
Town of Corte Madera CLIMATE ACTION PLAN



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Prepared by the
Marin Climate & Energy Partnership



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INTRODUCTION

This document does not and is not intended to create specific and enforceable obligations by the Town. Rather it is intended as a reference tool for possible future actions.

PURPOSE OF THE CLIMATE ACTION PLAN

The Town of Corte Madera understands that climate change has the potential to significantly affect Corte Madera's residents and businesses, as well as other communities around the world. The Town also recognizes that local governments play a strong role in reducing greenhouse gas emissions and mitigating the potential impacts of climate change.

The purpose of this Climate Action Plan (CAP) is to compile existing and potential strategies (i.e., actions, projects, and programs) that the Town's government and the community can use to address climate change. It provides a brief background on what climate change is and its potential impacts, but focuses on the efforts Corte Madera can take to reduce its greenhouse gas emissions and mitigate, to the extent feasible at the local level, the potential impacts of climate change.

Through the actions outlined in this plan, such as increasing energy efficiency in buildings, encouraging less dependence on the automobile, and using clean, renewable energy sources, the Corte Madera community can experience lower energy bills, improved air quality, reduced emissions, and an enhanced quality of life. The Town's preparation of the 2005 Greenhouse Gas Emissions Inventory and this Climate Action Plan are the beginning of an ongoing planning process that includes assessing, planning, mitigating and adapting to climate change.

Specifically, this plan does the following:

- Summarizes the various regulations at the federal, state, and regional levels.
- Incorporates the Town's 2005 Greenhouse Gas Emission Inventory, which identified sources of greenhouse gas emissions generated by the community and the local government.
- Estimates how these emissions may change over time under a business-as-usual forecast.
- Provides energy use, transportation, land use, waste, water, wastewater, and natural system strategies necessary to minimize Corte Madera's impacts on climate change.

RELATIONSHIP TO THE GENERAL PLAN

The Town of Corte Madera's General Plan, adopted by the Town Council in April 2009, contains policies and programs that promote community sustainability and effective management of renewable and non-renewable natural resources through energy conservation, and solid waste management and recycling in Chapter 3.0 Resource Conservation and Sustainability. This Climate Action Plan supports the Town's General Plan, including Implementation Program RCS-1.1.a which calls for the preparation of a Sustainability Plan for Town Government Operations. Specific General Plan implementation programs that support the emissions reduction measures identified in the Climate Action Plan are cross-referenced in the measure descriptions located in the appendix. Nonetheless, the Climate Action Plan is intended to be incorporated into the Town's General Plan.

CLIMATE CHANGE BACKGROUND

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth's climate by trapping infrared radiation (heat), a phenomenon known as the greenhouse effect (Figure 1). Significant evidence suggests that human activities are increasing the concentration of these gases (known as "greenhouse gases" or GHGs) in the atmosphere, causing a rise in global average surface temperature and consequent global climate change. The greenhouse gases include carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons (Table 1). Each one has a different degree of impact on climate change. To facilitate comparison across different emission sources with mixed and varied compositions of several GHGs, the term "carbon dioxide equivalent" or CO₂e is used. One metric ton of CO₂e may consist of any combination of GHGs, and has the equivalent Global Warming Potential (GWP) as one metric ton of carbon dioxide (CO₂). According to the U.S. Environmental Protection Agency's (EPA) April 2015, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013," the majority of GHG emissions comes from fossil fuel combustion, which in turn is used for electricity, transportation, industry, heating, etc.

Collectively, these gases intensify the natural greenhouse effect, causing global average surface temperatures to rise, which affects local and global climate patterns. These changes in climate are forecasted to manifest themselves in a number of ways that might impact Corte Madera as well as other changes to local and regional weather patterns and species migration.

FIGURE 1: THE GREENHOUSE EFFECT

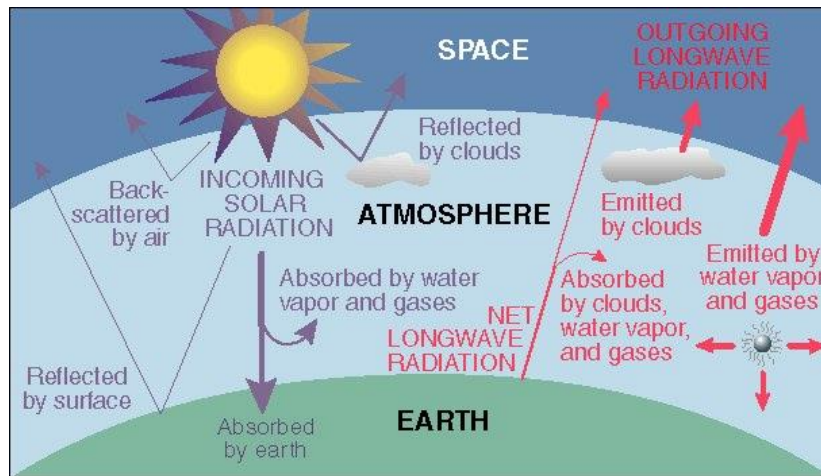


TABLE 1: GREENHOUSE GASES

Gas	Chemical Formula	Emission Source	Global Warming Potential
Carbon Dioxide	CO ₂	Combustion of natural gas, gasoline, diesel, and other fuels	1
Methane	CH ₄	Combustion, anaerobic decomposition of organic waste in landfills, wastewater and livestock	21
Nitrous Oxide	N ₂ O	Combustion, wastewater treatment	310
Hydroflourocarbons	Various	Leaked refrigerants, fire suppressants	12 to 11,700

CLIMATE CHANGE IMPACTS IN CALIFORNIA AND THE BAY AREA

According to a 2006 Summary Report from the California Climate Change Center, global warming could significantly impact California water and forest resources. The Center’s 2006 Summary Report noted the following findings and potential risks to California:¹

- Precipitation is the most important hydrologic variable and most difficult to forecast.
- Warming raises the elevation of snow levels with reduced spring snowmelt and more winter runoff.
- Less snowmelt runoff means lower early summer storage at major foothill reservoirs with less hydroelectric power production.
- Higher temperatures and reduced snowmelt compounds the problem of providing suitable cold-water habitat for salmon species.
- Rising sea levels would adversely affect many coastal marshes and wildlife reserves.
- Higher temperatures increase the demand for water by plants.
- Climate change in California will result in a higher frequency of large damaging fires.
- Regional climates that are hotter and drier will result in increased pest and insect epidemics within California's forests.

Historically, air temperatures over the western United States, including California, have risen significantly over the last several decades. However, quantifying how much warming has occurred in the San Francisco Bay region is problematic due to the siting of weather stations, as many have either moved or have experienced changes in the immediate surroundings of the station.² Climate models predict warming, globally and regionally over the San Francisco Bay, over the next century. Through the first half of this century, the models show annual temperatures

¹ California Climate Change Center, *Our Changing Climate: Assessing the Risks to California*, Document No. CEC-500-2006-077, July 2006. <http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF> (accessed 10/13/14)

² California Energy Commission, *Climate Change Scenarios for the San Francisco Bay Region*, July 2012, p. 4.

rising approximately 1.5°C (2.7°F); by the end of the century, temperatures are expected to rise between 2°C to 6°C (about 3.5°F to 11°F). The models indicate there will be greater warming in the summer than in the winter in the Bay Area, and that warming becomes greater at locations that are distant from the coast. Heat waves are expected to last longer, and extreme warm temperatures will likely begin in June and could continue to occur in September.³

Climate change simulations indicate the San Francisco Bay region will retain its Mediterranean climate, with relatively cool and wet winters and hot dry summers. At this time, changes in precipitation are quite uncertain, although some models suggest drier conditions in the Bay Area during the middle and end of the century.⁴ A 2011 study found that extreme weather events known as atmospheric rivers, which provide much of the rainfall in the region and are responsible for the largest floods, may increase both in intensity and frequency in some years.⁵ The study found that as climate change proceeds, occasional atmospheric river storms may be exceptionally intense, and the season for such storms may lengthen. This suggests a potential for more frequent and more severe flooding in the region, especially when coupled with sea level rise.

SEA LEVEL RISE

The San Francisco Bay is vulnerable to a range of natural hazards, including storms, extreme high tides, and rising sea levels resulting from global climate change. Flooding already poses a threat to communities along the Bay and there is compelling evidence that these risks will increase in the future. As temperatures rise globally, sea level is rising mainly because ocean water expands as it warms, and water from melting major ice sheets and glaciers flow into the ocean. In the past century, average global sea level has increased by 17 to 21 centimeters (7 to 8 inches), and sea level at the San Francisco tidal gauge has risen 20 centimeters (8 inches).⁶ Rising seas put new areas at risk of flooding and increase the likelihood and intensity of floods in areas that are already at risk. The State's *Sea-Level Rise Guidance Document* recommends using a range of 2 to 12-inch sea level rise increase by 2030 and 5 to 24-inch increase by 2050, as shown in Table 2.⁷

³ California Energy Commission, *Climate Change Scenarios for the San Francisco Bay Region*, July 2012, pp. 4-6.

⁴ California Energy Commission, *Climate Change Scenarios for the San Francisco Bay Region*, July 2012, p. 8.

⁵ Michael Dettinger, "Climate Change, Atmospheric Rivers, and Floods in California – A Multimodel Analysis of Storm Frequency and Magnitude Changes," *Journal of the American Water Resources Association* 47(3) (June 2011):514-523.

⁶ California Coastal Commission, *Sea-Level Rise Policy Guidance, Public Review Draft*, October 14, 2013.

⁷ [Coastal and Ocean Working Group of the California Climate Action Team, *State of California Sea-Level Rise Guidance Document*, March 2013.](#)

TABLE 2: REGIONAL SEA LEVEL RISE PROJECTONS RELATIVE TO YEAR 2000

Year	Sea Level Rise (inches)		
	NRC 2012 Projection (mean ± the standard deviation for the A1B scenario ⁸)	Low (mean of the B1 scenario)	High (mean of the A1F1 scenario)
2030	6 (±2)	2	12
2050	11 (±4)	5	24
2100	36 (±10)	17	66

Source: National Research Council (NRC), *Sea-Level Rise for the Coasts of California, Oregon, and Washington*, June 2012.

[Our Coast, Our Future](#) (OCOF) provides interactive, online maps and tools to help visualize vulnerabilities to sea level rise and storms within the San Francisco Bay and on the outer coast from Half Moon Bay to Bodega Bay. The online tools allow the user to zoom in and out on an area and to visualize inundation with tidal and storm surge effects for sea level rise scenarios in 25 centimeter increments. Figure 2 shows the inundation effect of a 25-centimeter sea level rise on the Corte Madera coast, while Figure 3 shows 25-centimeter (10-inch) sea level rise coupled with the 20-year storm, which is a severe storm expected approximately once every twenty years. Flooding under this scenario occurs primarily in the Mariner Cove neighborhood of Corte Madera. Flooding also occurs in areas to the north of Corte Madera, including the Greenbrae Boardwalk community in the unincorporated area and the Marin RV Park and adjacent industrial area of Larkspur.

The OCOF maps rely upon a sophisticated modeling system which takes into account wave run-up, wave set-up, storm surge, seasonal effects, tides, and sea level rise, as well as vertical land motions, levees, river discharge, and wind waves for San Francisco Bay. Heights of levees and manufactured mounds were included in the study. Levees were not allowed to fail in the model, but water was allowed to flow over them in cases when the total water level was sufficiently high. Nonetheless, inundation maps are intended as planning level tools to illustrate the potential for flooding under future sea level rise and storm surge scenarios. Although the information is appropriate for conducting vulnerability and risk assessments, finer-grained information may be needed for detailed engineering design and implementation.

⁸ The A1 scenario family assumes high economic growth, low population growth that peaks mid-century, and the rapid introduction of more efficient technologies. A1B is balanced and A1F1 is fossil fuel intensive. The B1 scenario family assumes the same low population growth as the A1 scenarios, but a shift toward a lower-emission service and information economy and cleaner technologies.

FIGURE 2: FLOODING EFFECT OF 25-CENTIMETER (10-INCH) SEA LEVEL RISE



Our Coast Our Future flood maps (accessed 11/23/15)

FIGURE 3: FLOODING EFFECT OF 25-CENTIMETER (10-INCH) SEA LEVEL RISE WITH A 20-YEAR STORM



Planning for sea level rise involves not only protecting existing structures and resources but ensuring new projects are designed to be resilient to and/or adapt to potential sea level rise. Factors to consider for any future coastal facility or infrastructure project include:

1. The projected lifespan of the project or facility;
2. The cost or value of the project or a replacement facility; and
3. The impact or consequence of damage to or loss of a facility or project.

The San Francisco Bay Conservation and Development Commission (BCDC) is a state agency that provides regulatory authority over the water of the San Francisco Bay up to mean high tide, salt ponds, managed wetlands, and a 100 foot band of land adjacent to the bay. BCDC's strategies to prepare for and adapt to sea level rise are to: 1) restore wetlands and manage sediments; 2) allow development of small and interim projects and repairs to existing levees, boat docks, sewer outfalls, etc.; and 3) require risk assessments for projects that have a longer life. If sea level rise and storm surge levels that are expected to occur during the life of the project would result in public safety risks, the project must be designed to be resilient to mid-century sea level rise. If it is likely that the project will remain in place longer than mid-century, the project must plan to address flood risks expected at the end of the century.

REGULATION OF CLIMATE CHANGE – FEDERAL, STATE AND COUNTY LEVELS

FEDERAL CLIMATE POLICY

Currently, there is no federal legislation mandating comprehensive greenhouse gas emissions reporting or reduction in the United States. The U.S. Senate considered, but failed to pass, various cap-and-trade bills in 2009 and 2010. Therefore, the U.S. has used its rulemaking authority under the Clean Air Act to begin to regulate greenhouse gas emissions. In 2009, the EPA made an "endangerment finding" that GHGs threaten the public health and welfare of the American people⁹. This finding provided the statutory prerequisite for EPA regulation of GHG emissions from motor vehicles and has led to a number of GHG regulations for stationary sources. In May 2010, the EPA issued a "tailoring" rule that enables the agency to control GHG emissions from the nation's largest GHG sources, including power plants, refineries, cement production facilities, industrial manufacturers and solid waste landfills, when these facilities are newly constructed or substantially modified. The EPA reports that its GHG permitting requirements will address 70% of the national GHG emissions from stationary sources¹⁰. In 2013, the EPA announced proposed Clean Air Act standards to cut carbon dioxide emissions from power plants.

In 2012, the Obama administration issued new rules that mandate an average fuel economy of 54.5 miles per gallon for cars and light-duty trucks by the 2025 model year, up from the current standard of 35.5 MPG in 2016.¹¹ The new standards put pressure on auto manufacturers to step up development of electric vehicles as well as improve the mileage of conventional passenger cars by producing more efficient engines and lighter car bodies. In 2011, the EPA and the Department of Transportation issued the first-ever regulations for medium and heavy-duty trucks, busses and vans, covering years 2014 through 2018¹². The new standards require a fuel consumption reduction of 10 to 20 percent by model year 2018, depending upon the type of truck.

In 2013, President Barack Obama released his administration's [Climate Action Plan](#) which outlines steps the administration can take to reduce GHG emissions. Actions include: reducing emissions from power plants;

⁹ [Final Rule, EPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under the Clean Air Act](#), 74 Fed. Reg. 66495, December 7, 2009, accessed 12/09/2010.

¹⁰ Final Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule Fact Sheet, EPA, <http://www.epa.gov/NSR/documents/20100413fs.pdf>, accessed 07/01/2013.

¹¹ "Obama Administration Finalizes Historic 54.5 MPG Fuel Efficiency Standards," Office of the Press Secretary, the White House, <http://www.whitehouse.gov/the-press-office/2012/08/28/obama-administration-finalizes-historic-545-mpg-fuel-efficiency-standard> (accessed 10/07/14).

¹² U.S. Environmental Protection Agency, "Factsheet: Paving the Way Toward Cleaner, More Efficient Trucks," August 9, 2011.

accelerating renewable energy production on public lands; expanding and modernizing the electric grid; raising fuel economy standards for passenger vehicles; and accelerating energy efficiency initiatives.

STATE CLIMATE POLICY

Since 2005, the State of California has responded to growing concerns over the effects of climate change by adopting a comprehensive approach to addressing greenhouse gas (GHG) emissions in the public and private sectors. Executive Order S-3-05, signed by Governor Arnold Schwarzenegger in 2005, established long-term targets to reduce GHG emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050. The 2020 GHG reduction target was subsequently codified with the passage of the Global Warming Solutions Act of 2006, more commonly known as AB 32. In 2015, Governor Jerry Brown issued Executive Order B-30-15, establishing an interim GHG reduction target of 40 percent below 1990 levels by 2030. A bill (SB 32) to enforce the post-2020 targets failed in the Assembly later that same year.

The California Air Resources Board (CARB) is responsible for monitoring and reducing greenhouse gas (GHG) emissions set forth in AB 32, and is, therefore, coordinating statewide efforts. In December 2008, CARB adopted a Scoping Plan that outlines the actions required for California to reach its 2020 emission target. The actions include a broad set of programs, including higher fuel-efficiency standards for light trucks and passenger vehicles, mandates for generation of electricity from renewable sources, higher energy efficiency standards for new buildings, and incentives for solar energy installation. These programs are detailed later in this plan.

The Scoping Plan 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 commitment to reduce greenhouse gas emissions to 1990 levels by 2020. The State encourages, but does not require, local governments to track GHG emissions and adopt a Climate Action Plan that identifies how the local community will meet the reduction target. Corte Madera has tracked both community and government operations GHG emissions since 2005.

