# CHAPTER 2
# GREENHOUSE GAS EMISSIONS AND TARGETS

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

# Greenhouse Gas Inventories

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

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

## Emissions Sectors

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

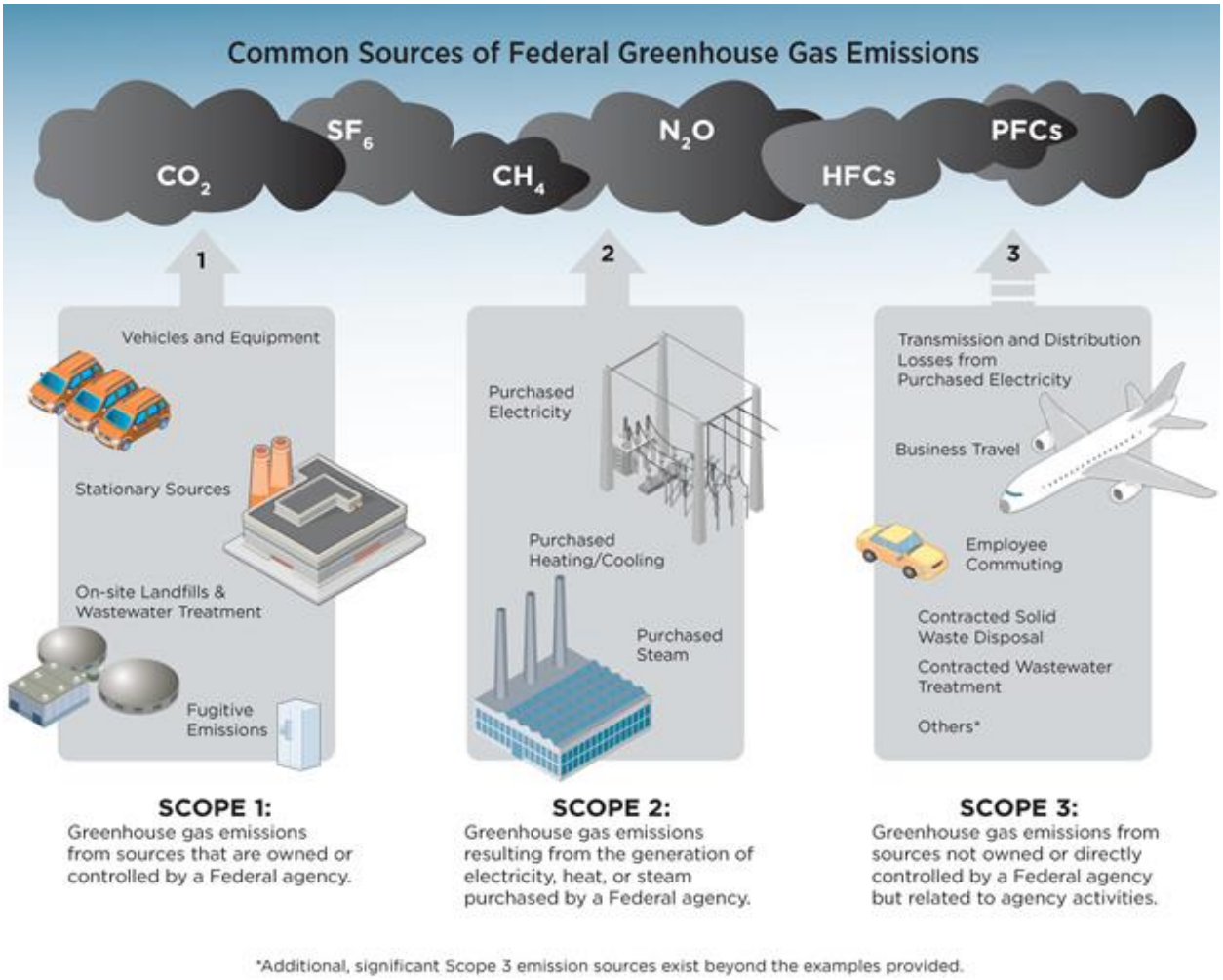
- Energy (i.e., electricity and natural gas)
- Transportation
- Off-Road Equipment (e.g., industrial, commercial, and lawn and garden equipment)
- Solid Waste
- Potable Water
- Wastewater

