
City of Sausalito

CLIMATE ACTION PLAN



Adopted June 16, 2015

Prepared by the
Marin Climate & Energy Partnership



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INTRODUCTION

PURPOSE OF THE CLIMATE ACTION PLAN

The City of Sausalito understands that climate change has the potential to significantly affect Sausalito's residents and businesses, as well as other communities around the world. The City 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 City'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 Sausalito 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 Sausalito community can experience lower energy bills, improved air quality, reduced emissions, and an enhanced quality of life. The City's preparation of the 2005 and 2010 Greenhouse Gas Emissions Inventories 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 City's 2005 and 2010 Greenhouse Gas Emission Inventories, 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, waste water, and natural system strategies necessary to minimize Sausalito's impacts on climate change and meet the City' adopted greenhouse gas emissions reduction target of 15% below 2005 levels by 2020 (Resolution 5365).

RELATIONSHIP TO THE GENERAL PLAN

The City of Sausalito's General Plan, adopted by the City Council on September 19, 1995, commits the City to implementing water, energy and solid waste conservation measures. This Climate Action Plan supports the following policies and programs:

Policy EQ-3.12

Water Conservation. Promote and encourage water conservation measures to assure that an adequate supply of high quality water is available for local residents.

Program EQ 3.12.1

Marin Municipal Water District. Coordinate development review with the Marin Municipal Water District (MMWD) to ensure adequate water supplies.

Program EQ-3.12-2

Local Water Conservation Ordinance. Continue to implement the local water conservation ordinance in coordination with MMWD.

Policy EQ-3.13

Energy Conservation. Encourage the application of energy-efficiency design and energy saving devices in new and existing buildings.

Program EQ-3.13.1

Street Light Conversion. Consider converting City incandescent street lights to color-corrected High Pressure Sodium (HPS) or other less energy intensive fixtures in order to reduce energy consumption and costs.

Program EQ-3.13.2

Passive Solar Design. Encourage new development to utilize passive solar energy methods to reduce energy consumption to the extent feasible with other design consideration, such as view retention, glare, and other requirements.

Policy EQ-3.14

Solid Waste Conservation and Recycling. Support recycling efforts and actions that reduce solid waste generation and provide for its safe disposal.

Program EQ-3.14.1

County Solid Waste Management Plan. Coordinate local recycling efforts and publicity efforts with those of the County Solid Waste Management Plan.

Program EQ-3.14.3

Recycling. Continue and expand existing residential program and establish a commercial recycling program in coordination with the Chamber of Commerce and local businesses.

Policy CP 3-1

Public Bus Service. Encourage the maintenance of a safe, efficient and reliable bus service to provide an alternative to driving.

Policy CP-3.2

Ferry System. Promote increased patronage of the ferries while still protecting the area near the ferry terminal from overly intensive use.

Policy CP-3.3

Alternative Transportation. Improve the efficiency of the existing transportation system and reduce the reliance on the private automobile by emphasizing alternative transportation modes.

Objective CP-4.0

Enhance Bicycle and Pedestrian Circulation. Enhance bicycle and pedestrian infrastructure and programs to reduce the use of motorized vehicles within the City and reduce conflicts between bicyclists, pedestrians, and motorists.

Policy CP-4.1

Bicycle Master Plan. Plan, design and maintain bicycle infrastructure in Sausalito.

Policy CP-4.6

Pedestrian Trails and Paths. Improve and extend existing public paths for use by residents and establish new pathway connections to complete the system as shown on map GP-12.

These objectives, policies and programs are referenced and integrated into this Climate Action Plan. Though both the General Plan and the Climate Action Plan are intended as long-range plans, the Climate Action Plan may be updated on a more regular basis to add and amend strategies as new information, policy guidance, and regulations regarding climate change evolve and new technologies and strategies to address it are developed. The Marin Climate & Energy Partnership recommends the City update the Climate Action Plan by the year 2020 to incorporate a new long-term reduction goal and update emissions reduction strategies.

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 hydroflouorocarbons (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 2009, "Inventory of U.S. Greenhouse Gas Emissions," 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 Sausalito as well as other changes to local and regional weather patterns and species migration.

FIGURE 1: THE GREENHOUSE EFFECT

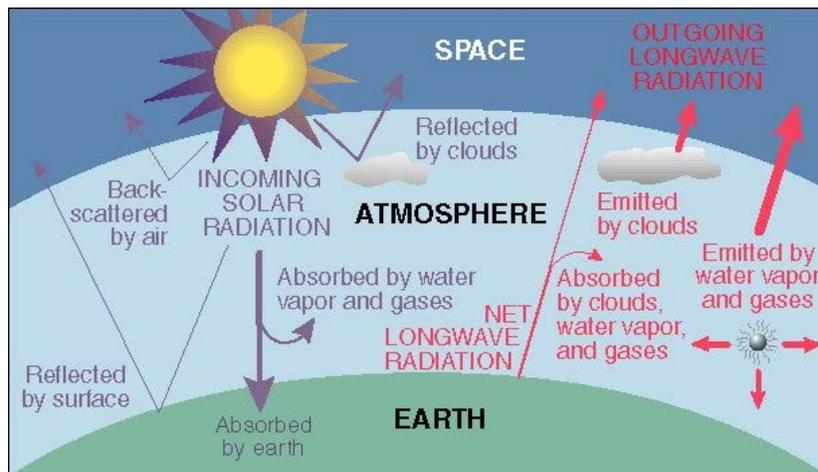


TABLE 1: GREENHOUSE GASES

| 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 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

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.

temperatures 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 are rising mainly because ocean water expands as it warms, and water from melting major stores of land ice like 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](#) 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 Sausalito coast, while Figure 3 zooms in on an area in northern Sausalito between West Harbor Drive and Gate 6 Road. The map shows inundation of parking lots, roads, and some structures at 25-centimeter sea level rise. Figures 4 and 5 show 25-centimeter (10-inch) inundation coupled with two different scenarios: the annual storm, which is a severe storm expected once every year; and a king tide, which is a high tide that occurs approximately twice per year when the gravitational pull of the sun and moon are in alignment. Under these two scenarios, substantially more land area is flooded.

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: INUNDATION EFFECT OF 25-CENTIMETER (10-INCH) SEA LEVEL RISE



Our Coast Our Future flood maps (accessed 10/09/14)

FIGURE 3: 25-CENTIMETER (10-INCH) INUNDATION OF NORTHERN SAUSALITO



FIGURE 4: 25-CENTIMETER (10-INCH) INUNDATION OF NORTHERN SAUSALITO WITH ANNUAL STORM

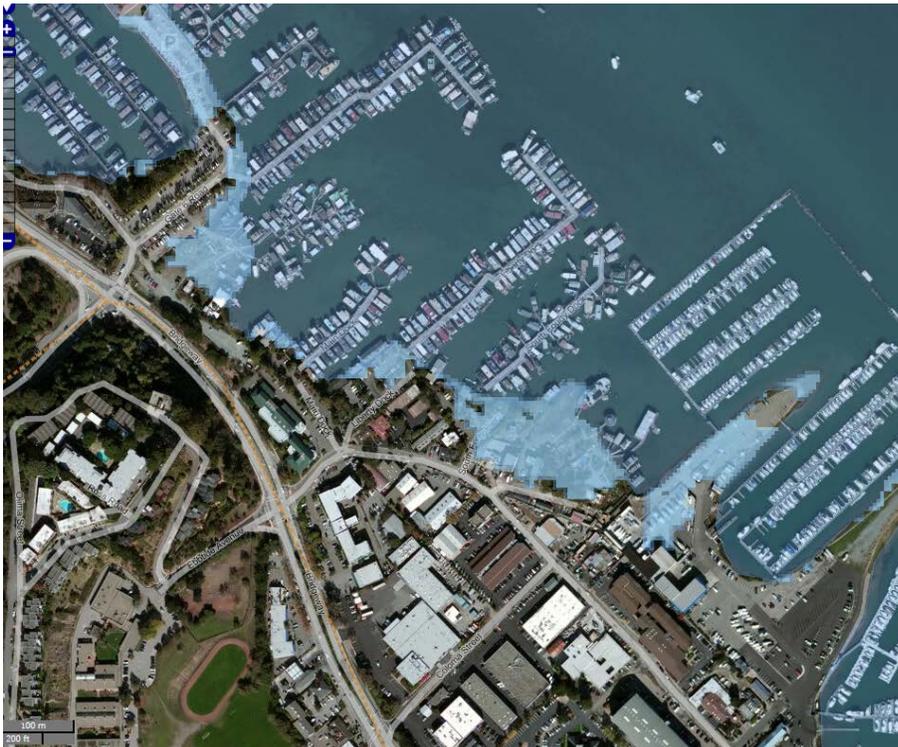
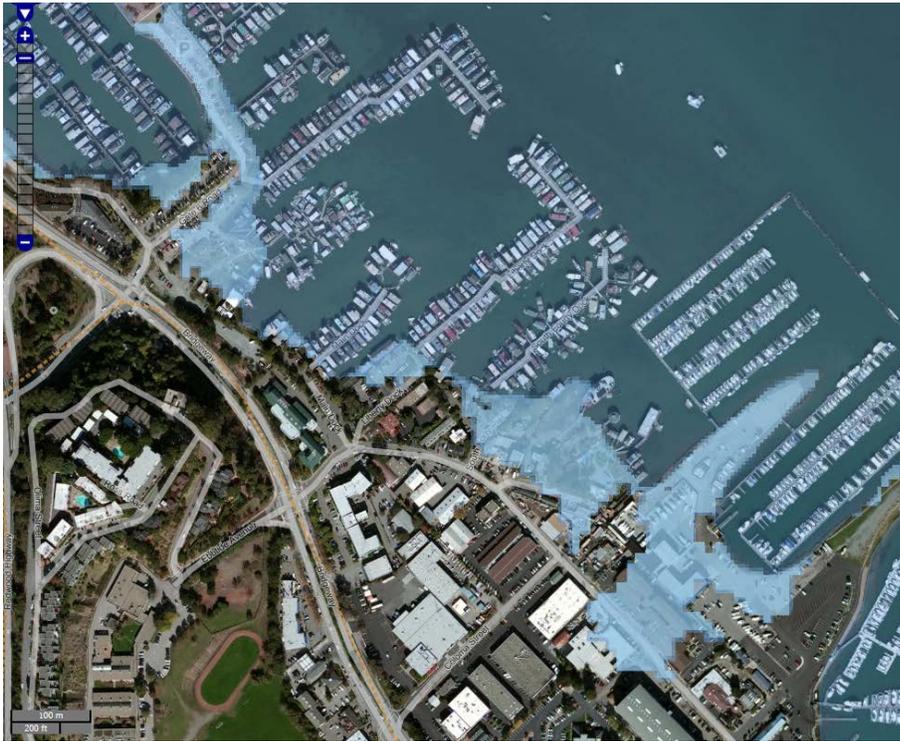


FIGURE 5: 25-CENTIMETER (10-INCH) INUNDATION OF NORTHERN SAUSALITO WITH KING TIDE



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 stop 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; 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% below 1990 levels by 2030.

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.

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. Sausalito has tracked both community and government operations GHG emissions since 2005 and, in October 2012, adopted a goal to reduce emissions 15% below 2005 levels by the year 2020, which is comparable to the State target.

