

TOWN OF  
**SAN ANSELMO**  
EST. 1907

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# CLIMATE ACTION PLAN 2030

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Image: Town of San Anselmo [www.sananselmo.org](http://www.sananselmo.org)

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# Section 1: INTRODUCTION

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There is broad scientific agreement that to stave off the worst effects of climate change, communities will need to reduce their greenhouse gas emissions by 80% below 1990 levels by the year 2050 and drawdown climate warming greenhouse gases (GHG) such as carbon dioxide from the atmosphere to secure a safe future for us all. But time is of the essence. We are already seeing the deleterious effects of climate change locally and throughout the world with more volatile and unpredictable weather; record-breaking heat days, rainfall droughts, fires and wind; storm surges and sea level rise; ecosystem degradation; species extinction; ocean acidification; climate-related human deaths; and, economic disruption. We are also seeing a growing response by all sectors of society, with many local governments, including San Anselmo, in the vanguard taking climate action. Working together, we are making a difference for our collective future.

## What's the Climate Action Plan?

The Climate Action Plan (CAP) is our community's tool to develop the strategies and guide the implementation of local, measurable actions needed to (1) mitigate climate change by dramatically reducing our greenhouse gas emissions (GHG) while also sequestering GHG from the atmosphere, and (2) prepare for and adapt to increasing extremes and impacts. While the CAP's primary metrics currently address the reduction of greenhouse gas emissions (mitigation), we have for the first time included metrics for adaptation and resiliency actions which we will expand with more milestones over the next several years. The CAP will be integrated with the Town's other emergency preparedness and ecosystem conservation efforts and will be reviewed and updated annually with the Town's Sustainability Commission.

## Climate Action Globally and California

In December 2015, all the members of the United Nations Framework Convention on Climate Change (UNFCCC)<sup>1</sup> signed on to the historic "[Paris Agreement](#)" at the 21st Conference of the Parties (COP21) to the UNFCCC. The central aim of the Paris Agreement is to "strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change."

The Intergovernmental Panel on Climate Change's (IPCC) [Special Report on Global Warming of 1.5 Degrees Celsius](#) (October, 2018) to the UNFCCC found that to avoid long lasting or irreversible climate change impacts and stay below 1.5° C warming since the industrial era, global net human-caused emissions of carbon dioxide (CO<sub>2</sub>) need to fall by about 45% from 2010 levels by 2030<sup>2</sup>, reaching around 2050 'net zero' emissions (carbon emissions balanced with carbon removal from the atmosphere). In addition, roughly 500 billion tons of human-caused CO<sub>2</sub> emissions already in the atmosphere must be removed over the decades

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<sup>1</sup> As of May 2019, 194 states and the European Union have signed the Agreement. 185 states and the EU, representing more than 88% of global greenhouse gas emissions, have ratified or acceded to the Agreement, including China, the United States and India.

<sup>2</sup> ~68% from 1990 levels based on 2010 global CO<sub>2</sub> emissions of 33.5 Gt and 1990 global CO<sub>2</sub> emissions of 22.29 Gt (see more [here](#)). Global CO<sub>2</sub> emissions reached 37.1 Gt in 2018, up 2.7% compared to the year before (see more [here](#)).

ahead. The [report](#) finds that this would require “rapid and far-reaching” transitions in land, energy, industry, buildings, transport, and cities. Per the IPCC, every bit of warming matters, every action matters, every year matters, every choice matters and every fraction of a degree *less* of warming will reduce the toll on humans, ecosystems and economies.

In California, climate policy objectives initially proposed by Governor Jerry Brown, were codified through passage of Senate Bill (SB) 32 (Pavley, Chapter 249, Statutes of 2016) and SB 1386 (Wolk, Chapter 545, Statutes of 2016). **SB 32 commits California to reducing GHG emissions 40% below 1990 levels by 2030, and SB 1386 identifies the protection and management of natural and working lands as a key strategy towards meeting this ambitious GHG emissions reduction goal.** Specifically, SB 1386 directs State agencies to consider the carbon sequestration potential of natural and working lands “when revising, adopting, or establishing policies, regulations, expenditures, or grant criteria related to [their] protection and management.” The Governor further supported these activities with Executive Order B-52-18, which calls for improved management of the State’s forests, and Executive Order B-54-18, which calls for actions to protect the State’s biodiversity from current and future challenges of climate change. In September 2018, Governor Brown signed **Executive Order B-55-18, which establishes a goal for California to achieve carbon neutrality (net zero emissions) by 2045 and after that, maintaining net-negative emissions (sequestering more carbon that is being emitted).** While California is still working through the details of what this means and how it can be achieved, it will require both technological solutions as well as natural solutions including more and appropriate tree planting; climate-smart habitat restoration initiatives; reduction of ecological degradation; and, ocean protection. Natural climate solutions and “green” infrastructure are increasingly being prioritized through several state directives and bills to reduce emissions and drawdown atmospheric GHG from natural and working lands (e.g., forests, rangelands, farmlands, wetlands, and soils) while also protecting biodiversity and nature’s ability to increase our resilience to growing climate extremes. In 2019, the California Air Resources Board was finalizing guidelines and protocols for [Natural and Working Lands](#) GHG emissions reductions and sequestration guidelines (including forests, rangelands, wetlands, and farms).

The regularly updated [Safeguarding California Plan](#) shows what state government is doing to address the climate impacts we are seeing today and create a more resilient future. The 2018 [Safeguarding California In Action: Climate Change Adaptation Examples from State Agencies](#) details examples of projects and programs to increase resilience to climate change. Actions include emergency management, public health improvements, habitat

 **PRINCIPLES TO SAFEGUARD CALIFORNIA FROM CLIMATE CHANGE**

 **CLIMATE JUSTICE**



restoration, reforestation and urban tree planting, permeable pavements, drought resilient lawns, climate-smart agriculture, planting of deep-rooted perennials, covering of bare soil, and water recycling.

**Matching the ambition of the State of California, we are setting an interim target of 54% GHG emissions reduction by the year 2030 (from a 2005 baseline or 45% below 1990 levels), establishing a goal of community-scale carbon neutrality by no later than 2045, and creating a “Framework for a Post-Carbon Community” to guide the Climate Action Plan update process. A**

“post-carbon community” can be defined as one that provides for economic and social opportunity across all ages, cultures, and abilities without producing net greenhouse gas emissions nor contributing to ecosystem degradation (see more below).

By adopting ambitious greenhouse gas emissions reductions and developing sequestration targets as well as measurable adaptation, hazard mitigation and ecological conservation measures, our community will continue to demonstrate local climate action leadership while aligning with urgency of recent IPCC climate science findings, the Paris Agreement and the vision of California Executive Order B-55-18.

**San Anselmo’s Climate Actions**

Our community has a rich history of climate action, environmental protection and supporting alternative transportation including bicycles, pedestrians, trains and bus service.



In 1973 we adopted a conservation and open space plan and procedures for environmental review (Resolutions 1492 and 1509). In 1974 we urged for scrutiny of stationary sources of air pollution (Reso. 1523) and passed requirements for recycling (Ordinance 670). In 1975 we urged Congress to reduce automobile emissions (Reso. 1580). In 1978 we recognized renewable energy sources by proclaiming a Sun Day and Marin Solar Energy Week (Reso. 1762).

In 1993 we adopted an ordinance to require all new construction to include recycling areas (Ord. 946). In 1999 we participated in the “Spare the Air” campaign to reduce air pollution (Reso. 3483).

In 2000 we established a Quality of Life Commission, which is now an active Sustainability Commission (Reso. 3512) and opposed saltworks in Mexico’s Laguna San Ignacio, a nursery for Pacific gray whales (Reso. 3498). In 2001 we adopted our first Bicycle Master Plan. In 2002 we committed to take a leadership role in promoting public awareness of climate change (Reso. 3615) and resolved to join a shared local vision for sustainable growth (Reso. 3589). In 2004 we supported AB 1493 (Pavley) to reduce global warming pollution. In 2007 we adopted a goal to be zero waste by 2025 (Reso. 3820).

In 2010 we adopted green building requirements (Ord. 1076). In 2011 we adopted our first Climate Action Plan, supported Senate Bill 790 for Community Choice Aggregation (Reso. 3945), and provided free parking for electric vehicles in Town lots (Reso. 3937). In 2012 we resolved to consider the life cycle economics of product manufacture, transportation, use and disposal (Reso. 3977), installed its first electric vehicle charging stations, installed LED street lighting, and adopted requirements for diversion of construction and demolition waste (Ord. 1081). In 2014 we secured 100% renewable energy with MCE Deep Green for town facilities and adopted a ban on single use carry out bags (Ord. 1092). In 2015 we held a Solar Fair. In 2016 we approved a Bicycle and Pedestrian Master plan. In 2018 we passed an ordinance banning single use plastics. Already in 2019, we passed an Electric Vehicle policy and new electrical vehicle chargers were installed in the Magnolia Parking Lot as part of a Low Impact Development project.

**Our San Anselmo community has already achieved its 2011 Climate Action Plan GHG reduction target to reduce measured emissions to 15% below 2005 levels by 2020.** These emissions come from residents, businesses, and visitors, with less than 1% coming from government operations and facilities.

**But that is not enough.**

**Our community is also preparing for the growing impacts of climate change that we are already experiencing through increasingly extreme events that threaten our homes, water availability, food supply, livelihoods, health and communities.**

**While there is still much more to do, San Anselmo has taken a great deal of climate action, including:**

- promoting clean and renewable energy through partnership with MCE;
- promoting emission-free transportation alternatives involving bikes, electric vehicles and charging stations;
- reducing waste through partnership with Zero Waste Marin;
- promoting energy conservation through incentive-based programs with BayREN and PG&E;
- banning single-use plastics to protect waterways;
- implementing progressive green building codes;
- reducing toxic pesticides; and
- developing and implementing significant flood and fire risk adaptation strategies.

Climate change mitigation and adaptation planning were identified as a critical action item when the Town updated its Local Hazard Mitigation Plan (LHMP) in 2018. The LHMP notes that climate change will likely exacerbate the impacts of natural hazards. The LHMP also states that planning is needed to minimize the potential for loss of life, injury and property damage from these hazards, including strategies for improving the resiliency of our community in the face of a trend towards increased average air temperatures and extreme events over the long term. The Town must review the LHMP annually and revise the plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding through the Federal Emergency Management Agency (FEMA). While both the Local Hazard Mitigation Plan and CAP remain stand-alone living plans to be reviewed and progress updated regularly, they also refer to one another.