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

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

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

**Figure 2.1 – Common Sources of Federal Greenhouse Gas Emissions**



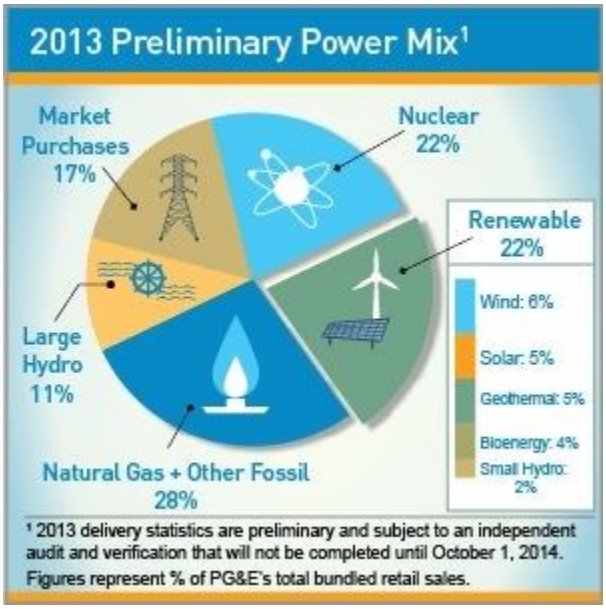

Source: https://www.fedcenter.gov/Photos/index.cfm?id=16810

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

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

**Energy / Facilities**

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



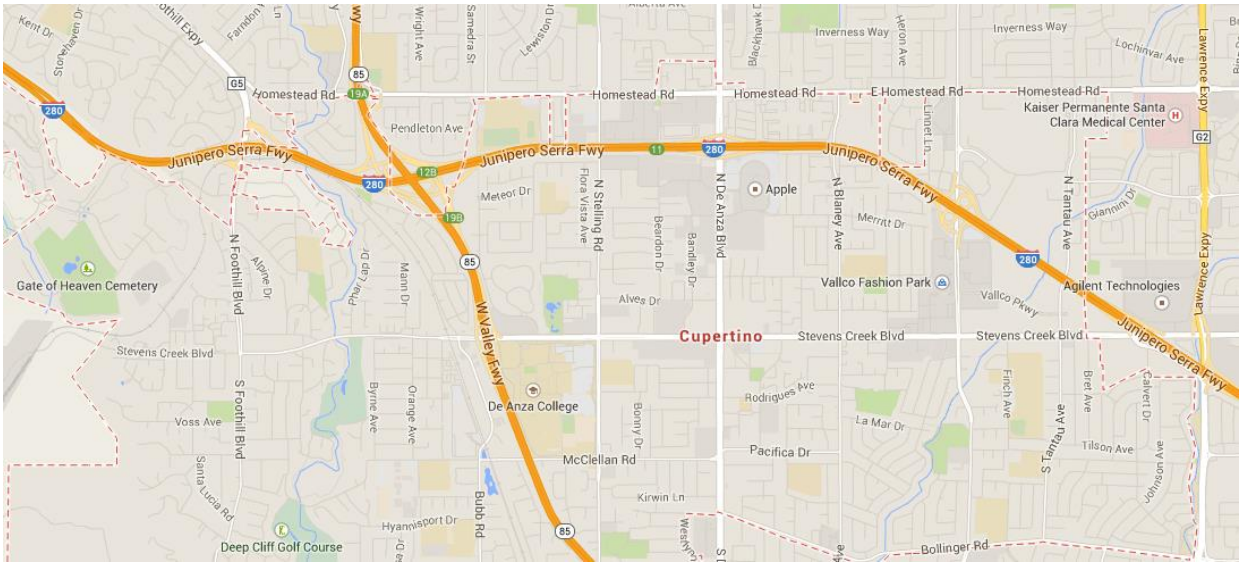

Source: http://www.greentechmedia.com/content/images/articles/PGE-2013-RE.jpg

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

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

### Transportation / Vehicle Fleet

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




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

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

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

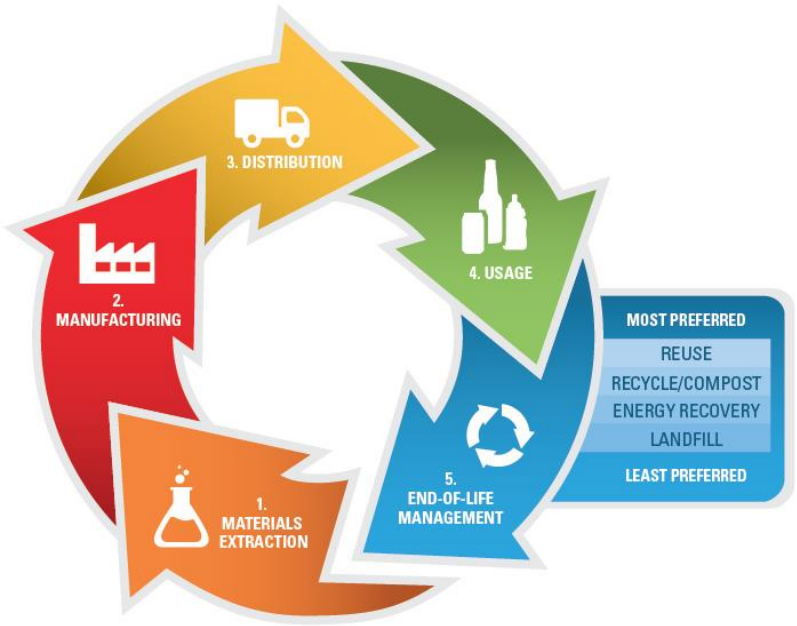
Emission factors for this sector were obtained from the California Air Resources Board's (ARB) vehicle emissions model, EMFAC2011. EMFAC2011 is a mobile source emission model for California that provides vehicle emission factors by both county and vehicle class. Santa Clara County-specific emission factors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