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

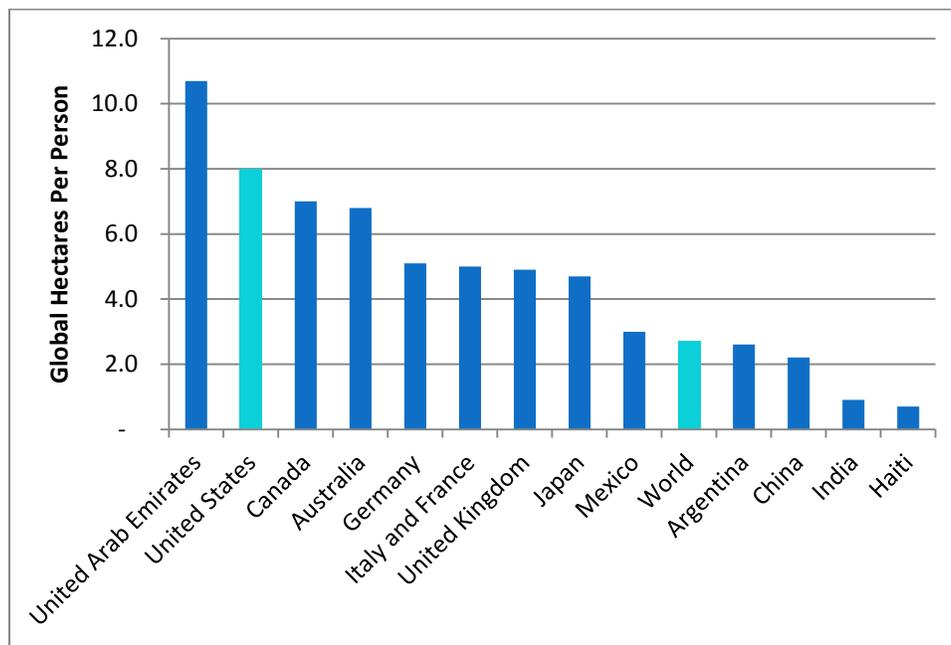
In 2010, the California State Office of Planning and Research adopted revised CEQA Guidelines which allow the City to streamline project-level analysis of greenhouse gas emissions through compliance with a greenhouse gas reduction plan contained in a general plan, long range development plan, or separate 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 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.

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.

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 6 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 6: 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 a climate action plan in 2006 (currently being updated) and adopted a goal to reduce emissions to 15 percent below 1990 levels by 2020. The City of San Rafael followed with its Climate Change Action Plan in 2009. As of October 2014, nearly all of the cities and towns in Marin had adopted climate action plans; most, including the City of Sausalito, have adopted emission reduction goals of 15 percent below 2005 levels by 2020.

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 City 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.

MITIGATION AND ADAPTATION ACTIVITIES IN SAUSALITO

Since 2005, the City of Sausalito has been actively pursuing a number of greenhouse gas emissions reductions programs, including:

- Converted 489 of the City's 664 streetlights to LED in 2012 and 2013. This represents 78% of all of the City's streetlights.
- Installed a 50 kW solar energy system at City Hall in 2009 and a 24 kW solar energy system at Fire Station 1 in 2010. These systems generate approximately 110,000 kWh annually.
- Completed energy-efficiency lighting upgrades in City Hall in 2008 that save approximately 25,200 kWh annually.
- Worked with Bay Cities Refuse Service, the City's franchised waste hauler, to provide residents and businesses with curbside composting of food scraps.
- Completed the following pedestrian and bicycle infrastructure and safety improvements as part of the Nonmotorized Transportation Pilot Program:
 - A pedestrian and cycling path that connects Bridgeway to the Sausalito Ferry Terminal.
 - A feasibility study for a proposed Class I pathway from Gate 6 Road to the Sausalito Ferry Terminal as an alternate to the Bridgeway bicycle lanes.
 - A planning project to implement an individualized marketing approach to encourage residents to shift from drive-alone trips to healthier trips on foot, by bike or on transit.
 - Bicycle parking.
 - Signing and striping of Class II bike lanes and Class III bike routes.

- Intersection safety improvements.
- Improvement to the Sausalito/Prospect pathway and the Cazneau Steps.
- Upgraded the Anchor Street wastewater pumping station in 2014 to improve energy efficiency.
- As of 2014, the City is purchasing Marin Clean Energy 100% renewable Deep Green electricity for City operations.

SAUSALITO'S GREENHOUSE GAS EMISSIONS

SAUSALITO PROFILE

Located on the southern tip of Marin County next to Richardson Bay, Sausalito is a small city with a land area of approximately 1.9 square miles. Sausalito 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 Sausalito in 2010 was 7,061 and there were 4,536 housing units. The housing stock is relatively older, with approximately 83 per cent of the housing units built before 1980, providing excellent opportunities to upgrade homes to include more energy-efficient features (American Community Survey, 2012). 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.

Sausalito has a vibrant downtown with unique shops and restaurants that serve both visitors and residents. The former shipyards along the waterfront have turned into commercial and office uses, contributing to a strong local economy that provides about 6,220 jobs (ABAG 2013 Projections). Most people who work in Sausalito (41 percent) commute from other Marin County towns, while about 18 percent come from San Francisco (Census Transportation Planning Products, 2006-2010).

The city has public and private schools for grades K-12, a post office, a library, police and fire stations, and a City Hall. The non-residential sector, which includes retail and office buildings, as well as public and government facilities, uses about 41 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.

Sausalito enjoys excellent transit service. The city is served by two ferries, the Golden Gate Ferry and the Blue & Gold Fleet, which provide daily service to the San Francisco Ferry Building and Fisherman's Wharf. The City is also well-connected to local bus service, which provides transportation to San Francisco and northbound cities, as well as local schools (in and outside of Sausalito) and recreation sites such as Stinson Beach and Muir Woods. Perhaps because of its comprehensive transit service, the City has relatively high participation rates for alternative transportation. Approximately 15 percent of employed residents commute to work by public transportation, while another 2 percent walk to work. Still, about 60 percent of employed residents drive to work alone (American Community Survey, 2012).

Because Sausalito is a gateway to Marin County from San Francisco, the city is a popular bike route and destination. The City provides a two-mile striped bicycle lane on Bridgeway Blvd. and nearly one mile of multi-use (off-street) bike paths. While cycling is popular with visitors and commuters, the topography of Sausalito limits the ability of hillside residents to use bicycles for transportation. Nonetheless, the compact size of Sausalito does provide opportunities for residents to walk or bike to local destinations.

Finally, Sausalito residents are both wealthier and more educated than residents in most California communities. With an average household income nearly twice that of the average California household (\$160,305 vs. \$85,265) and a great majority of well-educated residents (71 percent have bachelor's degrees or higher), Sausalito 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 September 2012, the Marin Climate & Energy Partnership prepared a [Greenhouse Gas Emissions Inventory for the City of Sausalito](#) for the baseline year 2005 and the year 2010. 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 City 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 city'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.

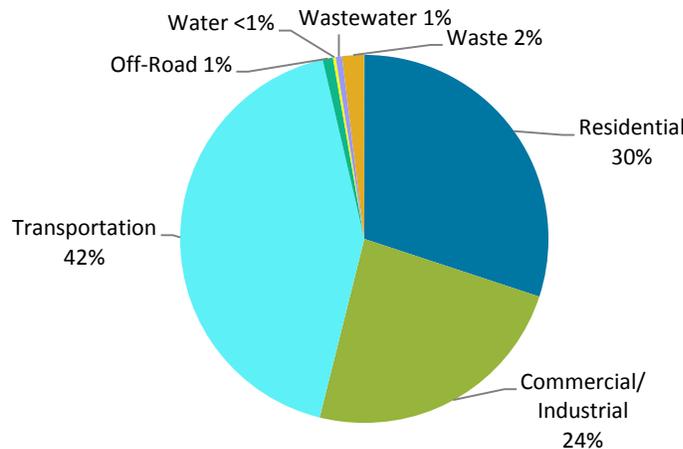
Community greenhouse gas emissions totaled 56,303 metric tons in 2005 and 54,394 metric tons in 2010, falling 3.4 percent, or 1,909 metric tons CO₂e. As shown in Table 3, reductions occurred in all seven inventoried sectors except the Residential sector, which experienced a small increase in emissions.

TABLE 3: COMMUNITY EMISSIONS BY SECTOR, 2005 AND 2010

| Sector | 2005 Metric Tons CO _{2e} | 2010 Metric Tons CO _{2e} | Change Metric Tons CO _{2e} | % Change |
|-------------------------------|--------------------------------------|--------------------------------------|--|--------------|
| Residential | 16,306 | 16,367 | +61 | +0.4% |
| Commercial/Industrial | 13,319 | 12,917 | -402 | -3.0% |
| Transportation | 23,760 | 23,107 | -653 | -2.7% |
| Off-Road Vehicles & Equipment | 600 | 497 | -103 | -17.2% |
| Water | 188 | 127 | -61 | -32.4% |
| Wastewater | 319 | 298 | -21 | -6.6% |
| Waste | 1,811 | 1,080 | -731 | -40.4% |
| Total | 56,303 | 54,394 | -1,909 | -3.4% |

Figure 7 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 (42 percent). This is followed by emissions from the Residential sector (30 percent) and the Commercial/Industrial sector (24 percent). The Waste, Wastewater, Off-Road Vehicles and Equipment, and Water sectors are each responsible for 2 percent or less of total community emissions.

FIGURE 7: EMISSIONS BY SECTOR, 2010



GOVERNMENT OPERATIONS EMISSIONS INVENTORY

In May 2011, Sausalito released its Local Government Operations Greenhouse Gas Inventory report for the baseline year of 2005. The report found that local government operations emitted a total of 1,761 metric tons CO_{2e} in 2005 from six sectors, as shown in Table 4. The Building and Facilities sector, which includes emissions from the generation of electricity, the combustion of natural gas, and the release of refrigerants from City Hall, the MLK schools, the Fire Station, the Police Station, and the Public Works facilities, generated 339 metric tons CO_{2e}. Emissions generated from the combustion of gasoline, diesel and other fuels used in the City’s fleet of 50 vehicles,

as well as refrigerants released from the air conditioning units of those vehicles, contributed 238 metric tons CO₂e. 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 123 metric tons CO₂e of total government operations emissions.

TABLE 4: GOVERNMENT OPERATIONS EMISSIONS SUMMARY BY SECTOR, 2005

| Sector | 2005 Metric Tons CO ₂ e |
|---|---------------------------------------|
| Buildings and Facilities | 339 |
| Vehicle Fleet | 238 |
| Public Lighting | 123 |
| Government Generated Solid Waste | 16 |
| Water Transport | 6 |
| Employee Commute | 1,039 |
| Total | 1,761 |

Government facilities produced approximately 63 tons of landfilled solid waste in 2005, with about two-thirds coming from the Martin Luther King School buildings. This waste is estimated to generate about 16 metric tons CO₂e 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 6 metric tons CO₂e. Finally, the 120 City of Sausalito employees are estimated to have generated 1,039 metric tons CO₂e commuting to and from work in 2005.

Government operations are considered a subset of community emissions. Excluding fugitive emissions generated by refrigerants, which are not presently accounted for in the community inventory, government operations represented approximately 2.9% of community emissions in 2005.

EMISSION FORECASTS AND REDUCTION TARGETS

The climate action plan includes a business-as-usual 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” baseline emissions by forecasted changes in population, number of households, and jobs according to projections developed by the Association of Bay Area Governments. Transportation emissions are projected utilizing data provided by the Metropolitan Transportation Commission (MTC), which incorporate the VMT reductions expected from the implementation of Plan Bay Area. Table 5 shows that emissions are expected to rise about 0.5 percent between 2010 and 2020.

TABLE 5: COMMUNITY EMISSIONS FORECAST AND REDUCTION TARGET

| 2005 Emissions | 2010 Emissions | 2020 BAU Emissions | 2020 Goal (15% Below 2005) | Reductions Needed to Meet 2020 Goal |
|-------------------|-------------------|-----------------------|-------------------------------|--|
| 56,303 | 54,394 | 54,660 | 47,858 | 6,536 |

On October 23, 2012, the Sausalito City Council adopted a goal to reduce community emissions 15 percent below 2005 levels by the year 2020 (Resolution 5365). In order to meet this goal, the City will need to reduce community emissions by 6,539 metric tons CO₂e from 2010 levels.