SB 375, passed by the State Assembly and Senate in August 2008, is another significant component of California's commitment to GHG reduction. The goal of SB 375 is to reduce emissions from cars and light trucks by promoting compact mixed-use, commercial and residential development. The first step outlined in SB 375 called for the state's 18 metropolitan planning organizations (MPOs) and the California Air Quality Board to establish a region's GHG reduction target for passenger vehicle and light duty truck emissions. Then, the MPO was required to develop a sustainable communities strategy that demonstrates how the region will meet its GHG reduction target. Here in the Bay Area, four regional government agencies – the Association of Bay Area Governments, the Bay Area Air Quality Management District, the Bay Conservation and Development Commission, and the Metropolitan Transportation Commission, worked together to create Plan Bay Area, the region's sustainable communities strategy. Adopted in July 2013, the plan is projected to reduce regional greenhouse gas emissions from passenger vehicles and light duty trucks 10.3% by 2020 and 16.4% by 2035.¹³

In 2010, the California State Office of Planning and Research adopted revised CEQA Guidelines which allow the Town to streamline project-level analysis of greenhouse gas emissions through compliance with a greenhouse gas reduction plan contained in a general plan, long range development plan, or separate climate action plan. Plans must meet the criteria set forth in section 15183.5 of the CEQA Guidelines, which include requirements for quantifying existing and projected greenhouse gases; identifying a level of cumulative greenhouse gas emissions

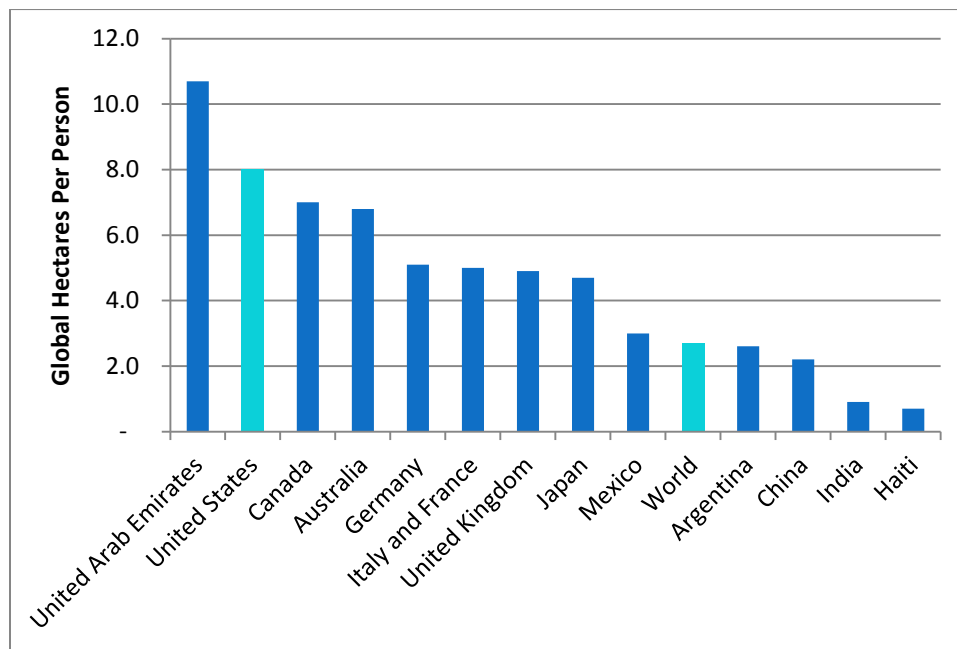
¹³ Association of Bay Area Governments and Metropolitan Transportation Commission, Draft Plan Bay Area Draft Environmental Impact Report, April 2013, pages 2.5-50 and 3.1.59.

that would not be considered significant; specifying measures and standards that would ensure achievement of this level; and continued monitoring to track progress. The greenhouse gas reduction plan, once adopted following certification of an EIR or adoption of an environmental document, may be used in the cumulative impacts analysis of later projects such as development or infrastructure projects. An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project. This Climate Action Plan has been developed as an advisory document only, but it could be submitted to the Bay Area Air Quality Management District for review and adopted as a qualified greenhouse gas reduction plan.

MARIN COUNTY CLIMATE POLICY

Though Marin County is known for its environmental consciousness, it is also known for its low-density developments, larger homes, multi-vehicle households, and consumerism. It also ranks among the highest in the U.S. in terms of per capita GHG emissions. Marin residents consume resources at a far greater rate than most industrialized nations, and that the worldwide use of resources is exceeding the earth’s capacity to renew them. One way to measure the use of natural resource against the planet’s actual biocapacity and ability to renew those resources is the “ecological footprint.” It can be calculated for individuals, regions, countries, or the entire earth and is expressed as the number of global acres (acres with world average biological productivity) that it takes to support one person. As Figure 4 shows, the average American uses 8 global acres per capita. Other western democracies, such as France, Germany, and Italy, have footprints of approximately 5 global acres per person.

FIGURE 4: ECOLOGICAL FOOTPRINT COMPARISON



Source: *National Ecological Footprint and Biocapacity for 2007*

Marin was an early leader in both quantifying greenhouse gas emissions and developing strategies to reduce emissions. The County developed its first climate action plan in 2006 (updated in 2015) and adopted a goal to reduce emissions to 15 percent below 1990 levels by 2020. The Town of San Rafael followed with its Climate Change Action Plan in 2009. As of December 2015, all of the cities and towns in Marin (except Corte Madera) had adopted climate action plans; most, including the Town of Corte Madera, have adopted emission reduction goals of 15 percent below 2005 levels by 2020. The County recently determined that it had met its GHG reduction target eight years ahead of schedule and subsequently adopted an updated target of 30 percent below 1990 levels by 2020 when it adopted the Climate Action Plan Update 2015.

THE MARIN CLIMATE & ENERGY PARTNERSHIP

Created in 2007, the mission of the Marin Climate & Energy Partnership (MCEP) is to reduce greenhouse gas emissions levels to the targets of Marin County and local municipalities, consistent with the standards set by AB32. All eleven Marin Cities and towns, the Marin County Community Development Agency, the Transportation Authority of Marin, and the Marin Municipal Water District are members. The Marin Climate and Energy Partnership provided staff support and technical expertise for the development of this Climate Action Plan. Funding for this project was provided in part by the Marin County Energy Watch (MCEW), a joint project of Pacific Gas and Electric Company (PG&E) and the County of Marin. MCEW is funded by California utility ratepayers under the auspices of the California Public Utilities Commission.

One of MCEP's first projects was to work with International Council for Local Environmental Initiatives (ICLEI) – Local Governments for Sustainability, a nonprofit organization, to develop GHG emissions inventories for the partner jurisdictions. With Bay Area Air Quality Management District grant funding, MCEP also worked on programs related to reducing energy use in municipal buildings, establishing a green purchasing collaborative, reducing energy use in residential and commercial buildings, reducing emissions from private and municipal vehicles, and reducing energy use and emissions from waste.

In 2009, MCEP developed a green building strategic plan and green building policies which resulted in the Marin Green Building, Energy, Retrofit & Solar Transformation (BERST) model ordinance. The Marin Community Foundation provided funding for this effort, as well as funds to develop climate action plans for six partner jurisdictions. Partner members have agreed to use their adopted climate action plans to identify mutual measures to reduce community-wide greenhouse gas emissions and develop policies and programs to support priority measures. The Town has worked closely with the MCEP to complete this climate action plan, and to implement a coordinated approach to local and regional emissions reduction targets and climate action planning goals.

In 2012-2013, MCEP conducted a re-inventory of greenhouse gas emissions for ten cities and towns in Marin County. A comparison of the results, as well as links to the cities' inventories and climate action plans, is available at the MCEP website at www.marinclimate.org. MCEP also provides an interactive map that compares how Marin cities and towns are progressing on various sustainability metrics at www.marintracker.org.

MITIGATION AND ADAPTATION ACTIVITIES IN CORTE MADERA

Since 2005, the Town of Corte Madera has been actively pursuing a number of greenhouse gas emissions reductions programs, including:

- Worked with Mill Valley Refuse Service, the Town's franchised waste hauler, to provide residents and businesses with curbside composting of food scraps.

- Enabled CaliforniaFIRST, a Property Assessed Clean Energy (PACE) program, to operate within the Town limits. This PACE program allows property owners to finance energy and water efficiency and renewable energy projects on their property tax bills.
- Joined Marin Clean Energy, which provides customers with high renewable energy content electricity, including 100% renewable electricity options.
- Completed pedestrian and bicycle infrastructure and safety improvements to encourage residents, employees and visitors to walk or bike rather than drive to their destinations.

CORTE MADERA'S GREENHOUSE GAS EMISSIONS

CORTE MADERA PROFILE

Located in Marin County on San Francisco Bay, Corte Madera is a small town with a land area of approximately 4.5 square miles of land, plus additional area in bay and tidelands. Corte Madera enjoys a temperate climate, with cool, wet, and almost frostless winters and cool, dry summers with frequent fog or wind. According to the U.S. Census, the population of Corte Madera in 2010 was 9,253 and there were 4,026 housing units. The housing stock is relatively older, with approximately 81 per cent of the housing units built before 1980, providing excellent opportunities to upgrade homes to include more energy-efficient features (American Community Survey, 2013). The local climate means that little electricity is used to cool buildings in the summer, while natural gas consumption rises in the winter months and fluctuates according to average low temperatures during the rainy season. Water use spikes during the summer, and outdoor water use is largely dependent upon local rainfall patterns and weather conditions.

Corte Madera is a local employment center with two regional shopping centers that serve both visitors and residents. The strong local economy provides about 8,000 jobs (ABAG 2013 Projections). Most people who work in Corte Madera commute from other Marin County towns (51 percent), while about 39 percent come from other counties (Census Transportation Planning Products, 2006-2010).

The Town has public and private schools for grades K-12, a post office, a library, fire stations, and a Town Hall. The non-residential sector of the built environment, which includes retail and office buildings as well as public and government facilities, uses about 32 percent of all electricity and natural gas in the built environment. As such, the non-residential sector has a significant role to play in reducing GHG emissions in the community.

Corte Madera enjoys good transit service. The Town is served by the Golden Gate Ferry in neighboring Larkspur, which provides daily service to the San Francisco Ferry Building. The Town is also connected to local bus service, which provides transportation to San Francisco and northbound cities as well as local schools and the ferry terminal. An estimated 8.5 percent of Corte Madera residents commute to work by public transportation. About 70 percent of employed residents drive to work alone and 11 percent carpool (American Community Survey, 2013).

The Town's climate, compact size and mostly flat topography are conducive to walking and bicycling, and the Town's well-developed network of bicycle and pedestrian facilities and amenities provides safe and convenient routes. Nonetheless, while approximately 6 percent of employed Corte Madera residents work in Town and not in their homes, only 1.4 percent walk or bike to work. Encouraging more residents to walk and bike to destinations within Town could help to reduce transportation emissions.

Finally, Corte Madera residents are both wealthier and more educated than residents in most California communities. With an average household income significantly higher than that of the average California household (\$151,640 vs. \$85,408) and a great majority of well-educated residents (70 percent have bachelor's degrees or

higher), Corte Madera residents are well-positioned to lead the way in adopting new technologies. Public information campaigns and incentives to support solar installation, electric vehicle infrastructure, and the purchase of “green” electricity are strategies that can be used to support programs to reduce GHG emissions in the community.

COMMUNITY EMISSIONS INVENTORY

The first step toward developing a climate action plan is to identify sources of emissions and establish baseline levels. In 2009, the Town prepared a Greenhouse Gas Emissions Inventory for both community and government operations emissions for the baseline year 2005. The Marin Climate & Energy Partnership updated the community inventory in preparation for Climate Action Plan. The inventory quantifies greenhouse gas emissions from a wide variety of sources, from the energy used to power, heat and cool buildings, to the fuel used to move vehicles and power off-road equipment, to the decomposition of solid waste and treatment of wastewater. The report provides a detailed understanding of where the highest emissions are coming from, and, therefore, where the greatest opportunities for emissions reductions lie. The inventory also establishes a baseline emission inventory against which to measure future progress.

Community emissions are quantified according to these seven sectors:

Residential. The Residential sector includes emissions generated by the use of electricity, natural gas and propane in homes.

Commercial & Industrial. This sector includes emissions generated by the use of electricity and natural gas in commercial and industrial buildings. Emissions generated by schools, governments, and public agencies are included in this sector.

Transportation. The Transportation sector includes emissions from on-road vehicles travelling on local roads within the Town limits and a portion of emissions generated by vehicular travel on state highways within Marin County.

Off-Road Vehicles & Equipment. This sector includes emissions from vehicles and equipment used for construction and lawn and garden activities.

Waste. This sector includes emissions generated by the decomposition of solid waste deposited in landfills located outside the Town’s borders.

Water. The Water sector inventories emissions generated by the use of electricity in treating, conveying and distributing water from the water source to water users in the community.

Wastewater. This sector includes emissions generated by the treatment of wastewater as well as electricity used by the wastewater treatment plant.

Community greenhouse gas emissions totaled 84,410 metric tons in 2005 and 56,234 metric tons in 2013, falling 33 percent, or 28,176 metric tons CO₂e. As shown in Table 3, reductions occurred in all inventoried sectors. The largest decline occurred in the Commercial sector, primarily due to the closing of the WinCup factory. Emissions declined 61 percent in this sector and 20,269 metric tons.

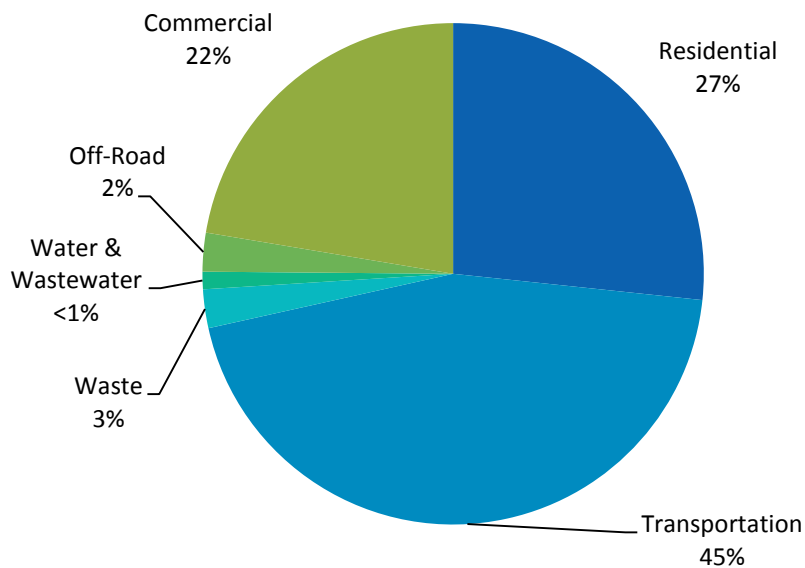
TABLE 3: COMMUNITY EMISSIONS BY SECTOR, 2005 TO 2013

Year	Residential	Commercial	Transportation	Waste	Water	Wastewater	Off-Road	Total	% Change from 2005
2005	17,641	33,020	30,161	2,085	368	372	762	84,410	0%
2006	17,374	30,370	30,285	2,201	346	364	744	81,684	-3%
2007	18,857	33,770	30,212	1,997	482	413	726	86,458	2%
2008	19,008	31,862	32,500	1,708	492	417	709	86,696	3%
2009	18,131	30,849	31,752	1,464	407	391	691	83,686	-1%
2010	16,540	27,679	31,804	1,378	302	354	674	78,730	-7%
2011*	16,398	16,278	30,816	1,336	254	340	669	66,090	-22%
2012	15,851	13,131	31,368	1,389	265	360	663	63,027	-25%
2013	15,204	12,751	25,562	1,422	277	364	654	56,234	-33%
Change from 2005	-2,438	-20,269	-4,599	-663	-92	-8	-108	-28,176	
% Change from 2005	-14%	-61%	-15%	-32%	-25%	-2%	-14%	-33%	

* Note: The WinCup foam cup manufacturing plant ceased operations in July 2011.

Figure 5 shows that emissions from the Transportation sector, which includes all local roads and a portion of vehicle miles traveled on state highways in Marin County, are responsible for the greatest percentage of greenhouse gas emissions (45 percent). This is followed by emissions from the Residential sector (27 percent) and the Commercial/Industrial sector (22 percent). The Waste, Wastewater, Off-Road Vehicles and Equipment, and Water sectors are each responsible for 3 percent or less of total community emissions.

FIGURE 5: EMISSIONS BY SECTOR, 2013



GOVERNMENT OPERATIONS EMISSIONS INVENTORY

In 2009, Corte Madera prepared Local Government Operations Greenhouse Gas Inventory report for the baseline year of 2005. This inventory was updated using 2013 energy data for the Buildings and Facilities, Public Lighting and Water Delivery sectors. The inventory shows that local government operations emitted an estimated total of 735 metric tons CO₂e in 2013 from six sectors, as shown in Table 4. The Building and Facilities sector, which includes emissions from the generation of electricity and the combustion of natural gas from Town Hall, the Public Safety Building, the Fire Station and the Recreation Center, generated 119 metric tons CO₂e. Emissions generated from the combustion of gasoline, diesel and other fuels used in the Town’s fleet of an estimated 34 vehicles, contributed 244 metric tons CO₂e (2005 data). The Public Lighting sector, which includes emissions created by the generation of electricity used to power streetlights, traffic signals, and park and other outdoor lighting, represented 79 metric tons CO₂e of total government operations emissions.

TABLE 4: GOVERNMENT OPERATIONS EMISSIONS SUMMARY BY SECTOR

Sector	2013 Metric Tons CO _{2e}
Buildings and Facilities	119
Vehicle Fleet*	244
Public Lighting	79
Water Delivery	104
Waste*	45
Employee Commute*	144
Total	735

*These estimates are based on 2005 data.

Government facilities produced approximately 178 tons of landfilled solid waste in 2005, with about two-thirds coming from complimentary bins. This waste is estimated to generate about 45 metric tons CO_{2e} as the waste decomposes in the landfill over the next 100+ years.

Electricity used to transport water to irrigation systems and to manage stormwater contributed approximately 104 metric tons CO_{2e}. Finally, Town of Corte Madera employees are estimated to have generated 144 metric tons CO_{2e} commuting to and from work in 2013.

Government operations are considered a subset of community emissions. Government operations represented approximately 1.3% of community emissions in 2013.

EMISSION FORECASTS AND REDUCTION TARGETS

The Climate Action Plan includes a business-as-usual (BAU) forecast in which emissions are projected in the absence of any policies or actions that would occur beyond the base year to reduce emissions. The forecasts are derived by “growing” 2013 emissions by forecasted changes in population, number of households, and jobs according to projections developed by the Association of Bay Area Governments. The forecast also includes projected energy use for the 180 units at Tam Ridge Residences which will replace the energy used previously at the WinCup factory.¹⁴ Transportation emissions are projected utilizing data provided by the Metropolitan Transportation Commission, which incorporate the vehicle miles traveled (VMT) reductions expected from the implementation of Plan Bay Area. Table 5 shows that emissions are expected to rise about 0.6 percent between 2013 and 2020 and 2.7 percent between 2020 and 2030.

