1 to produce GHG emissions under SVP's coal-free scenario.

Sources:

NREL (National Renewable Energy Laboratory). 2012. PVWatts Calculator. http://www.nrel.gov/rredc/pvwatts/.

2.1 Community electricity efficiency

Achieve City-adopted electricity efficiency targets to reduce community-wide electricity use by 5% through incentives, pilot projects, and rebate programs.

Assumptions and Indicators:

Metric	2020	Sources
Total MWh savings	159,032	Correspondence with SVP, May 22, 2013
GHG reduction ($MTCO_2e$)	27,600	Calculated
Costs and Savings:		
City costs	$$	
Budgeted?	Yes	

Method:
City staff identified the 2013 adopted electricity efficiency goals for SVP in terms of MWh of electricity. These goals were assumed to be fully implemented through 2020. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Measure 1.1.

Sources:
City of Santa Clara, Silicon Valley Power. 2013. Correspondence with Ann Hatcher. May 22.

2.2 Community natural gas efficiency

Work with community and social services agencies to provide information from PG&E to promote voluntary natural gas retrofits in 5% of multi-family homes, 7% of single-family homes, and 7% of nonresidential space through strategic partnerships, connecting residents and business owners to available financing resources.

Assumptions and Indicators:

Metric	2020	Sources
Therms saved per single-family home retrofit	390	ABAG
Therms saved per multi-family home retrofit	780	ABAG
Single-family homes participating	1,700	Assumed
Multi-family homes participating	1,000	Assumed
Therms saved	1,443,000	Calculated
GHG reduction ($MTCO_2e$)	7,680	Calculated
Reduction in natural gas use per retrofit	35%	Brown et al.
Therms saved per commercial account	140	Calculated
Number of commercial accounts participating	410	General Plan EIR, Table A-3
Therms saved	58,000	Calculated
GHG reduction ($MTCO_2e$)	300	Calculated
Reduction in natural gas use per retrofit	20%	Assumed based on Brown et al.
Therms saved per industrial account	5,900	Calculated
Number of industrial accounts participating	130	General Plan EIR, Table A-3
Therms saved	767,300	Calculated
GHG reduction ($MTCO_2e$)	4,100	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	n/a	

Method:

ABAG provided average natural gas savings seen through the Retrofit Bay Area Program for both single-family and multi-family projects. These assumed savings were applied to the assumed number of participating homes by type to calculate the total therms saved. The total therms saved was converted into $MTCO_2e$ using the emissions factor used in the baseline inventory and forecast.

Sources:

ABAG (Association of Bay Area Governments). April 2012. Retrofit Bay Area Final Report.

Brown, Rich, Sam Borgeson, Jon Koomey, and Peter Biermayer. 2008. U.S. Building-Sector Energy Efficiency Potential. Ernest Orlando Lawrence Berkeley National Laboratory, University of California. http://enduse.lbl.gov/info/LBNL-1096E.pdf.

2.3 Data centers

Encourage new data centers with an average rack power rating of 15 kW or more to identify and implement cost-effective and energy-efficient practices.

Assumptions and Indicators:

Metric	2020	Sources
Percentage reduction in cooling electricity use	31%	CEC 2013 Public Interest Energy Research (PIER) Report
Percentage of electricity used for cooling	54%	Tschudi et al.
Effective reduction in total electricity use	16.7%	Calculated
Percent of industrial electricity from data centers	32%	Correspondence with SVP
Electricity from data centers added from baseline to 2020	122,655,000	Calculated from forecast
Electricity from new data centers subject to measure	12,265,500	Calculated using 10% participation rate
kWh saved	2,053,200	Calculated
GHG reduction ($MTCO_2e$)	400	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	No	

Method:

Data provided by the City of Santa Clara showed that 28% of electricity used in the city is from data centers. The amount of additional industrial electricity from 2014 to 2020 was then calculated from the inventory and forecast and the 32% factor was applied to obtain the additional electricity use from future data centers. It was assumed that 10% of new data centers would use energy-efficient technologies such as liquid-cooled technology, and in turn, 10% of future additional data center electricity use would be subject to reductions. The CEC and Tschudi sources were used to calculate the effective reduction in total electricity use when going from air-cooled to liquid-cooled technology. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Measure 1.1.