### Off Road Equipment

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

### Solid Waste

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




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

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

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

### Wastewater

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

### Potable Water / Water Services

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

## Units of Measurement

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

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

**Table 2.1**
**Greenhouse Gases and Global Warming Potential**

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

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

## Baseline Inventory – 2010

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

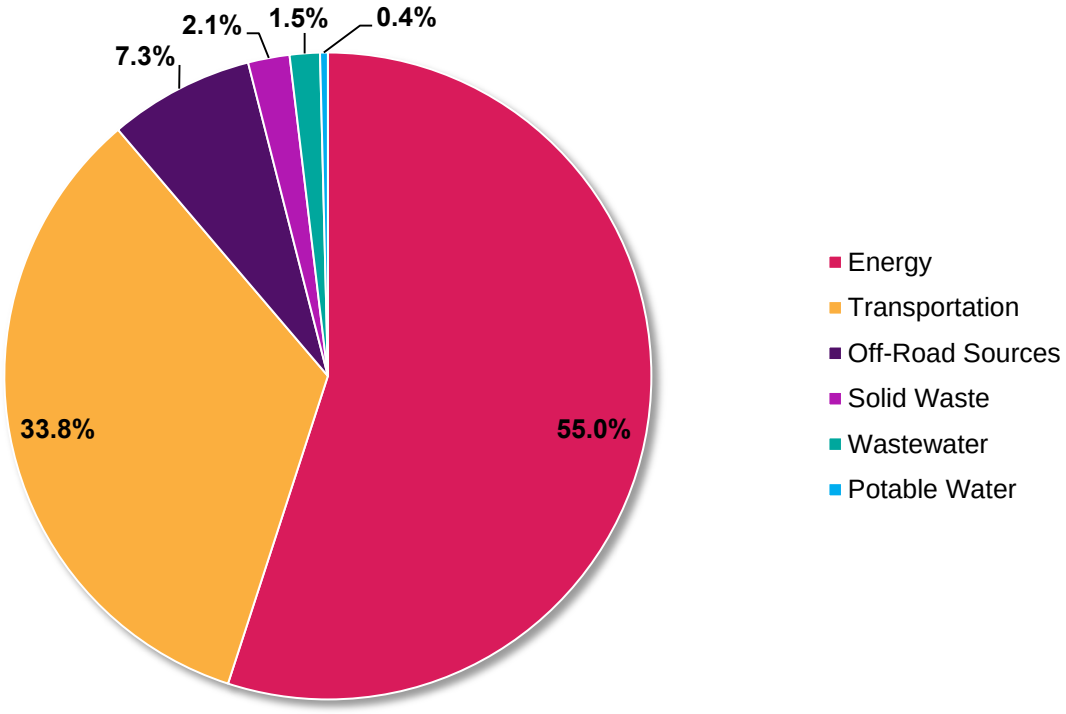

Cupertino, as well as the other participating jurisdictions, is located within the Bay Area Air Quality Management District's (BAAQMD) jurisdictional boundary. Therefore, the City's inventory was calculated to be consistent with BAAQMD's GHG Plan Level Quantification Guidance. This approach allowed all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