TABLE 5: COMMUNITY EMISSIONS FORECAST AND REDUCTION TARGET

2005 Emissions	2013 Emissions	2020 BAU Emissions	2030 BAU Emissions
84,410	56,234	56,571	58,087

¹⁴ Projected energy use is based on average household energy use in 2013, which was 5,689 kilowatt hours of electricity and 556 therms of natural gas per year.

Under the BAU forecast, the Town of Corte Madera will continue to reduce emissions approximately 33 percent below baseline emissions in 2020 and 31 percent below baseline emissions in 2030. Therefore, the Town should consider adopting a more aggressive goal to meet the State’s 2030 goal of 40 percent below 1990 levels, which is equivalent to 49 percent below 2005 levels by 2030.

Emissions from local government operations are not expected to rise due to an expansion of government services or facilities. Government operations emissions are estimated to have totaled 735 metric tons CO₂e in 2013 (utilizing some 2005 data). In order to meet a 15 percent reduction target, emissions would need to drop by 110 metric tons CO₂e, as shown in Table 6.

TABLE 6: GOVERNMENT OPERATIONS EMISSIONS FORECAST AND REDUCTION TARGET

Baseline Emissions	2020 BAU Emissions	2020 Goal (15% Below Baseline)	Reductions Needed to Meet 2020 Goal
735	735	625	110

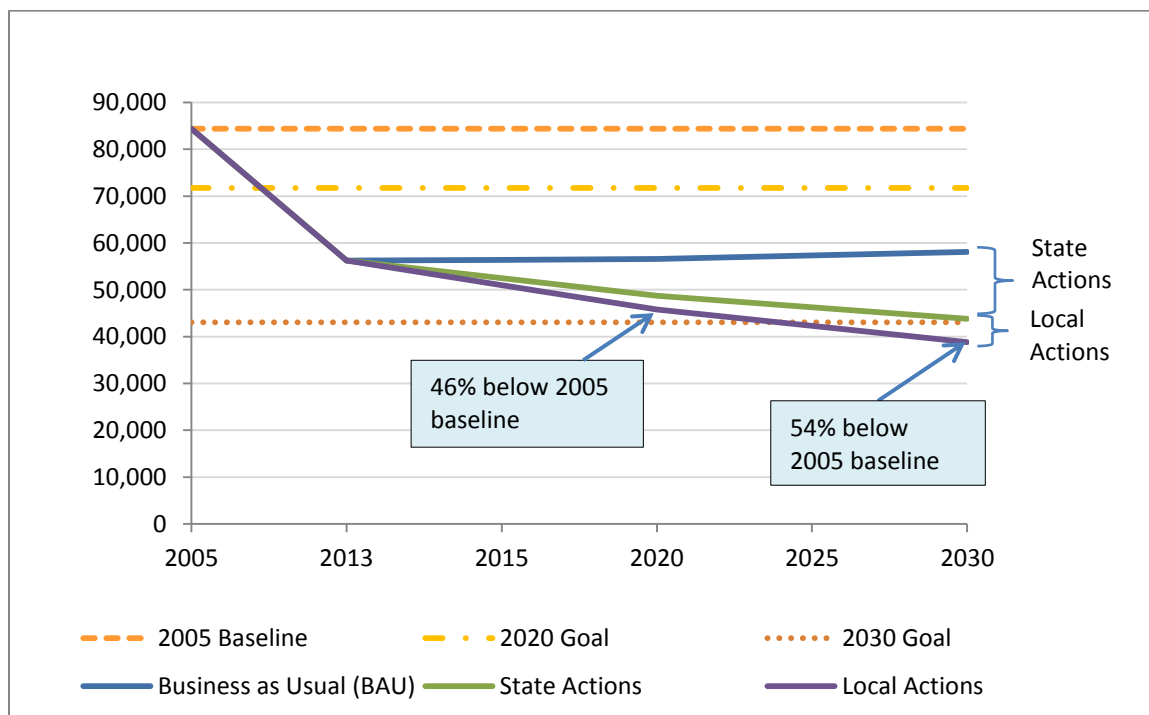
ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS

INTRODUCTION

The Climate Action Plan includes a variety of regulatory, incentive-based and voluntary strategies that are expected to reduce emissions from both existing and new development in Corte Madera. Several of the strategies build on existing programs while others provide new opportunities to address climate change. State actions will have a substantial impact on future emissions. Local strategies will supplement these State actions and achieve additional GHG emissions reductions. Successful implementation will rely on the combined participation of Town staff along with Corte Madera residents, businesses and community leaders.

The following sections identify the State and local strategies included in the Climate Action Plan to reduce community and government operations. Emissions reductions are estimated for each strategy; combined these indicate the Town will reduce emissions 46 percent below baseline emissions in 2020 and 54 percent below baseline emissions in 2030, which is enough to meet the State's 2030 goal. As shown in Figure 6, State actions are expected to reduce emissions to 48 percent below forecasted emissions in 2030, and local actions will reduce emissions another 6 percent.

FIGURE 6: CUMULATIVE IMPACT OF REDUCTION STRATEGIES



STATE ACTIONS

The following are State reduction strategies that have been approved, programmed and/or adopted and will reduce local community emissions from 2010 levels. These programs require no local actions. As such, the State actions are first quantified and deducted from projected community emissions in order to provide a better picture of the responsibility for local action.

RENEWABLE PORTFOLIO STANDARD (RPS)

Established in 2002 in Senate Bill 1078, the Renewable Portfolio Standard program requires electricity providers to increase the portion of energy that comes from eligible renewable sources, including solar, wind, small hydroelectric, geothermal, biomass and biowaste, to 20% by 2010 and to 33% by 2020. Senate Bill 350, passed in September of 2015, increases the renewable requirement to 50% by the end of 2030. In 2013, PG&E's electric power generation mix contained 23% eligible renewable energy. Marin Clean Energy's electricity contained 29% eligible renewable energy.

LIGHT AND HEAVY DUTY FLEET REGULATIONS

Assembly Bill 1493 (Pavley), signed into law in 2002, requires carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks beginning in 2009 through increased fuel efficiency standards. The California Air Resources Board (CARB) adopted regulations in September 2009 that reduce greenhouse gas emissions in new passenger cars, pickup trucks and sport utility vehicles for model years 2012-2016. CARB expects the new standards to reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016, while improving fuel efficiency and reducing motorists' costs. The Advanced Clean Cars rule will further reduce GHG emissions from automobiles and light-duty trucks for 2017-2025 vehicle models years. The ARB estimates that implementation of the ACC rule will reduce statewide emissions from light-duty vehicles by 3.8 million MTCO_{2e} in 2020, or by approximately 2.5%.

TITLE 24

The California Energy Commission (CEC) promotes energy efficiency and conservation by setting the state's building efficiency standards. Title 24 of the California Code of Regulations consists of regulations that cover the structural, electrical, mechanical, and plumbing system of every building constructed or altered after 1978. The building energy efficiency standards are updated on an approximate three-year cycle, and each cycle imposes increasingly higher demands on energy efficiency and conservation. The CEC's 2007 Integrated Policy Report established the goal that new building standards achieve "net zero energy" levels by 2020 for residences and by 2030 for commercial buildings. The California Public Utility Commission's California Long Term Energy Efficiency Strategic Plan, dated July 2008, endorses the Energy Commission's zero net energy goals for all newly constructed homes by 2020 and for all newly constructed commercial buildings by 2030. Emissions reductions are based on lower energy budgets mandated by existing Title 24 energy efficiency standards.

LIGHTING EFFICIENCY AND TOXIC REDUCTION ACT

AB 1109, the Lighting Efficiency and Toxic Reduction Act, tasks the California Energy Commission (CEC) with reducing lighting energy usage in indoor residences by no less than 50% from 2007 levels by 2018, as well as requires a 25% reduction in indoor and outdoor commercial buildings by the same date. To achieve these efficiency levels, the CEC applies its existing appliance efficiency standards to include lighting products, as well as requires minimum lumen/watt standards for different categories of lighting products. The bill also expands existing incentives for energy efficient lighting.

RESIDENTIAL SOLAR WATER HEATERS

The Residential Solar Water Heater Program (AB 1470) creates a \$25 million per year, 10-year incentive program to encourage the installation of solar water heating systems that offset natural gas and electricity use in homes and businesses throughout the state. The goal is to install 200,000 solar water heaters by 2017.

Table 7 shows the total emissions reductions in Corte Madera projected through implementation of State actions.

TABLE 7: EMISSIONS REDUCTIONS FROM STATE ACTIONS

State Action	2020 Emissions Reductions	2030 Emissions Reductions
Light and Heavy Duty Vehicle Regulations	3,401	9,489
Renewable Portfolio Standard	3,178	3,247
Title 24	113	391
Lighting Efficiency	1,136	1,136
Residential Solar Water Heaters	35	35
Total	7,862	14,298
% Reduced Below 2005 Baseline	42.3%	48.1%

SUMMARY OF LOCAL GREENHOUSE GAS EMISSIONS REDUCTION STRATEGIES

The local mitigation measures presented in this section, and as summarized in the tables below, achieve greenhouse gas emissions reductions in the community of nearly 3,000 metric tons CO₂e in 2020 and 5,000 metric tons CO₂e in 2030. These reductions are in addition to the 28,176 metric tons CO₂e already realized in the community between 2005 and 2013 (see Table 3). When State reductions are added (see Table 7 for a breakdown of State actions), emissions in Corte Madera would be approximately 46 percent below 2005 levels in year 2020 and 54 percent below baseline emissions in 2030 – enough to allow the Town to exceed State targets for both years.

Government operations represent a subset of community emissions. Within government operations, the Town could achieve reductions of 269 metric tons CO₂e by 2020 by implementing the local reduction strategies described in this chapter and detailed in the Appendix. Combined with State actions, the Town could reduce government operations emissions approximately 39 percent below 2005 levels by year 2020 (see Table 9). A wide range of programs that result in GHG emissions reductions that exceed the State's goal have been included to allow for the evaluation and prioritization of potential programs and capital improvement projects as new program and funding opportunities arise.

TABLE 8: REDUCTION STRATEGIES FOR COMMUNITY EMISSIONS

Sector	2020 GHG Reductions (metric tons CO ₂ e)	2030 GHG Reductions (metric tons CO ₂ e)
1 – Energy Efficiency and Renewable Energy	1,320	2,805
2 – Transportation	583	608
3 - Waste Reduction, Reuse and Recycling	615	1,059
4 - Water and Wastewater	168	170
5 - Natural Systems and Sequestration	9*	27*
Total Local Community Actions	2,687	4,642
Local Government Operations Actions (see Table 9)	269	322
State Actions (see Table 7)	7,862	14,298
TOTAL GHG Reductions		
2005 Emissions	84,410	84,410
Projected Emissions with Local and State Actions Implemented	45,753	38,825
<i>% Reduced Below 2005 Levels</i>	46%	54%

*Sequestration emissions are shown here for informational purposes only as they are not included in the Town’s Greenhouse Gas Emissions Inventory.

TABLE 9: REDUCTION STRATEGIES FOR GOVERNMENT OPERATIONS EMISSIONS

Sector	2020	2030
	GHG Reductions (metric tons CO ₂ e)	GHG Reductions (metric tons CO ₂ e)
1 – Energy Efficiency and Renewable Energy	177	177
2 – Transportation	10	8
3 – Waste Reduction, Reuse and Recycling	82	137
4 – Water and Wastewater	<1	<1
5 – Natural Systems and Sequestration	2*	5*
Total Local Government Operations Actions	269	322
State Actions Impacting Government Operations	20	53
TOTAL GHG Reductions		
Baseline Emissions	735	735
Projected Emissions with Local and State Actions Implemented	446	360
<i>% Reduced Below Baseline</i>	<i>39%</i>	<i>51%</i>

*Sequestration emissions are shown here for informational purposes only as they are not included in the Town’s Greenhouse Gas Emissions Inventory.

ENERGY EFFICIENCY AND RENEWABLE ENERGY

The two fundamental means for reducing emissions from electricity and natural gas use are decreasing consumption through both efficiency and behavioral change, and switching from fossil fuels to renewable sources.

Increasing the efficiency of buildings is the most cost-effective approach for reducing greenhouse gas emissions. Programs that require minimum energy efficiency upgrade for home remodeling, such as increasing insulation and sealing heating ducts, have demonstrated energy savings of up to 20 percent. More aggressive “whole house” retrofits can result in even greater energy savings. Many improvements are “low-hanging fruit” that can be made inexpensively and without remodeling, yet be extremely cost-efficient; these include use of efficient lighting, and use of advanced shower heads and irrigation controllers. Installing Energy Star-certified appliances and office equipment, high-efficiency HVAC systems, and LED lighting not only save energy but reduce operating costs in the long run.

New construction techniques and building materials, known collectively as “green building,” can significantly reduce the use of resources and energy and creation of waste in our homes and commercial buildings. Green construction methods can be integrated into buildings at any stage, from design and construction to renovation and deconstruction. The Town can also adopt energy efficiency standards for new construction and remodels that exceed existing State mandates.

Here in Marin County, residents and business have two primary options to switch to renewable energy – either by installing solar energy systems or purchasing Marin Clean Energy’s “Deep Green” electricity from 100 percent renewable energy sources. Existing solar energy systems in Corte Madera supply about 2.5 percent of the community’s electricity needs. The Town can help to increase solar adoption rates by providing incentives and financing options through property assessed clean energy (PACE) loans, streamlining permit processing, and amending design guidelines and zoning ordinances.

The Town can reduce energy consumption in its own operations by upgrading all streetlights and outdoor lighting to LED lights, completing recommended indoor lighting and HVAC retrofits, and installing solar energy systems at the Community Center, the corporation yard, and the fire stations. Finally, the Town should consider offsetting the rest of its electricity use through the purchase of Marin Clean Energy Deep Green electricity.

TABLE 10: ENERGY EFFICIENCY AND RENEWABLE ENERGY STRATEGIES

Strategy	2020	2030
	GHG Reductions (metric tons CO ₂ e)	GHG Reductions (metric tons CO ₂ e)
<i>Community Actions</i>		
1-1 Residential Green Building Ordinance	82	92
1-2 Commercial Green Building Ordinance	53	140
1-3 Solar Energy	700	1,603
1-4 Residential Energy Efficiency	70	140
1-5 Commercial Energy Efficiency	97	194
1-6 Energy Audits	19	38
1-7 Residential Marin Clean Energy Deep Green Electricity	299	598
<i>Government Operations Actions</i>		
1-8 Public Lighting	21	21
1-9 Municipal Energy Efficiency Projects	8	8
1-10 Municipal Energy Efficiency Protocols and Equipment	5	5
1-11 Municipal Solar	17	17
1-12 Municipal Marin Clean Energy Deep Green Electricity	125	125
TOTAL GHG Reductions	1,497	2,981

RECOMMENDED COMMUNITY ACTIONS

CAP 1-1

Residential Green Building Ordinance. Consider adopting CALGreen Tier 1 requirements to support higher building energy performance in new residential buildings and additions.

CAP 1-2.

Commercial Green Building Ordinance. Consider adopting CALGreen Tier 1 requirements to support higher building energy performance in new non-residential buildings, additions and remodels.

CAP 1-3

Solar Energy. Encourage residents and businesses to install solar energy systems.

CAP 1-3.a

Consider providing financial incentives for solar energy and hot water system installation, such as reducing or waiving permit fees.

CAP 1-3.b

Amend design guidelines and zoning ordinance to allow variances for solar systems in setbacks and to encourage ground-mount systems as well as installation on building roofs and over parking areas.

CAP 1-3.c

Continue to participate in CaliforniaFIRST, the property assessed clean energy (PACE) financing program.

CAP 1-3.d

Provide information to the public regarding energy audits, and the cost and payback time for solar installations and other energy efficiency improvements.

CAP 1-3.e

Provide solar assessment information to the public for residential and commercial projects.

CAP 1-4

Residential Energy Efficiency. Promote rebate and incentive programs offered through the Marin Energy Watch Partnership, Marin Clean Energy, PG&E, and others.

CAP 1-5

Commercial Energy Efficiency. Promote commercial and industrial energy efficiency and demand response programs provided through the Marin Energy Watch Partnership, Marin Clean Energy, PG&E and others.

CAP 1-6

Energy Audits. Consider requiring energy audits *and/or energy efficiency upgrades* for residential and commercial buildings prior to completion of sale or within a specified period of time after sale is transacted.

CAP 1-7

Residential 100% Renewable Electricity. Encourage homeowners to purchase 100 percent renewable electricity, such as Marin Clean Energy's Deep Green energy program.

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 1-8

Public Lighting. Replace all streetlights, traffic signals, and park lighting with energy-efficient LED lighting.

CAP 1-9

Municipal Energy Efficiency. Identify and complete energy-efficiency projects, including lighting efficiency and HVAC upgrades for Town Hall and the Fire Station, as feasible.

CAP 1-10

Municipal Energy Efficiency Protocols and Equipment. Install energy management software and implement energy efficiency protocols such as turning off lights and computers when not in use and reducing energy use through thermostat control. Adopt a sustainable purchasing policy that emphasizes recycled materials and Energy Star-certified appliances and office equipment.

CAP 1-11

Municipal Solar Energy. Install solar PV systems at Town facilities, such as the Community Center, the corporation yard, and the fire stations as feasible.

CAP 1-12

Municipal 100% Renewable Electricity. Purchase 100 percent renewable electricity for all Town facilities, such as Marin Clean Energy’s Deep Green energy program.

TRANSPORTATION

The transportation sector, which includes emissions from vehicles traveling on local road a portion of vehicle miles on State highways in Marin County, is the largest source of GHG emissions in the community, contributing 45 percent of total emissions. Federal and State legislation aimed at improving vehicle fuel efficiency will have the single greatest impact on reducing transportation emissions. Nonetheless, there is significant work that the local government can undertake to encourage residents, employees and visitors to use alternative modes of transportation, including bicycling, walking and public transportation. The Town can expand the network of pathways, sidewalks and bicycle routes and lanes, and ensure there are adequate facilities to lock and store bicycles. Improving safety and ensuring there are adequate multi-modal connections will help to maximize use of these facilities.