Emissions from local government operations are not expected to rise due to an expansion of government services or facilities. Government operations emissions totaled 1,761 metric tons CO₂e in 2005. In order to meet a similar 15 percent reduction target, emissions would need to drop by 264 metric tons CO₂e, as shown in Table 6.

TABLE 6: GOVERNMENT OPERATIONS EMISSIONS FORECAST AND REDUCTION TARGET

| 2005 Emissions | 2020 BAU Emissions | 2020 Goal (15% Below 2005) | Reductions Needed to Meet 2020 Goal |
|----------------|--------------------|----------------------------|-------------------------------------|
| 1,761 | 1,761 | 1,497 | 264 |

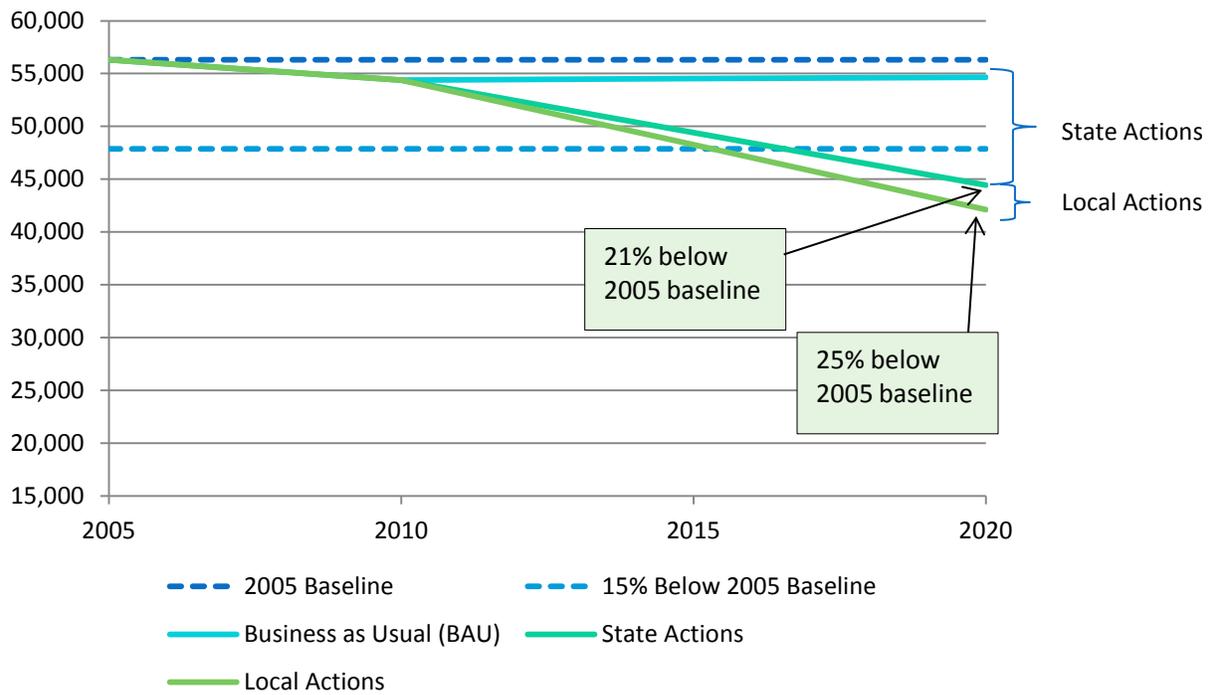
ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS

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 Sausalito. 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 City staff along with Sausalito 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 City will achieve its 2020 goal to reduce emissions 15 percent below 2005 levels through the implementation of State actions alone. As shown in Figure 8, State actions are expected to reduce emissions 21 percent below 2005 levels, and local actions will reduce emissions another 4 percent.

FIGURE 8: 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. In 2013, PG&E's electric power generation mix contained 22% eligible renewable energy. Marin Clean Energy's electricity contained 29% eligible renewable energy.

PAVLEY (AB 1493)

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.

LOW CARBON FUEL STANDARD

The State is also working to reduce the carbon intensity of transportation fuels consumed in California. To achieve this, CARB has developed a Low Carbon Fuel Standard (LCFS), which will reduce the carbon intensity of California's transportation fuels by at least 10% by 2020 as called for by Governor Schwarzenegger in Executive Order S-01-07. LCFS uses a market-based cap and trade approach to lowering the greenhouse gas emissions from petroleum-based transportation fuels like reformulated gasoline and diesel. Petroleum importers, refiners and wholesalers can either develop their own low carbon fuel products or buy LCFS credits from other companies that develop and sell low carbon alternative fuels, such as biofuels, electricity, natural gas or hydrogen.

ADVANCED CLEAN CARS

The Advanced Clean Cars rule will further reduce GHG emissions from automobiles and light-duty trucks for 2017-2025 vehicle model 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%.

AB 32 VEHICLE EFFICIENCY MEASURES

The AB 32 scoping plan includes several vehicle efficiency measures that focus on maintenance practices. The Tire Pressure Program will increase vehicle efficiency by assuring properly inflated automobile tires to reduce rolling resistance. The Heavy-Duty Vehicle Aerodynamic Efficiency Program will increase heavy-duty (long-haul trucks) efficiency by requiring installation of best available technology and/or ARB approved technology to reduce aerodynamic drag and rolling resistance. Finally, the Heavy-Duty Vehicle Hybridization Program will reduce GHG emission through the use of hybrid and zero-emission technology.

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.

CALIFORNIA SOLAR INITIATIVE

The California Solar Initiative (CSI) program is a solar rebate program for electric customers of the investor-owned utilities, including PG&E. The program funds solar installations on homes and commercial buildings and offers different incentive levels based on system capacity as well as the performance of the solar panels. Although the program was expected to run through 2016, program funds were exhausted in 2013, and the program is now closed. The program's goal was to install approximately 1,940 MW of new solar generation capacity. As of Sept. 17, 2014, California had installed 2,284 MW of solar projects (this figure includes non-CSI data).

As shown in the table below, projected emission reductions for these State actions total 10,218 metric tons CO₂e in Sausalito, which exceeds the 6,536 reduction needed to meet the City's 2020 target of 15% below 2005 levels (see Table 5). The impact of these programs by 2020 will be to reduce emission 21% below 2005 levels.

TABLE 7: EMISSIONS REDUCTIONS FROM STATE ACTIONS

| State Action | Emissions Reductions 2020 |
|--|---------------------------|
| Renewable Portfolio Standard | 4,148 |
| Pavley and Low Carbon Fuel Standard | 4,562 |
| Advanced Clean Cars Rule | 413 |
| AB32 Vehicle Efficiency Measures | 95 |
| Title 24 | 115 |
| Lighting Efficiency | 791 |
| Residential Solar Water Heaters | 39 |
| California Solar Initiative | 55 |
| Total | 10,218 |
| % Reduced Below 2005 Baseline | 21% |

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 2,065 metric tons CO₂e. These reductions are in addition to the 1,909 metric tons CO₂e already realized in the community between 2005 and 2010 (see Table 3). When State reductions are added (see Table 7 for a breakdown of State actions), emissions in Sausalito would be approximately 25% below 2005 levels in year 2020 – enough to allow the City to exceed its reduction target of 15% below the 2005 baseline.

Government operations represent a subset of community emissions. Within government operations, the City could achieve reductions of 218 metric tons CO₂e by implementing the local reduction strategies described in this chapter and detailed in the Appendix. Combined with State actions, government operations emissions are projected to be approximately 19% below 2005 levels by year 2020 (see Table 9).

TABLE 8: REDUCTION STRATEGIES FOR COMMUNITY EMISSIONS

| Sector | GHG Reductions (metric tons CO ₂ e) |
|--|---|
| 1 – Energy Efficiency and Renewable Energy | 955 |
| 2 – Transportation and Land Use | 457 |
| 3 - Waste Reduction, Reuse and Recycling | 508 |
| 4 - Water and Wastewater | 145 |
| 5 - Natural Systems and Sequestration | 21* |
| Total Local Community Actions | 2,065 |
| Local Government Operation Actions (see Table 9) | 218 |
| State Actions Impacting Community and Government Operations (see Table 7) | 10,218 |
| TOTAL GHG Reductions | |
| 2005 Emissions | 56,303 |
| Projected 2020 Emissions with Local and State Actions Implemented | 42,159 |
| <i>% Reduced Below 2005 Levels in Year 2020</i> | <i>25%</i> |

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

TABLE 9: REDUCTION STRATEGIES FOR GOVERNMENT OPERATIONS EMISSIONS

| Sector | GHG Reductions (metric tons CO ₂ e) |
|---|---|
| 1 – Energy Efficiency and Renewable Energy | 183 |
| 2 – Transportation and Land Use | 27 |
| 3 – Waste Reduction, Reuse and Recycling | 7 |
| 4 – Water and Wastewater | <1 |
| 5 – Natural Systems and Sequestration | 2* |
| Total Local Government Operation Actions | 218 |
| State Actions Impacting Government Operations | 116 |
| TOTAL GHG Reductions 2005-2020 | |
| 2005 Emissions | 1,761 |
| Projected 2020 Emissions with Local and State Actions Implemented | 1,429 |
| <i>% Reduced Below 2005 Levels in Year 2020</i> | <i>19%</i> |

*Sequestration emissions are shown here for informational purposes only as they are not included in the City’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%. 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 City 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 Sausalito supply about 2 percent of the community’s electricity needs. The City 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 City can reduce energy consumption in its own operations by upgrading all streetlights and outdoor lighting to LED lights (78% of streetlights have already been upgraded), completing recommended indoor lighting retrofits, and replacing inefficient boilers and heat pumps. In addition to the solar systems already installed at City Hall and Fire Station 1, the City could pursue opportunities to install solar panels on other City-owned buildings or over parking lots. Finally, the City should continue to offset 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 | GHG Reductions (metric tons CO ₂ e) |
|---|---|
| <i>Community Actions</i> | |
| 1-1 Residential Green Building Ordinance | 18 |
| 1-2 Commercial Green Building Ordinance | 76 |
| 1-3 Solar Energy | 64 |
| 1-4 Residential Energy Efficiency | 238 |
| 1-5 Commercial Energy Efficiency | 175 |
| 1-6 Energy Audits | 22 |
| 1-7 Residential Marin Clean Energy Deep Green Electricity | 361 |
| <i>Government Operations Actions</i> | |
| 1-8 Public Lighting | 39 |
| 1-9 Municipal Energy Efficiency Projects | 14 |
| 1-10 Municipal Energy Efficiency Protocols and Equipment | 9 |
| 1-11 Municipal Solar | 19 |
| 1-12 Municipal Marin Clean Energy Deep Green Electricity | 102 |
| TOTAL GHG Reductions | 1,139 |

RECOMMENDED COMMUNITY ACTIONS

CAP 1-1

Residential Green Building Ordinance. Update building codes to mandate higher building energy performance in newly constructed residential buildings.

CAP 1-2.

Commercial Green Building Ordinance. Update building codes to mandate higher building energy performance in newly constructed non-residential buildings.

CAP 1-3

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

CAP 1-3.a

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

CAP 1-3.b

Adopt streamlined permitting procedures, such as over-the-counter approval of solar permits.

CAP 1-3.c

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

CAP 1-3.d

Participate in property assessed clean energy (PACE) financing programs and bulk purchasing programs.

CAP 1-4

Residential Energy Efficiency. Participate in rebate and incentive programs such as Energy Upgrade California and promote existing rebates and programs offered through the Marin Energy Watch Partnership, Marin Clean Energy, and PG&E.

CAP 1-5

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

CAP 1-6

Energy Audits. Require energy audits 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 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 Projects. Identify and complete energy-efficiency projects, such as those identified by the Marin Energy Management Team.