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

## COMMUNITY-WIDE 2010 BASELINE INVENTORY

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

**Figure 2.2 – 2010 Community-wide Baseline Emissions by Sector**




Source: AECOM 2014

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

Source: AECOM 2014

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

## MUNICIPAL OPERATIONS 2010 BASELINE INVENTORY

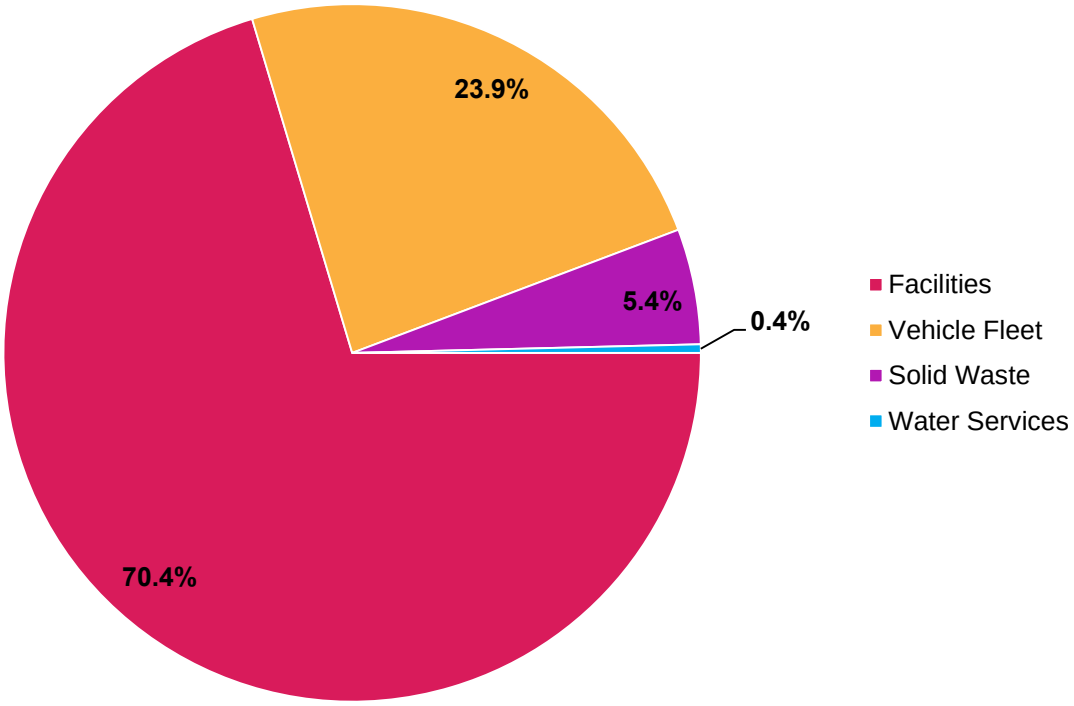
The municipal operations baseline inventory shows that the City's actions generated a total of 1,775 metric tons of carbon dioxide equivalent emissions (MT $CO_2e$) in 2010. As referenced above, these emissions are a sub-sector of the community-wide inventory (i.e., the community-wide inventory is inclusive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

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

Source: AECOM 2013

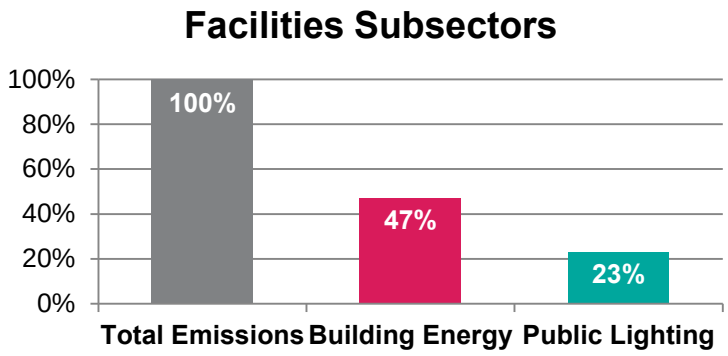
Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

**Figure 2.3 – 2010 Municipal Operations Baseline Emissions by Sector**




Source: AECOM 2014

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




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

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

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

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

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

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

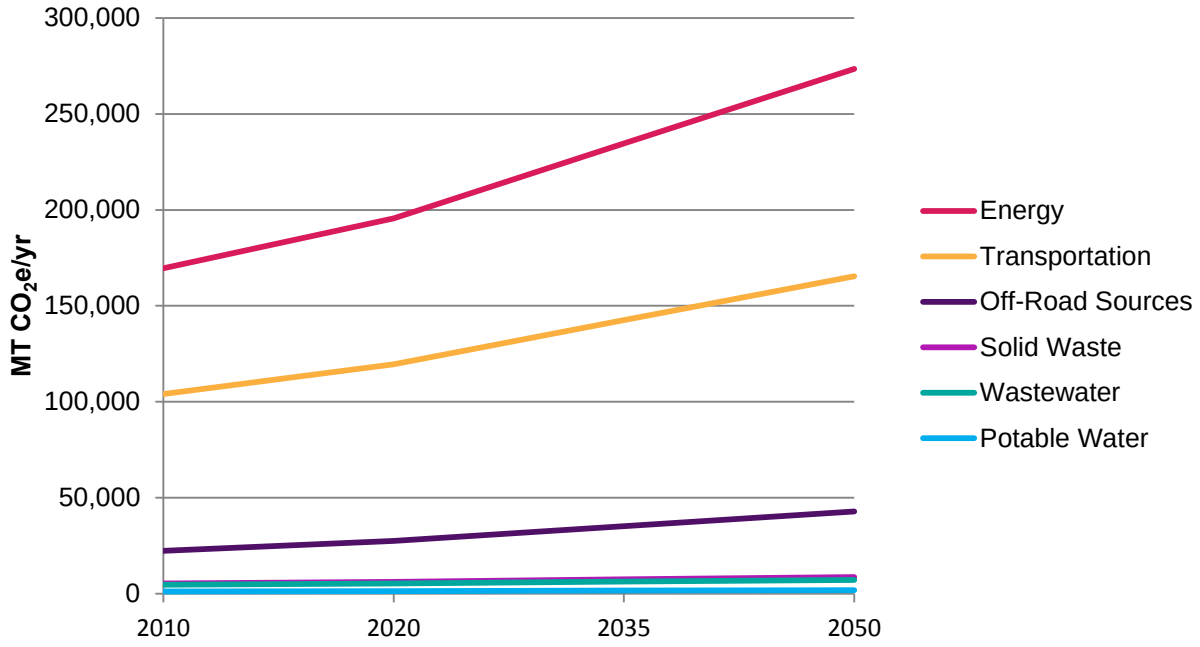
The 2020 emissions forecast year aligns with the AB 32 target year. Similarly, the 2050 forecast year aligns with the state's long-term target year, while the 2035 forecast year provides a mid-point between 2020 and 2050. These forecasts were developed for planning purposes, and due to the complexity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