**IMAGE: MARIN SANITARY SERVICE'S FOOD TO ENERGY PROGRAM IN CONJUNCTION WITH CENTRAL MARIN SANITATION AGENCY (CMSA) TURNS FOOD SCRAPS INTO ENERGY AND FUELS 100% OF CMSA'S ELECTRICITY USE.**

## Economy and Social Equity

Cities deal with a wide array of issues and pressures and must take all these issues into account when budgeting resources and balancing priorities. Housing, business retention, health and safety, and traffic congestion are some examples. Climate action can address these problems or make them worse, depending on how they are approached. We must be aware of causing unintended consequences and ensure that measures and programs benefit the most, not just a few. **Sustainability has been described as a three-legged stool, pointing to the need to address not just the environment, but the economy and social equity as well.**

One definition of social equity is the [“just and fair inclusion into a society in which all can participate, prosper, and reach their full potential”](#) (PolicyLink). Equity is the means to ensure equality for all. An example of how that might work with climate action measures is with energy efficiency. Giving rebates to homeowners to swap out inefficient appliances helps reduce energy consumption and therefore greenhouse gas emissions. But if financial incentives are only available to those with means to purchase new appliances

it leaves out a section of the community without means. Programs such as the [Green and Healthy Homes Initiative](#) acknowledges this and works with landlords to upgrade common areas of apartment complexes with the commitment to provide free appliance and building envelope upgrades to renters so that there is a double benefit. First, the property owner can see energy reductions, and second the renter can not only see energy reductions but can also enjoy a healthier home environment, often by increasing comfort, decreasing health hazards such as mold, and providing more reliable appliances.

The economy is the driver of prosperity and equity in a town and provides the revenue necessary for local government to enact programs that are beneficial to the whole community. But increased regulation can have the unintended consequence of driving up costs, deterring innovation and job growth, and stagnating business development. However, many measures related to climate action can also have significant return on investment and end up being great business prospects. There is a delicate balance between mandating, incentivizing, and enabling businesses to reduce greenhouse emissions. Nonetheless, there is great potential to work together to ensure a robust low-carbon economy that creates good jobs and benefits the whole community. **California as a whole is a great example: State emissions have declined 9% since 2006, while the economy has grown 16%.**

It is important to consider and include our diverse community members and business interests in the development and implementation of the measures in this plan.

**Throughout the CAP's various measures and recommendations, care was taken to avoid unintended consequences for our underrepresented and disadvantaged community members, as well as our business sector, to enhance the opportunity for equity and prosperity.**



# San Anselmo's Long Term Climate Action Goals

To achieve municipal and community-scale carbon emissions reductions and sequestration, to prepare for and adapt to greater extremes, and to transition to carbon neutrality and a post-carbon community, all aligned with California's ambition, our community commits to the following:

- Establish an interim target of 54% emissions reductions from a 2005 baseline emissions level by the year 2030 (45% below 1990 levels) and goal of carbon neutrality by 2045.
- Develop, adopt and implement actions that aim to achieve the interim 54% emission reduction target by 2030 and that align with the 2045 carbon neutrality/post-carbon community goal.
- Develop, adopt and implement adaptation strategies and ecosystem conservation programs in concert with the Town's Local Hazard Mitigation Plan.
- Adopt the following driving values and strategies as the framework for achieving carbon neutrality and a post-carbon economy:

## FRAMEWORK FOR A POST-CARBON COMMUNITY<sup>3</sup>

### *Guiding Values*

- **Equity & Access:** Ensure that all people have the opportunity to benefit equally from climate solutions, while not taking on an unequal burden of climate impacts.
- **Efficiency & Innovation:** Promote the efficient use of resources and the adoption of clean and climate-smart technologies and techniques.
- **Human Health & Wellness:** Safeguard and enhance the ability of the community to live, work, play, connect, and thrive in a healthy social and physical environment.
- **Ecosystem Health & Green Infrastructure:** Protect and restore natural and working ecosystems to mitigate the worst impacts of climate change while also provide nature's benefits from clean air and water to flood mitigation, carbon sequestration and biodiversity conservation.
- **Resiliency & Capacity Building:** Provide education and training on the opportunities offered by a more resilient future and encourage sustainable behaviors across all sectors of the community.

### *Key Strategies*

1. **Clean & Renewable Power:** Deploy and efficiently use clean, renewable, and locally sourced electricity generated onsite or transmitted through the power grid.
2. **Electrification & Fossil Fuel Phase-Out:** Upgrade and replace carbon-intensive, fossil fuel-based infrastructure and combustion power throughout the transportation and building sectors with clean electric power.
3. **Carbon Sequestration:** Drawdown carbon dioxide and other greenhouse gases from the atmosphere through ecological and/or technological methods to capture and store in plants, soils, water systems, and other solid, long-term forms.

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<sup>3</sup> Adopted with permission from the City of Fremont, CA

4. **Mobility & Connectivity:** Develop and enhance safe, multimodal, accessible, equitable, intelligent, and clean motorized and non-motorized travel options, transit modes, transportation infrastructure, and community connectivity.
5. **Resource Conservation & Elimination of Waste:** Conserve natural and manufactured resources by means of the responsible production, consumption, reuse, and recovery of products, packaging, and materials.
6. **Restorative Ecology & Green Infrastructure:** Restore, rehabilitate, and repurpose degraded, damaged, or destroyed ecosystems and habitats through active interventions. Incorporate green infrastructure and ecosystem services into community design.
7. **Climate Adaptation & Resilience:** Prepare for, limit, learn from, and adapt to the negative effects of climate change through proactive and holistic planning and response at infrastructural, ecological, cultural, and institutional levels.



IMAGE: A SAN ANSELMO RESILIENT NEIGHBORHOODS TEAM, THE DECARBONISTAS, WITH TOWN COUNCIL AND SUSTAINABILITY COMMISSION MEMBERS, 2018

<https://www.resilientneighborhoods.org/>

## Section 2: REDUCING GREENHOUSE GAS EMISSIONS

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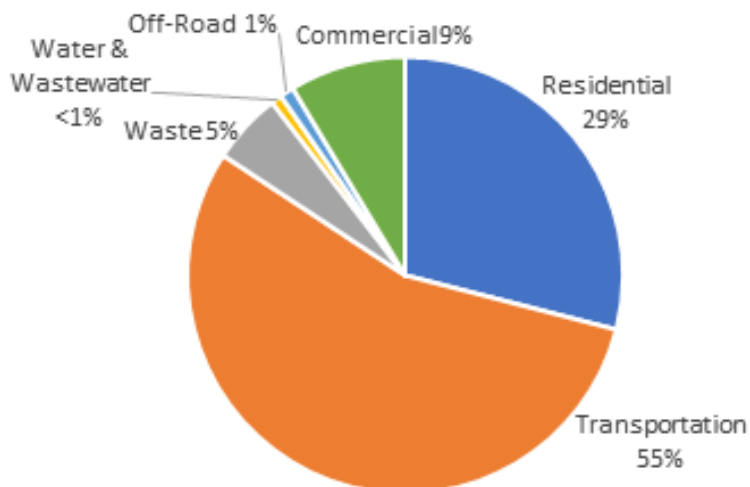
### Where We Are At: Emissions Trends

San Anselmo prepares an annual community-wide GHG inventory to track emissions in the following sectors:

- Transportation
- Residential energy use
- Commercial energy use
- Waste
- Water and wastewater
- Off-road vehicles and equipment

As shown in Figure 1, the majority of emissions come from vehicle trips generated by our residents and businesses. We generated 80,425 metric tons of carbon dioxide equivalents (MTCO<sub>2</sub>e; includes CO<sub>2</sub> and other warming GHG) in 2005. By 2016, emissions had dropped to 60,769 MTCO<sub>2</sub>e, a 24% reduction. This is well below the State and locally-adopted target for San Anselmo, which is 15% below baseline (2005) emissions by 2020. **While emissions declined in almost all sectors, the largest reductions were due to energy conservation and efficiency, a reduction in the carbon intensity of electricity, a decline in vehicle miles traveled, and improvements to vehicle fuel efficiency. Emissions from Town operations, which make up less than 1% of community-wide emissions, fell 18% by 2016.** For more details, see the Town’s latest Greenhouse Gas Emissions Inventory.

**FIGURE 1: COMMUNITY EMISSIONS BY SECTOR, 2016**

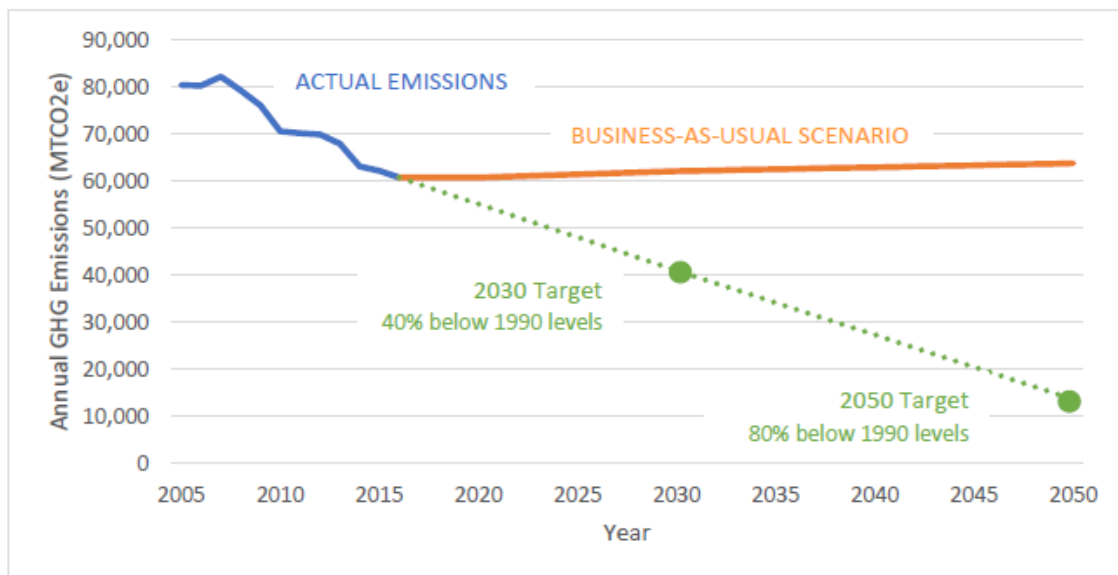


## Emissions Forecast and Reduction Targets

The CAP includes a “business-as-usual” (BAU) forecast in which emissions are projected in the absence of any policies or actions that would occur beyond the base year to reduce emissions. The forecasts are derived by increasing 2016 emissions using 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, which incorporate the vehicle miles traveled (VMT) reductions expected from the implementation of [Plan Bay Area 2020](#) and the [Regional Transportation Plan](#) adopted in 2017. Emissions are expected to rise about 2.2% by 2030 and 3.6% by 2040. Although the regional agencies have not made official projections for 2050, continuing the trendline suggests emissions would reach approximately 63,805 MTCO<sub>2e</sub> by 2050 under the BAU forecast.