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. Complete a feasibility study on the installation of solar or other renewable energy projects at select City facilities, such as the Martin Luther King School facilities and City parking lots, and install where feasible. Work with Marin Clean Energy to identify and construct a solar energy site.

CAP 1-12

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

TRANSPORTATION AND LAND USE

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 42% 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 riding the ferry and other public transportation. The City 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 City 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. Sausalito 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 AND LAND USE STRATEGIES

| Strategy | GHG Reductions (metric tons CO ₂ e) |
|---|---|
| <i>Community Actions</i> | |
| 2-1 Bicycle and Pedestrian Transportation | 256 |
| 2-2 School Transportation | 20 |
| 2-3 Carpooling | 49 |
| 2-4 Public Transportation | 85 |
| 2-5 Teleworking | 24 |
| 2-6 Electric Vehicles | 20 |
| 2-7 Market Price Parking | 4 |
| <i>Government Operations Actions</i> | |
| 2-8 High-Efficiency City Vehicles | 7 |
| 2-9 City Employee Commute | 20 |
| TOTAL GHG Reductions | 484 |

RECOMMENDED COMMUNITY ACTIONS

CAP 2-1

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

CAP 2-1.a

Implement the City’s Pedestrian and Bicycle Master Plan. Construct recommended bike lanes, routes, bike racks and other facilities, and develop a citywide bicycle system that meets the needs of residents, commuter 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.

CAP 2-1.f

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

CAP 2-1.g

Encourage 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

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

CAP 2-1.i

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

CAP 2-1.j

Educate residents and employees about the health and environmental benefits of walking and cycling and provide information to assist in these modes of travel (e.g., information available in public places and employment centers regarding bus schedules, pedestrian pathways, and bikeways).

CAP 2-2

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

CAP 2-2.a

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

CAP 2-2.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 2-2.c

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

CAP 2-3

Carpooling. Support and promote ride sharing programs.

CAP 2-3.a

Adopt development requirements to encourage carpooling through transportation demand management programs and require preferred parking for carpool vehicles.

CAP 2-3.b

Promote ridesharing programs, such as 511 Rideshare and the Transportation Authority of Marin's Vanpool Incentive Program and Emergency Ride Home Program.

CAP 2-3.c

Encourage the creation of a system to facilitate informal carpools for Sausalito commuters.

CAP 2-4

Public Transportation. Support and promote public transit.

CAP 2-4.a

Work with transit providers to increase both the frequency and types of transit services available to Sausalito residents, employees and visitors.

CAP 2-4.b

Support continued operation of ferry service.

CAP 2.4.c

Promote transit programs offered by the Transportation Authority of Marin for commuters, including the "Go Time Marin" commuter tool kit.

CAP 2-5

Teleworking. Support and encourage employers to implement green commute alternatives including teleworking, as outlined by the Transportation Authority of Marin.

CAP 2-6

Electric Vehicles. Increase ownership of electric vehicles.

CAP 2-6.a

Install electric vehicle charging stations in City parking lots.

CAP 2-6.b

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

CAP 2-6.c

Require new residential development to provide electrical service for potential electric vehicle use.

CAP 2-6.d

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

CAP 2-7

Market Price Parking. Establish market price parking at metered parking spaces to eliminate cruising for available spaces.

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 2-8

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

CAP 2-9

City Employee Commute. Provide city employees with incentives to use alternatives to single occupant auto 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 percent¹⁴ 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 Sausalito'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 City of Sausalito 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 2010 inventories. Nonetheless, per capita waste has remained fairly constant over the past five years, and has rebounded slightly since hitting a low in 2011.

¹⁴ U.S. Environmental Protection Agency, *Compilation of Air Pollutant Emissions Factors*, AP-42, Fifth Edition, January 1995.

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 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 | GHG Reductions (metric tons CO ₂ e) |
|---|---|
| <i>Community Actions</i> | |
| 3-1 Zero Waste | 508 |
| <i>Government Operations Actions</i> | |
| 3-2 Zero Waste in Government Operations | 7 |
| TOTAL GHG Reductions | 515 |

RECOMMENDED COMMUNITY ACTIONS

CAP 3-1

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

CAP 3-1.a

Explore implementation options to require mandatory recycling and composting for all Sausalito residents, businesses, and City government.

CAP 3-1.b

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

CAP 3-1.c

Review and revise the City’s franchise agreement with its waste hauler to ensure waste reduction and diversion rates are maximized. Explore feasibility of the following provisions: eliminate free backyard pickup service; charge a processing fee to customers who exceed specified contamination levels in trash bins (incentivizes landfill diversion); and charge a handling fee for moving bins to and from collection truck, if not placed at curb. 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 multi-unit 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.

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 and throughout the city within all government facilities. Increase focus on heavily trafficked tourist areas.

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 and providing dishware and glassware to reduce use of paper plates and cups, and initiating online submission of documents to the Community Development Department.

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 city of Sausalito. 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 Sausalito. 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 Sausalito 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, 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 Sausalito community.

WASTEWATER

The Sausalito-Marin City Sanitation District collects and treats wastewater produced by the Sausalito 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 can be collected and converted to energy, thereby reducing the treatment plant's use of electricity and/or natural gas in its daily operations. Food waste can be added to the biodigestion process, increasing the amount of energy that can be produced at the plant.

TABLE 13: WATER AND WASTEWATER STRATEGIES

| Strategy | GHG Reductions (metric tons CO ₂ e) |
|---|---|
| <i>Community Actions</i> | |
| 4-1 Indoor Water Efficiency and Conservation | 118 |
| 4-2 Outdoor Water Efficiency and Conservation | 6 |
| 4-3 Rainwater Catchment | <1 |
| 4-4 Greywater Systems | <1 |
| 4-5 Energy Production from Wastewater | 21 |
| <i>Government Operations Actions</i> | |
| 4-6 Municipal Water Conservation | <1 |
| 4-7 Municipal Wastewater Pumps | <1 |
| TOTAL GHG Reductions | 145 |

RECOMMENDED COMMUNITY ACTIONS

CAP 4-1

Indoor Water Efficiency and Conservation.

CAP 4-1.a.

Work with Marin Water District to promote existing and new rebates for water-efficient appliances and fixtures.

CAP 4-1.b

Require 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 4-2

Outdoor Water Efficiency and Conservation. Work with Marin Municipal Water district to promote existing and new rebates for water-efficient landscaping and irrigation systems and controllers. Support additional water-efficient landscape requirements if needed to meet water conservation targets.

CAP 4-3

Rainwater Catchment. Promote existing and new rebates for water storage facilities. Review existing building and zoning codes and permitting procedures and revise as necessary to encourage cisterns and other rainwater storage facilities.

CAP 4-4

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

CAP 4-5

Energy Production from Wastewater. Work with the Sausalito-Marín City Sanitation District to implement methane capture for energy production at the wastewater treatment plant.

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 4-6

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

CAP 4-7

Municipal Wastewater Pumps. Evaluate the City’s wastewater pumping stations and replace inefficient motors and pumps with more efficient units.

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 Sausalito can sequester emissions is by encouraging tree planting in the community.

TABLE 14: NATURAL SYSTEMS AND SEQUESTRATION STRATEGIES

| Strategy | GHG Reductions (metric tons CO ₂ e) |
|--------------------------------------|---|
| <i>Community Actions</i> | |
| 5-1 Tree Planting on Private Land | 21 |
| <i>Government Operations Actions</i> | |
| 5-2 Tree Planting on Public Land | 2 |
| TOTAL GHG Reductions | 23* |

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

RECOMMENDED COMMUNITY ACTIONS

CAP 5-1

Tree Cover. Increase Sausalito’s tree cover.

CAP 5-1.a

Establish a Sausalito Urban Releaf or Urban Forest Committee with a mandate to increase Sausalito’s trees.

CAP 5-1.b

Using satellite imagery or other means, perform a green audit and evaluation of the existing tree canopy in Sausalito.

CAP 5-1.c

Establish an ambitious yet achievable community tree planting goal for a specified time period.

CAP 5-1.d

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

CAP 5-1.e

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

RECOMMENDED GOVERNMENT OPERATIONS ACTIONS

CAP 5-2

Tree Planting. Increase the number of City, park and street trees.

CAP 5-2.a

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

CAP 5-2.b

Properly maintain and prune existing City, park and street trees.

CAP 5-2.c

Avoid paving of existing sidewalk planting buffers and reestablish plantings whenever sidewalks are renovated.

CAP 5-2.d

Plant trees along sidewalks at regular intervals, wherever feasible.

STRATEGIES TO ADAPT TO CLIMATE CHANGE

To effectively address the challenges that a changing climate will bring, the City 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 Sausalito'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 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 City's capital planning process.

CAP 6-4

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

CAP 6-5

Incorporate the likelihood of climate change impacts into City 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

Sausalito recognizes that responding to and preparing for climate change is a critical step toward a sustainable future. The City's early actions to reduce its contribution to climate change reflect the City'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 the City's target of 15% below 2005 emissions by the year 2020. A wide range of programs that exceed the City's reduction 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 City 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 City's progress annually. Create an annual Priorities List for implementation.

CAP 7-2

Update the greenhouse gas emissions inventory for community and government operations emissions every five years, 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 incorporate a new long-term reduction target and reduction strategies to meet that new target.

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

| Strategy | Target | Estimated Cost | Estimated Annual Savings | GHG Reductions (MTCO ₂ e) |
|---|---|--|--|--------------------------------------|
| 1-1 Residential Green Building Ordinance | Require new construction to reduce energy use 15% over 2013 State building code. | | | 18 |
| 1-2 Commercial Green Building Ordinance | Require new construction to reduce energy use 15% over 2013 State building code. | | | 76 |
| 1-3 Solar Energy | Average of 7 residential systems and 2.8 commercial systems installed each year | | | 64 |
| 1-4 Residential Energy Efficiency | 5% of households reduce energy use by 31% | | | 238 |
| 1-5 Commercial Energy Efficiency | 5% of commercial buildings reduce energy use by 31% | | | 175 |
| 1-6 Energy Audits | 10% of audited households reduce energy use by 10% | | | 22 |
| 1-7 Residential Marin Clean Energy Deep Green Electricity | 500 households purchase Deep Green. | | | 361 |
| 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 | | 39 |
| 1-9 Municipal Energy Efficiency Projects | Complete lighting retrofits and replace Public Works heat pump and City Hall boiler | Lighting retrofits: \$16,400 Heat Pump: \$12,300 Boiler: \$30,000 All estimates are net of rebates and were developed in 2010. | Lighting retrofits: \$3,100 Heat Pump: \$1,750 Boiler: \$1,600 All estimates, 2010. | 14 |
| 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. | | 9 |
| 1-11 Municipal Solar | Install an additional 25 kW solar system. | \$4.3 to \$5.3 per watt or \$108,000 - \$133,000 direct | \$9,400 - \$11,300 (direct) \$1,000-\$2,000 (PPA) | 19 |

| | | | | | |
|------|---------------------------------------|--|---|--|---|
| | | | costs for 25 kW roof-mounted system; \$0 for Power Purchase Agreement (PPA). | | |
| 1-12 | Municipal MCE Deep Green | Purchase Deep Green electricity for all facilities | \$13,000 for current operations; \$8,000 after implementation of all energy-efficiency and renewable energy strategies (1 cent per kWh) | 102 | |
| 2-1 | Bicycle and Pedestrian Transportation | Increase walking and biking mode share for utilitarian trips from 13.6% to 20% | | 256 | |
| 2-2 | School Transportation | Decrease mode share of children arriving alone in a car to school from 62% to 44%. | | 20 | |
| 2-3 | Carpooling | Increase carpooling mode share from 12% to 15% | | 49 | |
| 2-4 | Public Transportation | Increase public transportation mode share from 10% to 15% | | 85 | |
| 2-5 | Teleworking | 25% of all workers telecommute 1.5 days per week | | 24 | |
| 2-6 | Electric Vehicles | Install 30 electric vehicle charge ports | | 20 | |
| 2-7 | Market Price Parking | Establish market price parking for 100 metered parking spaces. | | 4 | |
| 2-8 | High-Efficiency City 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. | 7 |
| 2-9 | City Employee Commute | Reduce employee commute VMT 5.2% | The Transportation Authority of Marin provides green commute programs and a free Go Time Marin commuter | 20 | |