## COMMUNITY-WIDE BUSINESS-AS-USUAL EMISSION FORECASTS

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

- 355,610 MT $CO_2$e/yr by 2020 (15.7% above the 2010 baseline),
- 427,807 MT $CO_2$e/yr by 2035 (39.2% above the 2010 baseline), and
- 499,659 MT $CO_2$e/yr by 2050 (62.6% above the 2010 baseline).

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




Source: AECOM 2014

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

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

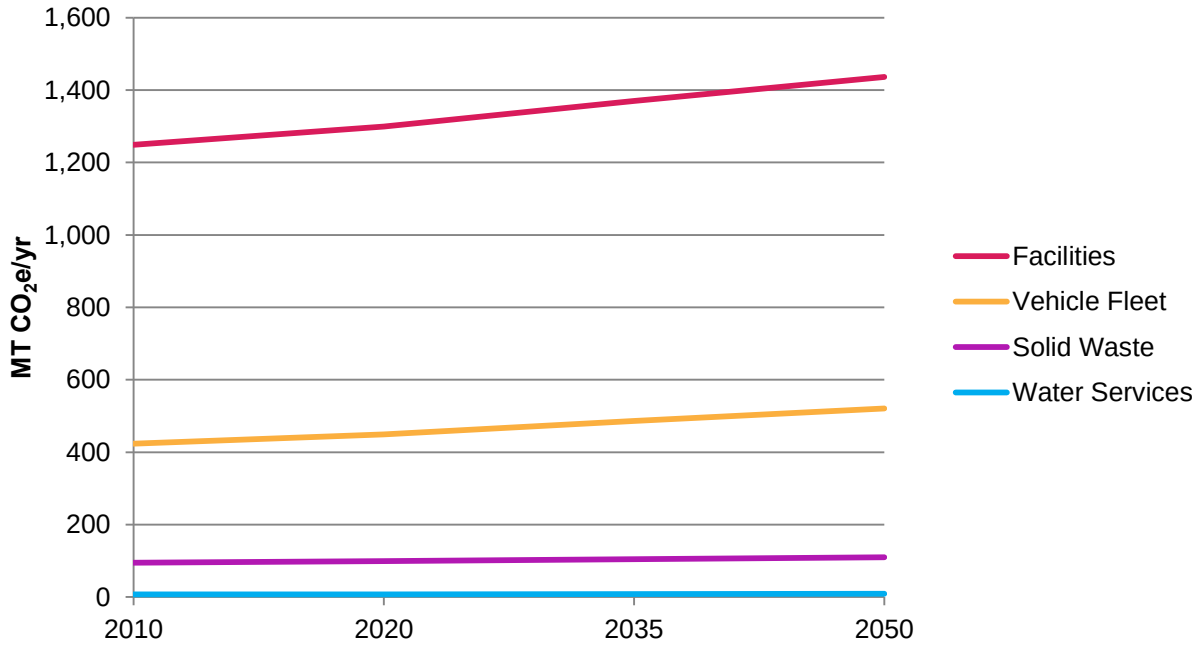
Source: AECOM 2014
Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