Sources:

California Energy Commission. 2013. Public Interest Energy Research 2012 Annual Report. Pg. 41. CEC-500-2013-013-CMF.

City of Santa Clara, Silicon Valley Power. 2013. Personal correspondence with Ann Hatcher. April 4.

Tschudi,William, Priya Sreedharan, Tengfang Xu, David Coup, and Paul Roggensack. 2003. Data Centers and Energy Use – Let's Look at the Data. ACEEE 2003 Paper #162.

2.4 Customer-installed solar

Incentivize and facilitate the installation of 6 MW of customer-owned residential and nonresidential solar PV projects.

Assumptions and Indicators:

Metric	2020	Sources
kW installed	6,000	Assumed
kWh produced per kW installed	1,440	NREL PVWatts
kWh produced	8,640,000	Calculated
GHG reduction ($MTCO_2e$)	1,500	Calculated
Costs and Savings:		
City costs	$$	
Budgeted?	Yes	

Method:

An assumed amount of installed PV solar power, in the unit of kW, was applied to the kWh produced per kW installed factor generated using the NREL PVWatts calculator. This calculator is geographically based and takes DC to AC conversion, weather, precipitation, and other factors into account to generate an accurate portrayal of actual electricity generation in PV systems. The kWh produced by the total size of the systems was applied to the emissions factor generated in Measure 1.1 to produce GHG emissions under SVP's coal-free scenario.

Sources:

NREL (National Renewable Energy Laboratory). 2012. PVWatts Calculator. http://www.nrel.gov/rredc/pvwatts/.

2.5 Municipal energy efficiency

Reduce municipal electricity use by 10% through comprehensive energy retrofits of existing equipment, and implementation of previously identified energy efficiency projects with a benefit-cost ratio of one or greater.

Assumptions and Indicators:

Metric	2020	Sources
Projects identified	11	City of Santa Clara
Estimated kWh savings from identified projects	254,335	City of Santa Clara
Percentage reduction in electricity use per participating building	30%	Brown et al.
Percentage reduction in natural gas use per participating building	28%	Brown et al.
Percentage of City government square footage undergoing energy upgrades	50%	Assumed
kWh reductions	1,311,800	Calculated
Therms reduced	72,800	Calculated
GHG reduction ($MTCO_2e$)	600	Calculated
Costs and Savings:		
City costs	$$	
Budgeted?	No	

Method:
The City of Santa Clara provided a list of energy efficiency projects identified in energy audits of City facilities. These audits also provided kWh reductions for each prospective project. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Measure 1.1.

To go beyond the reductions from previously identified projects, it was assumed that space responsible for at least 50% of City government building energy use would undergo an audit and retrofit of equipment. The assumed savings for electricity and natural gas were provided by Brown et al. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Measure 1.1, and natural gas savings were converted into $MTCO_2e$ using the emissions factor from the baseline inventory and forecast.

Sources:
Brown, Rich, Sam Borgeson, Jon Koomey, and Peter Biermayer. 2008. U.S. Building-Sector Energy Efficiency Potential. Ernest Orlando Lawrence Berkeley National Laboratory, University of California. http://enduse.lbl.gov/info/LBNL-1096E.pdf.

City of Santa Clara. n.d. List of prospective energy efficiency projects.

2.6 Municipal renewables

Install 1 MW of solar or other renewables at City-owned facilities.

Assumptions and Indicators:

Metric	2020	Sources
kW installed	1,000	Assumed
kWh produced per kW installed	1,440	NREL PVWatts
kWh produced	1,440,000	Calculated
GHG reduction ($MTCO_2e$)	300	Calculated
Costs and Savings:		
City costs	$$	
Budgeted?	No	

Method:

An assumed amount of installed PV solar power, in the unit of kW, was applied to the kWh produced per kW installed factor generated using the NREL PVWatts calculator. This calculator is geographically based and takes DC to AC conversion, weather, precipitation, and other factors into account to generate an accurate portrayal of actual electricity generation in PV systems. The kWh produced by the total size of the systems was applied to the emissions factor generated in Measure 1.1 to produce GHG emissions under SVP's coal-free scenario.