| | | | |
|-----|---|--|-----|
| | | toolkit. 511 provides free survey and consultation services. | |
| 3-1 | Zero Waste | Divert 86% of waste from landfill, or approximately 50% reduction in organic waste going to the landfill | 508 |
| 3-2 | Zero Waste in Government Operations | Divert 86% of waste from landfill, or approximately 50% reduction in organic waste going to the landfill | 7 |
| | | The City is eligible to receive approximately \$12,000 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. | |
| 4-1 | Indoor Water Efficiency and Conservation | Reduce indoor water use 9% | 118 |
| 4-2 | Outdoor Water Efficiency and Conservation | Reduce outdoor water use 20% | 6 |
| 4-3 | Rainwater Catchment | 50,000 gallons of water storage installed | <1 |
| 4-4 | Greywater Systems | 100 households using greywater systems | <1 |
| 4-5 | Energy Production from Wastewater | Convert 100% of methane to biogas | 21 |
| 4-6 | Municipal Water Conservation | Reduce indoor water use by 20%. | <1 |
| | | Change-out of specific fixtures will require additional analysis. | |
| 4-7 | Municipal Wastewater Pumps | Improve efficiency of pumps by 10-15%. | <1 |
| | | Estimated cost for upgrading the Whiskey Springs pumping station is \$800,000. | |
| 5-1 | Tree Planting on Private Land | Plant 100 net new trees per year. | 21 |
| 5-2 | Tree Planting on Public Land | Plant 10 net new trees per year. | 2 |
| | | Estimated annual cost for planting new trees is \$10,000. | |

 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 City 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

| | |
|---|---|
| Action | Update building code to mandate higher building performance in newly constructed residential buildings over existing CALGreen requirements. |
| Reductions (MTCO ₂ e) -18.2 | Require 15% energy reduction over Title 24 requirements. |
| Methodology | CAPCOA Measure BE-1 used for estimating building energy savings. |
| 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

Residential

| | |
|--|--------------------------|
| Percent over Title 24 Energy Requirements | 15 % |
| New construction electricity use, BAU | 277,637 kWh |
| New construction electricity use, after Title 24 | 210,692 kWh |
| Additional reduction in electricity use | 2,384 kWh |
| New construction natural gas use, BAU | 27,864 therms |
| New construction natural gas use, after Title 24 | 25,292 therms |
| Additional reduction in natural gas use | 3,372 therms |
| Emissions reductions | 18.2 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 (29% single, 71% multifamily) | 0.08% | 0.89% | Calculation |

COMMERCIAL GREEN BUILDING ORDINANCE

Community Action 1-2

| | |
|----------------------------------|---|
| Action | Update building code to mandate higher building performance in newly constructed commercial buildings over mandatory CALGreen requirements. |
| Reductions (MTCO ₂ e) | -75.8 Require 15% energy reduction over Title 24 requirements. |
| Methodology | CAPCOA Measure BE-1 used for estimating building energy savings. |
| 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

Commercial

| | |
|--|--------------------------|
| Percent over Title 24 Energy Requirements | 15 % |
| New construction electricity use, BAU | 3,634,846 kWh |
| New construction electricity use, after Title 24 | 3,430,023 kWh |
| Additional reduction in electricity use | 133,771 kWh |
| New construction natural gas use, BAU | 113,363 therms |
| New construction natural gas use, after Title 24 | 101,108 therms |
| Additional reduction in natural gas use | 10,920 therms |
| Emissions reductions | 75.8 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 (29% single, 71% multifamily) | 0.08% | 0.89% | Calculation |

SOLAR ENERGY
Community Action 1-3

| | |
|----------------------------------|--|
| Action | Provide financial incentives for solar PV and hot water system installation (e.g., reduce/waive fees). Adopt streamlined permitting procedures (e.g., allowing solar systems in setbacks, providing over-the-counter approval). Amend design guidelines and zoning ordinances as necessary to encourage solar installation on buildings, over parking areas, and ground-mount systems. Participate in AB811 financing programs such as CaliforniaFirst and HERO. Promote bulk purchases. |
| Reductions (MTCO ₂ e) | -64.6 |
| Methodology | 42 residential systems were installed between 2007 and 2013 with an average 4,635 kWh generated per system. 17 commercial systems were installed with an average 13,110 kWh generated annually. |
| Sources | California Solar Initiative, http://www.californiasolarstatistics.ca.gov/ . |

Calculation

Residential Renewable Energy

| | |
|---|--------------------------|
| Average number of residential solar energy systems installed annually | 7 |
| Number of systems projected to be installed 2014-2020 | 49 |
| Average electricity generated per installation | 4,635 |
| Annual electricity savings | 227,115 kWh |
| Electricity emissions reductions | 30.1 MTCO ₂ e |

Commercial Renewable Energy

| | |
|---|--------------------------|
| Average number of commercial systems installed annually | 2.8 |
| Number of systems projected to be installed 2014-2020 | 19.8 |
| Average electricity generated per installation | 13,110 |
| Annual electricity savings | 260,015 kWh |
| Electricity emissions reductions | 34.5 MTCO ₂ e |

RESIDENTIAL ENERGY EFFICIENCY

Community Action 1-4

| | |
|----------------------------------|--|
| Action | Participate in Energy Upgrade California and similar rebate/incentive programs as they become available and promote existing rebates (PG&E, MCE, State, Federal). Participate in AB811 financing programs such as CaliforniaFirst and HERO. |
| Reductions (MTCO ₂ e) | -237.8 |
| Methodology | Assumes 5% of households will complete energy efficiency projects that reduce energy use by 31%. Energy Upgrade California demonstrated energy savings averaging 31% Btu for projects completed in Marin County between June 2010 and May 2012. |
| Sources | Marin County Energy Watch Partnership, Dana Armanino, Sustainability Planner, County of Marin, darmanino@marincounty.org |

Calculation

| | |
|--|---------------------------|
| Residential electricity use 2020 BAU | 23,027,536 kWh |
| Residential natural gas use 2020 BAU | 2,311,041 therms |
| Percentage of participating households | 5% |
| Electricity reduction | 31% |
| Natural gas reduction | 31% |
| Annual electricity savings | 356,927 kWh |
| Natural gas savings | 35,821 therms |
| Electricity emissions reductions | 47.4 MTCO ₂ e |
| Natural gas emissions reductions | 190.4 MTCO ₂ e |
| TOTAL emissions reductions | 237.8 MTCO ₂ e |

COMMERCIAL ENERGY EFFICIENCY

Community Action 1-5

| | |
|--|---|
| Action | 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 AB811 financing programs such as CaliforniaFirst and HERO. |
| Reductions (MTCO ₂ e) -175.3 | |
| Methodology | Assumes 5% of businesses will complete energy efficiency projects that reduce energy use by 31% . Energy Upgrade California demonstrated energy savings averaging 31% Btu for projects completed in Marin County between June 2010 and May 2012. |
| Sources | Marin County Energy Watch Partnership, Dana Armanino, Sustainability Planner, County of Marin, darmanino@marincounty.org |

Calculation

| | |
|--|---------------------------|
| Commercial electricity use 2020 BAU | 37,890,518 kWh |
| Commercial natural gas use 2020 BAU | 1,181,719 therms |
| Percentage of participating households | 5% |
| Electricity reduction | 31% |
| Natural gas reduction | 31% |
| Annual electricity savings | 587,303 kWh |
| Natural gas savings | 18,317 therms |
| Electricity emissions reductions | 77.9 MTCO ₂ e |
| Natural gas emissions reductions | 97.4 MTCO ₂ e |
| TOTAL emissions reductions | 175.3 MTCO ₂ e |

ENERGY AUDITS
Community Action 1-6

| | |
|---|---|
| Action | Require energy audits for residential and commercial buildings prior to completion of sale. |
| Reductions (MTCO ₂ e) -22.4 | |
| Methodology | 103 housing units sold annually, based on 10-year average for 2004-2013 (Marin County Assessor). Assumes 10% of audited housing units will reduce energy use by 10%. |
| Sources | Marin County Assessor, http://www.marincounty.org/depts/ar/divisions/assessor/sales |

Calculation

| | |
|---|--------------------------|
| Average household electricity use 2010 | 5,444 kWh |
| Average household natural gas use 2010 | 546 therms |
| Number of housing units sold annually | 103 units |
| Number of housing units provided energy audits (2015-2020) | 618 units |
| Percent of participating housing units | 10% |
| Number of housing units implementing energy efficiency projects | 62 units |
| Electricity reduction | 10% |
| Natural gas reduction | 10% |
| Annual electricity savings | 33,643 kWh |
| Natural gas savings | 3,376 therms |
| Electricity emissions reductions | 4.5 MTCO ₂ e |
| Natural gas emissions reductions | 17.9 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) -361.2 | |
| Methodology | Approximately 1.8% of MCE's customers chose Deep Green electricity in 2014. This equates to approximately 74 customers in Sausalito. Marin Clean Energy Deep Green electricity costs 1 cent per kWh. |
| Sources | Rafael Silberblatt, Marin Clean Energy, presentation to Marin Climate & Energy Partnership, May 1, 2014. |

Calculation

| | |
|--|---------------------------|
| Number of households in 2020 | 4,230 |
| Average annual household electricity use (kWh) | 5,444 kWh |
| Electricity offset by purchase of Deep Green (kWh) | 5,444 kWh |
| Annual cost per household | \$54 |
| Number of participating households in 2020 | 500 |
| GHG emissions reductions | 361.2 MTCO ₂ e |

PUBLIC LIGHTING
Government Operations Action 1-8

| | |
|----------------------------------|---|
| Action | Replace street, traffic signals, parks and parking lot lighting with efficient LED lighting. |
| Reductions (MTCO ₂ e) | -39.2 |
| Methodology | <p>The City retrofitted 489 of 664 streetlights (78%) in 2012 and 2013. The estimated electricity savings from completed projects is 277,038 kWh. This measure assumes the City will retrofit remaining public lighting by 2020.</p> <p>This measure estimates energy efficiency by modeling the following replacement fixtures: HPS 70w with LED 37w; HPS 100w with LED 54w; HPS 150 w with LED 90w; and HPS 200w with LED 106w.</p> |
| Sources | <p>Replacement schedule provided by Republic ITS.</p> <p>Fixture energy use: PG&E Electric Schedule LS-2, September 30, 2014.</p> |

Calculation

| | | |
|---|---------|---------------------|
| Electricity consumption for public lighting, 2010 | 546,561 | kWh |
| Potential electricity reduction through LED replacement | 54% | |
| Electricity savings | 295,143 | kWh |
| GHG emissions reductions | 39.2 | MTCO ₂ e |

MUNICIPAL ENERGY EFFICIENCY PROJECTS

Government Operations Action 1-9

| | |
|----------------------------------|--|
| Action | Audit city facilities for energy efficiency opportunities and implement energy efficient retrofits. City participates in Marin County Energy Watch to identify opportunities for EE upgrades and track energy performance. Leverage other programs that provide funding. |
| Reductions (MTCO ₂ e) | -14.0 |
| Methodology | Annual electricity and natural gas savings for identified projects provided by the Marin Energy Management Team. |
| Sources | Proposed energy-efficiency projects and estimated energy savings based on Energy Management Plan for the City of Sausalito prepared by the Marin Energy Management Team on January 26, 2005 and December 13, 2010. |