The CAP establishes targets similar to the State’s goals. **Our community’s goal is a 54% GHG emissions reduction target by the year 2030 from a 2005 baseline (45% below 1990 levels) and 80% below 1990 levels by 2050.** This means emissions need to drop to 41,020 MTCO<sub>2e</sub> by 2030 and 13,670 MTCO<sub>2e</sub> by 2050. The Plan lays out measures that will exceed the 2030 target and put us on a trajectory to meet the 2050 goal. The community emissions trend, forecast and State targets are shown in Figure 2 below.

**FIGURE 2: EMISSION TREND, FORECAST AND STATE TARGETS**



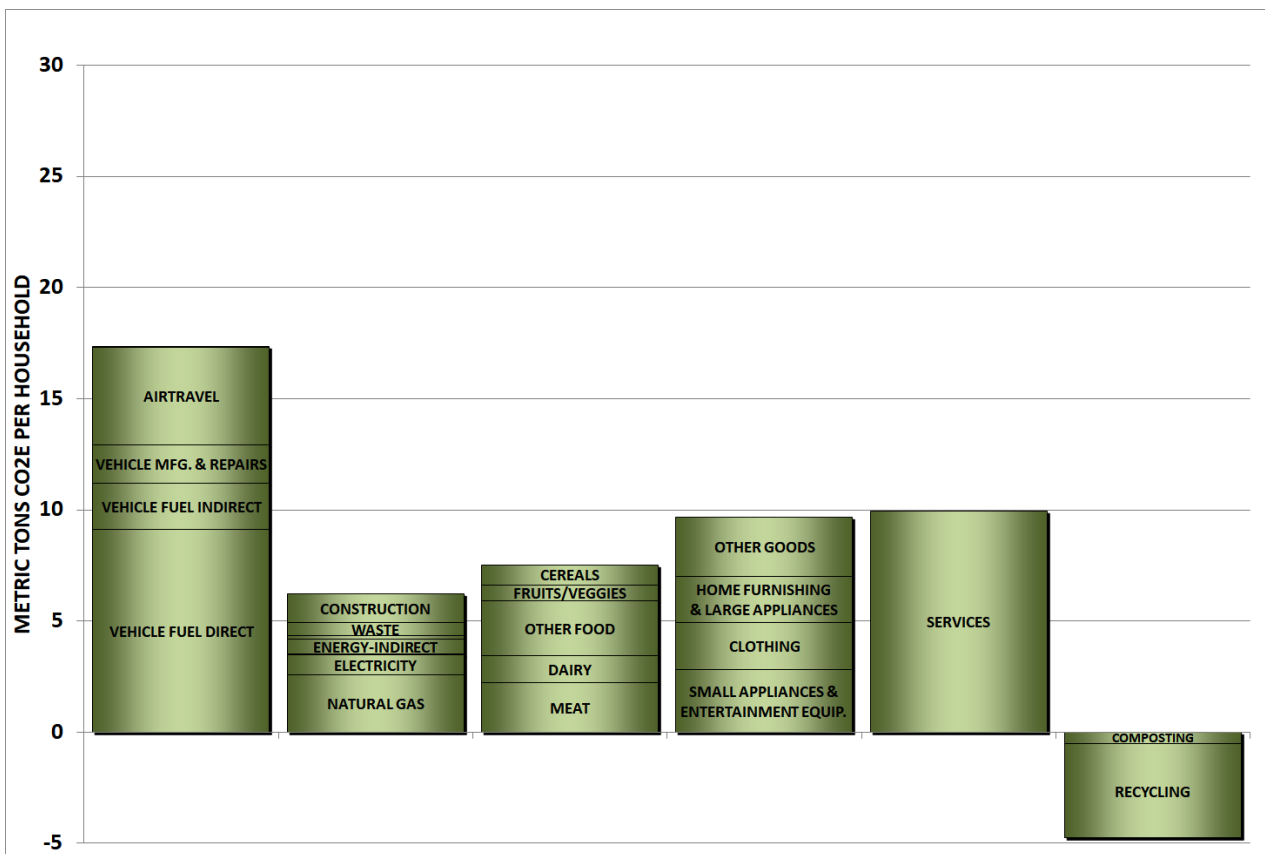
## Consumption-Based Emissions

The Bay Area Air Quality Management District (BAAQMD) and U.C. Berkeley developed a [Consumption-Based Inventory](#) to better understand how our purchasing habits contribute to global climate change. A consumption-based inventory includes emission sources that don’t get counted in the typical “in-boundary” GHG inventory, as well as other items that are difficult to quantify like airplane travel and upstream emissions from the production, transport and distribution of food and household goods. Figure 3 shows the results of the consumption-based inventory for our households.

According to this consumption-based inventory, the average San Anselmo household generates 50.2 MTCO<sub>2e</sub> per year or about 5 times more than the in-boundary emissions inventory of about 11.4 MTCO<sub>2e</sub> per household per year (calculated per household based on the Town’s community-wide emissions of 60,769 MTCO<sub>2e</sub>).

In essence, **our consumption drives climate change more than anything and although San Anselmo is meeting its state targets for strict “in-boundary” emissions reductions, we as a community have a long way to go.** For more information on this and to see carbon footprints by census tract, visit the [SF Bay Area Carbon Footprint Map](#). To learn how to measure and reduce your household carbon footprint, check out the [Resilient Neighborhoods](#) program. The graph below shows the relative impact of all the sources of emissions that make up a household carbon footprint. *Source: CoolClimate Network*

**FIGURE 3: AVERAGE SAN ANSELMO HOUSEHOLD CARBON FOOTPRINT**



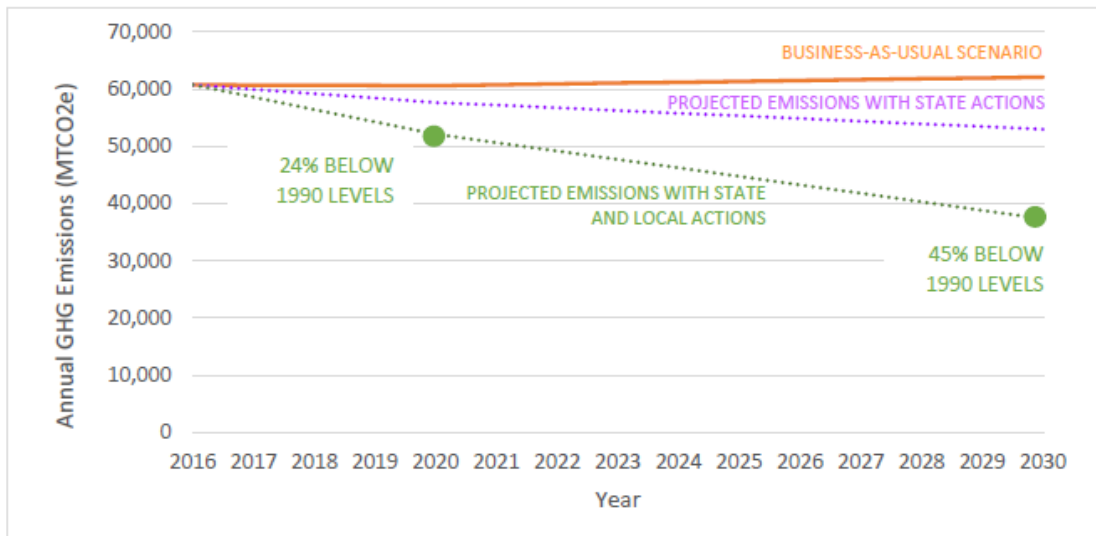
## Actions to Reduce Greenhouse Gas Emissions

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



The following sections identify the State and local strategies included in the CAP to reduce emissions in community and government operations. Emissions reductions are estimated for each strategy; combined, they show that **our community could reduce emissions 24% below 1990 levels by 2020 (i.e., 35% below 2005 levels), and 45% below 1990 levels by 2030 (54% below 2005 levels), which is enough to surpass the Town and State goals for those years.** Community emissions are projected to be 37,346 MTCO<sub>2</sub>e in 2030 with all State and local actions implemented, while the reduction target is 41,017 MTCO<sub>2</sub>e. **As shown in Figure 4, State actions represent about 37% of the reduction expected through implementation of San Anselmo’s CAP, while local actions represent about 63%.**

**FIGURE 4: CUMULATIVE IMPACT OF GHG REDUCTION STRATEGIES**



## Summary of State GHG Reductions

The CAP incorporates State reduction strategies that have been approved, programmed and/or adopted and will reduce local community emissions from 2016 levels. These programs require no local actions. They are quantified and deducted from projected San Anselmo emissions in order to provide a better picture of what still needs to be reduced at the local level to get to the overall GHG reduction targets. State actions and emissions reductions are shown in Table 1 and detailed in the appendix.