Sources:

NREL (National Renewable Energy Laboratory). 2012. PVWatts Calculator. http://www.nrel.gov/rredc/pvwatts/.

3.1 Urban Water Management Plan targets

Meet the water conservation goals presented in the 2010 Urban Water Management Plan to reduce per capita water use by 2020.

Assumptions and Indicators:

Metric	2020	Sources
Projected water savings in UWMP (acre-feet)	1,362	2010 UWMP, Table 16
mg water saved	444	Calculated
kWh/mg	1,846	Calculated
kWh saved	819,120	Calculated
GHG reduction ($MTCO_2e$)	140	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	Yes	

Method:

Table 16 of the 2010 UWMP provided projected potable water conservation savings in acre-feet per year for 2020. These savings were converted into million gallons using the USGS source below. The savings in million gallons was converted into kWh using the kWh/mg factor used in the baseline inventory and forecast. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Measure 1.1.

Sources:

City of Santa Clara. 2010 Urban Water Management Plan. Table 16.

USGS (United States Geological Survey). 2013. Water Science School. http://ga.water.usgs.gov/edu/mgd.html.

4.1 Food waste collection

Support the expansion of existing food waste and composting collection routes in order to provide composting services to 25% of existing restaurants.

Assumptions and Indicators:

Metric	2020	Sources
Pounds of waste generated per restaurant/ seat per year	1	CalRecycle, Waste Characterization
Percentage of waste from food	59%	Cascadia Consulting Group, Table 3 and 4
Number of participating restaurants	120	Calculated, 25% of estimated number of restaurants
Emissions generated from composting ($MTCO_2e$/ton food waste)	0.119	CARB, Composting, Table 3.1.4
Emissions avoided from composting ($MTCO_2e$/ton food waste)	0.54	CARB, Composting, Table 7
Effective emissions reduction from composting ($MTCO_2e$/ton food waste)	0.421	Calculated
GHG reduction ($MTCO_2e$)	150	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	Yes	

Method:
The number of restaurants in Santa Clara was estimated using a focused search of Yelp.com. An assumed participation rate was applied to yield the number of participating restaurants. The amount of food waste generated per restaurant was calculated using a combination of sources: CalRecycle and Cascadia Consulting. The CARB-provided protocol on emissions generated and reduced from food waste composting was used to calculate total GHG reductions from the collected food waste.

Sources:
CalRecycle (California Department of Resources Recycling and Recovery)). 2013. Waste Characterization: Service Sector. http://www.calrecycle.ca.gov/wastechar/wastegenrates/Service.htm.

CARB (California Air Resources Board). 2011. Method for estimating greenhouse gas emission reductions from compost from commercial organic waste. http://www.arb.ca.gov/cc/protocols/localgov/pubs/compost_method.pdf.

Cascadia Consulting Group. 2006. Targeted Statewide Characterization Study: Waste Disposal and Diversion Findings for Selected Industry Groups.

Yelp.com. 2013. Restaurants in Santa Clara.

4.2 Increased waste diversion

Work with regional partners to increase solid waste diversion to 80% through increased recycling efforts, curbside food waste pickup, and construction and demolition waste programs.

Assumptions and Indicators:

Metric	2020	Sources
Forecasted tons of waste landfilled in 2020	167,360	Calculated
Baseline diversion rate assumed in forecast	58%	Correspondence with City staff, April 11, 2013.
Forecasted tons of waste generated in 2020	288,550	Calculated
Estimated tons of waste landfilled with 80% diversion rate	57,710	Calculated
Tons of avoided landfill waste in 2020	109,650	Calculated
GHG reduction ($MTCO_2e$)	20,500	Calculated
Costs and Savings:		
City costs	$$	
Budgeted?	Partially	

Method:
The amount of waste landfilled, with the baseline diversion rate, was forecasted as part of the inventory and forecast. The target diversion rate was used to calculate the additional amount of waste diverted in tons by 2020. The tons diverted when moving from 58% diversion (baseline) to 80% (target) was converted to GHG reductions using the baseline $MTCO_2e$/ton of waste used in the inventory and forecast.