The Town is a member of the Transportation Authority of Marin (TAM), which provides funding and numerous programs to encourage alternative transportation. TAM funds Safe Routes to School programs and infrastructure improvements, a bicycle and pedestrian safety program called Street Smarts Marin, green commute programs, and electric vehicle infrastructure and events.

Increasing the use of electric vehicles is an important way to reduce emissions, as electric vehicle are estimated to generate less than 20 percent of the emissions produced by a gas-powered vehicle in Marin County. There are approximately 94 publically accessible electric vehicle charging stations in Marin, and local governments have installed about 40 percent of these chargers. Corte Madera could help expand the existing network by providing chargers in public parking lots, requiring new commercial and multi-family development to install chargers, and requiring residential development to pre-wire for future electric vehicle use.

TABLE 11: TRANSPORTATION STRATEGIES

Strategy	2020	2030
	GHG Reductions (metric tons CO ₂ e)	GHG Reductions (metric tons CO ₂ e)
<i>Community Actions</i>		
2-1 Bicycle and Pedestrian Transportation	260	197
2-2 Employee Trip Reduction	222	246
2-3 Transit	37	61
2-4 School Transportation	44	33
2-5 Electric Vehicles	20	70

<i>Government Operations Actions</i>			
2-6	High-Efficiency Town Vehicles	4	4
2-7	Town Employee Commute	7	5
TOTAL GHG Reductions		594	616

RECOMMENDED COMMUNITY ACTIONS

CAP 2-1

Bicycle and Pedestrian Transportation. Encourage bicycling and walking as a safe and efficient means to travel around Corte Madera.

CAP 2-1.a

Implement the Town’s Bicycle Master Plan. Construct recommended bike lanes, routes, bike racks and other facilities, and develop a town-wide bicycle system that meets the needs of residents, commuters and visitors.

CAP 2-1.b

Install traffic calming measures and intersection improvements to control speeding and improve pedestrian and cyclist safety.

CAP 2-1.c

Implement “Complete Streets” policies to ensure the needs of bicyclists, pedestrians and the disabled are considered in the transportation element of any new capital improvement or development project where feasible.

CAP 2-1.d

Install sidewalks and pathways where feasible. Improve and maintain all pedestrian facilities. Install lighting and other pedestrian amenities where practical.

CAP 2-1.e

Establish bicycle parking requirements for private developments, including indoor bike storage for multi-family projects.

CAP 2-1.f

Provide bicycle parking at large Town-sponsored events and encourage hosts of large events to do the same.

CAP 2-1.g

Require employers to provide bicycle parking and shower and changing facilities for employees in their development plans and as a component in all commute and traffic demand management programs.

CAP 2-1.h

Require development projects to provide connection and orientation to pedestrian and bicycle paths and existing transit facilities.

CAP 2-1.i

Work with transit providers to ensure there are adequate facilities to transport bicycles.

CAP 2-1.j

Promote “Share the Road” strategies to improve bicycle safety and improve compliance with traffic laws.

CAP 2-1.k

Educate residents and employees about the health and environmental benefits of walking and cycling and provide information to assist in these modes of travel.

CAP 2-2

Employee Trip Reduction. Encourage employees to walk, bike, carpool or take transit to work.

CAP 2-2.a

Work with the Transportation Authority of Marin, 511.org, and major employers to create and utilize transportation demand management programs, such as the Vanpool Incentive Program and Emergency Ride Home Program.

CAP 2-2.b

Require new commercial development to implement transportation demand management programs, such as shuttle service to transit stops, vanpool services, preferred parking for carpool vehicles, and teleworking and flexible work schedule policies.

CAP 2-3

Public Transit. Work with transit providers to plan, fund and implement additional transit services that are cost-effective and responsive to existing and future transit demand.

CAP 2-3a

Work with transit providers and other applicable agencies to develop a school and town-wide transit/transportation study.

CAP 2-4

School Transportation. Encourage bicycling, walking, carpooling, and taking public transit to school.

CAP 2-4.a

Construct pedestrian and bicycle facilities and safety improvements for school routes.

CAP 2-4.b

Work with the Transportation Authority of Marin and Safe Routes to School to develop and promote walking school buses, bike trains, and other programs that encourage walking and biking to school.

CAP 2-4.c

Work with school districts, Marin Transit and the Transportation Authority of Marin to promote school bus and carpooling programs.

CAP 2-5

Electric Vehicles. Encourage the use of electric vehicles, including electric bicycles, scooters and other personal transportation devices.

CAP 2-5.a

Install electric vehicle charging stations in Town parking lots.

CAP 2-5.b

Require new commercial and multi-family development to provide electric vehicle charging stations.

CAP 2-5.c

Require new single family residential development to provide electrical service for a potential electric vehicle charging station.

CAP 2-5.d

Participate in regional efforts and grant programs to encourage widespread availability of charging stations.

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 2-6

High-Efficiency Town Vehicles. Purchase or lease low or zero-emissions vehicles and the most fuel efficient models possible for the Town fleet, including construction vehicles where practical.

CAP 2-7

Town Employee Commute. Provide Town employees with incentives to use alternatives to single occupant automobile commuting, such as transit incentives, bicycle facilities, ridesharing services and subsidies, flexible schedules, and telecommuting when practical.

WASTE REDUCTION, REUSE AND RECYCLING

The reduction of waste, as well as the reuse and recycling of products, is key to reducing impacts on the environment. It is necessary to rethink what has traditionally been regarded as garbage and treat all materials as valued resources instead of items to discard. This requires shifting consumption patterns, more carefully managing purchases, and maximizing the reuse of materials at the end of their useful life.

Emissions from the waste sector are an estimate of methane generation from the decomposition of organic solid waste and alternative daily cover sent to the landfill. These emissions are not generated in the year the waste is landfilled, but instead result from the decomposition of the waste over 100+ years. About 75 percent¹⁵ of landfill methane emissions are captured through landfill gas collection systems, but the remaining 25 percent escape into the atmosphere as a significant contributor to global warming. Approximately 60 percent of Corte Madera's landfilled waste is organic (paper, cardboard, wood, yard trimming, food scraps, etc.); diverting this waste from the landfill is what will reduce greenhouse gas emissions.

The Town of Corte Madera is a member of the Marin Hazardous and Solid Waste Joint Powers Authority (JPA), which works with private waste haulers and facility operators to implement recycling programs and achieve state-mandated targets for waste diversion rates. Marin County has a high rate of diversion, with a current rate of about 74 percent. Countywide landfilled waste has declined about 28 percent since 2005, and is responsible for much of the decline in emissions between the 2005 and 2013 inventories. Nonetheless, per capita waste has remained fairly constant over the past five years, and has rebounded slightly since hitting a low in 2011.

In 2009, the JPA completed a zero-waste feasibility study which concluded that that between 75 and 80 percent of the material that goes to the landfill can be diverted. Currently the JPA is targeting the diversion of food waste and

¹⁵ U.S. Environmental Protection Agency, *Compilation of Air Pollutant Emissions Factors*, AP-42, Fifth Edition, January 1995.

demolished building materials to increase the county’s diversion rate. The JPA has embraced an aggressive goal for achieving “zero waste” by 2025, defined as achieving a 94 percent diversion rate by 2025. The JPA provides grant funds to member agencies to attain this goal. The JPA’s Zero Waste Marin website provides tips, tools and challenges to encourage community members to take action.

The JPA proposes that the member agencies endorse an Extended Producer Responsibility resolution and sign the California Product Stewardship Council pledge to shift California’s product waste management system from one focused on government funded and ratepayer financed waste diversion to one that relies on extended producer responsibility (EPR) in order to reduce public costs and drive improvements in product design that promote environmental sustainability.

TABLE 12: WASTE REDUCTION, REUSE AND RECYCLING STRATEGIES

Strategy	2020	2030
	GHG Reductions (metric tons CO ₂ e)	GHG Reductions (metric tons CO ₂ e)
<i>Community Actions</i>		
3-1 Zero Waste	615	1,059
<i>Government Operations Actions</i>		
3-2 Zero Waste in Government Operations	82	137
TOTAL GHG Reductions	697	1,196

RECOMMENDED COMMUNITY ACTIONS

CAP 3-1

Zero Waste. Increase the waste diversion rate to 86 percent by the year 2020 and 94 percent by the year 2030.

CAP 3-1.a

Explore requirements mandating recycling and composting for all Corte Madera residents, businesses, and Town government.

CAP 3-1.b

Work with the Town’s waste hauler to ensure timely collection of all organic waste, including food scraps, for businesses, residents, and Town offices.

CAP 3-1.c

Review and revise as appropriate the Town’s franchise agreement with its waste hauler to ensure waste reduction and diversion rates are maximized. Conduct a formal rate structure study to support these efforts.

CAP 3-1.d

Require recycling and composting at public events. Provide visible and educational signage to ensure compliance.

CAP 3-1.e

Adopt a Zero Waste Resolution with a goal to divert 94 percent waste from the landfill by the year 2025.

CAP 3-1.f

Increase mandatory construction and demolition diversion rates beyond the rate required by State building codes.

CAP 3-1.g

Work with community groups and the Marin Hazardous and Solid Waste Joint Powers Authority to conduct outreach and educational campaigns for Zero Waste initiatives. Host quarterly educational events throughout the year, and produce regular educational mailings for all residents including those living in multifamily dwellings.

CAP 3-1.h

Endorse an Extended Producer Responsibility resolution as proposed by the Marin Hazard and Solid Waste Joint Powers Authority.

CAP 3-1.i

Conduct a waste audit of all residences and businesses to understand where opportunities for increased diversion lie.

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 3-2

Zero Waste in Government Operations. Increase diversion of waste produced by government operations to 86 percent by the year 2020 and 94 percent by the year 2030.

CAP 3-2.a

Conduct a waste audit of all government facilities to understand where opportunities for increased diversion lie.

CAP 3-2.b

Provide recycling and composting containers with clear and visible educational signage in public areas, parks and Town facilities.

CAP 3-2.c

Embark on an educational and incentive-based campaign to increase recycling and composting rates within government operations.

CAP 3-2.d

Implement operational and purchasing policies to reduce paper use, such as requiring duplex printing, providing dishware and glassware to reduce use of paper plates and cups, and online submission of applications and documents.

CAP 3-2e

Provide educational materials to assist citizens and contractors in reducing waste at home and at construction sites.

WATER AND WASTEWATER

WATER

The Marin Municipal Water District (MMWD) supplies drinking water to a 147-square-mile area of south and central Marin, including the Town of Corte Madera. The primary source of water supply is rainfall stored in seven local reservoirs. About one-quarter of the water supply is imported from the Russian River annually. After treatment at one of the district's three water treatment plants, the water is transmitted throughout the MMWD service area by gravity flow or booster pumps.

Water conservation efforts not only save water but reduce the demand for electricity to pump, treat and convey water from the water source to water users in Corte Madera. In addition, conservation reduces the need to treat wastewater at the Central Marin Sanitation Agency's facilities, where GHG emissions are created during the treatment process as well as indirectly through the consumption of electricity to run the facilities.

Properties in Corte Madera are subject to MMWD's water conservation regulations, which exceed State building codes in some instances. All plumbing installed, replaced or moved in any new or existing building must be high-efficiency fixtures. Water-efficient landscape regulations apply to all newly constructed and rehabilitated non-residential and developer-installed residential landscapes of 1,000 square feet or greater, as well as homeowner residential projects of 2,500 square feet or greater.

The Water Conservation Act of 2009 (Senate Bill X7-7) requires all urban water districts, including MMWD, to reduce per capita water usage by 20 percent by the year 2020. MMWD's target is 124 gallons per capita per day, a level that was achieved in 2010. Water usage has rebounded due to the three-year drought and was 139 gallons per capita per day in 2013, indicating a need for additional conservation measures.

MMWD's Water Conservation Plan outlines a number of water conservation programs, including education, outreach, rebates, incentives, water audits, and requirements, designed to reduce water usage approximately 9 percent. Supporting MMWD's water conservation programs and adopting additional water conservation measures will help to reduce greenhouse gas emissions created by the Corte Madera community.

WASTEWATER

The Central Marin Sanitation Agency (CMSA) treats wastewater produced by the Corte Madera community. As wastewater is treated, chemical processes in aerobic and anaerobic conditions create two greenhouse gases, methane and nitrous oxide. Methane that would otherwise be released to the atmosphere is collected and converted to energy, thereby reducing the treatment plant's use of electricity and/or natural gas in its daily operations. In partnership with Marin Sanitary Service, CMSA adds food waste collected from restaurants, markets and other eligible businesses to the bio digestion process, increasing the amount of energy that can be produced at the plant.

TABLE 13: WATER AND WASTEWATER STRATEGIES

Strategy	2020 GHG Reductions (metric tons CO ₂ e)	2030 GHG Reductions (metric tons CO ₂ e)
<i>Community Actions</i>		
4-1 Indoor Water Efficiency and Conservation	153	153
4-2 Outdoor Water Efficiency and Conservation	14	14
4-3 Rainwater Catchment	<1	<1
4-4 Greywater Systems	1	3
<i>Government Operations Actions</i>		
4-5 Municipal Water Conservation	<1	<1
TOTAL GHG Reductions	168	170

RECOMMENDED COMMUNITY ACTIONS

CAP 4-1

Indoor Water Efficiency and Conservation. Reduce indoor water use in residential and commercial buildings.

CAP 4-1.a

Implement State law requirements for water-efficient fixtures and consider adopting CALGreen Tier 1 requirements.

CAP 4-1.b

Work with Marin Water District to promote existing and new rebates for water-efficient appliances and fixtures, including toilets, urinals, showerheads, faucets, washing machines and dishwashers.

CAP 4-1.c

Consider requiring upgrade (change-out) of plumbing fixtures to current code requirements upon resale of residential building or within a specified time after sale is transacted.

CAP 4-1.d

Utilize the Town’s website, newsletter, community events, and other communication channels to educate the public on indoor water conservation practices, available financial incentives and programs, and water-efficient fixture requirements for new buildings, remodels, and resales.

CAP 4-2

Outdoor Water Efficiency and Conservation. Reduce outdoor water use.

CAP 4-2.a

Work with Marin Municipal Water District to promote existing and new rebates for water-efficient landscaping, irrigation systems, and weather-based irrigation controllers.

CAP 4-2.b

Support additional water-efficient landscape requirements as needed to meet water conservation targets. Provide information to the public on water-efficient landscape requirements for new and remodeled landscape projects.

CAP 4-2.c

Utilize the Town’s website, newsletter, community events and other communication channels to educate the public on water-efficient landscaping and irrigation practices, rainwater catchment systems, and greywater systems.

CAP 4-2.d

Partner with non-profit agencies that provide workshops and classes to educate homeowners and business owners on ways to reduce outdoor water use and use captured rainwater and greywater for irrigation.

CAP 3-2.e

Install a demonstration garden with locally-available, low-water use plants to provide ideas for water-efficient landscaping.

CAP 4-3

Rainwater Catchment. Reduce potable water use for landscape irrigation.

CAP 4-3.a

Promote existing and new rebates for rainwater storage facilities, such as rain barrels, cisterns, and storage tanks.

CAP 4-3.b

Review existing building and zoning codes and permitting procedures and revise as necessary to encourage rainwater storage facilities.

CAP 4-4

Greywater. Recycle wastewater and reduce potable water use for landscape irrigation.

CAP 4-4.a

Promote existing and new rebates for greywater systems, including laundry-to-landscape system components.

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 4-5

Municipal Water Conservation. Assess, maintain and repair existing plumbing fixtures, pipes, and irrigation systems in all Town buildings, facilities and landscaping to minimize water use.

NATURAL SYSTEMS AND SEQUESTRATION

The natural environment has been extensively altered by human civilization, often with little consideration for how natural systems function, depriving us of the important benefits they offer. Clearing and draining of wetlands, forestlands, grasslands and other open space for agricultural production or urban development decreases or eliminates the capacity of those natural systems to store carbon. The carbon dioxide stored in soil, trees and other vegetation is released into the atmosphere when forestland and open space is converted to other uses. Restoration of these natural areas, and establishment of new ones, has the potential to tie up or sequester greenhouse gas emissions in the form of soil and wood carbon. One way Corte Madera can sequester emissions is by encouraging tree planting in the community.

TABLE 14: NATURAL SYSTEMS AND SEQUESTRATION STRATEGIES

Strategy	2020 GHG Reductions (metric tons CO ₂ e)	2030 GHG Reductions (metric tons CO ₂ e)
<i>Community Actions</i>		
5-1 Tree Planting on Private Land	9	27
<i>Government Operations Actions</i>		
5-2 Tree Planting on Public Land	2	5
TOTAL GHG Reductions	11*	32*

*GHG reductions are reported for informational purposes only, as sequestration is not included in the Town’s Greenhouse Gas Emissions Inventory.

RECOMMENDED COMMUNITY ACTIONS

CAP 5-1

Tree Planting on Private Land. Increase Corte Madera’s tree cover.

CAP 5-1.a

Require new development and significant remodeling projects to plant trees along street frontages, wherever feasible.

CAP 5-1.b

Require new and renovated parking lots to plant trees, wherever feasible.

CAP 5-1.c

Require replacement of trees that are removed.

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 5-2

Tree Planting on Public Land. Increase the number of trees on Town land.

CAP 5-2.a

Plant trees in Town parks, parking lots, medians and sidewalks, wherever feasible.

CAP 5-2.b

Replace Town park and street trees that are removed, wherever feasible.

CAP 5-2.c

Properly maintain and prune existing Town park and street trees.

STRATEGIES TO ADAPT TO CLIMATE CHANGE

To effectively address the challenges that a changing climate will bring, the Town must not only reduce its greenhouse gas emissions, but be prepared to respond to the expected impacts of climate change. Sea level rise, in particular, is expected to have significant impacts on Corte Madera's coastline, especially when coupled with storm events and king tides. Many of the mitigation measures incorporated in this Climate Action Plan will help the community prepare for the effects of climate change. Reducing water use will ease competition for limited water supplies expected from higher temperatures and reduced snowmelt, while reducing electricity use will help ease demand for diminishing hydroelectric power. Other expected effects from climate change – such as higher frequency of large damaging fires and pest and insect epidemics – must be anticipated through adequate public safety, emergency, and public health responses.

