



4.0 Implementation of Emissions Reduction Strategies

4.1 Calculating the Emissions Reductions Potential of the Strategies

Emissions reduction strategies were evaluated to determine the amount of reduction that can be expected to be realized from each one by applying a software tool developed by the Statewide Energy Efficiency Collaborative, called the “Climate Action Planning Assistant” or “CAPA.” The Association of Monterey Bay Area Governments (AMBAG) Energy Watch staff assisted Planning Department staff with the CAPA tool, and provided data on emissions reductions from implementation of energy efficiency programs. Applying the CAPA tool to the County’s Climate Action Strategy framework involved using the standard calculation methods, however, in some cases calculations were modified based on available data. Several strategies were not included in the calculations due to insufficient data and low reduction potential, but this is not expected to significantly affect the overall calculations. The calculations, including sources of information, are detailed in Appendix D and summarized in Table 4-1.

Because the feasibility of a community choice aggregation (CCA) program has not yet been assessed the table presents two different scenarios for the future. One scenario has a CCA program in place and the other scenario is run without a CCA program. Both the CCA program and the California Renewable Portfolio Standard (RPS) program involve reducing emissions through meeting electricity demand with more carbon-free sources of electricity, however, the assumed level of reduction varies under the two scenarios. Without a CCA program the RPS would account for a certain amount of emissions reduction based on the percentage of renewable sources of electrical energy in PG&E’s energy portfolio. With a CCA program that includes a higher percentage of renewable sources than the RPS, greater emissions reductions would be achieved.

It should be noted that for each of these two scenarios, only the emissions reductions due to energy procurement is included in the calculation. Actually, a CCA program would likely involve more than just electricity procurement. Other aspects of a potential CCA program could involve programs to increase installation of renewable energy systems, and energy efficiency and energy conservation in homes and businesses, and associated emissions reductions. A CCA program could also help further reduce emissions in the transportation sector by supplying more carbon-free power for electric vehicle charging. However, because of lack of data, potential emissions reductions from these types of programs associated with a CCA program are not included in the estimate of potential emissions reductions. The scenario with a CCA program assumes a moderate level of participation in the program (50 percent of electricity load). Participation could be higher with a successful program (the CCA program in Marin County currently serves about 75 percent of electricity customers in Marin County). For these reasons the estimate of emissions reductions under a CCA program is considered conservative.

Similar to the “Business as Usual” emissions growth projections, potential emissions reductions from various strategies are calculated for 2035 because many factors in the calculations are derived from forecasts and goals that generally do not extend beyond 2035, such as the population growth forecast, fleet fuel economy forecast, electric vehicle and carpooling growth goals, and emissions reductions as a result of the Clean Car Standards and the Low Carbon Fuel Standard. Accordingly, in Table 4-1 total potential reductions in 2035 are compared to total reductions needed below “Business as Usual” projections for 2035 (Table 2-5). Additional reductions of nearly 200,000 MT CO₂e will be needed in order to meet 2050 reduction targets. Meeting the 2035 target is an appropriate interim goal because continuation of the successful strategies used to meet the 2035 target would help the County meet the 2050 target, and adaptive management will help improving the effectiveness of



strategies over time. In addition, the full benefits of some strategies may accrue beyond 2035, such as significant reductions in vehicle miles traveled as a result of strategic investment in transportation infrastructure and land use planning.

Table 4-1: Summary of Potential Emissions Reduction by 2035 by Strategy¹

Strategy	With CCA		Without CCA	
	Potential Reduction Amount in 2035 (Metric Tons CO ₂ e)	Percent of Total Reductions Needed	Potential Reduction Amount in 2035 (Metric Tons CO ₂ e)	Percent of Total Reductions Needed
Statewide Initiatives				
California Clean Car Standards and Low Carbon Fuel Standards	186,450	49%	186,450	49%
California Renewable Portfolio Standard (RPS) ²	34,820	9%	69,650	18%
Statewide Initiatives Subtotal	221,270	58%	256,100	67%
County Climate Action Strategy				
Energy				
Community Choice Aggregation Program(CCA) ³	83,320	22%	0	0%
Energy Efficiency	35,430	9%	47,240	12%
Green Business Program	12,290	3%	23,970	6%
Renewable Energy	3,520	1%	15,060	4%
Education	800	<1%	1,200	<1%
Beyond Title 24	160	<1%	160	<1%
Energy Subtotal	135,520	36%	87,630	23%
Transportation				
Transportation Infrastructure and Land Use Planning ⁴	20,130	5%	20,130	5%
Electric Vehicle Charging	10,590	3%	10,590	3%
Carpooling	3,730	1%	3,730	1%
Transportation Subtotal	34,450	9%	34,450	9%
Solid Waste				
Waste to Energy	3,770	1%	3,770	1%
Solid Waste Subtotal	3,770	1%	3,770	1%
Climate Action Strategy Subtotal	173,740	46%	125,850	33%
Total Potential Reductions in 2035	395,010	104%	381,950	101%
Total Reductions Needed in 2035	380,000	100%	380,000	100%