Sources:
City of Santa Clara. 2013. Personal correspondence with City staff. April 11.

5.1 Lawn and garden equipment

Support and facilitate a community-wide transition to electric outdoor lawn and garden equipment through outreach, coordination with BAAQMD, and outdoor electrical outlet requirements for new development.

Assumptions and Indicators:

Metric	2020	Sources
Annual emissions per conventional leaf blower ($MTCO_2e$)	0.0262	CARB OFFROAD
Annual emissions per electric leaf blower ($MTCO_2e$)	0.0104	BAAQMD Clean Air Plan
Effective reduction per electric leaf blower ($MTCO_2e$)	0.0158	Calculated
Percentage of leaf blowers exchanged	25%	Assumed
Number of leaf blowers exchanged	1,170	Calculated
GHG reduction ($MTCO_2e$)	20	Calculated
Annual emissions per conventional lawn mower ($MTCO_2e$)	0.0319	CARB OFFROAD
Annual emissions per electric lawn mower ($MTCO_2e$)	0.0058	BAAQMD Clean Air Plan
Effective reduction per electric lawn mower ($MTCO_2e$)	0.0261	Calculated
Percentage of lawn mowers exchanged	25%	Assumed
Number of lawn mowers exchanged	130	Calculated
GHG reduction ($MTCO_2e$)	100	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	No	

Method:

The annual emissions per leaf blower and lawn mower were provided by the CARB OFFROAD software. The annual emissions for electric leaf blowers and lawn mowers were provided by BAAQMD, and the difference between the conventional and electric emissions was used as the per-unit reduction when converting from conventional to electric energy.

Sources:

BAAQMD (Bay Area Air Quality Management District). 2010 Clean Air Plan. http://www.baaqmd.gov/~/media/Files/Board%20of%20Directors/2010/brd_agenda_091510_p4.ashx.

CARB (California Air Resources Board). 2007. OFFROAD Software.

EPA (US Environmental Protection Agency). 2009. Potential for Reducing Greenhouse Gas Emissions in the Construction Sector. http://www.epa.gov/sectors/pdf/construction-sector-report.pdf.

5.2 Alternative construction fuels

Require construction projects to comply with BAAQMD best management practices including alternative-fueled vehicles and equipment.

Assumptions and Indicators:

Metric	2020	Sources
Percentage reduction when converted to hybrid	5%	Assumed, industry best practice
Percentage reduction when converted to CNG	7%	EPA 2009
Percentage reduction when converted to electric	9%	Assumed, industry best practice
Percentage reduction when converted to B100	4%	EPA 2009
Percentage of equipment converted to hybrid, CNG, electric, or B100 technology	30%	Assumed; reductions assumed an even distribution between the four categories
GHG reduction ($MTCO_2e$)	6,100	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	No	

Method:

A target conversion rate to alternative fuels of 30% was assumed for all construction equipment used in Santa Clara. An even distribution was used for the four fuels listed in the measure, meaning each will have a market penetration of 8%. Emissions factors from Table 4 in the EPA report "Potential for Reducing Greenhouse Gas Emissions in the Construction Sector" were used to calculate the reduction from converting diesel vehicles to CNG fuel; Table 5 was used for conversion to biodiesel and assumed reductions were used for electric and hybrid conversions.

Sources:

EPA (US Environmental Protection Agency). 2009. Potential for Reducing GHG Emissions in the Construction Sector. http://www.epa.gov/sectors/pdf/construction-sector-report.pdf.

6.1 Transportation demand management program

Require new development located in the city's transportation districts to implement a transportation demand management (TDM) program to reduce drive-alone trips.