RECOMMENDED ACTIONS

CAP 6-1

Conduct a sea level rise vulnerability and risk assessment and develop adaptation measures to prepare for flooding and inundation. Integrate the impact of storm events and king tides when analyzing and planning for sea level rise.

CAP 6-2

Partner with neighboring municipalities and regional agencies to develop and implement regional risk and vulnerability studies and adaptation programs and projects.

CAP 6-3

Prepare a guidance document for incorporating sea level rise into the Town's capital planning process.

CAP 6-4

Incorporate the likelihood of sea level rise and extreme heat and storm events in the Town's Local All-Hazard Mitigation Plan.

CAP 6-5

Incorporate the likelihood of climate change impacts into Town emergency planning and training.

CAP 6-6

Coordinate with water districts, wildlife agencies, flood control and fire districts, Marin County, and other relevant organizations to address climate change impacts and develop adaptation strategies. Address human health and the health and adaptability of natural systems, including the following:

- a. Water resources, including expanded rainwater harvesting, water storage and conservation techniques, water reuse, and water-use and/or irrigation efficiency.
- b. Biological resources, including land acquisition, creation of marshlands/wetlands as a buffer against sea level rise and flooding, and protection of existing natural barriers.
- c. Public health, including heat-related health plans, vector control, safe water, and improved sanitation.
- d. Environmental hazards, including seawalls, storm surge barriers, and fire protection.

IMPLEMENTATION OF THE CLIMATE ACTION PLAN

Corte Madera recognizes that responding to and preparing for climate change is a critical step toward a sustainable future. The Town's early actions to reduce its contribution to climate change reflect the Town's history and commitment to decrease the impacts of day-to-day activities on the natural environment while enhancing its vibrant quality of life. Mitigating climate change will require everyone — residents, businesses, government agencies, and nonprofit organizations — to work together to implement this plan.

This plan provides a strategy to achieve emission reductions that will achieve local levels consistent with State goals to reduce greenhouse gas emissions to 1990 levels by 2020 and to 40 percent below 1990 levels by 2030. A wide range of programs that exceed the 2020 goal have been included to allow for the evaluation and prioritization of potential programs and capital improvement projects as new program and funding opportunities arise. Successful implementation of the plan will require staff and the Town Council to identify and commit resources to climate change mitigation activities, and to monitor and report on progress towards meeting emissions reduction goals.

RECOMMENDED ACTIONS

CAP 7-1

Monitor and report on the Town's progress annually. Create an annual priorities list for implementation.

CAP 7-2

Update the greenhouse gas emissions inventory for community emissions annually and every five years for government operations, beginning in 2015.

CAP 7-3

Continue and expand public and private partnerships that support implementation of the climate action plan, including membership in the Marin Climate and Energy Partnership.

CAP 7-4

Identify funding sources for recommended actions, and pursue local, regional, state and federal grants as appropriate.

CAP 7-5

Update the Climate Action Plan by the year 2020 to revise and add new reduction strategies as appropriate.


TABLE 15: IMPLEMENTATION TARGETS AND COST/BENEFIT ASSESSMENT FOR REDUCTION STRATEGIES

Strategy	Target	Estimated Cost	Estimated Annual Savings	2020 GHG Reductions (MTCO ₂ e)	2030 GHG Reductions (MTCO ₂ e)
1-1 Residential Green Building Ordinance	Adopt CALGreen Tier 1 standards for residential projects that require new construction to reduce energy use 15% and additions to reduce energy use 5-10%.			82	92
1-2 Commercial Green Building Ordinance	Adopt CALGreen Tier 1 standards for non-residential projects that require new construction to reduce energy use 10% and remodels and additions to reduce energy use 5-10%.			53	140
1-3 Solar Energy	Achieve 8.7% market penetration by 2020 and 20% market penetration by 2030.			700	1,603
1-4 Residential Energy Efficiency	5% of households participate in programs by 2020 and 10% participate by 2030.			70	140
1-5 Commercial Energy Efficiency	51 businesses participate by 2020 and 102 participate by 2030.			97	194
1-6 Energy Audits	10% of audited households reduce energy use by 10%			19	38
1-7 Residential Marin Clean Energy Deep Green Electricity	400 households purchase Deep Green by 2020 and 800 purchase Deep Green by 2030			299	598
1-8 Public Lighting	Replace all public lighting with LED lights.	\$225 per cobra-head streetlight. On bill financing is available through PG&E which is a loan program with no out-of-pocket expenses. ¹		21	21
1-9 Municipal Energy Efficiency Projects	Complete lighting and HVAC retrofits.	Town Hall & firehouse lighting retrofit: \$26,017	Town Hall & Firehouse lighting retrofits: \$1,551 Lighting retrofits were	8	8

		Firehouse 14 lighting retrofit: \$4,790 Lighting retrofit estimates are net of rebates and were developed in 2015. Town Hall HVAC replacement: \$33,750 Town Hall furnace replacement: \$7,200	developed in 2015. Town Hall HVAC replacement: \$434 Town Hall furnace replacement: \$224			
1-10	Municipal Energy Efficiency Protocols and Equipment	Reduce energy use by 5%	Energy management software costs approximately \$20 per desktop with a \$15 rebate currently available.	5	5	
1-11	Municipal Solar	Install solar PV as follows: 1. 32 kW system at Firehouse 14 2. 30 kW DC system at Community Center 3. 18 kW DC system at Corp Yard 4. 15 kW DC system at Firehouse 13	1. \$152,000 2. \$143,310 3. \$85,500 4. \$75,770 Estimates updated in 2015.	1. \$10,164 2. \$9,582 3. \$5,717 4. \$4,870 Estimates updated in 2015.	17	17
1-12	Municipal MCE Deep Green	Purchase Deep Green electricity for all facilities	\$12,830 for current operations; \$9,500 after implementation of all energy-efficiency and renewable energy strategies (1 cent per kWh)	125	125	
2-1	Bicycle and Pedestrian Transportation	Pedestrian improvements decrease VMT 1% by 2020 and 2% by 2030. New Class I and II bike facilities increase bicycle mode share for utilitarian trips from 1.8% to 3.97%			260	197
2-2	Employee Trip Reduction	TDM programs targeted to 50% of employees by 2020 and 100% of employees by 2030. 5.4% of targeted employees participate.			222	246
2-3	Transit	Increase transit ridership 2.5% per year.			37	61

2-4	School Transportation	Decrease number of students driving alone to school by 29%.		44	33	
2-5	Electric Vehicles	Install 20 electric vehicle charge ports by 2020 and 100 by 2030.		20	70	
2-6	High-Efficiency Town Vehicles	Replace 4 vehicles with hybrid models	Fueleconomy.gov compares costs for individual hybrid vs. non-hybrid models. As an example, the hybrid version of the Honda Accord costs \$30,095 vs. \$26,620, an additional expense of \$3,475.	Fueleconomy.gov provides fuel savings and payback periods for hybrid vs. non-hybrid models. As an example, estimated fuel savings for the Honda Accord hybrid is \$535 per year. The payback period is 6.5 years.	4	4
2-7	Town Employee Commute	Reduce employee commute VMT 5.4%	The Transportation Authority of Marin provides green commute programs and a free Go Time Marin commuter toolkit. 511 provides free survey and consultation services.		7	5
3-1	Zero Waste	Divert 86% of waste from landfill, or approximately 50% reduction in organic waste going to the landfill, by 2020. Divert 94% of waste by 2030.			615	1,059
3-2	Zero Waste in Government Operations	Divert 86% of waste from landfill, or approximately 50% reduction in organic waste going to the landfill, by 2020. Divert 94% of waste by 2030.	The Town is eligible to receive approximately \$14,000 per year in Zero Waste grant funds from the Marin County Hazardous and Solid Waste JPA, and funds may be used to conduct waste audits, adopt a zero waste resolution, adopt a Construction & Demolition Ordinance, add public recycling receptacles, etc.		82	137

4-1 Indoor Water Efficiency and Conservation	Reduce water consumption by 11.4 acre-feet per year (approximately 1.2% of 2013 consumption).		153	153
4-2 Outdoor Water Efficiency and Conservation	Reduce outdoor water use 20%		14	14
4-3 Rainwater Catchment	25,000 gallons of water storage installed by 2020 and 50,000 gallons installed by 2030.		<1	<1
4-4 Greywater Systems	50 households using greywater systems by 2020 and 200 systems by 2030.		1	3
4-5 Municipal Water Conservation	Reduce water use by 20%.	Change-out of specific fixtures will require additional analysis.	<1	<1
5-1 Tree Planting on Private Land	Plant 50 net new trees per year.		9	27
5-2 Tree Planting on Public Land	Plant 10 net new trees per year.	Estimated annual cost for planting new trees is \$10,000.	2	5

 Indicates a Government Operations Action

¹Large scale replacement of standard high pressure sodium (HPS) fixtures with light-emitting diode (LED) fixtures saves a significant of money each month in lower energy costs and lower routine monthly maintenance charges. PG&E pays for the new LED fixtures up front as a loan, but instead of cities paying the loan back directly, PG&E instead takes the difference between what the monthly bill would have been with old HPS fixtures and the lower energy cost of new LED fixtures. The amount the Town pays each month stays the same as the old billing structure up until the time when the loan is paid in full.

APPENDIX

RESIDENTIAL GREEN BUILDING ORDINANCE

Community Action 1-1

Objective	Adopt CALGreen Tier 1 standards for residential projects.				
General Plan Programs	RCS-2.6.d: Green Building Guidelines. Adopt Green Building guidelines for new construction, renovations and municipal projects. Integrate green building requirements into the development review and building permit process. Collaborate with local jurisdictions to share resources, and develop green building policies and programs that are optimized for the region. (See GP for full text)				
Reductions (MTCO ₂ e)	Implementation action: <table border="0"> <tr> <td>-82.0</td> <td>2020</td> </tr> <tr> <td>-91.6</td> <td>2030</td> </tr> </table>	-82.0	2020	-91.6	2030
-82.0	2020				
-91.6	2030				
Methodology	<p>CAPCOA Measure BE-1 used for estimating building energy savings.</p> <p>For additions, assumed an average of 22 residential projects per year (approximately 780 square feet of conditioned space total). Assumed 1,800 square feet per residential building (2011 American Housing Survey for owner-occupied units in San Francisco-San Mateo-Redwood City AHS Area).</p> <p>CALGreen Tier 1 currently requires 15% reduction in the energy budget for new residential. Assumed requirements for residential additions are 5% reduction for projects involving one new mechanical systems and a 10% reduction for projects involving two or more new mechanical systems, as proposed for the 2016 CALGreen update. Space heating systems, space cooling systems, and water heating systems are each separate mechanical systems. Assumed an equal percentage of both project types.</p> <p>All new residential buildings (single family and low-rise multifamily 3 stories or less) are assumed to be zero net energy as of 2020 and are separately quantified as a State Action.</p>				
Sources	<p>California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.</p> <p>California Building Standards Commission, 2013 California Green Building Standards Code, California Code of Regulations, Title 24, Part 11</p> <p>Building Department, Town of Corte Madera 2011 American Housing Survey, Table C-02-OO-M</p>				

Calculation

Residential	2020	2030
Percent over Title 24 Energy Requirements	15 %	15 %
Percent of participating new residential units	100%	100%
New construction electricity use, BAU	1,183,403 kWh	1,183,403 kWh
New construction electricity use, after Title 24	938,428 kWh	938,428 kWh
Additional reduction in electricity use	10,346 kWh	10,346 kWh
New construction natural gas use, BAU	115,702 therms	115,702 therms
New construction natural gas use, after Title 24	106,868 therms	106,868 therms
Additional reduction in natural gas use	14,265 therms	14,265 therms
GHG emissions reductions	77.2 MTCO ₂ e	77.2 MTCO ₂ e

Residential: Additions	2020	2030
Percent over Title 24 Energy Requirements	7.5 %	7.5 %
Number of projects per year requiring new or modified mechanical systems	11	11
Annual expanded space per year	8,580 square feet	8,580 square feet
Total expanded space	42,900 square feet	128,700 square feet
Electricity use, BAU	135,598 kWh	406,795 kWh
Reduction in electricity use	747 kWh	2,242 kWh
Natural gas use, BAU	13,257 therms	39,772 therms
Reduction in natural gas use	885 therms	2,655 therms
GHG emissions reductions	4.8 MTCO ₂ e	14.4 MTCO ₂ e

Reductions in Energy Use for Every 1% Over 2008 Title 24 Energy Requirements, Zone 5

	Electricity	Natural Gas	Source
Commercial	0.26%	0.72%	CAPCOA Measure BE-1
Residential - Multifamily	0.09%	0.88%	
Residential - Single	0.04%	0.91%	
Residential - Townhome	0.05%	0.90%	
Residential (33% single, 67% multifamily)	0.07%	0.89%	Calculation

COMMERCIAL GREEN BUILDING ORDINANCE

Community Action 1-2

Objective	Adopt CALGreen Tier 1 standards for non-residential projects.				
General Plan Programs	RCS-2.6.d: Green Building Guidelines. Adopt Green Building guidelines for new construction, renovations and municipal projects. Integrate green building requirements into the development review and building permit process. Collaborate with local jurisdictions to share resources, and develop green building policies and programs that are optimized for the region. (See GP for full text)				
Reductions (MTCO ₂ e)	Implementation action: <table style="width: 100%; border: none;"> <tr> <td style="text-align: right; padding-right: 20px;">-53.1</td> <td>2020</td> </tr> <tr> <td style="text-align: right; padding-right: 20px;">-140.0</td> <td>2030</td> </tr> </table>	-53.1	2020	-140.0	2030
-53.1	2020				
-140.0	2030				
Methodology	CAPCOA Measure BE-1 used for estimating building energy savings. For additions, assumed 84 non-residential projects per year (approximately 64,500 square feet of remodeled area total). CALGreen Tier 1 currently requires 5% reduction in the energy budget for projects that include indoor lighting or mechanical systems, but not both, and 10% reduction for projects that include both indoor lighting and mechanical systems. Assumed an equal percentage of both project types. Assumed 15.3 kWh per square foot and 0.32 therms per square foot.				
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010. California Building Standards Commission, 2013 California Green Building Standards Code, California Code of Regulations, Title 24, Part 11 Town of Corte Madera Building Department U.S. Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-871A, C, and E of the 2003 Commercial Buildings Energy Consumption Survey (Zone 4).				

Calculation

Commercial	2020	2030
Percent over Title 24 Energy Requirements	10 %	10 %
Percent of participating new commercial space	100%	100%
New construction electricity use, BAU	972,779 kWh	1,279,972 kWh
New construction electricity use, after Title 24	917,963 kWh	1,071,559 kWh
Additional reduction in electricity use	23,867 kWh	27,861 kWh
New construction natural gas use, BAU	22,670 therms	29,829 therms
New construction natural gas use, after Title 24	20,220 therms	24,992 therms
Additional reduction in natural gas use	1,456 therms	1,799 therms
GHG emissions reductions	10.9 MTCO ₂ e	13.2 MTCO ₂ e

Commercial: Remodels and Additions	2020	2030
Percent over Title 24 Energy Requirements	7.5 %	7.5 %
Number of projects per year	5	5
Total remodeled/expanded space, 2015-2020	322,500 square feet	967,500 square feet
Electricity use, BAU	4,934,250 kWh	14,802,750 kWh
Reduction in electricity use	96,218 kWh	288,654 kWh
Natural gas use, BAU	103,200 therms	309,600 therms
Reduction in natural gas use	5,573 therms	16,718 therms
GHG emissions reductions	42.3 MTCO ₂ e	126.8 MTCO ₂ e

Reductions in Energy Use for Every 1% Over 2008 Title 24 Energy Requirements, Zone 5

	Electricity	Natural Gas	Source
Commercial	0.26%	0.72%	CAPCOA Measure BE-1
Residential - Multifamily	0.09%	0.88%	
Residential - Single	0.04%	0.91%	
Residential - Townhome	0.05%	0.90%	
Residential (40% single, 60% multifamily)	0.07%	0.89%	Calculation

COMMUNITY SOLAR ENERGY

Community Action 1-3

Objective	Identify and remove barriers to small-scale, distributed solar energy production within the community.				
Program Description	The goal of this measure is to reduce GHG emissions from residential and commercial energy use by facilitating the development of small-scale distributed solar energy production. This can be accomplished through 1) adoption of incentives, such as permit streamlining and fee waivers, as feasible; 2) amendments to development codes, design guidelines, and zoning ordinances, as necessary; 3) installation of solar panels on carports and over parking areas on commercial projects, and new large-scale residential developments, and; 4) implementation of Property Assessed Clean Energy (PACE) programs for residential and non-residential projects.				
General Plan Programs	RCS-2.4.b: Renewable Energy. Provide for use of renewable energy systems to help meet future energy needs of the community. This may include use of photovoltaic solar collection systems to reduce dependency on fossil fuels. Include provisions for use of such systems in the Town's Design Guidelines.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%; text-align: right;">-699.6</td> <td style="width: 40%;">2020</td> </tr> <tr> <td style="text-align: right;">-1,602.6</td> <td>2030</td> </tr> </table>	-699.6	2020	-1,602.6	2030
-699.6	2020				
-1,602.6	2030				
Methodology	Calculation assumes 8.7% PV market penetration by 2020 based on 2014 annual growth rates of 36% for residential systems and 12% for non-residential systems. PV residential market penetration is estimated at 3.2% in June 2015, and non-residential penetration at 2.2%. The estimate of PV to be installed is restricted to installations on existing homes and commercial properties, excluding government facilities.				
Sources	<p>Solar Electric Power Association, "Utility Solar Market Snapshot: Sustained Growth in 2014," May 2015, https://www.solarelectricpower.org/media/322918/solar-market-snapshot-2014.pdf</p> <p>California Solar Statistics, "Currently Interconnected Data Set," June 30, 2015</p> <p>Dana Armanino, Senior Planner, Marin County Community Development</p>				