Notes:

- (1) See Appendix D for details on emissions reductions calculations for each strategy.
- (2) The Renewable Portfolio Standard (RPS) requires all of the state's electricity retailers to meet a 33 percent renewable energy target for retail power by 2020. This calculation assumes future regulations would require a 50 percent carbon free portfolio for PG&E power by 2035. The emissions reductions estimates from the RPS for our local area will vary depending on whether or not a CCA program is implemented. Reductions from a CCA program covering half the projected electricity load in 2035 are reported on a separate line. With a CCA program the reduction from the RPS is estimated by applying a 50 percent carbon free portfolio to half of the projected electricity load (PG&E customers) in 2035. Without a CCA program the reduction is estimated by applying the 50 percent carbon free portfolio to the entire projected electricity load in 2035.
- (3) Reductions from energy procurement only for a program with a 100 percent carbon free portfolio applied to half the projected electricity load (CCA customers) in 2035.
- (4) Research and empirical evidence shows that improvements to transportation infrastructure (transit, bike, pedestrian) and land use planning (mixed use, infill) result in reductions in vehicle miles traveled (VMT) and corresponding reductions in emissions. See Appendix D for details on the model used for this calculation.

Source: County of Santa Cruz, 2013.

Special Note: Additional reductions will need to occur between 2035 and 2050 to meet the 2050 target. Assuming that 380,000 metric tons of reductions occurs by 2035, then an additional nearly 200,000 metric tons of reductions would be required to meet the 2050 target.



4.2 Meeting the 2035 Emissions Reduction Target and Prioritizing Strategies and Actions

For each strategy a calculation was performed to estimate the potential emissions reduction as a result of implementing the strategy. The calculations are structured to model the emissions reduction scenario in 2035 as a result of the strategies. The equations in each calculation incorporate data gathered from various sources cited in the calculations and avoid the use of unsupported inputs. The calculations involve projections into the future (to 2035), which carries inherent risk that future conditions will differ due to unforeseen circumstances. However, the calculations represent a model of potential emissions reductions that could result from full implementation of the CAS.

The scenario including implementation of a CCA program presents the results of the calculations, and shows that the 2035 target of a 380,000 MT CO₂e reduction could be achieved as a result of comprehensive implementation of all of the strategies in the CAS. If a CCA program is not feasible or otherwise not able to be implemented, the resulting gap will require greater reductions from other energy strategies in the CAS, and perhaps from additional strategies that will be new programs that have not been created yet. The numbers shown in Table 4-1 under the scenario without a CCA program reflect increasing the effectiveness of energy efficiency, green business, and educational programs by about 50 to 100 percent, and increasing the rate of installation of rooftop solar systems by about 600 percent. This would be very difficult to achieve without harnessing additional financial resources. As noted above, a successful CCA program could provide such resources, however, the County could also seek to provide incentives for energy efficiency and renewable energy programs that are similar to what a CCA would provide using a different structure.

The potential emissions reduction of each strategy was initially calculated without consideration of the overall emissions reduction needed to meet the County's 2035 GHG emission target. Reasonable levels of implementation were selected based on existing information and expected future trends. When the resulting emissions reduction amounts are summed for all strategies the total potential reduction meets the 2035 target. This indicates that full implementation of the strategies and actions listed in Table 4-1 could achieve the desired reductions for 2035; and likely for 2050, as well. However, it will be very challenging to meet both the 2035 and 2050 reduction targets because that will require action across a variety of areas in which the County has varying levels of jurisdictional control.