Assumptions and Indicators:

Metric	2020	Sources
Percentage increase in VMT from all new development	13.8%	Fehr & Peers, CAPCOA
District 1 minimum daily VMT reduction	17,100	Fehr & Peers, CAPCOA
District 2 minimum daily VMT reduction	8,000	Fehr & Peers, CAPCOA
District 3 minimum daily VMT reduction	8,400	Fehr & Peers
District 4 minimum daily VMT reduction	400	Fehr & Peers
Overall minimum daily VMT reduction	33,900	Fehr & Peers
GHG reduction ($MTCO_2e$)	4,240	Calculated
Costs and Savings:		
City costs	$$$	
Budgeted?	No	

Method:

The City will require all new developments to implement a TDM program that reduces drive-alone trips based on the project's size, location, and land use. The City will recommend a suite of TDM strategies that each project may implement to achieve the goal. These recommended strategies will include transit subsidy passes, employer rideshare assistance, transit and bicycle subsidies, emergency ride home services, telecommute/flex commute options, car- and bike-sharing solutions, and others.

The minimum VMT reductions by transportation district and land use presented in **Table 9** in the measure description are based on an analysis prepared by Fehr & Peers (see Table B-1 below and technical memorandum). For the City to achieve the minimum daily VMT reductions with a TDM program that requires new development over a certain size (25 multi-family units or 10,000 nonresidential square feet) to comply, new projects in each transportation district would need to achieve between 5% and 10% reduction in VMT through the implementation of TDM strategies.

Since different land use types and projects influence VMT at different rates, the percentage VMT reductions expected from each project type have been adjusted relative to anticipated trip generation rates for each General Plan land use designation. Requiring applicable projects in certain General Plan land use designations to achieve a percentage VMT reduction greater than the average for the transportation district as a whole accounts for a certain number of exempt projects generating VMT being exempt, and allows the City to meet GHG emissions reduction estimates for this measure.

Table B-1 – Vehicle Miles Traveled and Reductions Needed by District

Transportation District	2008 Baseline Daily VMT	2020 BAU Daily VMT	VMT Growth 2008–2020	% Growth 2008–2020	Minimum Daily VMT Reduction	% VMT Reduction from *all* VMT	% Reduction Needed from *new* VMT
1 - North of Caltrain	1,815,000	1,900,500	85,500	4.5%	17,100	0.9%	20.0%
2 - Downtown	74,900	119,900	45,000	37.5%	8,000	6.7%	17.8%
3 - El Camino Real Corridor	303,500	351,200	47,700	13.6%	8,400	2.4%	17.6%
4 - Stevens Creek Blvd	177,500	185,200	7,700	4.2%	400	0.2%	5.2%
Remainder of City	817,100	876,500	59,400	6.8%	-	0.0%	0.0%
City of Santa Clara Total	3,188,000	3,433,300	245,300	7.1%	33,900	1.0%	13.8%

Source: Fehr & Peers 2013.

The minimum percent reductions identified by transportation district and land use in Table 9 were identified using a combination of:

- overall VMT reductions needed from new development in each district (see **Table B-1**),
- average trip generation rate for each land use, and
- CAPCOA estimates of the VMT reduction potential for each land use type.

The minimum VMT reduction requirements identified in the table above are on average slightly higher than the reductions needed from new development to account for projects less than or equal to 25 residential units or 10,000 square feet being exempt from TDM requirements, though still contributing a small portion of the VMT from new development. Finally, the percentages in the table above are rounded to the nearest 5% increment to support staff implementation and enforcement of the TDM program.

Sources:

CAPCOA (California Air Pollution Control Officers Association). 2010. Quantifying GHG Mitigation Measures.

City of Santa Clara General Plan. 2010. http://santaclaraca.gov/ftp/csc/pdf/general-plan/SantaClara_Ch8-6_1-3-11_Final.pdf.

Fehr & Peers Transportation Consultants. 2013. Quantification Workbook of Santa Clara CAP Measures.

———. 2013. VMT+ Tool http://www.fehrandpeers.com/vmt/.

6.2 Municipal transportation demand management

Develop and implement a transportation demand management program for City employees to encourage alternative modes of travel and reduce single-occupant vehicle use.