## MUNICIPAL OPERATIONS BUSINESS-AS-USUAL EMISSION FORECASTS

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

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

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




Source: AECOM 2014

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

Source: AECOM 2013

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

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

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

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

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

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

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

## Community-wide Emissions Adjusted Business-as-Usual Forecasts

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

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

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

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

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

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

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

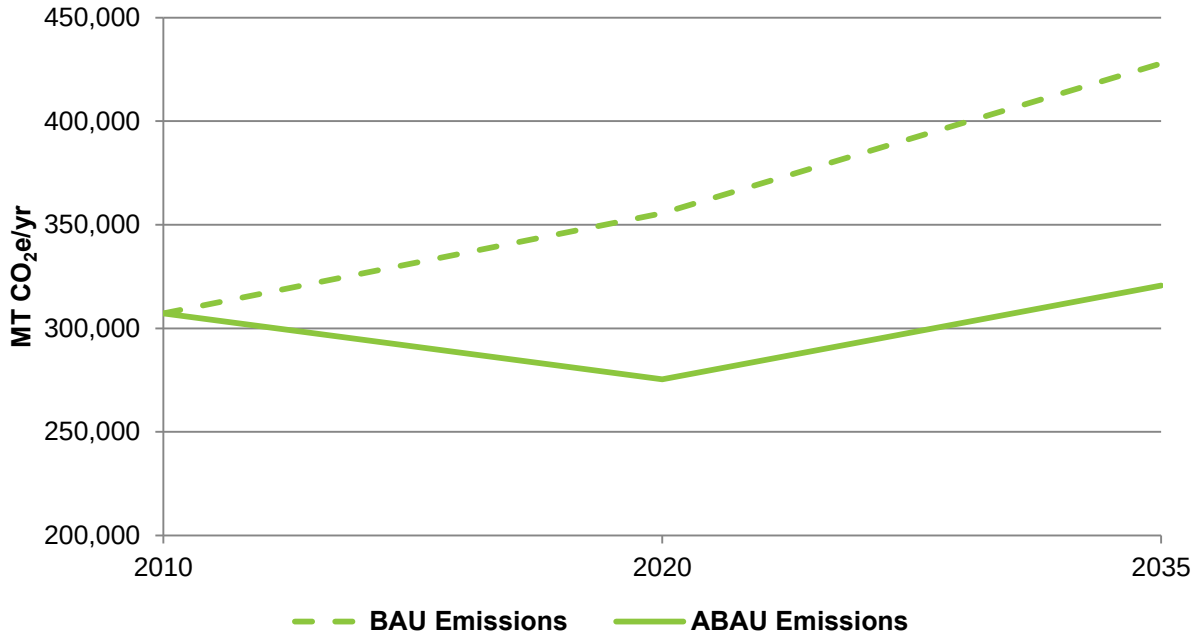
Table 2.6 summarizes the anticipated reductions associated with these statewide actions in years 2020 and 2035. Based on these estimated reductions, Figure 2.6 shows the trajectory of community-wide BAU and ABAU emissions forecasts from baseline year 2010 through 2035.

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

Source: AECOM 2014

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

**Figure 2.6 – Community-wide ABAU Emissions Forecasts**




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

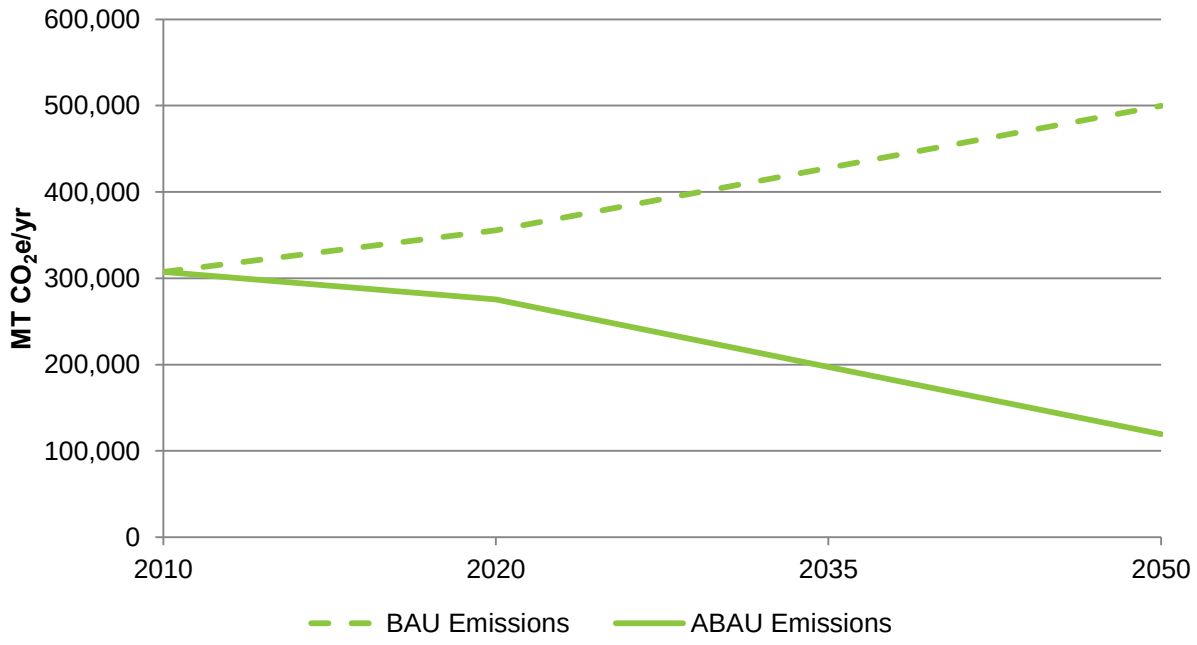
well. Based on that assumption, Table 2.7 shows what statewide actions would achieve in Cupertino in 2035 and 2050 if their level of impact in 2020 is maintained. This table does not attempt to estimate the distribution of statewide reductions among the currently known statewide actions, but instead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