Calculation

| Project | Annual Electricity Savings (kWh) | Annual Natural Gas Savings (therms) |
|--|----------------------------------|-------------------------------------|
| Lighting Retrofit, City Hall (completed in 2008) | 25,200 | 0 |
| Lighting Retrofit, Fire Station #1 | 7,383 | 0 |
| Lighting Retrofit, MLK Recreation Center | 949 | 0 |
| Lighting Retrofit, Public Works | 6,659 | 0 |
| Heat Pump Replacement, Public Works | 11,665 | 0 |
| City Hall Boiler Replacement | 0 | 1,337 |
| TOTAL | 51,857 | 1,337 |
| Emissions reductions (MTCO ₂ e) | 6.9 | 7.1 |

MUNICIPAL ENERGY EFFICIENCY PROTOCOLS AND EQUIPMENT
Community Action 1-10

| | |
|----------------------------------|--|
| Action | 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. |
| Reductions (MTCO ₂ e) | -8.9 |
| 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

| | |
|--|-------------------------|
| Electricity consumption in municipal buildings, 2005 | 696,700 kWh |
| Electricity use in municipal buildings | 142 MTCO ₂ e |
| Natural gas use in municipal buildings | 85 MTCO ₂ e |
| Percent reduction in energy use | 5% |
| Reduction in electricity consumption | 34,835 kWh |
| GHG emissions reductions | 8.9 MTCO ₂ e |

MUNICIPAL SOLAR ENERGY

Government Operations Action 1-11

| | |
|----------------------------------|--|
| Action | Complete a feasibility study on the installation of solar or other renewable energy projects at select City facilities and install where feasible. |
| Reductions (MTCO ₂ e) | -19.5 |
| Methodology | The City installed a 50 kW solar energy system at City Hall in 2009 and a 24 kW system at Fire Station 1 in 2010. These systems have generated an average of 109,794 annually. |
| Sources | |

Calculation

| | |
|---|--------------------------|
| Electricity consumed by municipal operations (kWh) | 1,269,339 kWh |
| Electricity generated by installed renewable energy systems (kWh) | 109,794 kWh |
| Electricity generated by additional 25 kW system | 37,093 kWh |
| Total electricity savings (kWh) | 146,886 kWh |
| GHG emissions reductions | 19.5 MTCO ₂ e |

MUNICIPAL MARIN CLEAN ENERGY DEEP GREEN

Government Operations Action 1-12

| | |
|----------------------------------|--|
| Related CAP Program | Purchase Marin Clean Energy 100% renewable energy ("Deep Green") for all facilities. |
| Reductions (MTCO ₂ e) | -101.7 |
| 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

| | |
|---|---------------------------|
| Government operations electricity consumption in 2005 | 1,295,417 kWh |
| Electricity emissions reduced through other measures | 528,721 kWh |
| Remaining electricity to be offset with Deep Green | 766,696 kWh |
| Cost to City | \$7,667 |
| Reduction in GHG emissions | 101.7 MTCO ₂ e |

BICYCLE AND PEDESTRIAN TRANSPORTATION

Community Action 2-1

| | |
|--|---|
| Action | Construct bike facilities as adopted in City'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. |
| Reductions (MTCO ₂ e) -255.5 | Increase walking and biking mode share to 20%. |
| Methodology | According to a 2007 survey prepared for the Marin County Nonmotorized Transportation Pilot Program, 11.8% of utilitarian trips (trips made to a destination and not solely for recreation or exercise) in 2007 were made by walking and 1.8% by bicycle, for a total mode share of 13.6%. Studies cited by CAPCOA show: Pedestrian network improvements can reduce VMT 1-2%. Traffic calming measures can reduce VMT by 0.25 to 1%. Each additional mile of bike lanes per square mile increases the share of workers commuting by bicycle by 1%. |
| Sources | 2010 U.S. Census, SF1:DP-1. Average daily walking and bicycling data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007. 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. City of Sausalito Bicycle Master Plan, prepared by Alta Planning + Design, 2008 update. |

Calculation

| | |
|---|---------------------------|
| Average daily walking and bicycling for utilitarian purposes per adult in Marin | 0.62 miles |
| Population 18 years and over in Sausalito, 2010 | 6,446 people |
| Population 18 years and over in Sausalito, 2020 | 6,664 people |
| Annual walking and biking miles, 2020 BAU | 1,508,105 miles |
| Walking and biking mode share for utilitarian trips, 2010 | 13.6 % |
| Increase walking and biking mode share to: | 20 % |
| VMT avoided | 709,696 VMT |
| Emissions reductions | 255.5 MTCO ₂ e |

SCHOOL TRANSPORTATION
Community Action 2-2

| | |
|---|--|
| 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. |
| Reductions (MTCO ₂ e) -20.2 | Decrease number of students driving to school alone by 29%. |
| Methodology | <p>Average trip length was determined by modeling trip lengths to Sausalito schools and Tamalpais High School.</p> <p>Estimated 347 students enrolled in Sausalito schools and Tamalpais High School in 2010 (based on 2010 ACS).</p> <p>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>Safe Routes to School Marin County, http://www.saferoutestoschools.org/history.html#success</p> |

Calculation

| | |
|--|--------------------------|
| Average trip length | 2.5 miles |
| Students in Sausalito schools in 2010 | 347 students |
| Number students estimate to drive to school | 215 students |
| Potential decrease in students driving to school | 62 students |
| VMT avoided | 56,152 VMT |
| Emissions reductions | 20.2 MTCO ₂ e |

CARPOOLING
Community Action 2-3

| | |
|---|---|
| Action | Adopt development requirements to encourage carpooling such as transportation demand management programs and required preferred parking for carpool vehicles. |
| Reductions (MTCO ₂ e) -49.1 | Increase carpooling mode share to 15%. |
| Methodology | Approximately 12% of workers carpooled to work in 2010. VMT reductions were calculated assuming 250 workdays per year. Average trip length was determined by modeling trip lengths from Sausalito city limits to various points in Sausalito. |
| Sources | 2010 American Community Survey, 5-Year Estimates. Trip lengths modeled with Google Maps, maps.google.com. |

Calculation

| | |
|--------------------------------------|--------------------------|
| Workers in Sausalito, 2010 | 6,220 people |
| Workers in Sausalito, 2020 | 6,880 people |
| Percent carpooling for commute, 2010 | 12.2% |
| Average trip length | 1.40 miles |
| Increase carpooling mode share to: | 15% |
| VMT avoided | 136,347 VMT |
| Emissions reductions | 49.1 MTCO ₂ e |

PUBLIC TRANSPORTATION

Community Action 2-4

| | |
|---|--|
| Action | Adopt development requirements to encourage transit use such as transportation demand management programs. |
| Reductions (MTCO ₂ e) -85.0 | Increase public transportation mode share to 15%. |
| Methodology | Approximately 10% of workers commuted to work via public transportation in 2010. VMT reductions were calculated assuming 250 workdays per year. Average trip length was determined by modeling trip lengths from Sausalito city limits to various points in Sausalito. |
| Sources | 2010 American Community Survey, 5-Year Estimates. Trip lengths modeled with Google Maps, maps.google.com. |

Calculation

| | |
|---|--------------------------|
| Workers in Sausalito, 2010 | 6,220 people |
| Workers in Sausalito, 2020 | 6,880 people |
| Percent using public transportation for commuting, 2010 | 10.1% |
| Average trip length | 1.40 miles |
| Increase public transportation mode share to: | 15% |
| VMT avoided | 236,016 VMT |
| Emissions reductions | 85.0 MTCO ₂ e |

TELEWORKING
Community Action 2-5

| | |
|----------------------------------|---|
| Action | Adopt development requirements to encourage green commute alternatives, including teleworking. |
| Reductions (MTCO ₂ e) | -23.8 |
| Methodology | <p>CAPCOA Measure 3.4.6 was used to quantify potential GHG reductions. The measure notes that roughly 50% of a typical workforce could participate in alternative work schedules and roughly 50% of these would choose to participate. A 25% discount for rebound effects (i.e., travel for other purposes during the day while not at the work site) is utilized to provide a conservative estimate and support the literature results.</p> <p>Average trip length was determined by modeling trip lengths from Sausalito city limits to various points in Sausalito.</p> <p>VMT reductions assume workers work an average of 250 days per year.</p> |
| Sources | <p>2010 American Community Survey, 5-Year Estimates.</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>Trip lengths modeled with Google Maps, maps.google.com.</p> |

Calculation

| | |
|---|--------------------------|
| Workers in Sausalito, 2010 | 6,220 people |
| Workers in Sausalito, 2020 | 6,880 people |
| Percent candidates for telecommuting | 50.0% |
| Percent participating in programs | 50.0% |
| Average number of days telecommuting per week | 1.5 |
| Average trip length | 1.40 miles |
| VMT avoided | 66,220 VMT |
| Emissions reductions | 23.8 MTCO ₂ e |

ELECTRIC VEHICLES

Community Action 2-6

| | |
|---|---|
| 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) -19.5 | Implementation options: 30 parking spaces with charging facilities (30 charge ports). |
| Methodology | Average trip length was determined by modeling trip lengths from City 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

| | |
|--|--------------------------|
| Average trip length | 1.40 miles |
| Miles impacted annually per parking space | 2,045 miles |
| Annual emissions per parking space, 2020 | 0.74 MTCO ₂ e |
| Annual electricity use per parking space | 655 kWh |
| Electric vehicle emissions per parking space, 2020 | 0.09 MTCO ₂ e |
| Emissions reductions per parking space | 0.65 MTCO ₂ e |
| Total annual emissions reduction for: 30 parking spaces | 19.5 MTCO ₂ e |

MARKET PRICE PUBLIC PARKING
Community Action 2-7

| | |
|----------------------------------|--|
| Action | Establish market price parking at metered parking spaces to eliminate cruising for available spaces. |
| Reductions (MTCO ₂ e) | -3.6 100 metered parking spaces. |
| Methodology | Average trip length was determined by modeling trip lengths for cars "cruising" for available parking spaces. Each parking space was assumed to be occupied for an average of 60 minutes. Meters were assumed to be in operation 7 days per week and 10 hours per day. CAPCOA PDT-3 methodology used to estimate emissions reduction by implementing market price public parking. The measure indicates a 2.8 - 5.5% reduction in VMT and GHG emissions by increasing on-street parking prices 25 - 50%. Since the program would charge parking fees for currently free parking spaces, the higher end was applied. |
| Sources | Trip lengths modeled with Google Maps, maps.google.com. 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

| | |
|---|--------------------------|
| Annual operational hours of each metered parking space | 3,640 hours |
| Average occupancy of parking space | 1 hours |
| Average "cruising" trip length for each parking space occupancy | 0.5 miles |
| Miles generated annually per parking space | 1,820 miles |
| Annual emissions per parking space | 0.66 MTCO ₂ e |
| Emissions reductions per parking space occupancy (5.5%) | 0.04 MTCO ₂ e |
| Total annual emissions reduction for: 100 parking spaces | 3.6 MTCO ₂ e |

HIGH-EFFICIENCY CITY VEHICLES

Community Action 2-8

| | |
|--|--|
| Action | Purchase or lease low or zero-emissions vehicles and the most fuel efficient models possible for the city fleet, including construction vehicles. |
| Reductions (MTCO ₂ e) -7.3 | Implementation options: Replace 4 vehicles with hybrid vehicles |
| Methodology | Assumes vehicles with an average of fuel economy of 20 MPG are replaced with hybrid vehicles with a fuel economy of 45 MPG. Assumes vehicles travel an average of 7,500 miles annually. Emissions reduction calculated for CO ₂ only since N ₂ O and CH ₄ emissions are dependent on VMT and VMT is unaffected. |
| Sources | www.fueleconomy.gov |