Assumptions and Indicators:

Metric	2020	Sources
Percentage of employees participating	50%	Fehr & Peers, CAPCOA
VMT savings (million VMT)	1.18	Fehr & Peers, CAPCOA
GHG reduction ($MTCO_2e$)	400	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	No	

Method:
See Measure 6.1 for strategy detail. This strategy is considered a similar version of the TDM requirements with the City attempting to achieve a 20% reduction in employee commute–related VMT, but is applicable to City facilities and employees

Sources:
CAPCOA (California Air Pollution Control Officers Association). 2010. Quantifying GHG Mitigation Measures.

Fehr & Peers Transportation Consultants. 2013. Quantification Workbook of Santa Clara CAP Measures.

6.3 Electric vehicle parking

Revise parking standards for new multi-family residential and nonresidential development to require that a minimum of one parking space, and a recommended level of 5% of all new parking spaces, be designated for electric vehicle charging.

Assumptions and Indicators:

Metric	2020	Sources
VMT driven per EV parking spot per month	727	Cullen et al.
Additional commercial square footage (2014–2020)	437,134	General Plan EIR
Zoning requirement (square feet per parking space)	300	Santa Clara Zoning Code, Section 18.74.020(f)
Number of parking spots to have EV charging station	40	Calculated, 2.5% of future commercial spots
VMT from new electric vehicles	348,000	Calculated
Additional kWh from electric vehicles (kWh/mile)	0.34	Plugincars.com
Additional kWh from electric vehicles (kWh)	118,320	Calculated
Additional GHG emissions from electric vehicles ($MTCO_2e$)	20	Calculated
GHG reductions from electric vehicles	130	Calculated
Net GHG reduction ($MTCO_2e$)	110	Calculated
VMT driven per EV parking spot per month	727	Cullen et al.
Additional commercial square footage (2014–2020)	4,435,650	General Plan EIR
Zoning requirement (square feet per parking space)	600	Santa Clara Zoning Code, Section 18.74.020(l)
Number of parking spots to have EV charging station	180	Calculated, 2.5% of future industrial spots
VMT from new electric vehicles	1,566,000	Calculated
Additional kWh from electric vehicles (kWh/mile)	0.34	Plugincars.com
Additional kWh from electric vehicles (kWh)	532,440	Calculated
Additional GHG emissions from electric vehicles ($MTCO_2e$)	90	Calculated
GHG reductions from electric vehicles	560	Calculated
Net GHG reduction ($MTCO_2e$)	470	Calculated
VMT per EV per year in Santa Clara County	11,000	EMFAC 2011
Multi-family units added (2014–2020)	4,236	Santa Clara General Plan
Parking spots required per unit	2	Santa Clara Zoning Code, Section 18.18.130
Number of parking spots to have EV charging station	212	Calculated, 2.5% of future multi-family spots
VMT from new electric vehicles	2,329,900	Calculated
Additional kWh from electric vehicles (kWh/mile)	0.34	Plugincars.com
Additional kWh from electric vehicles (kWh)	792,200	Calculated
Additional GHG emissions from electric vehicles ($MTCO_2e$)	100	Calculated
GHG reductions from electric vehicles	800	Calculated
Net GHG reduction ($MTCO_2e$)	800	Calculated
Costs and Savings:		
City costs	$$	
Budgeted?	Partially	

Method:

A 2.5% participation rate was applied to new commercial, industrial, and multi-family development for the number of additional parking spaces designated for electric vehicles. The number of required spaces per each development type was provided in the City's Zoning Code. The amount of new space was calculated from 2014 to 2020 using the 2010–2035 General Plan. The typical amount of VMT by space for nonresidential sectors was provided by Cullen et al., while multi-family EV driving patterns were provided by EMFAC 2011. The net decrease in emissions is the difference between the total reductions from taking a conventional vehicle off the road and the slight increase in use of electricity. Electricity used per EV mile was provided by Plug-In Cars and conventional GHG emissions from EMFAC 2011.