The largest emissions reductions, nearly 60 percent, will come from implementation of California Clean Car Standards and Low Carbon Fuel Standards, and the RPS reflecting the power of statewide initiatives that affect entire emissions sectors rather than individual actions. The next largest potential contributor to emissions reductions is CCA, which has a large potential, 22 percent of all reductions, but which has not yet been evaluated for feasibility in the local area.

While significant emissions can be achieved through energy efficiency programs (9 percent), almost all of the programs included in the calculations are implemented by agencies or organizations other than the County, such as AMBAG, PG&E, Ecology Action and Central Coast Energy Services (CCES). The calculations assume the continuation of these programs at current levels into the future. An additional strategy included within the calculations under energy efficiency is a time of sale energy efficiency ordinance.

The Green Business Program has achieved significant emissions reductions to date in the commercial sector, and expansion of this program with additional financial and staff resources to build on its demonstrated success has the potential to be a significant component of the County's climate action strategy. With continuation and moderate expansion of the program (10 additional businesses per year), the Green Business Program can play a significant role in achieving the emissions reduction target (3 percent of 2035 reduction target).



The calculation of potential reductions from renewable energy installation assumes continuation of existing annual installation rates in the County. This is estimated to contribute approximately one percent of the 2035 reduction target. This represents a conservative aspect of the reduction calculations considering the CAS includes actions to encourage increased renewable energy installation in the County.

The calculation of potential reductions from public education assumes a certain number of homes and businesses are made more energy efficient through increased knowledge provided by an energy audit. This is estimated to contribute less than one percent of the 2035 reduction target. It should be noted that responsibility and a mechanism for accomplishing such audits would have to be established.

The County could also adopt building code standards that require greater energy efficiency and greater utilization of renewable energy in new and substantially remodeled buildings. Because this strategy works by limiting the amount of increased emissions from new and remodeled buildings, and because of the low level of building permit activity in the county, stricter building code standards would result in relatively minimal emissions reductions (less than one percent of the 2035 reduction target).

In the transportation sector the calculation of potential emissions reductions from transportation and land use strategies reflects the results of the Rapid Fire modeling tool which calculates results based on empirical data and the latest research on the role of land use and transportation systems on automobile travel and emissions. It was developed by Vision California, a project funded by the California High Speed Rail Authority in partnership with the California Strategic Growth Council. The Rapid Fire model calculates VMT by applying assumptions about VMT to population growth based on research and empirical evidence. The model works by comparing two different development patterns: One applies the existing per capita VMT to the projected 2035 population assuming the increased population is accommodated by continuation of automobile-oriented development patterns, and the other applies a reduced per capita VMT to the projected 2035 population assuming the increased population is accommodated with a high percentage of mixed use and infill development. The overall reduction in VMT from a compact and urban development scenario corresponds to a reduction in emissions compared to the business as usual scenario. These estimates were calculated for the urban portion of Santa Cruz County and indicate a potentially significant contribution of approximately five percent to the 2035 reduction target.

Electric vehicles can play a significant role in emissions reductions (three percent of 2035 reduction target) if the future number of EV's on Santa Cruz roads keeps pace with statewide targets for on-road electric vehicles. Carpooling can also play a significant role in emissions reductions (two percent of 2035 reduction target) if goals established in the next Regional Transportation Plan to decrease single occupancy vehicle mode share compared to the baseline condition up to eight percent by 2035 are realized.

In the solid waste sector the calculator estimates the amount of existing electricity emissions that could be offset if the electric power produced by landfill gas at the Buena Vista landfill were credited to the County of Santa Cruz after the conclusion of the current contractual scenario in which the electricity production is purchased by another jurisdiction. This could contribute approximately one percent of the 2035 reduction target.

Lastly, there may be additional opportunities for emissions reductions that were not calculated that have not been identified yet. The proposed strategies include some actions for which reduction estimates have not been made, and new strategies may be identified as the community focus on emissions reduction becomes more established.

For each strategy there are a number of implementing actions which the County can implement on its own, in collaboration with others, or by encouraging and supporting the actions of others. Priority for implementation typically is a function of the potential gain (in this case the estimated potential for emissions reductions) combined with considerations such as cost to implement, probability of reaching full implementation of the strategy, and co-benefits of the strategy. Implementation of the strategies should be prioritized with respect to the order listed in



Table 4-1 with the highest priority given to the strategies listed first in each sector, while also giving consideration to the constraints of staffing and resources with respect to implementing actions.