Calculation

| | |
|--|-------------------------|
| Annual mileage per vehicle | 7,500 VMT |
| Annual fuel use per vehicle at 20 MPG fuel economy | 375 gallons |
| Annual fuel use per vehicle at 45 MPG fuel economy | 167 gallons |
| Annual fuel saved per car replaced | 208 gallons |
| Annual emissions reduced per vehicle | 1.8 MTCO ₂ |
| Number of vehicles replaced with hybrid vehicles | 4 vehicles |
| Emissions reductions | 7.3 MTCO ₂ e |

CITY EMPLOYEE COMMUTE
Government Operations Action 2-9

| | |
|----------------------------------|--|
| Action | Provide city 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. |
| Reductions (MTCO ₂ e) | -19.6 |
| Methodology | CAPCOA Measure TRT-1. Assuming a low density suburb and 100% of employees are eligible for incentives, VMT reduction is 5.2%. |
| 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

| | |
|--------------------------------|--------------------------|
| Employee commute VMT, 2020 BAU | 1,047,695 VMT |
| Reduction in VMT | 5.2% |
| VMT avoided | 54,480 VMT |
| Emissions reduction | 19.6 MTCO ₂ e |

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. |
| Reductions (MTCO ₂ e) -508.0 | 2020: Divert 86% of waste from landfill. |
| 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. Sausalito'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 | 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

| | |
|--|-----------------------------|
| Waste emissions BAU less government waste | 1,100.7 MTCO ₂ e |
| Percent waste diverted from landfill in 2010 | 74 % |
| Percent waste diverted from landfill | 86 % |
| GHG emissions reduction | 508.0 MTCO ₂ e |

MUNICIPAL ZERO WASTE
Government Operations Action 3-2

| | |
|--|---|
| Action | Government policy to achieve 86% diversion in city operations by 2020. |
| Reductions (MTCO ₂ e) -7.3 | Divert 86% of waste from landfill. |
| Methodology | Targeted waste diversion is assumed to be 86%. Sausalito's 2010 diversion rate is assumed to be consistent with Marin County average of 74%. |
| 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

| | |
|--|--------------------------|
| Waste emissions BAU less government waste | 15.9 MTCO ₂ e |
| Percent waste diverted from landfill in 2010 | 74 % |
| Percent waste diverted from landfill | 86 % |
| GHG emissions reduction | 7.3 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) | -117.8 |
| 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> |
| 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> |

Calculation

| | |
|--|---------------------------|
| Indoor water consumption reduction | 2,771,298 gallons |
| Water and wastewater-related electricity saved | 10,977 kWh |
| Indoor hot water consumption reduction | 2,771,298 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 | 15,752 therms |
| Electricity saved | 221,150 kWh |
| GHG emissions reduction | 117.8 MTCO ₂ e |

MMWD 2007 Water Conservation Master Plan, Appendix A, Tables 4, 5, and 6

| | 30-year Average Water Savings (AFY) | Hot Water Use (30%) (AFY) | Estimated Savings for ERM 29 (AFY) |
|--|---|---------------------------------|---|
| BMP 1a - Residential Water Surveys -Indoor | 29.7 | 8.9 | 8.9 |
| BMP 6 - Washing Machine Rebate: 1,200 washers per year | 59.4 | | 59.4 |
| BMP 6 - Washing Machine Rebate: 2,700 washers per year | 133.8 | | |
| T2-5 Coin-Op Washing Machine Rebate: 447 washers | 14.0 | | 14.0 |
| T2-5 Coin-Op Washing Machine Rebate: 745 washers | 23.3 | | |
| ND-4 Dishwasher New Efficient | 10.2 | | 10.2 |
| ND-5 Clothes Washing Machine Requirement for New Residential | 69.2 | | 69.2 |
| ND-6 Hot Water on Demand | 52.8 | | 52.8 |
| ND-7 High efficiency faucets and showerheads | 47.8 | 14.3 | 14.3 |
| TOTAL for MMWD Service Area (190,000 population) | | | 228.9 |
| Estimated Savings for Sausalito | | | 8.5 |

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) | -5.7 Reduce outdoor water use by 20%. |
| 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>In compliance with AB 1881, MMWD has adopted a Water Efficient Landscape Ordinance that limits landscape water use.</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.</p> <p>33% of water consumption is for outdoor use. Calculation includes emissions avoided for treating and transporting potable water by MMWD.</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>Personal communication with Dan Carney, Water Conservation Manager, MMWD.</p> |

Calculation

| | |
|-------------------------------------|-------------------------|
| Outdoor water consumption 2010 | 101,908,728 gallons |
| Outdoor water consumption 2020 BAU | 105,358,124 gallons |
| Percent outdoor water reduced | 20% |
| Outdoor water consumption reduction | 21,071,625 gallons |
| Electricity saved | 43,169 kWh |
| GHG emissions reduction | 5.7 MTCO ₂ e |

RAINWATER CATCHMENT
Community Action 4-3

| | |
|---|--|
| Action | Encourage cisterns and other water storage facilities. Encourage greywater systems. |
| Reductions (MTCO ₂ e) 0.0 | 50,000 gallons of water storage installed. |
| 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. |
| Sources | |

Calculation

| | |
|---|----------------------------|
| Average rainwater storage capacity per tank | 500 gallons |
| Avoided water-related electricity use per storage tank per year | 2 kWh |
| 100 tanks | 205 kWh |
| Avoided GHG emissions per storage tank per year | 0.0003 MTCO ₂ e |
| 100 tanks | 0.03 MTCO ₂ e |

GREYWATER
Community Action 4-4

| | |
|----------------------------------|---|
| Action | Encourage greywater systems. |
| Reductions (MTCO ₂ e) | -0.4 100 households using greywater systems. |
| Methodology | 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. |
| 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. MMWD potable water production for 2010 provided by Nancy Gibbs, MMWD Business Systems Analyst. MMWD electricity consumption provided by Jon LaHaye, MMWD Principal Engineer. kWh/MG was calculated from this data. |

Calculation

| | |
|--|--------------------------|
| Greywater generation per residential occupant per day | 40 gallons |
| Greywater generation per household per year available for irrigation | 13,159 gallons |
| Avoided electricity use per household per year | 27 kWh |
| 100 households | 2,696 kWh |
| Avoided GHG emissions per year | 0.36 MTCO ₂ e |

ENERGY PRODUCTION FROM WASTEWATER

Community Action 4-5

| | |
|----------------------------------|---|
| Action | Capture 100% of methane produced from wastewater treatment and combust methane in a cogeneration system to produce electricity. |
| Reductions (MTCO ₂ e) | -21.0 |
| Methodology | CAPCOA Measure AE-6 used for estimating electricity generated from capturing and combusting methane for cogeneration. Volume of digester gas produced in 2010 and fraction of methane in the digester gas provided by Sausalito-Marin City Sanitation District. Volume of digester gas is adjusted based on proportion of wastewater treated for the Sausalito community. |
| 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. Personal communication with Kevin Rahman, SMCSO Associate Engineer. |

Calculation

| | |
|---|---|
| Volume of digester gas produced in 2010 | 8,630 ft ³ /day |
| Fraction of methane in digester gas in 2010 | 0.65 |
| Heating Value of Methane | 1,012 BTU/ft ³ CH ₄ |
| Energy conversion factor | 0.00009 kWh/BTU |
| Efficiency factor | 0.85 |
| Electricity generated | 158,513 kWh |
| GHG emissions reduction | 21.0 MTCO ₂ e |

MUNICIPAL WATER CONSERVATION
Government Operations Action 4-6

| | |
|----------------------------------|---|
| Action | Reduce water use by 20% |
| Reductions (MTCO ₂ e) | -0.2 |
| Methodology | <p>Reduction in indoor water use is based on the following:</p> <p>Installing all low-flow water fixtures can reduce indoor non-residential water use by 17-31% (CAPCOA Measure WUW-1).</p> <p>Calculation includes emissions avoided for treating and transporting potable water by MMWD and treating wastewater</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>Water Consumption: Bob Fairchild, MMWD, bfairchild@marinwater.org.</p> |

Calculation

| | |
|--|-------------------------|
| Indoor municipal water use | 3,648,744 gallons |
| Water use reduction | 20% |
| Reduction in electricity use for water and wastewater conveyance and treatment | 578 kWh |
| GHG emissions reduction | 0.2 MTCO ₂ e |

MUNICIPAL WASTEWATER PUMPS

Government Operations Action 4-7

| | |
|----------------------------------|--|
| Action | Replace inefficient wastewater pumps |
| Reductions (MTCO ₂ e) | -0.2 |
| Methodology | The City operates four wastewater pumping stations at Whiskey Springs, Gate 5, Spinnaker and Anchor Street. Wastewater pumping stations are maintained by the Sausalito-Marin Sanitary District. The Anchor Street pumping station was upgraded in 2014 and the Whiskey Springs pumping station is anticipated to be upgraded in 2016. Spinnaker is a new pumping station, constructed in 2014. The Gate 5 pumping station was upgraded in 2002 and is not expected to be replaced by 2020. On average, upgrading old pumps to more efficient pumps can reduce energy consumption by 10-15%, depending on how old the original pumps were and how efficient the new unit is. Efficiency assumed to be midpoint at 12.5%. |
| Sources | Sausalito Public Works Department Dana Armanino, Sustainability Planner, County of Marin Community Development Department, darmanino@marincounty.org |

Calculation

| | |
|-----------------------------|-------------------------|
| Energy savings from upgrade | 1,453 kWh |
| GHG emissions reduction | 0.2 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) -21.2 | 2020: Plant 100 new trees per year. |
| 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

| | |
|---|--------------------------|
| Annual sequestration rate per tree | 0.0354 MTCO ₂ |
| Number of tree planted each year | 100 |
| Number of years | 6 |
| Number of trees planted over period in active growing stage in inventory year | 600 |
| GHG emissions reduction from sequestration | 21.2 MTCO ₂ e |

TREE PLANTING ON PUBLIC LAND
Government Operations Action 5-2

| | |
|--|--|
| Action | Require new development to plant trees and limit tree removal in order to achieve net new tree planting. |
| Reductions (MTCO ₂ e) -2.1 | 2020: Plant 10 new trees per year. |
| 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

| | |
|---|--------------------------|
| Annual sequestration rate per tree | 0.0354 MTCO ₂ |
| Number of tree planted each year | 10 |
| Number of years | 6 |
| Number of trees planted over period in active growing stage in inventory year | 60 |
| GHG emissions reduction from sequestration | 2.1 MTCO ₂ e |

RENEWABLE PORTFOLIO STANDARD

State Action

| | |
|--|---|
| Reductions (MTCO ₂ e) -4,148.3 | 33% of PG&E and MEA electricity comes from eligible renewable energy sources by 2020. |
| Methodology | <p>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.</p> <p>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. 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.</p> <p>Assumes the following breakdown of the electricity load in 2020: MEA, 80%; PG&E, 16%; Direct Access, 4%.</p> |
| Sources | <p>Marin Energy Authority, "Revised Community Choice Aggregation Implementation Plan and Statement of Intent," October 4, 2012.</p> <p>Marin Clean Energy, 2013 Integrated Resource Plan.</p> <p>Personal communication, Rafael Silberblatt, MCE Program Coordinator, rsilberblatt@marinenergyauthority.org, Jan. 21, 2014.</p> <p>GHG Calculator, version 3c_Oct2010. https://ethree.com/public_projects/cpuc2.php</p> <p>Pacific Gas & Electric, "Greenhouse Gas Emission Factors: Guidance for PG&E Customers," April 2013.</p> |

Calculation

| | |
|--------------------------------------|------------------------------|
| Total Electricity Use, 2010 | 57,373,496 kWh |
| Total Electricity Use, 2020 BAU | 61,675,517 kWh |
| Electricity emissions, 2020 BAU | 12,690 MTCO ₂ e |
| Electricity Emissions, 2020 with RPS | 8,542 MTCO ₂ e |
| GHG Emission Reductions | 4,148.31 MTCO ₂ e |