Calculation

	2020	2030
Community electricity consumption (kWh), excluding new development (2013)	62,229,069	62,229,069
Less government operations kWh	60,946,329	60,946,329
Percent kWh generated by renewable systems	8.7%	20.0%
kWh produced by renewable systems	5,321,556	12,189,266
GHG emissions reductions	699.6	1,602.6

Growth Rate Calculation

Estimated residential PV generation, 2015	717,796
Estimated residential electricity consumption including PV generation, 2015	22,294,951
Estimated residential market penetration, 2015	3.2%
Annual growth rate, 2014	36.0%
Projected generation, 2020	3,894,621
Projected market penetration, 2020	17.5%
Non-residential PV generation, 2015	900,910
Estimated non-residential electricity consumption including PV generation, 2015	41,552,824
Estimated non-residential market penetration, 2015	2.2%
Annual growth rate, 2014	12.0%
Projected generation, 2020	1,680,275
Projected market penetration, 2020	4.0%
Projected market penetration, residential and non-residential combined, 2020	8.7%

RESIDENTIAL ENERGY EFFICIENCY

Community Action 1-4

Objective	Continue and expand participation in County and regional residential energy efficiency programs such as California Energy Youth Services and Energy Upgrade California. Participate in similar rebate/incentive programs as they become available and promote existing rebates (PG&E, MCE, State, Federal). Participate in PACE financing programs such as CaliforniaFirst and HERO.				
General Plan Programs	RCS-2-2.f: Cooperate with Regional Energy Programs. Cooperate with regional energy programs such as the Marin County Energy Watch Partnership to promote energy efficiency in Town facilities, residences, and commercial buildings. RCS-2.3.a: Utility Efficiency Programs. Encourage homeowners to utilize programs offered by the utility services when designing plans for residences as a means of reducing energy demands and costs.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="width: 30%; text-align: right;">-70.2</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-140.3</td> <td>2030</td> </tr> </table>	-70.2	2020	-140.3	2030
-70.2	2020				
-140.3	2030				
Methodology	<p>California Youth Energy Services (CYES) provides no-cost green house calls to homeowners and renters, regardless of income level. The professionally-trained staff provides energy assessments and installs free energy and water-saving equipment. CYES serves single family dwellings, 2-4 duplexes, and multi-family units. In 2014, CYES served 14 households in Corte Madera and installed energy-efficient equipment that saves an average of 187 kWh per home.</p> <p>Energy Upgrade California is an energy efficiency program that provides rebates and resources to upgrade single family and 2-4 unit multi-family dwellings to save energy and water. Energy Upgrade California demonstrated energy savings averaging 31% Btu for projects completed in Marin County between June 2010 and May 2012.</p> <p>Residences use 1,342 kWh for indoor lighting on average (U.S. Department of Energy). Energy efficient lighting can reduce energy lighting use by 50% - 75% (U.S. Department of Energy), or 671 to 1,007 kWh in Corte Madera.</p> <p>Approximately 46% of residential natural gas consumption is for space heating (California Energy Commission), or an average of 265 therms per home in Corte Madera. Insulation, air sealing and programmable thermostat upgrades can reduce energy use 20% to 50% (U.S. Department of Energy), or an estimated 53 to 133 therms in Corte Madera.</p> <p>Calculation assumes the low end of these potential savings.</p>				
Sources	<p>Marin County Energy Watch Partnership, Dana Armanino, Sustainability Planner, County of Marin, darmanino@marincounty.org</p> <p>U.S. Department of Energy, http://energy.gov/eere/why-energy-efficiency-upgrades</p> <p>California Energy Commission Demand Analysis Office, http://energyalmanac.ca.gov/naturalgas/residential_use.html</p>				

Calculation

	2020	2030
Existing households, 2010	3,792	3,792
Program participation rate	5%	10%
Households served	190	379
Electricity savings per household (kWh)	671	671
Annual electricity savings (kWh)	127,238	254,476
Natural gas savings per household (10%)	53.0	53.0
Annual natural gas savings (therms)	10,050	20,100
GHG emissions reductions	70.2	140.3

COMMERCIAL ENERGY EFFICIENCY

Community Action 1-5

Objective	Promote PG&E and MCE commercial and industrial energy efficiency/demand response programs. Leverage existing rebates/add additional rebates for energy efficient retrofits. Participate in PACE financing programs such as CaliforniaFirst and HERO.				
General Plan Programs	RCS-2.2a: Energy Conservation and Efficiency. Identify opportunities for creating energy conservation and efficiency programs for application on all Town facilities, schools and local businesses.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; width: 150px;">-97.0</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-194.1</td> <td>2030</td> </tr> </table>	-97.0	2020	-194.1	2030
-97.0	2020				
-194.1	2030				
Methodology	Smart Lights is designed to help small businesses become more energy-efficient. The program offers free start-to-finish technical assistance and instant rebates to help defray the cost of upgrading and/or repairing existing equipment. Smart Lights can help with comprehensive lighting retrofits, refrigeration tune-ups, controls, and seals replacement, replacing domestic hot water heaters, and referrals to appropriate HVAC programs. Between January 2009 and April 2015, Smart Lights completed 32 projects in Corte Madera that save 461,266 kWh annually.				
Sources	Marin County Energy Watch Partnership, Dana Armanino, Sustainability Planner, County of Marin, darmanino@marincounty.org				

Calculation

	2020	2030
Number of projects completed	51	102
Electricity savings per project (kWh)	14,415	14,415
Annual electricity savings (kWh)	738,026	1,476,051
GHG emissions reductions	97.0	194.1

ENERGY AUDITS

Community Action 1-6

Objective	Require energy audits for residential and commercial buildings prior to completion of sale.				
General Plan Programs	RCS-2.2a: Energy Conservation and Efficiency. Identify opportunities for creating energy conservation and efficiency programs for application in all Town facilities, schools and local businesses.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; width: 100px;">-18.9</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-37.8</td> <td>2030</td> </tr> </table>	-18.9	2020	-37.8	2030
-18.9	2020				
-37.8	2030				
Methodology	<p>118 housing units sold annually, based on 10-year average for 2005-2014 (Marin County Assessor).</p> <p>Assumes 10% of audited housing units will voluntarily reduce energy use by 10%.</p>				
Sources	Marin County Assessor, http://www.marincounty.org/depts/ar/divisions/assessor/sales				

Calculation

	2020	2030
Average household electricity use 2010	5,689 kWh	5,689 kWh
Average household natural gas use 2010	556 therms	556 therms
Number of housing units sold annually	102 units	102 units
Number of housing units provided energy audits	510 units	1,020 units
Percent of participating housing units	10%	10%
Number of housing units implementing energy efficiency projects	51 units	102 units
Electricity reduction	10%	10%
Natural gas reduction	10%	10%
Annual electricity savings	29,016 kWh	58,032 kWh
Natural gas savings	2,837 therms	5,674 therms
Electricity emissions reductions	3.8 MTCO ₂ e	7.6 MTCO ₂ e
Natural gas emissions reductions	15.1 MTCO ₂ e	30.16 MTCO ₂ e

MCE DEEP GREEN ELECTRICITY

Community Action 1-7

	Encourage homeowners to purchase Marin Clean Energy 100% renewable energy ("Deep Green").				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 100px;">-299.2</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-598.4</td> <td>2030</td> </tr> </table>	-299.2	2020	-598.4	2030
-299.2	2020				
-598.4	2030				
Methodology	<p>Approximately 1.8% of MCE's customers chose Deep Green electricity in 2014. This equates to approximately 68 customers in Corte Madera.</p> <p>Marin Clean Energy Deep Green electricity costs 1 cent per kWh.</p>				
Sources	Rafael Silberblatt, Marin Clean Energy, presentation to Marin Climate & Energy Partnership, May 1, 2014.				

Calculation

	2020	2030
Number of households	4,000	4,294
Average annual household electricity use (kWh)	5,689 kWh	5,689 kWh
Electricity offset by purchase of Deep Green (kWh)	5,689 kWh	5,689 kWh
Annual cost per household	\$57	\$57
Number of participating households	400	800
GHG emissions reductions	299.2 MTCO ₂ e	598.4 MTCO ₂ e

Public Lighting
Government Operations Action 1-8

Objective	Replace energy-inefficient street, parking lot and other municipal outdoor lights with LED or other energy efficient alternative.
General Plan Programs	RCS-2.2a: Energy Conservation and Efficiency. Identify opportunities for creating energy conservation and efficiency programs for application an all Town facilities, schools and local businesses.
Reductions (MTCO ₂ e)	<p style="text-align: right;">-21.4</p> <p style="text-align: right;">-21.4</p> <p>2020: Replace all streetlights with LED lamps. 2030: Replace all streetlights with LED lamps.</p>
Methodology	The method used to calculate energy savings was developed by Town staff and the Marin Energy Watch Partnership.
Sources	Dana Armanino, Senior Planner, Marin County Community Development Agency

Calculation

	2020	2030
Reduction in annual energy use (kWh)	162,497	162,497
Reduction in electricity emissions (MTCO ₂ e)	21.4	21.4

MUNICIPAL ENERGY EFFICIENCY

Government Operations Action 1-9

Objective	Implement energy efficiency retrofits as indicated in the 2015 audit of Town facilities by the Marin County Energy Watch partnership. Leverage programs that provide rebates and advantageous financing.
Reductions (MTCO ₂ e)	<p>-8.2 2020: Implement identified projects</p> <p>-8.2 2030: Implement identified projects</p>
General Plan Programs	<p>RCS-2.2a: Energy Conservation and Efficiency. Identify opportunities for creating energy conservation and efficiency programs for application an all Town facilities, schools and local businesses.</p> <p>RCS-2.2.g: Conduct Energy Audits. Continue to conduct energy audits of Town facilities, and implement energy efficiency recommendations from those audits. Seek funding from available state sources and grant opportunities, as well as the CIP.</p>
Methodology	<p>This measure requires the Town to complete identified lighting efficiency and HVAC upgrade projects.</p> <ol style="list-style-type: none"> 1. Town Hall and Firehouse Lighting Retrofit (10,341 kWh) 2. Firehouse 14 Lighting Retrofit (6,645 kWh) 3. Town Hall Furnace Replacement (224 therms) 4. Town Hall HVAC Replacement (2,896 kWh) 4. Water Heater Replacement for Town Hall, both Firehouses and Community Center (821 therms)
Sources	<p>SmartLights Customer Reports for the Corte Madera Fire Department and Town Hall, September 10, 2015.</p> <p>Dana Armanino, Senior Planner, Marin County Community Development Agency</p>

Calculation

	2020	2030
Annual electricity savings (kWh)	19,882	19,882
Annual natural gas savings (therms)	1,045	1,045
GHG emissions reductions	8.2	8.2

ENERGY EFFICIENCY PROTOCOLS AND EQUIPMENT

Government Operations Action 1-10

Objective	Implement energy management software and energy efficiency protocols such as turning off lights and computers, thermostat control, etc. Implement a sustainable purchasing policy that emphasizes recycled materials and Energy Star equipment.						
General Plan Programs	RCS-2-2.d: Energy Efficient Models. Require energy-efficient models for all new Town equipment purchases. RCS-2-2.e: Energy Efficient Town Facilities. Manage Town facilities in the most energy efficient manner feasible.						
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; width: 10%;">-4.8</td> <td style="width: 10%;">2020</td> <td style="width: 80%;"></td> </tr> <tr> <td style="text-align: right;">-4.8</td> <td>2030</td> <td></td> </tr> </table>	-4.8	2020		-4.8	2030	
-4.8	2020						
-4.8	2030						
Methodology	Energy management software is proven to reduce energy consumption by 10% through identifying inefficiencies within operations. 5% reduction in energy use for miscellaneous behavioral changes by staff and mechanical operations, and upgrading to Energy Star equipment was assumed.						
Sources							

Calculation

	2020	2030
Electricity use in municipal buildings (kWh)	347,287	347,287
Natural gas use in municipal buildings (therms)	9,317	9,317
Percent reduction in energy use	5%	5%
Annual natural gas savings (therms)	466	466
Annual electricity savings (kWh)	17,364	17,364
GHG emissions reductions	4.8	4.8

MUNICIPAL SOLAR ENERGY

Government Operations Action 1-11

Objective	Install cost-effective solar PV systems on all buildings and facilities.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 50%;">-16.9</td> <td style="width: 50%;">2020</td> </tr> <tr> <td style="text-align: right;">-16.9</td> <td>2030</td> </tr> </table>	-16.9	2020	-16.9	2030
-16.9	2020				
-16.9	2030				
General Plan Programs	RCS-2.4.a: Use Alternative Energy Systems. Increase the use of renewable energy when retrofitting or constructing new Town facilities or when purchasing new equipment, provided they meet all public, safety, health, and design requirements and are proven to be reliable. Use renewable energy systems where they are cost effective. Analysis and consideration of payback time periods and future financial savings shall be included in the review of cost effectiveness.				
Methodology	<p>There are four potential sites for solar PV on municipal buildings.</p> <ol style="list-style-type: none"> 1. 32 kW system at Firehouse 14 2. 30 kW DC system at Community Center 3. 18 kW DC system at Corp Yard 4. 15 kW DC system at Firehouse 13 				
Sources	Dana Armanino, Senior Planner, Marin County Community Development Agency				

Calculation

	2020	2030
kWh generated by renewable energy systems	128,910	128,910
GHG emissions reductions	16.9	16.9

MUNICIPAL 100% RENEWABLE ELECTRICITY

Government Operations Action 1-12

Related CAP Program	Purchase Marin Clean Energy 100% renewable energy ("Deep Green") for all facilities.
Reductions (MTCO ₂ e)	
-125.4	2020
-125.4	2030
Methodology	Purchase remaining electricity from renewable sources (e.g., Marin Clean Energy Deep Green) at a cost of 1 cent per kWh.
Sources	Marin Clean Energy

Calculation

	2020	2030
Government operations electricity consumption in 2013 (kWh)	1,282,740	1,282,740
Electricity emissions reduced through other measures (kWh)	328,653	328,653
Remaining electricity to be offset with Deep Green (kWh)	954,087	954,087
Cost to Town	\$9,541	\$9,541
Reduction in GHG emissions (MTCO ₂ e)	125.4	125.4

BICYCLE AND PEDESTRIAN TRANSPORTATION

Community Action 2-1

Action	Promote walking through design standards and amenities that concentrate uses, reduce the need for vehicular travel, improve safety, and enhance the pedestrian experience. Construct bike facilities as adopted in Town's Bicycle Master Plan and as required by Complete Streets policies. Establish parking policies and development requirements to increase use of walking and bicycling. Requirements for new commercial and multi-family development could include sidewalks, bike racks, lockers and showers. Ensure new development provides connection and orientation to pedestrian and bicycle paths and existing transit facilities.				
General Plan Programs	RCS-2.5.c: Programs to Reduce Fossil Fuel Based Transportation. Support municipal and community programs aimed at reducing fossil fuel based transportation. Programs should include alternatives such as employee carpooling, transit, walking and biking.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; text-align: right;">-259.8</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-196.6</td> <td>2030</td> </tr> </table>	-259.8	2020	-196.6	2030
-259.8	2020				
-196.6	2030				
Methodology	<p>According to a 2007 survey prepared for the Marin County Nonmotorized Transportation Pilot Program, mode shares for utilitarian trips (trips made to a destination and not solely for recreation or exercise) in Marin are as follows: bicycle, 1.8%; walking, 11.8%; transit, 3.2%; vehicle, 82%; rideshare, 1.4%. The average daily mileage per adult for utilitarian bike trips is 0.22 miles.</p> <p>Pedestrian network improvements can reduce VMT 1-2% (CAPCOA SDT-1). Each additional mile of Class II bike lanes per square mile increases the share of workers commuting by bicycle by 1% (CAPCOA SDT-5).</p>				
Sources	<p>Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007.</p> <p>California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.</p> <p>Town of Corte Madera Bicycle Master Plan, prepared by Alta Planning + Design, 2008.</p>				

Calculation

	2020	2030
<i>Pedestrian Improvements</i>		
Non-commercial VMT, entirely within Corte Madera town limits	3,474,070	3,650,365
% decrease in VMT due to pedestrian improvements	1.0%	2.0%
Annual decrease in VMT	34,741	73,007
GHG emissions reductions	13	21
<i>Bicycle Improvements</i>		
Miles of new Class I bike lanes	3.94	3.94
Miles of new Class II bike lanes	1.84	1.84
Total miles new bike lanes	5.78	5.78
New bike lanes per square mile	2.17	2.17
Corte Madera residents, aged 18 and over	6,971	7,191
Bicycle mode share for utilitarian purposes, BAU	1.8	1.8
Average bicycle miles for utilitarian purposes per person, BAU	0.22	0.22
Bicycle miles, BAU	559,763	577,440
Increase bicycle mode share to (percent):	3.97	3.97
VMT avoided	674,311	695,605
Emissions reductions	259.8	196.6

EMPLOYEE TRIP REDUCTION

Community Action 2-2

Program Description	Work with the Transportation Authority of Marin, 511.org, and major employers to create and utilize transportation demand management (TDM) programs to encourage employees to walk, bike, carpool or take transit to work.				
General Plan Programs	RCS-2.5.c: Programs to Reduce Fossil Fuel Based Transportation. Support municipal and community programs aimed at reducing fossil fuel based transportation. Programs should include alternatives such as employee carpooling, transit, walking and biking.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 15%;">-222.2</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-246.2</td> <td>2030</td> </tr> </table>	-222.2	2020	-246.2	2030
-222.2	2020				
-246.2	2030				
Methodology	<p>The Transportation Authority of Marin provides several employee commute programs including Emergency Ride Home, Vanpool Incentive, Telework Initiative, Safe Routes to School, School Pool, and a dynamic rideshare pilot program (Carma smartphone application). SB 1339 requires employers with 50 or more employees within the Bay Area Air Quality Management District's geographic boundaries to offer their employees specific alternative commute incentives, including the option to pay for their transit or vanpooling with pre-tax dollars, a subsidy to reduce or cover the employee's transit or vanpool costs, or free or low-cost bus, shuttle or vanpool service operated by or for the employer.</p> <p>CAPCOA Measure TRT-1. Assuming a suburban center and 100% of employees are eligible for incentives, VMT reduction is 5.4%. Measure assumes the employer support program will include carpooling, ride-matching, preferential carpool parking, flexible work schedules for carpools, vanpool assistance, bicycle parking, showers, and locker facilities.</p> <p>Assumed 10 federal holidays and 10 personal days per employee, for a total of 240 workdays per person.</p> <p>An estimated 7.8% of people work at home (American Community Survey, 2009-2013 Five-year estimates)</p>				
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.				