**TABLE 1: EMISSIONS REDUCTIONS IN SAN ANSELMO FROM STATE OF CALIFORNIA ACTIONS**

State Action	Emissions Reductions by 2030 (MTCO <sub>2</sub> e)	% Reductions
Light and Heavy-Duty Vehicle Regulations	8,206	90%
Renewable Portfolio Standard	427	5%
Title 24 Energy Efficiency Standards	351	4%
Lighting Efficiency	143	2%
Residential Solar Water Heaters	7	<1%
<b>Total</b>	<b>9,134</b>	<b>100%</b>

## Local Measures to Reduce Greenhouse Gas Emissions

Each of the following sections provide a summary table of local measures and associated GHG reductions, followed by a description of the specific actions we will undertake to implement each measure. The methodologies and implementation targets used to calculate emissions reductions are described in the appendix. Sometimes, there is no direct or reliable way to estimate GHG savings for a particular measure or the savings are embedded in another measure. In this case, the GHG reduction is identified as “not applicable” or “n/a.” For example: Community Engagement is essential for success in many of the measures set forth throughout the Plan, but counting savings in this section would then be double-counting savings from other measures such as those in Low Carbon Transportation or Energy. People need to know about a program to take advantage of it, but the actual emissions reductions will come from participating in the program itself. Therefore, the savings is counted for that program.

### Summary of Local Strategies

The local mitigation measures, summarized in Table 2 below, achieve greenhouse gas emissions reductions in the community of approximately 5,537 MTCO<sub>2</sub>e in 2020 and 15,648 MTCO<sub>2</sub>e in 2030.

**TABLE 2: EMISSIONS REDUCTIONS FROM LOCAL STRATEGIES**

Strategy	GHG Reductions by	
	2030 (MTCO <sub>2</sub> e)	% Reductions
Low Carbon Transportation	5,872	38%
Energy Efficiency	3,238	21%
Renewable Energy	4,290	27%
Waste Reduction	2,084	13%
Water Conservation	164	1%
Sequestration/Drawdown	n/a	n/a
<b>Total</b>	<b>15,648</b>	<b>100%</b>

*Note: some numbers may be slightly off due to rounding.*

These local mitigation measures are detailed in the following sections:

1. **Low Carbon Transportation (T)**
2. **Energy Efficiency (E)**
3. **Renewable Energy (R)**
4. **Waste Reduction (W)**
5. **Water Conservation (C)**
6. **Sequestration (S)**

Together, the projected reductions from State and local actions total 24,782 MTCO<sub>2</sub>e by 2030. Our community emissions are projected to be 37,346 MTCO<sub>2</sub>e in 2030 with the full implementation of the CAP. This is 45% below 1990 levels and exceeds the reduction target set by the State.



## 1. TRANSPORTATION (T)

*38% of potential reductions*

Approximately 55% of our community emissions come from transportation, and up until the recent commercial success of electric vehicles, it's been hard to see how we were going to reduce transportation emissions. Sure, improvements in fuel efficiency have driven emissions down – the passenger vehicle fleet in Marin County is about 17% more fuel efficient than it was ten years ago – and vehicle miles traveled by passenger vehicle trips starting and/or ending in San Anselmo have gone down about 16% over the same period. However, surveys show that alternative transportation rates have hardly budged over the years, despite improvements in the bicycle and pedestrian network and public information campaigns to get people to carpool, bicycle, walk and take transit.

All of that is now changing with the viability of zero emission vehicles (ZEVs), especially here in San Anselmo where electricity is pretty clean and expected to get cleaner. Marin County is a leader in ZEV adoption rates – second only to Santa Clara County – and ZEVs already comprise about 3.3% of all registered passenger vehicles in Marin. In the Town of San Anselmo, ZEVs made up 2% of the total vehicles in the Town, or 244 vehicles (as of January 1, 2018).

In 2019, we amended its General Plan Circulation Element to add a goal to support transportation improvements and emerging vehicle technology that help reduce greenhouse gas emissions and work toward more widespread use of electric vehicles to lower greenhouse gas emissions from transportation.

In 2019 we moved forward with a program for Zero Emission Vehicle readiness. To provide a foundation for electric vehicle implementation efforts, including investments in electric vehicle infrastructure and guidance for ongoing Town initiatives, we prepared an Electric Vehicle Strategy. The EV Strategy establishes a framework for near-term actions that support longer-term mobility goals and initiatives, including, but not limited to, development of Town policy on costs and fees for Town charging stations, regulations for residential and workplace electric vehicle readiness, and policies for conversion of the Town vehicle fleet.

The goals of the EV Strategy are:

1. Increase and accelerate EV use within the Town to achieve at least 3,000 zero emission vehicles in San Anselmo by 2030.
2. Increase the visibility and awareness of EVs as a preferred transportation option.

### What You Can Do

#1 Drive an all-electric or plug-in hybrid vehicle.

#2 Bike, walk or take transit whenever possible.

#3 Shut your car off when waiting in line at the ATM or in the school pick up/drop off lane.

#4 Better yet, encourage your child to walk or bike to school.

#5 Use an electric leaf blower and lawn mower; use a broom whenever possible for additional healthy benefits.

#6 Ride an electric bike.

3. Make it easier and less expensive for residents and businesses to install electric vehicle charging infrastructure in the Town.
4. Advance an efficient distribution of public charging infrastructure that is optimized for future technologies and EV demand.

Our plan is to increase the number of ZEVs from 244 to 3000 by 2030 by building out the EV charging infrastructure and encouraging ZEV ownership through incentives, public education, and development requirements. This is an aggressive target, but one that complements the State’s goal to put 5 million ZEVs on the road by 2030. Improvements in battery and charging technology, expected cost reductions, and automakers’ commitments to significantly expand ZEV offerings point to an all-electric future. Of course, new cars are typically out of the reach of low-income household budgets, but programs that incentivize used EV car purchases and installation of public EV chargers throughout the community can help ensure the benefits of EV ownership are shared by all. In 2019, San Anselmo adopted an EV Strategy to increase outreach, add additional public charging stations, and to electrify the Town fleet. That said, we can’t rely on ZEV’s alone to meet our transportation reductions; reducing congestion, enabling better biking and walking opportunities, and incentivizing public transit all carry co-benefits and can be enjoyed by all.

Our community will take the following actions to reduce emissions from transportation sources.

**TABLE 3: TRANSPORTATION MEASURES TO REDUCE GHG EMISSIONS – FROM COMMUNITY AND TOWN OPERATIONS**

ID	Measure	GHG Reduction by 2030 (MTCO <sub>2</sub> e)	Share of Reductions
T-1	Zero Emission Vehicles	5,242	90%
T-2	Bicycling	211	4%
T-3	Walking	30	1%
T-4	Safe Routes to School	86	1%
T-5	Public Transit	182	3%
T-6	Employee Trip Reduction	50	1%
T-7	Parking Requirements	27	<1%
T-8	Traffic System Management and Vehicle Idling	n/a	n/a
T-9	Smart Growth Development	n/a*	n/a
T-10	Electric Landscape Equipment	24	<1%
	<b>Community Subtotal</b>	<b>5,854</b>	<b>100%</b>
T-11	Zero and Low Emission City Vehicles	13	71%
T-12	Low Carbon Fuels	1	6%
T-13	City Employee Commute	4	23%
T-14	Municipal Electric Landscape Equipment	n/a	n/a
	<b>Town Operations Subtotal</b>	<b>18</b>	<b>100%</b>
	<b>TRANSPORTATION GHG REDUCTIONS TOTAL</b>	<b>5,872</b>	

\*Emissions reductions due to smart growth development are embedded in vehicle miles traveled projections utilized in the development of the emissions forecast. In order to avoid double-counting, they are not included here.

## **T-1: Zero Emission Vehicles**

Implement an Electric Vehicle Strategy that will result in 3,000 zero emission vehicles (ZEVs), including plug-in electric vehicles (EVs) and hydrogen fuel cell electric vehicles, in San Anselmo by 2030.

The EV Strategy includes the following actions:

- a. **Increase and accelerate EV use within the Town to achieve 3,000 zero emission vehicles in San Anselmo by 2030. Measure of success: number of EVs in Town, number of EV chargers and e-bike charging stations.**
  - 1.1. When adopting the 2019 Energy Code Standards (which take effect 1/1/20), consider adopting the County of Marin model ordinance that includes more stringent requirements for pre-wiring single family and multifamily development than state regulations, e.g. requiring pre-wiring for substantial remodels, taking into consideration the cost to property owners. Require new and remodeled commercial projects to install a minimum number of electric vehicle chargers for use by employees, customers, and residents.
  - 1.2. When adopting the 2019 Energy Code Standards (which take effect 1/1/20), consider requiring new and remodeled commercial projects to install a minimum number of electric vehicle chargers for use by employees, customers, and residents.
  - 1.3. Consider requiring new and remodeled gas stations to provide EV fast chargers and encourage hydrogen fueling stations.
  - 1.4. Consider feasibility of incentives for EVs such as providing free parking for EVs at metered parking spaces, but requiring EVs to comply with posted time limits.
  - 1.5. Promote adoption of electric bicycles, scooters and motorcycles.
  - 1.6. Identify locations for e-bike charging stations.
  - 1.7. Run Town fleet vehicles on 100% renewable sources by 2030. Purchase or lease EVs for Town fleet wherever possible, unless no model is economically viable. Ensure that all available pricing incentives, purchase contracts and financing options are considered when assessing EV fleet purchases. Consider resale value of vehicles in cost comparisons.
  - 1.8. Encourage or require, as practicable, ride hailing companies to utilize zero emission vehicles.
  - 1.9. Update the EV Strategy annually to reflect advances in EV policies and technologies.
- b. **Increase the visibility and awareness of EVs as a preferred transportation option. Measure of success: number of EVs in Town fleet and number of impressions delivered by media coverage, number of public participants reached during dedicated outreach activities.**
  - 2.1. Initiate public awareness campaign for benefits of EV ownership, available rebates, preferential utility rates and pricing, and expected electricity costs as compared to gasoline powered transportation, through mechanisms including the Town newsletter, website, and neighborhood social media, and over-the-counter handouts developed by EV organizations at Town Hall.
  - 2.2. Seek opportunities to promote EVs at Town events, such as by running a Public Service Announcement during summer Movies in the Park and including EV/E Bikes in the Country Fair Day parade.
  - 2.3. Coordinate test drive events with local EV dealers, manufacturers and related non-profit organizations to familiarize residents with EV technology and use these forums to present information about available federal and state incentives which significantly reduce costs.
  - 2.4. Repair or replace Town electric bicycles.