4.3 Monitoring

For the County to be successful in achieving the adopted emissions reduction targets of 80 percent below 1990 levels by 2050, a practical implementation plan is needed to track and periodically re-evaluate the activities that are being relied upon to reduce greenhouse gas emissions. Implementation will require an ongoing commitment to track which strategies are achieving results, and a willingness to change course when more effective options become available. This style of implementation is referred to as “adaptive management.” There will also need to be ongoing engagement with residents, business, educational institutions, community organizations, and partner jurisdictions to ensure that the strategies remain relevant and attractive so that participation will be strong. The strategy tables in Chapter 3 outline implementing actions for each strategy, assignment of responsibility for implementation, and the performance indicators that will be monitored to measure success for each strategy. The measure of overall emissions reduction will be the periodic updating of the GHG emissions inventory.

4.3.1 Performance Indicators

Performance indicators have been identified to measure implementation of each strategy. Performance indicators reflect the expected product of implementing a specific action and provide a way to measure the degree of implementation or effectiveness of each strategy.

In some cases the calculation of reduction potential measures actual performance data, for example, the number and size of new photovoltaic systems installed, and in some cases it measures an indirect parameter, such as the increase in residential density that may be the result of population growth, land use policy, and/or infrastructure improvements. This mix of direct and indirect measuring criteria may make it difficult to closely track progress across all strategy areas. However, future monitoring reports will address these relationships. The clearest performance indicator overall will be the periodic greenhouse gas inventories.

4.3.2 Reporting

Annual reports from implementing agencies will monitor progress from the emissions reduction strategies and actions. The information will be obtained primarily from County departments and to the extent feasible from outside agencies and organizations. The emission inventories and the estimates of emissions reduction will be periodically updated as well. Monitoring reports that correlate this information can evaluate the overall effectiveness of the mitigation portion of the CAS, and may make recommendations to modify the CAS for greater effectiveness.

4.3.3 Five Year Emissions Inventories Updates

A schedule for follow up activity ensures that the plan doesn’t just sit on the shelf. Monitoring reports should be prepared annually to track performance indicators for strategy implementation. Every five years the monitoring report will include a monitoring inventory update and evaluation of progress toward achieving the long term emissions reductions goals calculated for each strategy. It is important to monitor emissions trends at least every five years to either verify the effectiveness of the plan or, more importantly, to address a lack of progress and take action to adapt the strategy to achieve the target emission reductions. It will be important to balance monitoring efforts with strategy implementation efforts to meet the emissions reduction targets.

The following table summarizes the emissions reduction monitoring program.



Table 4-2 Emissions Reduction Monitoring

Strategy	Goal	Performance Indicator	Monitoring Interval	Lead Responsible Implementing Agency	Potential Reductions by 2035 (MTCO ₂ e)	
					With CCA ¹	Without CCA ¹
Statewide Initiatives						
Clean Car Standards and Low Carbon Fuel Standard (Pavely I & II LCFS)	Lower emission vehicles and lower carbon fuels	Association of Monterey Bay Area Governments (AMBAG) Future updates to greenhouse gas analysis in Metropolitan Transportation Plan/Regional Transportation Plan (MTP)	5 Years	AMBAG, RTC	186,450	186,450
Renewable Portfolio Standard ² (RPS)	50% Carbon-Free by 2035	California Public Utilities Commission (CPUC) RPS status reports.	Annual	CPUC	34,820	69,650
<i>Statewide Initiatives Subtotal</i>					221,270	256,100
County Climate Action Strategy						
Energy						
CCA (50% Participation, 100% Carbon-Free)	Evaluate CCA program	If a CCA is formed, program participation rates and energy portfolio	Annual	County	83,320	0
Energy Efficiency ³	Continuation of existing programs, & Retrofits at Time of Sale ordinance	Data from AMBAG, Pacific Gas and Electric (PG&E), Central Coast Energy Services (CCES); Retrofits at Time of Sale: ordinance adoption and real estate sales data	Annual	AMBAG, PG&E, CCES, Planning, General Services	35,430	47,240
Green Business Program (GBP) ³	Continuation and expansion of existing program	GBP Data	Annual	Public Works	12,290	23,970
Renewable Energy ³	Continue current annual rate of installed capacity	California Solar Initiative (CSI), building permit data, and County projects	Annual	Planning, General Services, Public Works	3,520	15,060
Energy Efficiency Education ³	Increased home energy audits, and benchmarking of commercial buildings	Number of home energy audits, number of benchmarked commercial buildings and other education program metrics	Annual	Planning, General Services, Public Works	800	1,200