Sources:

CARB (California Air Resources Board). 2011. EMFAC 2011 Online Database.

City of Santa Clara. Zoning Code, Section 18.74.020(f). 18.18.130.

Cullen, Michael, Donny Katz, Allie Looft, Lucrecia Martinez, and Erin Rosintoski. 2009. Parking Policy and Transportation-Oriented Development.

Plug-In Cars. 2010. Nissan LEAF Finally Gets Official EPA Fuel Economy Label. http://www.plugincars.com/nissan-leaf-finally-gets-official-epa-label-106486.html.

7.1 Urban forestry

Create a tree-planting standard for new development and conduct a citywide tree inventory every five years to track progress of the requirements.

Assumptions and Indicators:

Metric	2020	Sources
New Trees Added per year	500	Assumed
Years Program Implemented	5	Assumed
kg CO_2e sequestered per tree	25	Donovan and Butry
GHG reduction ($MTCO_2e$)	60	Calculated
kWh used per home for cooling	468	KEMA; represents 9% of average electricity use
kWh saved per participating home	20	ICLEI CAPPA
GHG reduction ($MTCO_2e$)	10	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	Yes	

Method:

A certain number of trees per year were assumed to be planted for each year the program is implemented. GHG benefits result from both the reduced load on air conditioning units from window shading and the sequestration of CO_2 by the tree itself. Sequestration savings were provided by Donovan and Butry and converted to $MTCO_2e$ per tree using a simple conversion factor. The savings from reduced air conditioning load were calculated using a combination of sources. The Residential Appliance Saturation Study (RASS) was used to estimate the kWh used per year per home in Santa Clara on air conditioning. Donovan and Butry was then used to estimate the reductions in air conditioning electricity from shading. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Measure 1.1.

Sources:

City of Santa Clara. 2010. 2010–2035 General Plan.

Donovan, G., and D. Butry. 2009. The value of shade: Estimating the effect of urban trees on summertime electricity use. http://naldc.nal.usda.gov/download/31642/PDF.

ICLEI-Local Governments for Sustainability. 2010. CAPPA: Climate and Air Pollution Planning Assistant.

KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study, Volume 2: Results. CEC 200-2010-004.

7.2 Urban cooling

Require new parking lots to be surfaced with low-albedo materials to reduce heat gain, provided it is consistent with the Building Code.

Assumptions and Indicators:

Metric	2020	Sources
Additional nonresidential square feet (2014–2020)	437,100	Calculated from General Plan EIR
Parking space requirement for new nonresidential development (parking sq ft/building sq ft)	300	Santa Clara Zoning Code, Section 18.74.020(f)
Additional square feet of parking lots	638,750	Calculated; included 125% inflation factor to account for lanes
kWh saved per square meter of cool pavement	0.162	Akbari, H. et al., CEC Energy Almanac
kWh saved from cool pavement	9,623	Calculated
GHG reduction ($MTCO_2e$)	10	Calculated
Costs and Savings:		
City costs	$	
Budgeted?	No	

Method:

The additional nonresidential square footage planned from 2014 to 2020 was used with the Santa Clara Zoning Code to estimate the total new area of parking lots in the city. It was assumed that all of these surfaces would have a lower than normal albedo to reflect more sunlight back into space. Akbari et al. was used to estimate the kWh saved per square foot of cool pavement. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Measure 1.1.

Sources:

Akbari, H., et al. Cool surfaces and shade trees to reduce energy use and improve air quality in urban areas. Section 6.1.1: Electric power savings in Los Angeles.

CEC (California Energy Commission). 2011. Electricity Rates. http://energyalmanac.ca.gov/electricity/Electricity_Rates_Combined.xls.

City of Santa Clara. 2010. 2010–2035 General Plan.

Reach Measures

Expansion of 1.1 Coal-free by 2020

Replace the use of coal in Silicon Valley Power's portfolio with an even mix of renewable energy and natural gas by 2035.