2.5. Apply decals to Town EVs to promote Town's use of Zero Emissions Vehicles.

**c. Make it easier and less expensive to install electric vehicle charging infrastructure in the Town.**

**Measure of success: Number of charging stations installed, and time required to issue permits for charging infrastructure.**

- 3.1. Create an effective and efficient permitting process to set clear and transparent expectations for required materials, fees, the review process, and what plan reviewers and building inspectors will be looking for. AB 1236 (Statutes of 2015, Chapter 598) requires the Town to develop an expedited, streamlined permitting process for EV charging stations. As part of this process, the Town must adopt a checklist of all requirements with which electric vehicle charging stations shall comply to be eligible for expedited review.
- 3.2. Publish submittal checklist and plan check requirements for EV projects on the Town website.
- 3.3. Continue to waive permit fees for EV charging infrastructure.
- 3.4. Affirm that charging in an existing legal parking space is an accessory use that does not require a planning permit if charging is not the primary purpose of the site.
- 3.5. Affirm that charging spaces designated for EVs count toward meeting minimum parking requirements for business owners and developers.
- 3.6. Consider reduced parking requirements for sites with EV charging spaces, particularly since charging improvements can lead to requirements for additional disabled parking, which can reduce site parking.

**d. Advance an efficient distribution of public charging infrastructure that is optimized for future technologies and EV demand. Measure of success: number of charging stations in Town.**

- 4.1. Increase the number of public charging stations and locations to 162 by 2030 taking advantage of all relevant grants including funds available through TAM, PG&E, MCE and BAAQMD.
- 4.2. Install chargers for Town vehicles that may also be used by the public.
- 4.3. Promote countywide efforts by MCE, PG&E and others to provide rebates for new or used electric vehicles and/or charging stations.
- 4.4. Consider EV charging stations and EV conduit for all public parking lot improvements, including parks.
- 4.5. Explore innovative opportunities to expand the Town's EV charging network, such as installing chargers at existing streetlight locations.
- 4.6. Work with PG&E and other entities to identify multi-family and workplace charging sites appropriate for available incentive programs, such as EV Charge Network.
- 4.7. Encourage Tamalpais Union High School District to install publicly available charging stations.
- 4.8. When installing conduit at Town lots, add EV conduit.
- 4.9. Establish at least one electric bicycle charging station near a bicycle parking area.
- 4.10. Provide wayfinding signage to public EV chargers and link to existing wayfinding programs.
- 4.11. Develop rules and a fee structure for Town EV charging spaces that recovers costs, encourages user turnover and supports the EV program.

**T-2: Bicycling**

Encourage bicycling as an alternative to vehicular travel. Establish and maintain a system of bicycle facilities that are consistent with the Town's Bicycle and Pedestrian Plan and Complete Streets policies.

- a. Provide bicycle racks for public use.
- b. Consider bike lockers for public use.
- c. Consider participating in a bike share program.
- d. Add at least one easily accessible charging station for Electric Bicycles .
- e. Amend zoning regulations to allow bicycle service, sales and repair in all commercial zoning districts.

### **T-3: Walking**

Encourage walking as an alternative to vehicular travel through outreach channels and partner agencies. Establish and maintain a system of pedestrian facilities that are consistent with the Town’s Bicycle and Pedestrian Master Plan and Complete Streets policies. Develop a sidewalk improvement program and consider when property owners will be required to install sidewalks, or pay fees in lieu of providing sidewalks to fund sidewalk improvement program.

### **T-4: Safe Routes to School**

Continue to support the Safe Routes to School Program and strive to increase bicycling, walking, carpooling, and taking public transit to school. Promote school participation, identify issues associated with unsafe bicycle and pedestrian facilities between neighborhoods and schools, apply for Safe Routes to School grants, and execute plans to improve pedestrian and bicycle facilities.

### **T-5: Public Transit**

Support and promote public transit by taking the following actions:

- a. Work with Marin Transit and Golden Gate Transit to maximize ridership.
- b. Work with SMART, TAM, employers and others to provide first and last mile programs to maximize utilization of the train, including shuttle buses.
- c. Support the “Yellow School Bus” program and student use of regular transit to reduce school traffic.
- d. Encourage transit providers, including school buses, to use renewable diesel as a transition fuel and to purchase electric buses whenever replacing existing buses.

### **T-6: Employee Trip Reduction**

Work with the Transportation Authority of Marin and the Bay Area Air Quality Management District to promote transportation demand programs to local employers, including rideshare matching programs, vanpool incentive programs, emergency ride home programs, telecommuting, and incentives to use transportation other than single occupant vehicles.

### **T-7: Parking Standards**

Consider amending General Plan parking policies for the downtown area and reducing minimum parking requirements in the downtown area.

### **T-8: Traffic System Management and Vehicle Idling**

- a. Implement signal synchronization and/or transportation network improvements such as traffic circles to minimize or eliminate wait times at traffic lights and to reduce congestion through increased traffic flow.
- b. Encourage drivers and autonomous vehicles to limit vehicle idling through implementing behavior change and engagement campaigns.

**T-9: Smart Growth Development**

Maintain existing zoning that allows for infill, higher density, and mixed-use development near transit and within walking distance to shopping, schools and services.

**T-10: Electric Landscape Equipment**

Encourage the use of electric landscape equipment powered by renewable energy sources instead of gasoline-powered equipment through engagement campaigns; encourage transition to manual equipment.

**T-11: Zero and Low Emission Town Vehicles**

Run Town fleet vehicles on 100% renewable sources by 2030. Purchase or lease EVs for Town fleet wherever possible, unless no model is economically viable. Ensure that all available pricing incentives, purchase contracts and financing options are considered when assessing EV fleet purchases. Consider resale value of vehicles in cost comparisons.

**T-12: Low Carbon Fuels**

Use low-carbon fuel such as renewable diesel as a transition fuel in the Town's fleet and encourage the Town's service providers to do the same, until vehicles are replaced with zero-emissions vehicles.

**T-13: Town Employee Commute**

Provide Town employees with incentives and/or reduce barriers to use alternatives to single occupant auto commuting, such as transit use discounts and subsidies, bicycle facilities, showers and changing facilities, ridesharing services, vanpools, emergency ride home service, flexible schedules, and telecommuting when practicable.

**T-14: Municipal Electric Landscape Equipment**

Consider replacing gas-powered leaf blowers with electric models or manual sweeping where feasible.



## 2. ENERGY EFFICIENCY (E)

*21% of potential reductions*

Increasing the efficiency of buildings is often the most cost-effective approach for reducing greenhouse gas emissions. Energy efficiency upgrades, such as adding insulation and sealing heating ducts, have demonstrated energy savings of up to 20%, while more aggressive “whole house” retrofits can result in even greater energy savings. Many “low-hanging fruit” improvements can be made inexpensively and without remodeling yet can be extremely cost-efficient, such as swapping out incandescent bulbs to LED bulbs, sealing air leaks, and installing a programmable thermostat. Energy Star-certified appliances and office equipment, high-efficiency heating and air conditioning systems, and high-efficiency windows not only save energy but reduce operating costs in the long run. Nonetheless, some upgrades can be expensive, particularly for low-income households, so the Town participates in programs that provide rebates, free energy audits, and financing options for residents and businesses.

New construction techniques and building materials, known collectively as “green building,” can significantly reduce the use of resources and energy in homes and commercial buildings. Green construction methods can be integrated into buildings at any stage, from design and construction to renovation and deconstruction. The State of California requires green building energy-efficiency through the Title 24 Building codes. The State updates these codes approximately every three years, with increasing energy efficiency requirements since 2001. The State’s energy efficiency goals are to have all new residential construction to be zero net electricity by 2020 and all new residential and commercial construction to be zero net energy by 2030. Local governments can accelerate this target by adopting energy efficiency standards for new construction and remodels that exceed existing State mandates, or by providing incentives, technical assistance, and streamlined permit processes to enable quicker adoption.

Our community will take the following actions to reduce emissions in the built environment.

### What You Can Do

- #1 Replace indoor and outdoor lights with LED bulbs, and turn them off when not in use.
- #2 Have an energy assessment done for your home or business.
- #3 Upgrade insulation, seal leaks, and install a programmable thermostat.
- #4 Purchase Energy Star appliances and equipment.
- #5 Unplug electronic appliances when not in use and set the thermostat to use less heat and air conditioning.

**TABLE 4: ENERGY EFFICIENCY MEASURES TO REDUCE GHG EMISSIONS – FROM COMMUNITY AND TOWN OPERATIONS**

ID	Measure	GHG Reduction by 2030 (MTCO <sub>2</sub> e)	Share of Reductions
E-1	Energy Efficiency Programs	3,077	96%
E-2	Energy Audits	77	2%
E-3	Cool Pavement and Roofs	34	12%
E-4	Green Building Reach Code	27	1%
E-5	Streamline Permit Process and Provide Technical Assistance	n/a	n/a
	<b>Community Subtotal</b>	<b>3,215</b>	<b>100%</b>
E-6	Streetlights	n/a	n/a
E-7	Energy Efficiency Audit and Retrofits	19	85%
E-8	Energy Conservation	3	15%
	<b>Town Operations Subtotal</b>	<b>22</b>	<b>100%</b>
	<b>ENERGY GHG REDUCTIONS TOTAL</b>	<b>3,237</b>	

Note: The Town purchased Deep Green electricity for all of its facilities in 2016. Therefore, emission reductions are only included for programs that reduce natural gas consumption

**E-1: Energy Efficiency Programs**

Promote and expand participation in residential and commercial energy efficiency programs.

- a. Work with organizations and agencies such as the Marin Energy Watch Partnership, the Bay Area Regional Network, Resilient Neighborhoods, and the Marin Climate & Energy Partnership to promote and implement energy efficiency programs and actions.
- b. Continue and expand participation in energy efficiency programs such as Energy Upgrade California, California Energy Youth Services, and Smart Lights.
- c. Promote utility, state, and federal rebate and incentive programs.
- d. Participate and promote financing and loan programs for residential and non-residential projects such as Property Assessed Clean Energy (PACE) programs, PG&E on-bill repayment, and California Hub for Energy Efficiency Financing (CHEEF) programs.

**E-2: Energy Audits**

Consider participating in a countywide effort to encourage energy audits for residential and commercial buildings at the time of resale.

**E-3: Cool Pavement and Roofs (See also A-2)**

Consider high albedo material for roadways, parking lots, sidewalks and roofs to reduce the urban heat island effect and save energy.