Calculation

	2020	2030
Total employment	8,130	8,190
Work at home	649	659
Town of Corte Madera employees	58	58
Percent employees targeted	50%	75%
Number employees targeted	3,711	5,605
Rate of participation in TDM programs	5.4%	5.4%
Annual VMT from targeted employees	10,681,281	16,129,826
Annual decrease in VMT	576,789	871,011
GHG emissions reductions	222	246

	Number	Percent of Total	Estimated Daily Marin County Commute VMT		
			Per Employee	Total 2020	Total 2030
Corte Madera Workers	5,920	100%			
<i>Reside in Corte Madera</i>	635	11%	2.5	2,006	2,020
<i>Reside Outside Corte Madera</i>	5,285	89%			
Reside in Marin County	3,005	51%			
<i>San Rafael</i>	945	16%	9	10,747	10,820
<i>Novato</i>	475	8%	25.4	15,246	15,348
<i>Southern Marin Communities</i>	1,585	27%	4	8,011	8,065
Reside Outside Marin County	2,280	39%			
<i>Alameda County</i>	253	4%	6.2	1,982	1,995
<i>Contra Costa County</i>	430	7%	6.2	3,369	3,392
<i>San Francisco</i>	485	8%	16.6	10,173	10,242
<i>San Mateo County</i>	115	2%	16.6	2,412	2,429
<i>Santa Clara County</i>	10	0%	16.6	210	211
<i>Sonoma County</i>	635	11%	40	32,096	32,312
<i>Other California Counties</i>	169	3%	6.2	1,324	1,333
Unaccounted	183	3%	6.2	1,434	1,443

Source: Census Transportation Planning Package using 2010 American Community Survey 5-year Estimates

TRANSIT IMPROVEMENTS

Community Action 2-3

Action	Work with transit providers to plan, fund and implement additional transit services that are cost-effective and responsive to existing and future transit demand.				
General Plan Programs	RCS-2.5.c: Programs to Reduce Fossil Fuel Based Transportation. Support municipal and community programs aimed at reducing fossil fuel based transportation. Programs should include alternatives such as employee carpooling, transit, walking and biking.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 150px;">-37.1</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-61.4</td> <td>2035</td> </tr> </table>	-37.1	2020	-61.4	2035
-37.1	2020				
-61.4	2035				
Methodology	<p>Transit fixed-route passenger trips in FY 2011/12 was 3,307,179.</p> <p>Marin Transit's Short Range Transit Plan is anticipating a 12% growth in fixed route service by 2025. Improvements will be centered on addressing current deficiencies (Routes 2, 29, 49, 228 and 259), increasing service frequency (providing 15 minute headways in high ridership corridors), improving connectivity (SMART stations, the Canal, College of Marin, San Rafael to the Larkspur ferry), and reducing travel time (express service from Novato to San Rafael). Projections are for a 2-3% growth in ridership per year.</p>				
Sources	<p>Google maps</p> <p>Marin Transit 2016-2025 Short Range Transit Plan, July 2015</p> <p>Robert Betts, Marin Transit</p>				

Calculation

	2020	2030
Transit fixed route passenger trips, BAU	3,259,550	3,259,550
Corte Madera's share of trips (based on population)	118,597	117,397
Average trip length (Hwy 101 segment within Town limits)	2.9	2.9
Estimated transit miles allocated to Corte Madera, BAU	343,932	340,450
Projected annual growth rate in ridership	2.5%	2.5%
Projected transit miles allocated to Corte Madera	440,262	557,867
Annual decrease in VMT	96,330	217,417
GHG emissions reductions	37	61

SCHOOL TRANSPORTATION

Community Action 2-4

Action	Construct pedestrian and bicycle facilities and safety improvements for school routes. Work with the Transportation Authority of Marin to encourage walking school buses, bike trains, and other programs to encourage walking, biking and carpooling to school.				
General Plan Programs	RCS-2.5.c: Programs to Reduce Fossil Fuel Based Transportation. Support municipal and community programs aimed at reducing fossil fuel based transportation. Programs should include alternatives such as employee carpooling, transit, walking and biking.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; width: 150px;">-44.1</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-33.4</td> <td>2030</td> </tr> </table>	-44.1	2020	-33.4	2030
-44.1	2020				
-33.4	2030				
Methodology	<p>Average trip length was determined by modeling trip lengths to Corte Madera schools.</p> <p>Estimated 1,755 Corte Madera students enrolled in local schools in 2010. 180 days in a school year.</p> <p>To demonstrate the benefits of providing Safe Routes to Schools, the Marin County Bicycle Coalition recruited nine pilot schools in four different geographic locations. Initial surveys reported that 62% of the students were arriving by car, with only 14% walking, 7% biking to school, 11% carpool, and 6% arriving by bus. Every school in the pilot program held periodic Walk and Bike to School Days and participated in the Frequent Rider Miles contest, which rewarded children who came to school walking, biking, by carpool or bus.</p> <p>At the end of the pilot program, the participating schools experienced a 57% increase in the number of children walking and biking and a 29% decrease in the number of children arriving alone in a car.</p>				
Sources	<p>Trip lengths modeled with Google Maps, maps.google.com.</p> <p>2010 U.S. Census, Summary File 1</p> <p>Safe Routes to School Marin County, http://www.saferoutestoschools.org/history.html#success</p>				

Calculation

	2020	2030
Average trip length	1.0 miles	1.0 miles
Number of students in Corte Madera schools	1,768 students	1,823 students
Number students estimated to drive to school	1,096 students	1,131 students
Potential decrease in students driving to school	318 students	328 students
VMT avoided	114,417 VMT	118,030 VMT
Emissions reductions	44.1 MTCO ₂ e	33.4 MTCO ₂ e

ELECTRIC VEHICLES

Community Action 2-5

Action	Install electric vehicle charging stations in public parking lots/areas. Require new commercial and multi-family development to provide electric vehicle charging stations. Require new residential development to provide electrical service for potential electric vehicle use.
Reductions (MTCO ₂ e)	Implementation options: -20.1 2020 -70.3 2030
Methodology	Average trip length was determined by modeling trip lengths from Town limits to employment centers. Each parking space was assumed to be associated with two round trip EV vehicle trips per day. Assumes electric vehicle efficiency of .32 kWh/mile, based on the Nissan Leaf fuel economy for city driving.
Sources	Trip lengths modeled with Google Maps, maps.google.com. Electric vehicle fuel economy from www.fueleconomy.gov.

Calculation

	2020	2030
Average trip length (miles)	2.00	2.00
Miles impacted annually per parking space	2,922	2,922
Annual emissions per parking space (MTCO ₂ e)	1.13	0.83
Annual electricity use per parking space (kWh)	935	935
Electric vehicle emissions per parking space (MTCO ₂ e)	0.12	0.12
Emissions reductions per parking space (MTCO ₂ e)	1.00	0.70
Number of EV charging spaces	20	100
Total annual emissions reduction for:	20.1	70.3

HIGH-EFFICIENCY TOWN VEHICLES

Community Action 2-6

Action	Purchase or lease low or zero-emissions vehicles and the most fuel efficient models possible for the Town fleet, including construction vehicles.				
General Plan Programs	RCS–2.5.a: Vehicle Program. Create and implement a Town vehicle green fleet program that includes the purchase of fuel-efficient and alternative-fuel vehicles, to be implemented in a timely manner.				
Reductions (MTCO ₂ e)	Implementation options: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: right;">-3.5</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-3.5</td> <td>2030</td> </tr> </table>	-3.5	2020	-3.5	2030
-3.5	2020				
-3.5	2030				
Methodology	<p>Assumes vehicles with an average of fuel economy of 20 MPG are replaced with hybrid vehicles with a fuel economy of 45 MPG.</p> <p>Assumes vehicles travel an average of 3,600 miles annually based on 2010 GHG Inventory.</p> <p>Emissions reduction calculated for CO₂ only since N₂O and CH₄ emissions are dependent on VMT and VMT is unaffected.</p>				
Sources	www.fueleconomy.gov				

Calculation

	2020	2030
Annual mileage per vehicle	3,600 VMT	3,600 VMT
Annual fuel use per vehicle at 20 MPG fuel economy	180 gallons	180 gallons
Annual fuel use per vehicle at 45 MPG fuel economy	80 gallons	80 gallons
Annual fuel saved per car replaced	100 gallons	100 gallons
Annual emissions reduced per vehicle	0.9 MTCO ₂	0.9 MTCO ₂
Number of vehicles replaced with hybrid vehicles	4 vehicles	4 vehicles
Emissions reductions	3.5 MTCO ₂ e	3.5 MTCO ₂ e

TOWN EMPLOYEE COMMUTE

Government Operations Action 2-7

Action	Provide Town employees with incentives to use alternatives to single occupant vehicles including flexible schedules, transit incentives, bicycle facilities, ridesharing services and subsidies, and telecommuting when practical.				
General Plan Programs	RCS-2.5.c: Programs to Reduce Fossil Fuel Based Transportation. Support municipal and community programs aimed at reducing fossil fuel based transportation. Programs should include alternatives such as employee carpooling, transit, walking and biking.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 10%;">-6.7</td> <td style="width: 10%;">2020</td> </tr> <tr> <td style="text-align: right;">-4.9</td> <td>2030</td> </tr> </table>	-6.7	2020	-4.9	2030
-6.7	2020				
-4.9	2030				
Methodology	CAPCOA Measure TRT-1. Assuming a suburban center and 100% of employees are eligible for incentives, VMT reduction is 5.4%.				
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.				

Calculation

	2020	2030
Employee commute VMT, BAU	321,724	321,724
Reduction in VMT	5.4%	5.4%
VMT avoided	17,373	17,373
Emissions reduction (MTCO ₂ e)	6.7	4.9

ZERO WASTE

Community Action 3-1

Action	Increase participation in recycling programs and ensure weekly collection of recyclables and organic waste. Provide residents and businesses with food waste collection. Adopt a Zero Waste resolution. Adopt Solid Waste JPA's model C&D Ordinance. Adopt Single-Use Bag Reduction Ordinance. Provide recycling containers in public areas. Require recycling at public events. Provide backyard service for recycling and composting.				
General Plan Programs	<p>RCS-4.1.a: Reduction of Waste. Work with Marin County's MRRRA and Office of Waste Management in distributing recycling and related educational information to businesses in order to reduce commercial and industrial wastes.</p> <p>RCS-4.1.b: Recycling Receptacles. Include provisions in the Zoning Ordinance to allow for placement of recycling receptacles at public, multi-family residential, commercial, office and industrial use locations.</p> <p>RCS-4.2.a: Recycling for Existing Uses. Work with the Town's refuse collection provider and Marin County in continuing to provide Town-wide recycling and waste reduction services to existing residences, schools and businesses, as well as increasing participation in composting and recycling programs for technology waste, hazardous waste, and green waste.</p> <p>RCS-4.2.b: Recycling for Future Uses. Cooperate with the Town's refuse collection provider and Marin County to provide for future Town-wide programs to promote waste reduction and recycling. Program development shall include innovative recycling options for future waste disposal and recycling as patterns and needs of consumption and waste generation change. Evaluate the Town's waste and solid waste management and recycling every two years to ensure that the City is taking every possible action to provide adequate and appropriate waste reduction and recycling services.</p>				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 30%;">-615.4</td> <td style="width: 10%;">2020</td> </tr> <tr> <td style="text-align: right;">-1,059.1</td> <td>2030</td> </tr> </table>	-615.4	2020	-1,059.1	2030
-615.4	2020				
-1,059.1	2030				
Methodology	Marin County Hazardous and Solid Waste JPA's goal is to achieve "zero waste" by 2025. Zero Waste is defined as a 94% diversion rate in 2025. Corte Madera's diversion rate is assumed to be consistent with Marin County averages. Diversion rates were 74% in 2010 and 74% in 2013 (most recent year available). A linear reduction rate from the current rate implies a diversion rate of approximately 86% by 2020. Calculation assumes organic waste will be diverted at the same rate as all other waste. This is equivalent to assuming the amount of organic waste sent to the landfill in 2010 will be reduced by approximately one-half by 2020.				
Sources	Diversion rates reported by the Marin County Solid and Hazardous Waste JPA; personal communication with Alex Soulard, Waste Management Specialist, County of Marin, asoulard@marincounty.org .				

Calculation

	2020	2030
Waste emissions BAU less government waste	1,333.3 MTCO ₂ e	1,376.9 MTCO ₂ e
Percent waste diverted from landfill in 2010	74 %	74 %
Percent waste diverted from landfill	86 %	94 %
GHG emissions reduction	615.4 MTCO ₂ e	1,059.1 MTCO ₂ e

MUNICIPAL ZERO WASTE

Government Operations Action 3-2

Action	Government policy to achieve 86% diversion in Town operations by 2020 and 94% by 2030.				
General Plan Programs	See programs identified for Action 3-1.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; text-align: right;">-82.0</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-136.6</td> <td>2030</td> </tr> </table>	-82.0	2020	-136.6	2030
-82.0	2020				
-136.6	2030				
Methodology	<p>Targeted waste diversion is assumed to be 86% by 2020 and 94% by 2030.</p> <p>Corte Maderas's 2010 diversion rate is assumed to be consistent with Marin County average of 74%.</p>				
Sources	2010 diversion rate reported by the Marin County Solid and Hazardous Waste JPA; personal communication with Alex Soulard, Waste Management Specialist, County of Marin, asoulard@marincounty.org .				

Calculation

	2020	2030
Waste emissions BAU less government waste	177.6 MTCO ₂ e	177.6 MTCO ₂ e
Percent waste diverted from landfill in 2010	74 %	74 %
Percent waste diverted from landfill	86 %	94 %
GHG emissions reduction	82.0 MTCO ₂ e	136.6 MTCO ₂ e

INDOOR WATER EFFICIENCY AND CONSERVATION

Community Action 4-1

Action	Promote existing and/or new rebates for water efficient appliances and fixtures.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 150px;">-153.3</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-153.3</td> <td>2030</td> </tr> </table>	-153.3	2020	-153.3	2030
-153.3	2020				
-153.3	2030				
Methodology	<p>Programs related to hot water use from the MMWD 2007 Water Conservation Master Plan were used to estimate potential savings from water conservation education, outreach, rebates, incentives, audits, and requirements that exceed Title 24 requirements.</p> <p>67% of water consumption is for indoor use, and hot water use is 30% of indoor water use. Calculation includes emissions avoided for treating and transporting potable water by MMWD and treating wastewater.</p> <p>Electricity needed to treat, pump and convey water and wastewater estimated at 5,411 kWh per million gallons (California Energy Commission).</p>				
Sources	<p>EBMUD Indoor Water Conservation Study (p. 31), 2003, http://www.ebmud.com/sites/default/files/pdfs/residential-indoor-wc-study.pdf.</p> <p>ICLEI Climate and Air Pollution Planning Assistant - CAPPV1.5</p> <p>Marin Municipal Water District, 2007 Water Conservation Master Plan</p> <p>Personal communication with Dan Carney, MMWD.</p> <p>California Energy Commission, "Refining Estimates of Water-Related Energy Use in California," December 2006.</p>				

Calculation

Indoor water consumption reduction	3,701,866 gallons
Water and wastewater-related electricity saved	20,031 kWh
Indoor hot water consumption reduction	3,701,866 gallons
Natural gas required to heat one gallon of water	0.0098 therms
Electricity required to heat one gallon of water	0.19 kWh
Percent water heaters that use natural gas	58%
Therms saved	21,041 therms
Electricity saved	295,409 kWh
GHG emissions reduction	153.3 MTCO ₂ e

OUTDOOR WATER EFFICIENCY AND CONSERVATION

Community Action 4-2

Action	Promote existing and/or new rebates and support existing landscape efficiency requirements.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: right;">-14.5</td> <td style="width: 50%;">2020</td> </tr> <tr> <td style="text-align: right;">-14.5</td> <td>2030</td> </tr> </table>	-14.5	2020	-14.5	2030
-14.5	2020				
-14.5	2030				
Methodology	<p>20% reduction in outdoor water use is based on the following:</p> <p>Water efficient landscapes can reduce outdoor water use by up to 70% (CAPCOA Measure WUW-3).</p> <p>Water-efficient landscape irrigation systems reduce outdoor water use by 6.1% (CAPCOA Measure WUW-4).</p> <p>The Water Conservation Act (SBX 7-7) requires the state to achieve a 20% reduction in urban per capita water use by the year 2020. In compliance with State law, MMWD has adopted a Water Efficient Landscape Ordinance that limits landscape water use.</p> <p>33% of water consumption is for outdoor use. Calculation includes emissions avoided for treating and transporting potable water by MMWD.</p> <p>Electricity needed to treat, pump and convey water estimated at 3,500 kWh per million gallons (California Energy Commission).</p>				
Sources	<p>California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures,"</p> <p>California Energy Commission, "Refining Estimates of Water-Related Energy Use in California," December 2006.</p> <p>Personal communication with Dan Carney, Water Conservation Manager, MMWD.</p>				

Calculation

	2020	2030
Outdoor water consumption	157,550,087 gallons	162,525,353 gallons
Percent outdoor water reduced	20%	20%
Outdoor water consumption reduction	31,510,017 gallons	32,505,071 gallons
Electricity saved	110,285 kWh	113,768 kWh
GHG emissions reduction	14.5 MTCO ₂ e	15.0 MTCO ₂ e

RAINWATER CATCHMENT

Community Action 4-3

Action	Encourage cisterns and other water storage facilities.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; width: 100px;">-0.01</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-0.02</td> <td>2030</td> </tr> </table>	-0.01	2020	-0.02	2030
-0.01	2020				
-0.02	2030				
Methodology	Rainwater cisterns vary in size from 50 gallon barrels to 15,000+ gallon storage tanks. This analysis assumes an average 500 gallons of storage per tank, and tanks that are emptied twice per year.				
	Electricity needed to treat, pump and convey water estimated at 3,500 kWh per million gallons (California Energy Commission).				
Sources	California Energy Commission, "Refining Estimates of Water-Related Energy Use in California," December 2006.				