Assumptions and Indicators:

Metric	2035	Sources
Percentage of baseline electricity coming from coal	24%	SVP Power Content Label
Percentage of baseline electricity coming from natural gas	26%	SVP Power Content Label
$MTCO_2e$/MWh for electricity produced from coal	0.324	LGOP v1.1
$MTCO_2e$/MWh for electricity produced from natural gas	0.187	LGOP v1.1
$MTCO_2e$/MWh for electricity produced from renewable energy	0.000	LGOP v1.1
$MTCO_2e$/MWh for 50/50 mix of renewables and natural gas	0.093	Calculated average
Percent reduction in $MTCO_2e$/MWh	-71%	Calculated
GHG reduction ($MTCO_2e$)	806,200	Calculated

Method:

This measure calculates the change in SVP's emissions factor ($MTCO_2e$/kWh) when switching from coal to an even mix of renewable energy and natural gas. In Measure 1.1, the only GHG-producing source of electricity is natural gas. Since this reach measure replaces half of that natural gas electricity with emissions free renewable energy, the emissions coefficient for 2035 is exactly half of the one calculated for 2020 in Measure 1.1.

Sources:

CARB (California Air Resources Board), et al. 2010. Local Government Operations Protocol. Table G.3.

City of Santa Clara. 2012. SVP Power Content Label.

Expansion of 1.3 Utility-installed renewables

Develop up to five solar PV projects with a total installed capacity of 25 MW.

Assumptions and Indicators:

Metric	2035	Sources
kW installed	25,000	Assumed
kWh produced per kW installed	1,440	NREL PVWatts
kWh produced	36,000,000	Calculated
GHG reduction ($MTCO_2e$)	3,100	Calculated

Method:

An assumed amount of installed PV solar power, in the unit of kW, was applied to the kWh produced per kW installed factor generated using the NREL PVWatts calculator. This calculator is geographically based and takes DC to AC conversion, weather, precipitation, and other factors into account to generate an accurate portrayal of actual electricity generation in PV systems. The kWh produced by the assumed total size of the systems was applied to the emissions factor generated in Reach Measure 1.1 to produce GHG emissions under SVP's coal-free scenario.

Sources:

NREL (National Renewable Energy Laboratory). 2012. PVWatts Calculator. http://www.nrel.gov/rredc/pvwatts/.

Expansion of 2.1 Community electricity efficiency

Achieve twice the City-adopted 2020 electricity efficiency targets to reduce community-wide electricity use by 10% through incentives, pilot projects, and rebate programs.

Assumptions and Indicators:

Metric	2035	Sources
Total MWh savings	318,064	Assumed, correspondence with SVP, May 22, 2013
GHG reduction ($MTCO_2e$)	27,600	Calculated

Method:

The 2013 adopted electricity efficiency goals for SVP (in terms of MWh of electricity) were assumed to be fully implemented through 2020. It was also assumed that by 2035, two times the savings would occur. The kWh reductions were converted into $MTCO_2e$ using the coal-free emissions factor generated in Reach Measure 1.1.

Sources:

City of Santa Clara, Silicon Valley Power. 2013. Personal correspondence with Ann Hatcher. May 22.

Expansion of 2.4 Customer-installed solar

Incentivize and facilitate the installation of 10,000 kW of customer-owned residential and nonresidential solar PV projects.

Assumptions and Indicators:

Metric	2035	Sources
kW installed	10,000	Assumed
kWh produced per kW installed	1,440	NREL PVWatts
kWh produced	14,400,000	Calculated
GHG reduction ($MTCO_2e$)	1,250	Calculated

Method:

An assumed amount of installed PV solar power, in the unit of kW, was applied to the kWh produced per kW installed factor generated using the NREL PVWatts calculator. This calculator is geographically based and takes DC to AC conversion, weather, precipitation, and other factors into account to generate an accurate portrayal of electricity generation in PV systems. The kWh produced by the total size of the systems was applied to the emissions factor generated in Reach Measure 1.1 to produce GHG emissions under SVP's coal-free scenario.

Sources:

NREL (National Renewable Energy Laboratory). 2012. PVWatts Calculator. http://www.nrel.gov/rredc/pvwatts/.