- a. Evaluate use of high albedo pavements when resurfacing Town streets or re-roofing Town facilities.
- b. Encourage new development to use high albedo material for roofs, driveways, parking lots, walkways, patios, and roofing through engagement and behavior change campaigns.
- c. Update Bald Hill Area Plan roof material restrictions to align with the Climate Action Plan.

**E-4: Green Building Reach Code**

Investigate adopting a green building ordinance for new and remodeled commercial and residential projects that requires green building methods and energy efficiency savings above the State building and energy



codes. Consider utilizing the County's green building ordinance as a model and including the use of photovoltaic systems and all-electric building systems as options to achieve compliance.

**E-5: Streamline Permit Process and Provide Technical Assistance**

Analyze current green building permit and inspection process to eliminate barriers and provide technical assistance to ensure successful implementation of green building requirements. Participate in countywide efforts to make it easier for contractors and building counter staff to simplify applications and identify incentives.

**E-6: Streetlights**

Complete replacement of inefficient street, parking lot and other outdoor lighting with LED fixtures.

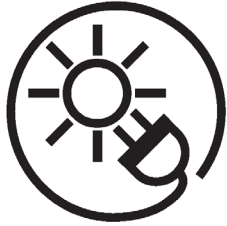
**E-7: Municipal Energy Efficiency Audit and Retrofits**

Work with the Marin Energy Management Team to identify and implement energy efficiency projects in municipal buildings and facilities and electrification of existing building systems and equipment that use natural gas.

**E-8: Energy Conservation (See also R-3)**

Reduce energy consumption through behavioral and operational changes.

- a. Establish energy efficiency protocols for building custodial and cleaning services and other employees, including efficient use of facilities, such as turning off lights and computers, thermostat use, etc.
- b. Incorporate energy management software, electricity monitors, or other methods to monitor energy use in municipal buildings.
- c. Investigate 9/80 work schedule for Town facilities where feasible and where facilities can be shut down entirely.



### 3. RENEWABLE ENERGY (R)

*27% of potential reductions*

Energy that comes from renewable sources, including appropriately-sited solar, wind, geothermal, and small hydroelectric, are the cleanest and most-environmentally friendly energy sources. Here in San Anselmo, where there is an abundance of sunny days, solar energy is a particularly good energy source. **According to [Project Sunroof](#), 76% of San Anselmo buildings have roofs that are solar-viable. These 3,600 roofs could generate over 55.8 million kWh per year, which is more than the total electricity usage in San Anselmo in 2016.** Solar system costs keep falling, too, which make them an attractive option for home and commercial building owners. Our Climate Action Plan projects that we can get about 30% of our electricity from locally produced solar energy systems by 2030, up from about 6% currently, without exceeding the current growth rate.

When solar is not an option or only provides a portion of your electricity needs, due perhaps to a shady roof or a reluctant landlord, residents and business owners can purchase 100% renewable electricity from MCE Clean Energy (MCE) and PG&E. MCE and PG&E electricity have a high percentage of renewable and GHG-free content, which means it's some of the cleanest electricity in the country. What's more, MCE's goal is provide 100% renewable and GHG-free electricity to all its customers by 2025. Considering that MCE currently carries about three-quarters of the total electricity load in San Anselmo, that action alone will significantly reduce emissions.

#### What You Can Do

#1 Switch to MCE Deep Green or PG&E Solar Choice 100% renewable electricity option.

#2 Install a solar energy system on your home or business.

#3 Replace gas and oil powered appliances with electric.

#4 Investigate electric hot water heaters and heat pumps so you can swap out heaters and furnaces that use natural gas when it's time to replace them.

Since our electricity is so clean, and getting cleaner, it's a great idea to swap out appliances and heating and cooling systems that use natural gas for ones that use electricity. Increases in natural gas production have been identified as the single largest cause of a recent major increase in the global warming compound methane in the Earth's atmosphere (see Cornell University Methane Lab information [here](#) and [here](#)). While CO2 stays in the atmosphere far longer than methane, methane is 86 times more powerful as an atmospheric warming compound than CO2 over 20 years.

If you're constructing a new home or building, consider going all-electric. Home and commercial battery array prices are falling, and will soon be a cost-effective option, too. Eventually, we will need to replace the majority of natural gas appliances and equipment to achieve our urgent emissions reductions goals. Fortunately, ongoing research and development of energy storage systems are creating new business opportunities and making an all-electric, 100% renewable future possible.

Our community will take the following actions to reduce emissions from energy use.

**TABLE 5: RENEWABLE ENERGY MEASURES TO REDUCE EMISSIONS - FROM COMMUNITY AND TOWN OPERATIONS**

ID	Measure	GHG Reduction by 2030 (MTCO <sub>2</sub> e)	Share of Reductions
R-1	Renewable Energy Generation	1,686	39%
R-2	GHG-Free Electricity	2,558	60%
R-3	Building and Appliance Electrification	46	1%
R-4	Innovative Technologies	n/a	n/a
R-5	Solar Energy Systems – Town Operations	n/a	n/a
R-6	Deep Green Electricity – Town Operations	n/a	n/a
<b>RENEWABLE ENERGY GHG REDUCTIONS TOTAL</b>		<b>4,290</b>	<b>100%</b>

*Note: The Town purchased Deep Green electricity for all of its operations in 2016. Therefore, additional reductions are not counted here.*

**R-1: Renewable Energy Generation**

Accelerate installation of residential and commercial solar and other renewable energy systems.

- a. Continue to provide permit streamlining and waive electrical permit fees, as feasible.
- b. Encourage installation of solar panels on carports and over parking areas on commercial projects and large-scale residential developments through ordinance, engagement campaigns, or incentives.
- c. Participate and promote available financing and loan programs for residential and non-residential projects such as Property Assessed Clean Energy (PACE) programs and California Hub for Energy Efficiency Financing (CHEEF) programs.
- d. Encourage installation of battery storage in conjunction with renewable energy generation projects through engagement campaigns and partner agency incentives.

**R-2: GHG-Free Electricity**

Continue to encourage residents and businesses to switch to 100% renewable electricity (MCE Deep Green, MCE Local Sol, and PG&E Solar Choice) through engagement campaigns and partner agency incentives and work with MCE Clean Energy to assure that it reaches its goal to provide electricity that is 100% GHG-free by 2022.

**R-3: Building and Appliance Electrification**

Promote electrification of building systems and appliances that currently use natural gas, including heating systems, hot water heaters, stoves, and clothes dryers.

**R-4: Innovative Technologies**

Investigate and pursue innovative technologies such as micro-grids, battery storage, and demand-response programs that will improve the electric grid’s resiliency and help to balance demand and renewable energy production.

**R-5: Solar Energy Systems for Municipal Buildings**

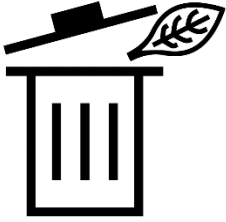
Install solar energy systems at municipal buildings and facilities where feasible and investigate and pursue innovative technologies such as battery storage and demand response programs.

**R-6: Municipal Deep Green Electricity**

Continue to purchase MCE Deep Green electricity for all Town facilities.



Good Earth Solar Roof Top (from [The Patch, 2013](#))



## 4. WASTE REDUCTION (W)

*13% of potential reductions*

The things we buy, consume, and throw away generate a lot of greenhouse gas emissions during manufacturing, transport, distribution and disposal. The best way to reduce emissions is to purchase and consume less stuff in the first place, and then find someone who can reuse whatever you no longer need before considering recycling or disposal.

Due to the way we account for community emissions, our Climate Action Plan does not take credit for reducing upstream emissions. Instead, our GHG accounting is directly concerned with emissions that are created from the anaerobic decomposition of organic waste in the landfill. The decomposition process creates methane, which is 28 times more potent as a greenhouse gas than carbon dioxide. Although landfills capture most of the methane, and some like Redwood Landfill use that methane to create biogas or electricity, about one-quarter of it escapes into the atmosphere.

The good news is that it is relatively easy to divert organic material from the landfill. Paper and cardboard can be recycled. Food scraps, some paper (like napkins and paper towels), and yard waste can be composted, either at home or at the landfill. Surplus food can be donated to nonprofits that distribute it to the needy. About half of the organic material that is put into the landfill is “recoverable.” The measures below are geared to making that happen by 2030, starting with encouraging residents and businesses to divert, recycle and compost organic waste.

In September 2016, Governor Brown signed into law SB 1383 (Lara, Chapter 395, Statutes of 2016), establishing methane emissions reduction targets in a statewide effort to reduce emissions of short-lived climate pollutants (SLCP) in various sectors of California's economy. The law directs the state's Department of Resources Recycling & Recovery (CalRecycle) to adopt regulations and requirements to **achieve a 50 percent reduction in organic waste disposal by 2020 and a 75 percent reduction by 2025**. The law further requires that 20 percent of the amount of edible food currently disposed be recovered for human consumption by 2025.

### What You Can Do

#1 Buy only as much as you need.

#2 Buy locally grown food, especially organics; eat less industrially-grown meat.

#3 Put your food scraps in the composting/green can and/or compost them at home.

#4 Donate extra food and used clothing and housewares to charities.

#5 Sort your recyclables and only recycle what truly can be recycled—don't be a “wishful” recycler.

#6 Bring your own water, hot drink and takeaway food containers with you daily. Avoid single-use plastics.

To help meet our diversion target, we passed an ordinance regarding disposable food service ware, called the **Single Use Food Service Ware Ordinance** ([San Anselmo Ordinance 1129](#)). This ordinance occurred as a result of the town’s desire and duty to protect its natural environment and the health of its citizens and economy. Our throw-away culture is creating an overwhelming amount of waste in the San Francisco Bay, creeks and oceans worldwide destroying precious marine life with microplastics accumulating in fish and other marine wildlife that humans eat. Single-use plastics and other service ware items have also been found to contain harmful, sometimes carcinogenic chemicals that leach into food and drinks resulting in toxicity to both humans and animals. This pollution threatens our precious water resources and our public health.