TITLE 24
State Action

| | |
|----------------------------------|---|
| Reductions (MTCO ₂ e) | |
| -114.9 | Implement Title 24 and subsequent building standards updates that ultimately achieve zero net energy use for new residential and non-residential construction. |
| Methodology | |
| 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

| <i>Reductions from Title 24 Upgrades</i> | 2008 Reductions from 2005 Standards (assumed for development after 2010) | | 2013 Reductions from 2008 standards (assumed for development after 2015) | 2020 Projected -- Reductions from 2010 Baseline |
|--|--|---------------------|--|---|
| | Electricity Savings | Natural Gas Savings | Energy Savings | Energy Savings |
| Single-family New Construction | 22.70% | 10.00% | 25.00% | 100% |
| Multi-family New Construction | 19.70% | 7.00% | 14.00% | 50% |
| Residential New Construction (29% single, 71% multifamily) | 20.57% | 7.87% | 17.20% | 65% |
| Non-residential New Construction | 4.90% | 9.40% | 30.00% | 50% |

Projected Residential Development with Title 24 Energy Reductions

| | 2011-2015 | 2016-2020 | TOTAL | Emissions Reductions |
|-------------------------|-----------|-----------|---------|----------------------|
| New Residential (units) | 0 | 51 | 51 | |
| Electricity Use BAU | 0 | 277,637 | 277,637 | |
| Electricity Use Savings | 0 | 66,945 | 66,945 | 8.9 |
| Natural Gas Use BAU | 0 | 27,864 | 27,864 | |
| Natural Gas Use Savings | 0 | 2,571 | 2,571 | 13.7 |

Projected Non-Residential Development with Title 24 Energy Reductions

| | 2011-2015 | 2016-2020 | TOTAL | Emissions Reductions |
|-------------------------|-----------|-----------|-----------|----------------------|
| Electricity Use BAU | 1,817,423 | 1,817,423 | 3,634,846 | |
| Electricity Use Savings | 89,054 | 115,770 | 204,824 | 27.2 |
| Natural Gas Use BAU | 56,681 | 56,681 | 113,363 | |
| Natural Gas Use Savings | 5,328 | 6,926 | 12,254 | 65.1 |

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) -791.3 | |
| 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. <http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf></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

| | |
|---|---------------------------|
| Residential electricity indoor lighting use, 2010 | 6,087,312 kWh |
| Commercial electricity use, 2010 | 34,255,672 kWh |
| Commercial indoor and outdoor lighting use, 2010 | 11,681,184 kWh |
| Reduction in residential electricity use | 3,043,656 kWh |
| Reduction in commercial electricity use | 2,920,296 kWh |
| GHG emission reductions | 791.3 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 (MTCO2e) -39.4 | |
| Methodology | Natural gas solar water heaters reduce natural gas use by 130 therms (U.S. Department of Energy 2010) Electric solar water heaters reduce electricity use by 2,429 kWh (U.S. Department of Energy 2010) 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) 85% of California homes use natural gas for water heating, 4% use propane/LPG, and 11% use electricity (U.S. Energy Information Administration 2009) |
| Sources | 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 > 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 > |

Calculation

| | |
|---|--------------|
| Number of housing units, 2010 | 4,536 |
| Number of solar water heaters installed | 59 |
| Percent electric water heaters | 11% |
| Percent natural gas water heaters | 89% |
| Reduction in electricity use | 15,756 kWh |
| Reduction in natural gas use | 6,823 therms |
| GHG emission reductions | 39.4 MTCO2e |

PAVLEY AND LOW CARBON FUEL STANDARD

State Action

| | |
|--|---|
| Reductions (MTCO ₂ e) -4,562.0 | State implements Pavley 1 and the Low Carbon Fuel Standard. |
| Methodology | <p>Assembly Bill 1493 (Pavley) requires carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks in two phases. Pavley 1 took effect for model years 2012 through 2016. The second phase, which is not included in this analysis, will take effect for model years 2017 through 2025.</p> <p>The Low Carbon Fuel Standard (CLFS) will reduce the carbon intensity of California's transportation fuels and encouraging the use of cleaner transportation fuels such as electricity, natural gas, hydrogen and low-carbon biofuels.</p> <p>Transportation emissions estimated using EMFAC 2011.</p> |
| Sources | California Air Resources Board, EMFAC Emissions Database, http://www.arb.ca.gov/jpub/webapp//EMFAC2011WebApp/emsSelectionPage_1.jsp |

Calculation

| | |
|--|----------------------------|
| VMT 2020 BAU | 45,636,434 VMT |
| Emissions 2020 without Pavley and LCFS | 21,466 MTCO ₂ e |
| Emissions 2020 w/Pavley and LCFS | 16,904 MTCO ₂ e |
| Reduction in emissions | 4,562 MTCO ₂ e |

ADVANCED CLEAN CARS

State Action

| | |
|--|---|
| Program Description | The Advanced Clean Cars rule will further reduce GHG emissions from automobiles and light-duty trucks for 2017-2025 vehicle models years. |
| Reductions (MTCO ₂ e) -413.1 | |
| Methodology | The EMFAC 2011 model does not include emissions benefits from the ACC rule. Local reductions achieved by the ACC rule were therefore obtained by apportioning expected statewide reductions to the city level. The ARB estimates that implementation of the ACC rule will reduce statewide emissions from light-duty vehicles by 3.8 million MTCO ₂ e in 2020, or by approximately 2.5% (California Air Resources Board 2013). |
| Sources | California Air Resources Board, EMFAC Emissions Database, http://www.arb.ca.gov/jpub/webapp//EMFAC2011WebApp/emsSelectionPage_1.jsp |

Calculation

| | |
|---|----------------------------|
| VMT BAU | 49,124,722 VMT |
| VMT, light-duty vehicles, BAU | 47,919,259 VMT |
| Emissions with Pavley and LCFS, light-duty vehicles | 16,524 MTCO ₂ e |
| Percent reduction from ACC rule | 2.5% |
| Reduction in emissions | 413 MTCO ₂ e |

AB 32 VEHICLE EFFICIENCY MEASURES

State Action

| | |
|---|---|
| Program Description | The AB 32 scoping plan includes several vehicle efficiency measures that focus on maintenance practices. The Tire Pressure Program will increase vehicle efficiency by assuring properly inflated automobile tires to reduce rolling resistance. The Heavy-Duty Vehicle Aerodynamic Efficiency Program will increase heavy-duty (long-haul trucks) efficiency by requiring installation of best available technology and/or ARB approved technology to reduce aerodynamic drag and rolling resistance. Finally, the Heavy-Duty Vehicle Hybridization Program will reduce GHG emission through the use of hybrid and zero-emission technology. |
| Reductions (MTCO ₂ e) -94.6 | |
| Methodology | The EMFAC 2011 model does not include emissions benefits from AB 32 vehicle efficiency measures. Local reduction achieved by these measures were therefore obtained by apportioning expected statewide reductions to the city level. The ARB estimates that implementation of the Tire Pressure Program will reduce statewide emissions from light-duty vehicles by 0.6 million MTCO ₂ e, or by approximately 0.39%. Implementation of the Heavy-Duty Vehicle Programs (Aerodynamic Efficiency Program and Hybridization) will reduce statewide emissions from heavy-duty vehicles by 0.8 million MTCO ₂ e in 2020, or by approximately 1.9%. |
| Sources | California Air Resources Board, EMFAC Emissions Database, http://www.arb.ca.gov/jpub/webapp//EMFAC2011WebApp/emsSelectionPage_1.jsp |

Calculation

| | |
|---|----------------------------|
| VMT BAU | 49,124,722 VMT |
| VMT, light-duty vehicles, BAU | 47,919,259 VMT |
| Light-duty emissions with Pavley and LCFS and ACC | 16,111 MTCO ₂ e |
| Percent reduction from Tire Pressure Program | 0.39% |
| Light-duty vehicle emissions reduction from Tire Pressure Program | 63 MTCO ₂ e |
| VMT, heavy-duty vehicles, BAU | 1,205,463 VMT |
| Heavy-duty emissions with Pavley and LCFS | 1,672 MTCO ₂ e |
| Percent reduction from Heavy Duty Vehicle Programs | 1.90% |
| Heavy-duty vehicle emissions reduction from Tire Pressure Program | 32 MTCO ₂ e |
| Total reduction in emissions | 95 MTCO ₂ e |

GOVERNMENT TRANSPORTATION
Impact of State Actions

| | |
|---|--|
| Reductions (MTCO ₂ e) 115.9 | State implements Pavley 1, Low Carbon Fuel Standard, Advance Clean Cars Rule, and AB 32 Vehicle Efficiency measures. |
| Methodology | <p>EMFAC 2011 provides emission estimates that include impacts from the Pavley 1 and Low Carbon Fuel Standard programs. Assembly Bill 1493 (Pavley) requires carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks in two phases. Pavley 1 took effect for model years 2012 through 2016.</p> <p>The Low Carbon Fuel Standard (LCFS) will reduce the carbon intensity of California's transportation fuels and encouraging the use of cleaner transportation fuels such as electricity, natural gas, hydrogen and low-carbon biofuels.</p> <p>The EMFAC 2011 model does not include emissions benefits from the Advanced Clean Cars rule or AB 32 vehicle efficiency measures. Local reduction achieved by these measures were therefore obtained by apportioning expected statewide reductions to the city level. The ARB estimates that implementation of the ACC rule will reduce statewide emissions from light-duty vehicles by 3.8 million MTCO₂e in 2020, or by approximately 2.5% (California Air Resources Board 2013). The ARB estimates that implementation of the Tire Pressure Program will reduce statewide emissions from light-duty vehicles by 0.6 million MTCO₂e, or by approximately 0.39%. Implementation of the Heavy-Duty Vehicle Programs (Aerodynamic Efficiency Program and Hybridization) will reduce statewide emissions from heavy-duty vehicles by 0.8 million MTCO₂e in 2020, or by approximately 1.9%.</p> |
| Sources | California Air Resources Board, EMFAC Emissions Database, http://www.arb.ca.gov/jpub/webapp//EMFAC2011WebApp/emsSelectionPage_1.jsp |

Calculation

| | |
|--|-------------------------|
| VMT 2020 BAU | 1,047,695 VMT |
| Emissions 2020 without Pavley and LCFS | 493 MTCO ₂ e |
| Emissions 2020 w/Pavley and LCFS | 388 MTCO ₂ e |
| Percent reduction from ACC rule | 2.5% |
| Reduction in emissions from ACC rule | 10 MTCO ₂ e |
| Percent reduction from Tire Pressure Program | 0.39% |
| Emissions reduction from Tire Pressure Program | 1 MTCO ₂ e |
| Total reductions | 116 MTCO ₂ e |

CALIFORNIA SOLAR INITIATIVE

State Action

| | | |
|----------------------------------|-------|---|
| Reductions (MTCO ₂ e) | -54.8 | California Solar Initiative (CSI) program systems installed from 2007 through end of program in 2013. |
| Methodology | | 42 residential systems were installed between 2007 and 2013 with an average 4 635 kWh generated per system. 17 commercial systems were installed with an average 13,110 kWh generated annually. |
| Sources | | California Solar Initiative, http://www.californiasolarstatistics.ca.gov/ . Electricity production estimates from Jonathan Whelan, Senior Project Manager, Optony, Inc. |

Calculation

Residential Renewable Energy

| | |
|---|--------------------------|
| Number of residential systems installed between 2010 and 2013 | 29 |
| Annual electricity savings | 144,574 kWh |
| Electricity emissions reductions | 28.6 MTCO ₂ e |

Commercial Renewable Energy

| | |
|--|--------------------------|
| Number of commercial systems installed between 2010 and 2013 | 3.0 |
| Annual electricity savings | 124,160 kWh |
| Electricity emissions reductions | 26.2 MTCO ₂ e |