**Table 2.7**
**Alternative Emissions Reduction Estimates from Statewide Actions**

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

Source: AECOM 2014

**Figure 2.7 – Revised Community-wide ABAU Forecasts**



## MUNICIPAL OPERATIONS ADJUSTED BUSINESS-AS-USUAL EMISSION FORECASTS

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

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

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

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

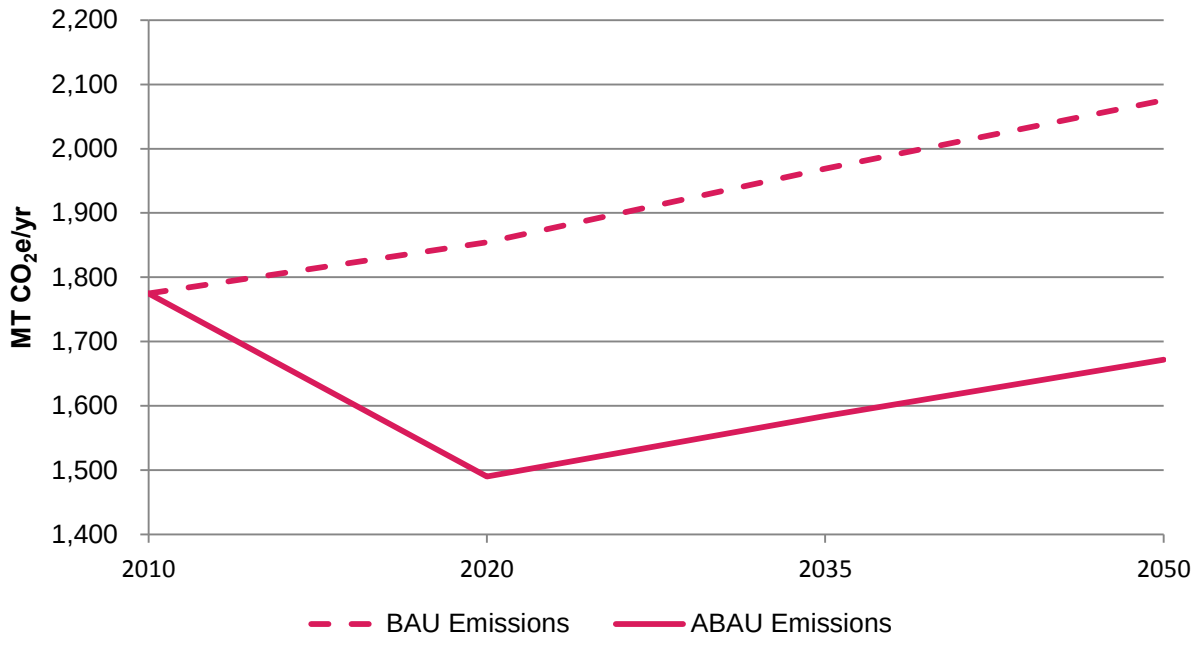
See Figure 2.8 for a graph of the City's BAU and ABAU emissions forecasts.

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

Source: AECOM 2013

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

**Figure 2.8 – Municipal Operations ABAU Emissions Forecasts**



# GHG Emission Reduction Targets

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


## Mass Emissions and Efficiency Thresholds

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

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

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

## TARGET SETTING CONSIDERATIONS

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

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

### State Legislation and Guidance

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

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

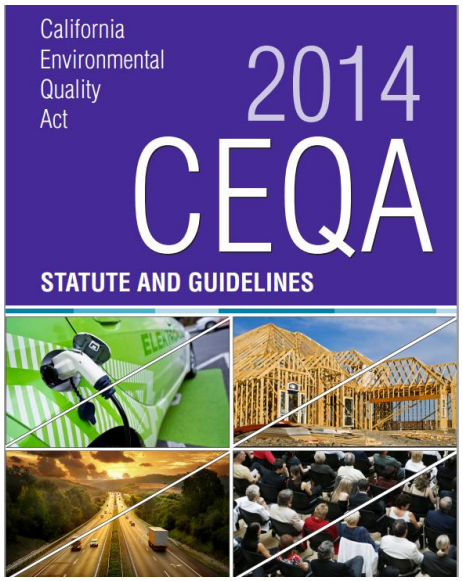
AB 32 also directed ARB to develop and implement regulations that reduce statewide GHG emissions. ARB approved *The Climate Change Scoping Plan* (Scoping Plan) in December 2008, which outlines the state's plan to achieve the GHG reductions required in AB 32. The Scoping Plan does not define the specific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

As such, many cities and counties began to asses local GHG contributions and develop community-focused Climate Action Plans. However, many local governments do not have access to sufficient historical data to prepare a 1990 baseline emissions inventory, which would allow local governments to establish reduction targets that exactly mimic the state's own targets. In the 2008 Scoping Plan, ARB "encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community

emissions that parallel the state's commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020."[viii]

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

### California Environmental Quality Act




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

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

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

### Air Quality Management District Guidance

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

As previously mentioned, the 2008 Scoping Plan presents substantial evidence recommending local agencies seek to reduce community-wide emissions by 15% below current emission levels by 2020. In 2010, BAAQMD also adopted CEQA Air Quality Guidelines that presented substantial evidence for three community-wide emissions reduction targets: 1) 1990 levels by 2020, 2) 15% below current (2008 or earlier) levels by 2020, or 3) use of an efficiency threshold of 6.6 MT $CO_2$e/yr per service population (i.e., residents plus employees) by 2020. This efficiency threshold is intended to be used only in the context of general or community-wide plans, not individual development projects.