Calculation

	2020	2030
Average rainwater storage capacity per tank	500 gallons	500 gallons
Avoided water-related electricity use per storage tank per year	2 kWh	2 kWh
Number of tanks installed	50	100
Avoided water-related electricity use per year	88 kWh	175 kWh
Avoided GHG emissions per storage tank per year	0.0002 MTCO ₂ e	0.0002 MTCO ₂ e
Avoided GHG emissions per year	0.01 MTCO ₂ e	0.02 MTCO ₂ e

GREYWATER

Community Action 4-4

Action	Encourage greywater systems.				
General Plan Programs	RCS-2.2.c: Public Facilities Conservation. Strongly encourage the use of recycled water and drought-resistant landscaping in Town facilities, public roadway landscape, and in new development.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="width: 10%; text-align: right;">-0.6</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-2.5</td> <td>2030</td> </tr> </table>	-0.6	2020	-2.5	2030
-0.6	2020				
-2.5	2030				
Methodology	<p>CAPCOA Measure WSW-2 used for estimating greywater generation. Assumes 25 gallons generated per residential occupant per day from showers, bathtubs, and wash basins and 15 gallons per occupant per day from laundry machines. Greywater assumed to be used for landscape irrigation for the typical irrigation season of May through October.</p> <p>Electricity needed to treat, pump and convey water and wastewater estimated at 5,411 kWh per million gallons (California Energy Commission).</p>				
Sources	<p>California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.</p> <p>MMWD potable water production for 2010 provided by Nancy Gibbs, MMWD Business Systems Analyst.</p> <p>California Energy Commission, "Refining Estimates of Water-Related Energy Use in California," December 2006.</p>				

Calculation

	2020	2030
Greywater generation per residential occupant per day	40 gallons	40 gallons
Greywater generation per household per year available for irrigation	17,335 gallons	17,619 gallons
Number of households installing greywater systems	50	200
Electricity saved per year	4,690 kWh	19,067 kWh
Avoided GHG emissions per year	0.6 MTCO ₂ e	2.5 MTCO ₂ e

MUNICIPAL WATER CONSERVATION

Government Operations Action 4-5

Action	Reduce water use by 20% by installing water-efficient fixtures, reducing outdoor water requirements, and modifying behavior.				
General Plan Programs	RCS-2.2.b: Water Conservation. Institute a water conservation program for all Town facilities, to include the installation of waterless urinals and low-flow toilets, sinks and showers. Include funding for these improvements in the CIP. RCS-2.2.c: Public Facilities Conservation. Strongly encourage the use of recycled water and drought-resistant landscaping in Town facilities, public roadway landscape, and in new development.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; text-align: right;">-0.03</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-0.03</td> <td>2030</td> </tr> </table>	-0.03	2020	-0.03	2030
-0.03	2020				
-0.03	2030				
Methodology	Reduction in indoor water use is based on the following: Installing all low-flow water fixtures can reduce indoor non-residential water use by 17-31% (CAPCOA Measure WUW-1). Calculation includes emissions avoided for treating and transporting potable water by MMWD and treating wastewater. Electricity needed to treat, pump and convey water and wastewater estimated at 5,411 kWh per million gallons (California Energy Commission).				
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010. California Energy Commission, "Refining Estimates of Water-Related Energy Use in California." December 2006.				

Calculation

Municipal water use	198,211 gallons
Water use reduction	20%
Reduction in electricity use for water and wastewater conveyance and treatment	215 kWh
GHG emissions reduction	0.03 MTCO ₂ e

TREE PLANTING ON PRIVATE LAND
Community Action 5-1

Action	Require new development to plant trees and limit tree removal in order to achieve net new tree planting.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 10%;">-8.9</td> <td style="width: 10%;">2020</td> </tr> <tr> <td style="text-align: right;">-26.6</td> <td>2030</td> </tr> </table>	-8.9	2020	-26.6	2030
-8.9	2020				
-26.6	2030				
Methodology	Sequestration: CAPCOA Measure V-1. Assumed default annual sequestration rate of .0354 MTCO ₂ accumulation per tree per year and an active growing period of 20 years. Thereafter, the accumulation of carbon in biomass slows with age, and will be completely offset by losses from clipping, pruning, and occasional death.				
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.				

Calculation

	2020	2030
Annual sequestration rate per tree	0.0354 MTCO ₂	0.0354 MTCO ₂
Number of net new trees planted each year	50	50
Number of years	5	15
Number of trees planted over period in active growing stage in inventory year	250	750
GHG emissions reduction from sequestration	8.9 MTCO ₂ e	26.6 MTCO ₂ e

TREE PLANTING ON PUBLIC LAND
Government Operations Action 5-2

Action	Implement a tree planting program that increases tree cover by 10 new trees per year.
Reductions (MTCO ₂ e)	-1.8 2020 -5.3 2030
Methodology	Sequestration: CAPCOA Measure V-1. Assumed default annual sequestration rate of .0354 MTCO ₂ accumulation per tree per year and an active growing period of 20 years. Thereafter, the accumulation of carbon in biomass slows with age, and will be completely offset by losses from clipping, pruning, and occasional death.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.

Calculation

	2020	2030
Annual sequestration rate per tree	0.0354 MTCO ₂	0.0354 MTCO ₂
Number of net new trees planted each year	10	10
Number of years	5	15
Number of trees planted over period in active growing stage in inventory year	50	150
GHG emissions reduction from sequestration	1.8 MTCO ₂ e	5.3 MTCO ₂ e

RENEWABLE PORTFOLIO STANDARD

State Action

Program Description	The Renewable Portfolio Standard (RPS) requires electricity providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and by 33% by 2020.
(MTCO ₂ e) -3,177.5 -3,247.2	Implementation action: 2020: 33% of PG&E and MEA electricity comes from eligible renewable energy sources. 2030: 33% of PG&E and MEA electricity comes from eligible renewable energy sources.
Methodology	According to MCE's updated Integrated Resource Plan MCE "plans to increase its RPS qualifying content to at least 33% by 2020 and to obtain an overall renewable energy content of at least 55% during this timeframe." In addition, "MCE policy targets the carbon neutral energy content of the MCE generation supply portfolio to be less than or equal to the carbon neutral energy content of the PG&E generation supply portfolio" and has set a goal for its Light Green electricity to be at least 60% carbon free in 2020. According to Rafael Silberblatt, MCE Program Coordinator, these goals (33% RPS eligible, 55% renewable and 60% carbon free) are best viewed as minimums to be exceeded as prices permit. In addition, MCE's board has set a goal for its light green power to be 80% renewable and 95% GHG-free by 2025. As a matter of policy, MCE seeks to have a lower emission factor than PG&E. Mr. Silberblatt recommended using PG&E's publically stated 2020 target emission factor for an upper bound on MCE's future emissions factor. Assumes the same percentage of Direct Access electricity in future years as in 2010.
Sources	Marin Energy Authority, "Revised Community Choice Aggregation Implementation Plan and Statement of Intent," October 4, 2012. Marin Clean Energy, 2013 Integrated Resource Plan. Personal communication, Rafael Silberblatt, MCE Program Coordinator, rsilberblatt@marinenergyauthority.org, Jan. 21, 2014. GHG Calculator, version 3c_Oct2010. https://ethree.com/public_projects/cpuc2.php PG&E, "Greenhouse Gas Emission Factors: Guidance for PG&E Customers," November 2015, https://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf

Calculation

	2020	2030
Electricity use, BAU	66,056,237 kWh	66,757,565 kWh
Electricity saved through other State actions	6,425,982 kWh	6,767,348 kWh
Projected PG&E and MEA electricity use	53,884,002 kWh	54,209,275 kWh
PG&E and MEA electricity emissions, BAU	10,262 MTCO ₂ e	10,374 MTCO ₂ e
PG&E and MEA electricity emissions w/RPS	7,084 MTCO ₂ e	7,127 MTCO ₂ e
GHG emission reductions	3,177.5 MTCO ₂ e	3,247.2 MTCO ₂ e

Title 24

State Action

Reductions (MTCO ₂ e)	Implementation action: -112.9 2020: Implement Title 24 and subsequent building standards updates that ultimately achieve zero net energy use for new residential and non-residential construction. -391.4 2030: Implement Title 24 and subsequent building standards updates that ultimately achieve zero net energy use for new residential and non-residential construction.
Methodology	<p>The California Energy Commission's 2007 Integrated Policy Report established the goal that new building standards achieve "net zero energy" levels by 2020 for residences (single family and low-rise multifamily 3 stories or less) and by 2030 for commercial buildings.</p> <p>The California Public Utility Commission's (CPUC) California Long Term Energy Efficiency Strategic Plan, dated July 2008, endorses the Energy Commission's zero net energy goals for all newly constructed homes by 2020 and for all newly constructed commercial buildings by 2030.</p>
Sources	<p>California Energy Commission, "Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings," prepared by Architectural Energy Corporation, November 7, 2007.</p> <p>California Energy Commission, http://www.energy.ca.gov/title24/2013standards/background.html</p> <p>California Energy Commission, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-5-31-Item-05-Adoption_Hearing_Presentation.pdf</p>

Calculation

	2008 Reductions from 2005 Standards (assumed for development after 2010)		2013 Reductions from 2008 standards (assumed for development after 2015)	Projected -- Reductions from 2010 Baseline	
	Electricity Savings	Natural Gas Savings		2020	2030
			Energy Savings	Energy Savings	Energy Savings
Reductions from Title 24 Upgrades					
Single-family New Construction	22.70%	10.00%	25.00%	100%	100%
High Rise Multi-family New Construction (more than 3 stories)	19.70%	7.00%	14.00%	50%	100%
Non-residential New Construction	4.90%	9.40%	30.00%	50%	100%

Projected Residential Development with Title 24 Energy Reductions

	2013-2015*	2016-2020	2021-2030	TOTAL through 2020	GHG Reductions through 2020	TOTAL through 2030	GHG Reductions through 2030
New Residential (units)	184	24	60	208		268	
Electricity Use BAU	1,046,857	136,547	341,366	1,183,403		1,524,770	
Electricity Use Savings	206,231	38,745	341,366	244,976	43	586,342	101.8
Natural Gas Use BAU	102,352	13,350	33,376	115,702		149,077	
Natural Gas Use Savings	7,165	1,669	33,376	8,833	47	42,209	224.4

*Includes Tam Ridge Residences, 3 single family homes and 1 second unit as reported in the 2015-2023 Housing Element

Projected Non-Residential Development with Title 24 Energy Reductions

	2011-2015	2016-2020	2021-2030	TOTAL through 2020	GHG Reductions through 2020	TOTAL through 2030	GHG Reductions through 2030
Electricity Use BAU	486,389	486,389	307,193	972,779		1,279,972	
Electricity Use Savings	23,833	30,983	153,597	54,816	10	208,413	39.6
Natural Gas Use BAU	11,335	11,335	4,773	22,670		29,829	
Natural Gas Use Savings	1,066	1,385	2,386	2,451	13	4,837	25.7

Lighting Efficiency and Toxic Reduction Act

State Action

Program Description	AB 1109, the Lighting Efficiency and Toxic Reduction Act, tasks the California Energy Commission (CEC) with reducing lighting energy usage in indoor residences by no less than 50% from 2007 levels by 2018, as well as requires a 25% reduction in indoor and outdoor commercial buildings by the same date. To achieve these efficiency levels, the CEC applies its existing appliance efficiency standards to include lighting products, as well as requires minimum lumen/watt standards for different categories of lighting products. The bill also expands existing incentives for energy efficient lighting.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: right;">-1,135.7</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-1,135.7</td> <td>2035</td> </tr> </table>	-1,135.7	2020	-1,135.7	2035
-1,135.7	2020				
-1,135.7	2035				
Methodology	<p>State action applies to buildings constructed before 2010.</p> <p>5.2% of nonresidential electricity is used for outdoor lighting (California Energy Commission 2006)</p> <p>28.9% of nonresidential electricity is used for indoor lighting (California Energy Commission 2006)</p> <p>Residences use 1,342 kWh for indoor lighting on average (U.S. Department of Energy 2012)</p>				
Sources	<p>Itron, Inc., "California Commercial End-Use Survey," California Energy Commission, March 2006, Publication Number: CEC-400-2006-005, p. 186. Accessed March 26, 2015.</p> <p>Navigant Consulting, Inc., "2010 U.S. Lighting Market Characterization," U.S. Department of Energy, January 2012, p. 42. Accessed March 26, 2015. <http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf></p>				

Calculation

	2020	2030
Residential electricity indoor lighting use, 2013	5,402,892 kWh	5,402,892 kWh
Commercial electricity use, 2013	40,651,914 kWh	40,651,914 kWh
Commercial indoor and outdoor lighting use, 2013	13,862,303 kWh	13,862,303 kWh
Reduction in residential electricity use	2,701,446 kWh	2,701,446 kWh
Reduction in commercial electricity use	3,465,576 kWh	3,465,576 kWh
GHG emission reductions	1,135.7 MTCO ₂ e	1,135.7 MTCO ₂ e

Residential Solar Water Heaters

State Action

Program Description	The Residential Solar Water heater Program (AB 1470) creates a \$25 million per year, 10-year incentive program to encourage the installation of solar water heating systems that offset natural gas and electricity use in homes and businesses throughout the state. The goal is to install 200,000 solar water heaters by 2017.				
Reductions (MTCO ₂ e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; width: 15%;">-34.6</td> <td style="width: 15%;">2020</td> </tr> <tr> <td style="text-align: right;">-34.6</td> <td>2035</td> </tr> </table>	-34.6	2020	-34.6	2035
-34.6	2020				
-34.6	2035				
Methodology	<p>Natural gas solar water heaters reduce natural gas use by 130 therms (U.S. Department of Energy 2010)</p> <p>Electric solar water heaters reduce electricity use by 2,429 kWh (U.S. Department of Energy 2010)</p> <p>An average of 0.013 water heaters per home will be replaced as a result of the strategy in 2020 (California Air Resources Board 2008)</p> <p>85% of California homes use natural gas for water heating, 4% use propane/LPG, and 11% use electricity (U.S. Energy Information Administration 2009)</p>				
Sources	<p>U.S. Department of Energy, "ENERGY STAR Water Heater Market Profile," September 2010, p. 15. Accessed March 27, 2015. <https://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/Water_Heater_Market_Profile_2010.pdf></p> <p>U.S. Energy Information Administration, 2009 Residential Energy Consumption Survey, Table HC8.11, "Water Heating in U.S. Homes in West Region, Division, and States, 2009." Accessed March 26, 2015. <http://www.eia.gov/consumption/residential/data/2009/#undefined></p>				

Calculation

	2020	2035
Number of housing units, 2013	4,026	4,026
Number of solar water heaters installed	52	52
Percent electric water heaters	11%	11%
Percent gas water heaters	89%	89%
Reduction in electricity use	13,984 kWh	13,984 kWh
Reduction in natural gas use	6,056 therms	6,056 therms
GHG emission reductions	34.6 MTCO ₂ e	34.6 MTCO ₂ e

LIGHT AND HEAVY DUTY FLEET REGULATIONS

State Action

Reductions (MTCO ₂ e) -3,400.9 -9,489.3	2020 2030
Methodology	Current federal and State regulations and standards will reduce transportation emissions from the light and heavy duty fleet. These include: <ol style="list-style-type: none"> 1. Pavley Standards which increase fuel economy standards for light-duty vehicles for 2009-2016 model years. 2. Advanced Clean Cars Program which will reduce greenhouse gas and smog emissions for light-duty vehicles sold between 2017 and 2025. New automobiles will emit 34 percent fewer GHG emissions and 75 percent fewer smog-forming emissions. 3. ARB Tractor -Trailer Greenhouse Gas Regulations which accelerate the use of low rolling resistance tires and aerodynamic fairing to reduce GHG emissions in the heavy-duty truck fleet. 4. Heavy Duty GHG Emissions Standards (Phase One) which establish GHG and fuel efficiency standards for medium duty and heavy duty engines and vehicles for 2014-2018 model years. Transportation emissions estimated using EMFAC 2014.
Sources	California Air Resources Board, EMFAC 2014 Web Database, http://www.arb.ca.gov/emfac/2014/ California Air Resources Board, EMFAC 2014 Volume III - Technical Documentation, v1.0.7, May 12, 2015

Calculation

	2020	2030
VMT BAU	55,381,335 VMT	57,827,202 VMT
Emissions, BAU	24,741 MTCO ₂ e	25,833 MTCO ₂ e
Emissions with regulations	21,340 MTCO ₂ e	16,344 MTCO ₂ e
Reduction in emissions	3,401 MTCO ₂ e	9,489 MTCO ₂ e

GOVERNMENT TRANSPORTATION

Impact of State Action

Reductions (MTCO ₂ e) -19.8 -52.8	2020 2030
Methodology	Current federal and State regulations and standards will reduce transportation emissions from the light and heavy duty fleet. These include: <ol style="list-style-type: none"> 1. Pavley Standards which increase fuel economy standards for light-duty vehicles for 2009-2016 model years. 2. Advanced Clean Cars Program which will reduce greenhouse gas and smog emissions for light-duty vehicles sold between 2017 and 2025. New automobiles will emit 34 percent fewer GHG emissions and 75 percent fewer smog-forming emissions. 3. ARB Tractor -Trailer Greenhouse Gas Regulations which accelerate the use of low rolling resistance tires and aerodynamic fairing to reduce GHG emissions in the heavy-duty truck fleet. 4. Heavy Duty GHG Emissions Standards (Phase One) which establish GHG and fuel efficiency standards for medium duty and heavy duty engines and vehicles for 2014-2018 model years. Transportation emissions estimated using EMFAC 2014.
Sources	California Air Resources Board, EMFAC 2014 Web Database, http://www.arb.ca.gov/emfac/2014/ California Air Resources Board, EMFAC 2014 Volume III - Technical Documentation, v1.0.7, May 12, 2015

Calculation

	2020	2030
VMT BAU	321,724 VMT	321,724 VMT
Emissions, BAU	144 MTCO ₂ e	144 MTCO ₂ e
Emissions with regulations	124 MTCO ₂ e	91 MTCO ₂ e
Reduction in emissions	20 MTCO ₂ e	53 MTCO ₂ e