Under the new ordinance:

1. Reusable food ware is strongly encouraged and preferred in businesses, schools, and local government facilities.
2. When reusable ware is not feasible, any and all disposable **food service ware must be unlined compostable fiber or wood-based** alternative food ware, including containers, utensils, straws, stirrers, cocktail sticks, and beverage plugs to be collected in the Town’s municipal compost facility.
3. The only recyclable packaging allowable are plastic bottles (look for the number 1 chasing recycling arrow), glass, and aluminum cans, wrap, and tins. Ensure materials are free of liquids or solids.
4. Any items on the *San Anselmo Acceptable Food Ware Vendor List* is pre-approved and compliant with the Law.
5. *Accessory* food ware items (anything other than the food or beverage container) are required to be by request only or can be offered to customers as self-serve. This includes straws, sleeves, lids, stirrers, beverage plugs, utensils, condiment packets, and napkins. Plastic straws will be available by request for special needs customers.
6. Styrofoam foam coolers and food containers and single-use plastic bags are banned.
7. In accordance with the California Retail Food and Safety Code, food vendors will refill customer’s beverage and food containers where appropriate.

The Town has partnered with the national non-profit Clean Water Action’s ReThink Disposable program to offer outreach, education, and technical assistance to support Town food vendors to become compliant with the law while identifying cost-saving practices to reduce harmful food packaging and transition to reusables.

Our community will take the following actions to reduce emissions from waste.

**TABLE 6: WASTE REDUCTION MEASURES TO REDUCE EMISSIONS– FROM THE COMMUNITY AND TOWN OPERATIONS**

ID	Measure	GHG Reduction by 2030 (MTCO <sub>2</sub> e)	Share of Reductions
W-1	Commercial Organic Waste	216	11%
W-2	Residential Organic Waste	508	25%
W-3	C&D and Self-Haul Waste	29	1%
W-4	Mandatory Waste Diversion	664	33%
W-5	Waste Processing Infrastructure	581	29%
W-6	Extended Producer Responsibility	n/a	n/a
W-7	Inorganic Waste	n/a	n/a
	<b>Community Subtotal</b>	<b>1,998</b>	<b>100%</b>

W-8	Waste from Public Facilities	27	32%
W-9	Waste from Town Operations	58	68%
	<b><i>Town Operations Subtotal</i></b>	<b>85</b>	100%
<b>TOTAL WASTE GHG REDUCTIONS</b>		<b>2083</b>	

**W-1: Commercial Organic Waste**

Work with Zero Waste Marin, Marin Sanitary Service, and nonprofits such as Extra Food to divert commercial organic waste from the landfill through recycling, composting, and participation in waste-to-energy and food recovery programs. Conduct outreach and education to businesses subject to State organic waste recycling mandates (AB 1826) and encourage or enforce compliance with the law.

**W-2: Residential Organic Waste**

Work with Zero Waste Marin, Marin Sanitary Service, Sir Francis Drake High School Students and other organizations to educate and motivate residents to utilize curbside collection services and home composting for food waste.

**W-3: Construction & Demolition Debris and Self-Haul Waste**

Continue to enforce Town construction & demolition debris material recycling ordinance ([San Anselmo Municipal Code Section 9-20.01 et. seq.](#)).

**W-4: Mandatory Waste Diversion**

Consider an ordinance requiring mandatory subscription to and participation in waste diversion activities, including recycling and organics collection provided by Marin Sanitary Service.

**W-5: Waste Processing Infrastructure**

Review and revise the Town’s franchise agreement with Marin Sanitary Service to ensure waste reduction and diversion targets are met. Conduct a feasibility study and consider investing in new solid waste processing infrastructure to remove recoverable materials (recycling and organics) from the waste stream and reduce contamination. Require regular residential and commercial waste audits and waste characterization studies to identify opportunities for increased diversion and to track progress in meeting targets.

**W-6: Extended Producer Responsibility.** Encourage the State to regulate the production and packaging of consumer goods and take-back programs. Encourage on-demand delivery services like Amazon and Blue Apron to reduce packaging waste and investigate requirements and incentives for same through ordinance or engagement campaigns.

**W-7: Inorganic Waste.** Promote reuse, repair, and recycling of inorganic materials, and encourage reduced use of packaging and single use items.

**W-8: Waste from Public Facilities**

Increase opportunities for recycling, reuse, and composting at Town facilities.

**W-9: Waste from Town Operations**





Embark on an educational and campaign to increase recycling, composting, reuse, and waste reduction within municipal operations. Conduct periodic waste audits of Town facilities to understand where opportunities for increased diversion lie and to track progress.

## 5. WATER CONSERVATION (C)

*1% of potential reductions*

Our community is no stranger to periodic droughts and the need to conserve water. We have responded by reducing per capita water use by about 23%, from 142 gallons per person per day (gpcd) in 2005 to 110 gpcd in 2018. In addition to installing low-flow fixtures (showerheads, faucets and toilets) and water-efficient appliances (clothes washers and dishwashers), residents and businesses are planting native, drought-tolerant species and even replacing lawns with attractive, low-water use gardens. Good thing, because as temperatures continue to rise, we will experience more droughts and more intense heat waves than before.

Our Greenhouse Gas Inventory counts emissions that are generated from the energy used to pump, treat and convey water from the water source to San Anselmo water users. Far more emissions are created from the energy that is used to heat water, but those emissions are counted in the residential and commercial sectors. Therefore, the water sector comprises a much smaller share of community emissions than one might expect.

The water agencies that supply San Anselmo's water are committed to using 100% renewable energy in their operations. Marin Municipal Water District (MMWD) began purchasing Deep Green electricity from MCE in 2017, and Sonoma County Water Agency, which provides 20-25% of MMWD's water, started purchasing 100% renewable electricity in 2015. As a result, emissions from the water sector will go down to nearly zero, but the overall contribution to community emissions reduction is small.

The Town will take the following actions to reduce emissions from water use.

### What You Can Do

#1 Replace your lawn with a drought-tolerant and fire-resilient garden.

#2 Install a drip irrigation system and check it regularly for leaks.

#3 Install low water flow faucets, showerheads and toilets.

#4 Buy water-efficient dishwashers and clothes washers when it's time to replace them.



Drip irrigation home vegetable garden (from [here](#))

**TABLE 7: WATER CONSERVATION MEASURES TO REDUCE EMISSIONS –COMMUNITY AND TOWN OPERATIONS**

ID	Measure	GHG Reduction by 2030 (MTCO <sub>2</sub> e)	Share of Reductions
C-1	Community Water Use	<b>164</b>	<b>100%</b>
C-2	Municipal Water Use	n/a	n/a

Note: The Town purchased Deep Green electricity for all of its operations in 2016. Therefore, additional reductions are not counted here.

**W-1: Community Water Use**

Reduce indoor and outdoor water use in residential and commercial buildings and landscaping.

- a. Work with Marin Municipal Water District (MMWD) and other organizations to promote water conservation programs and incentives.
- b. Educate residents and businesses about local and State laws requiring retrofit of non-compliant plumbing fixtures during remodeling and at resale.
- c. Ensure all projects requiring building permits, plan check, or design review comply with State and MMWD regulations.
- d. Encourage the installation of greywater and rainwater collection systems and the use of recycled water where available through ordinance or engagement campaigns.

**W-2: Municipal Water Use**

Reduce indoor and outdoor water use in municipal facilities and operations.

- a. Replace high water use plants, lawns and inefficient irrigation systems with water-efficient and carbon sequestering landscaping.
- b. Replace inefficient plumbing fixtures with high-efficiency fixtures.
- c. Use recycled water as available and practicable.



## 6. SEQUESTRATION (S)

*n/a potential reductions*

The Town of San Anselmo supports California and County directives and statutes to capture or drawdown carbon emissions from the atmosphere from natural solutions including more and appropriate tree planting, climate-smart habitat restoration and healthy soils initiatives. In addition to naturally pulling and storing GHG pollution from the atmosphere, this strategy increases the health of our local ecosystems and helps protect the vital services they provide including clean air and water, pollination, enhanced biodiversity, flood control and increased resilience to growing climate extremes.

Nascent drawdown technologies will likely be scaled up over the years ahead. As local approaches become viable, they will be considered by the Town for future CAP updates.

This section focuses on currently known natural approaches to sequestering carbon dioxide in both the built and natural environments, both by the community and the Town operations combined. The Town will evaluate and plan for other natural as well as novel technologies to sequester carbon dioxide from the atmosphere, and how to best measure climate-friendly outcomes, working with Drawdown Marin and other entities as new information becomes available.

Carbon offsets are often used to fund these types of carbon sequestration projects and can be purchased to offset emissions that are difficult to otherwise mitigate, such as airplane flights. We have not credited emission reductions for these actions because we do not yet count sequestered carbon in the community greenhouse gas inventory, but we recognize that sequestration is a critical component to meeting our carbon reduction goals.

### What You Can Do

#1 Plant native, drought-tolerant and fire-resistant trees and other vegetation.

#3 Manage for healthy soil by planting no-till gardens and avoiding soil compaction. Avoid bare spots by filling in with plants or mulch.

#3 Plant perennial, long rooted grasses that help pull carbon out of the atmosphere and make soil more permeable, to sequester carbon and hold more water naturally when it does rain.

**TABLE 8: SEQUESTRATION MEASURES TO REDUCE EMISSIONS –COMMUNITY AND TOWN GOVERNMENT**

ID	Measure	Milestone	Estimated Carbon Sequestered
S-1	Urban Forests and Ecosystems	# new trees planted; # of Town outreach efforts and implementation initiative; # of new home “carbon gardens”; # of new green roofs	n/a yet
S-2	Habitat Restoration and Soil Regeneration	# of acres managed for carbon sequestering trees, other vegetation and soil	n/a yet

S-3	Carbon Offsets	# voluntary natural climate solution offsets	n/a yet
S-4	Carbon-sequestering Building Materials	# new buildings using net carbon-sequestering materials in place of other materials;	n/a yet

### S-1: Urban Forests and Ecosystems

Increase carbon sequestration, and improve air quality and natural cooling, through increasing appropriate (e.g., native, drought resistant, fire resilient) tree cover, other vegetation and healthy soils in San Anselmo.

- a. Plant additional trees on Town-owned land, including public parks, open space, medians, and rights of way, where feasible.
- b. Develop parking lot landscape standards to maximize tree cover, size, growth, and sequestration potential.
- c. Continue to regulate and minimize removal of large trees and require planting of replacement trees and other appropriate vegetation as per San Anselmo Municipal Code 4-13.06.
- d. Require that the site planning, construction and maintenance of new development preserve existing healthy trees and native vegetation on site to the maximum extent feasible, considering fire safety. Replace trees and vegetation not able to be saved, consistent with fire department Vegetation Management Plans.
- e. Encourage community members to plant appropriate tree species on private land. Evaluate creating a tree giveaway event or providing lower-cost trees to the public through a bulk purchasing program.
- f. Encourage the creation of community no-till gardens and healthy soils management on public lands by community groups and on private lands by individual households.
- g. Provide information to the public, including landscape companies, gardeners and nurseries, on carbon sequestration rates, drought tolerance, soil management, and fire resistance of different tree and vegetation species as well as healthy soils management.