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

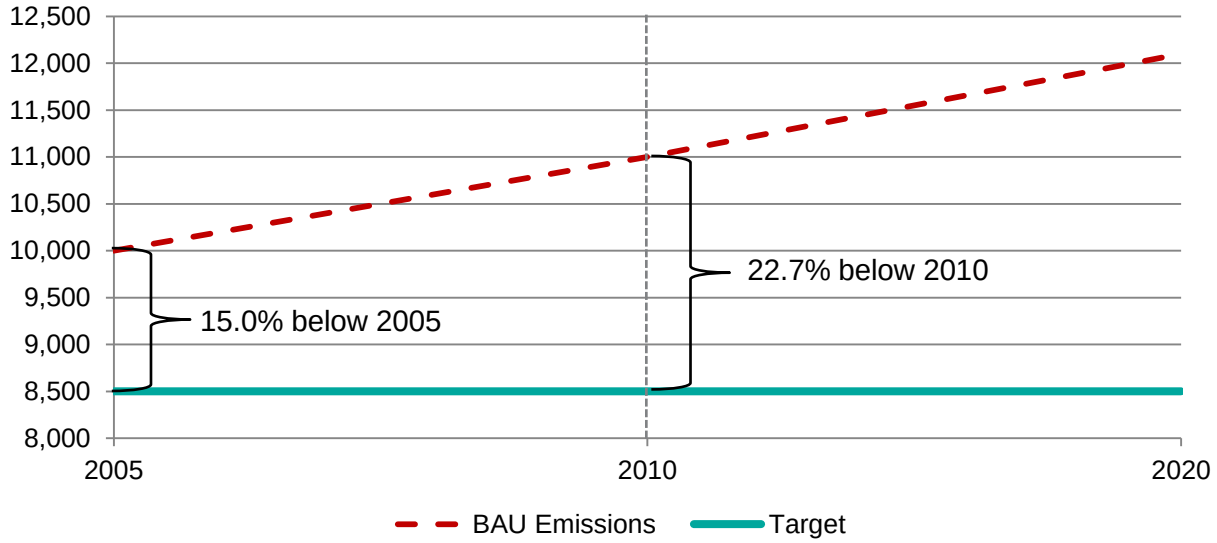
However, the court did not determine whether the thresholds are or are not based on substantial evidence and thus valid on the merits. Therefore, cities could continue to rely on the substantial evidence based on statewide data and analysis relative to AB 32 that underlies the June 2010 BAAQMD thresholds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

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

## CUPERTINO'S EMISSIONS REDUCTION TARGETS

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

**Figure 2.9 – Reduction Targets based on Baseline Year**




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

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

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

Source: AECOM 2014

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

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

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

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

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

Source: AECOM 2014

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

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

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

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

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

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

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

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

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

Tables 2.11 and 2.12 summarize the emissions reduction targets, contributions from statewide actions, and the remaining emissions reduction gaps to be addressed through implementation of local actions at the community-wide and municipal operations levels, respectively. As shown in Table 2.11, the community would face an emissions reduction gap of approximately 14,000 MT $CO_2$e/yr in 2020 after considering the likely impact of statewide actions. Similar reductions gaps are shown for 2035 and 2050 as well. Additional reductions will likely need to be provided through development and implementation of local CAP measures, as described in Chapter 3.

**Table 2.11**
**Community-wide 2020 and 2035 Emissions Reduction Targets**

| | 2010 (MT $CO_2$e/yr) | 2020 (MT $CO_2$e/yr) | 2035 (MT $CO_2$e/yr) | 2050 (MT $CO_2$e/yr) |
|---|---|---|---|---|
| BAU Emissions Inventory and Forecasts | 307,288 | 355,610 | 427,807 | 499,659 |
| Reduction Target | - | 15% below 2010 levels | 49% below 2010 levels | 83% below 2010 levels |
| | | 261,195 | 156,717 | 52,239 |
| Reductions Needed to Achieve Target | - | 94,415 | 271,090 | 447,420 |
| Assumed Statewide Reductions[1] | - | -80,261 | -230,427 | -380,307 |
| **Local Action Reductions Needed to Achieve Target** | **-** | **14,154** | **40,663** | **67,113** |

Source: AECOM 2014

Note: MT $CO_2$e = metric tons of carbon dioxide equivalent; column sums may not match total shown due to rounding

[1] Per Table 2.7 alternative statewide reduction estimates

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

**Table 2.12**
**Municipal Operations 2020 and 2035 Emissions Reduction Targets**

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

Source: AECOM 2014

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

[1] Per Table 2.7