Table 4-2 Emissions Reduction Monitoring

Strategy	Goal	Performance Indicator	Monitoring Interval	Lead Responsible Implementing Agency	Potential Reductions by 2035 (MTCO ₂ e)	
					With CCA ¹	Without CCA ¹
Beyond Title 24	30% improvement over CALGreen mandatory measures	Building code adoption and permit activity	Annual	Planning	160	160
<i>Energy Subtotal</i>					<i>135,520</i>	<i>87,630</i>
Transportation						
Vehicle Miles Traveled (VMT) Reduction	Focus on infill, compact development , multi modal transportation improvements	Land use data within the urban area , transportation projects, census data	10 Years	Planning, Public Works	20,130	20,130
Electric Vehicle Charging	Local share of statewide goal: 5,525 EV's	Clean Vehicle Rebate Program (CVRP) Statistics	Annual	Planning, General Services, Public Works	10,590	10,590
Carpooling	5,508 additional carpoolers	U.S. Census	10 Years	Planning, RTC	3,730	3,730
<i>Transportation Subtotal</i>					<i>34,450</i>	<i>34,450</i>
Solid Waste						
Waste to Energy	Energy production credits to Santa Cruz County	CCA or other mechanism in place when contract expires in 2025	12 Years	General Services, Public Works	3,770	3,770
<i>Solid Waste Subtotal</i>					<i>3,770</i>	<i>3,770</i>
Climate Action Strategy Subtotal					173,740	125,850
Total Potential Reductions in 2035					395,010	381,950
Total Reductions Needed in 2035					380,000	380,000

Notes:

- (1) CCA – Community Choice Aggregation
- (2) With a CCA program the reduction from the RPS is estimated by applying the 50 percent carbon free portfolio to half of the projected electricity load in 2035. The reductions from a CCA program with a 100 percent carbon portfolio covering the other half of the projected electricity load in 2035 are reported on a separate line. Without a CCA program the reduction from the RPS is estimated by applying the 50 percent carbon free portfolio to the entire projected electricity load in 2035.
- (3) If a CCA program is not feasible or is not able to be implemented, the resulting gap between our emissions reductions target and our actual reductions will require greater reductions from other energy strategies in the CAS. Accordingly, the numbers shown under the scenario without a CCA program assume the effectiveness of energy efficiency, green business, and educational programs is able to be increased 50 to 100 percent, and that the rate of installation of rooftop solar systems is increased by 600 percent.

Source: County of Santa Cruz, 2013.



4.3.4 Implementation Costs

Cost is an important factor in emissions reduction. A detailed cost-benefit analysis has not been completed. It should be noted that in nearly every case where investment is needed there are long-term financial benefits in terms of energy or fuel cost savings that eventually pay back the initial investment and create ongoing cost savings. In addition, successful implementation of many of the emissions reduction strategies will have a range of community co-benefits such as improved air quality, economic development, decreased traffic congestion, energy conservation, natural resource conservation, and improved public health. The co-benefits have not been evaluated in a quantitative manner, but can be reasonably inferred with decreased fossil fuel consumption and development of renewable energy.

There are number of potential funding sources and financing mechanisms to partially or wholly offset these costs. While specific funding sources may change over time, in general, options include federal and state government programs, the local air district, PG&E, and a number of different public and private financing mechanisms, including partnerships with other jurisdictions and organizations.

4.4 Adaptive Management

Adaptive management refers to a system of collecting information about the success of a project as it moves forward, with the expectation that the project will be adjusted in response to the monitoring information.

To remain effective, strategies must be periodically evaluated to account for new information that may be relevant to a more effective strategy. It will also be important to incorporate new information about climate change science and risk, which may have an effect on strategies outlined in the plan. New greenhouse gas reduction technologies may be developed and new mechanisms for financing or incentivizing energy efficiency and renewable energy projects may be developed. The CAS may have to be amended to comply with new State or federal legislation. All of these factors will be taken into account during the annual plan evaluation process to determine if updates to the CAS are necessary or desirable. Candidates for this responsibility include staff in General Services, Public Works, Administration, or Planning Departments, or a working group consisting of staff from various departments.