### S-2: Habitat Restoration and Soil Regeneration

Increase carbon sequestration in the built environment, developed landscapes, and open space/natural areas.

- a. Increase carbon sequestration potential of wetland habitat, such as streamside forests, through climate-smart restoration.
- b. Encourage and support composting and biochar for application to developing healthy, carbon-rich soils as appropriate.
- c. Manage parks and open spaces to steadily increase carbon in vegetation and soil.
- d. Manage trees and invasive species in the open space for forest health, water cycling and soil organic matter as well as reduction of fuel load.

### S-3: Carbon Offsets

- a. Identify and partner with local non-profit organizations and/or businesses that actively sequester carbon in their activities (e.g., climate-smart habitat restoration or regenerative agriculture) to promote a carbon offset program.
- b. Encourage community members to purchase carbon offsets to reduce their carbon footprint through engagement campaigns.

- c. Focus on offsetting emissions that are currently difficult to mitigate otherwise, such as airplane travel.

#### S-4: Building Materials

Cement is responsible for 7% of global man-made greenhouse emissions , making it the world's second largest industrial source of carbon dioxide, according to the [International Energy Agency](#) but new approaches are being tested that either replace the need for cement and lock up carbon such as through wood products (e.g., cross-laminated timber) or trap carbon dioxide and reduce the need for cement (new approaches to concrete production).

- a. Encourage use of climate-friendly building materials that store more carbon dioxide than is released in their production through agency partnerships and engagement campaigns.



b. S.F. [Drake High School Sea-Disc](#) maintaining our creek in a restoration project.



## SECTION 3 - PREPARING FOR IMPACTS: ADAPTATION AND RESILIENCE

California is already experiencing the effects of climate change with more wildfires, more heat waves, longer droughts, more intense storms, less snowpack, and less fresh water. Annual average air temperatures have already increased by about 1.8 °F in California, and that number will likely double even if the world can reduce emissions 80% by 2050. San Anselmo needs to be prepared for the likely impacts of climate change, including flooding from more intense storms, health impacts from heat exposure and poor air quality, and safety risks from the increased likelihood of wildfires and landslides. Although sea level rise has no direct impact on the Town of San Anselmo, the indirect impact will be huge. Most San Anselmo residents commute out of town to their places of employment, an option which may be severely restricted with sea level rise and an increasing number of days of “nuisance” or “sunny day” flooding (as we have already experienced on Highways 101 and 37 in Marin County).

While this CAP contains some measures that address adaptation, a more complete set of goals, policies and programs addressing emergency preparedness are contained in the 2018 [San Anselmo Local Hazard Mitigation Plan](#) that will be incorporated in the Town’s updated General Plan. These plans will be updated as new climate change related data is available and broadened to consider county and region wide issues that may leave our town even more vulnerable.

We also need to assess our ecological footprint as it relates to habitat loss, water availability and conservation, soil health, plant, animal, and insect biodiversity, natural disaster prevention and responsiveness, as well as the overall health and resilience of our ecosystems that increase our resilience to rapid environmental change and that may overlap with other municipalities in the county.



San Anselmo Creek in recent storm event (from [the Patch](#)).





## 1. Adaptation and Resilience (A)

Per [NASA](#), “adaptation – adapting to life in a changing climate – involves adjusting to actual or expected future climate. The goal is to reduce our vulnerability to the harmful effects of climate change (like sea-level encroachment, more intense extreme weather events or food insecurity). It also encompasses making the most of any potential beneficial opportunities associated with climate change (for example, longer growing seasons or increased yields in some regions).

Throughout history, people and societies have adjusted to and coped with changes in climate and extremes with varying degrees of success. Climate change (drought in particular) has been at least partly responsible for [the rise and fall of civilizations](#). Earth’s climate has been relatively stable for the past 12,000 years and this stability has been crucial for the development of our modern civilization and life as we know it. Modern life is tailored to the stable climate we have become accustomed to. As our climate changes, we will have to learn to adapt. The faster the climate changes, the harder it could be.

While climate change is a global issue, it is felt on a local scale. Cities and municipalities are therefore at the frontline of adaptation. In the absence of national or international climate policy direction, cities and local communities around the world have been focusing on [solving their own climate problems](#). They are working to build flood defenses, plan for heatwaves and higher temperatures, install water-permeable pavements to better deal with floods and stormwater and improve water storage and use.”

Following are measures that the Town is adopting through the CAP in concert with other emergency preparedness efforts such as the Local Hazard Mitigation Plan.

**TABLE 9: ADAPTATION AND PREPAREDNESS MEASURES - FROM THE COMMUNITY AND TOWN GOVERNMENT**

ID	Measure	Milestone
A-1	Preparation and Response	# and types of improvements to Town emergency planning, training, implementation
A-2	Cool Pavement and Roofs	# and types of outreach; # new projects implemented
A-3	Climate-friendly Development	# and types of outreach; # new projects implemented
A-4	Use Natural Infrastructure	# and types of outreach; # new projects implemented
<b>TOTAL</b>		<b>n/a yet</b>

### A-1: Preparation and Response

- a. Continue to incorporate the increased risk of wildfire, extreme heat, storm events and other extremes in the Town’s Local Hazard Mitigation Plan.
- b. Incorporate the likelihood of climate change impacts into Town emergency planning and training.
- c. Explore increase health risks associated with air quality impacted by wildfire.

- d. Coordinate with water districts, wildlife agencies, flood control and fire districts, Marin County, and other relevant organizations to develop a comprehensive plan addressing climate change impacts and adaptation strategies. The comprehensive plans should address economic sustainability, human health, and the health and adaptability of natural systems, including the following:
  - Water resources, including expanded rainwater harvesting, water storage and conservation techniques, water reuse, water-use and irrigation efficiency, and reduction of impervious surfaces.
  - Ecological resources, including land acquisition, creation and expansion of riparian zones as a buffer against flooding, and protection of existing natural infrastructure.
  - Public health, including heat-related health plans, vector control, air quality, safe water, and improved sanitation. Consider storing approved N95 air masks to hand out in case of emergency. Consider designating “safe spaces” that have air filtration systems for poor air quality days, such as the San Anselmo Library.
  - Environmental hazard defenses, including flood barriers, pumping stations, and fire prevention and suppression.
- e. Explore the need for emergency survival rations including food, medication, and shelter with consideration to both local needs and our ability to support climate-related refugee populations.
- f. Develop local systems of food and energy production to enhance our town's resiliency and adaptation toward localized systems. Examples include micro-grids for energy and regenerative agriculture practices on Town managed land, as well as promoting home gardens and water catchment systems.
- g. Ensure fair and robust inclusion of lower-income households and our diverse communities in the planning and response to climate change impacts, including sea level rise, wildfire, public health, and emergency preparedness.

**What You Can Do**

#1 Get to know your neighbors and form an emergency preparedness phone tree and leadership team.

#2 Replace your roof with a green vegetated one or blue (water holding) one to conserve water and insulate your home.

#3 Plant vegetation and build rain gardens to slow flood waters and retain water in soil later in the year to reduce drought and extreme heat impacts.

#4. Volunteer with a local habitat restoration effort.

**A-2: Cool Pavement and Roofs (See also E-3)**

Consider use of high albedo material for roadways, parking lots, and sidewalks to reduce the deleterious effects of the urban heat island effect and save energy.

- a. Evaluate the use of highly reflective pavements when resurfacing Town streets.
- b. Encourage new development to use high albedo material for roofs, driveways, parking lots, walkways, and patios.
- c. Update Bald Hill Area Plan roof material restrictions to better align with the Climate Action Plan.

**A-3: Eco-friendly Development**

- a. Require new development, redevelopment, and human built infrastructure projects to implement best management practices as feasible, including low-impact development techniques, permeable pavements and other surfaces in landscape design, and the integration of natural features into the project design, to naturally filter and biodegrade contaminants and to minimize surface runoff into drainage systems and creeks.
- b. Encourage green vegetated roofs or “blue roofs” to buffer drought impacts by holding up to eight inches of precipitation on its surface or in engineered trays, and discharged at a controlled rate.

#### A-4: Natural Infrastructure

- a. Incentivize tree planting on public and private lands to keep air temperatures cooler, reduce stormwater runoff and increase filtration of water into soil.
- b. Encourage the use of rain gardens or bioswales and other [bioretention](#) features to reduce the impacts of flood events.
- c. Provide training to Town staff on natural infrastructure approaches and benefits.
- d. Compile and publicize list of green infrastructure contractors and engineers.



Bioswales are designed to remove silt and other pollutants from surface runoff waters, slow down flood waters, harvest surface runoff and support urban tree growth. <https://actreesnews.org/wp-content/uploads/2017/12/bioswale.jpg>

## SECTION 4 - TAKING ACTION

### 1. COMMUNITY OUTREACH AND ENGAGEMENT (O)



This Climate Action Plan contains actions that the Town can undertake to reduce its own emissions by about 126 MTCO<sub>2</sub>e, bringing the emissions from municipal operations down to 57% below 2005 levels while also preparing for accelerating climate change impacts. However, since emissions from governmental operations make up less than 1% of community-wide emissions, that is just a drop in the bucket.

The fact is that our residents, businesses, workers, and visitors will have to do their part to ensure we meet our reduction targets, prepare for increasing climate change impacts and conserve the ecosystem services that sustain life as we know it. The Town can compel some of these actions by adopting ordinances and building regulations, but much of the success of our plan will depend on informing our community members and encouraging them to act on their own. This section details the ways in which the Town will seek public engagement and work with local businesses and community groups to achieve the emissions reductions, preparedness and conservation activities identified in other sections of the CAP.

The Town has been partnering with [Resilient Neighborhoods](#) to educate San Anselmo residents on ways they can take climate-smart actions, from emissions reductions to living a more sustainable lifestyle, every day. The program organizes Climate Action Teams of up to 12 households that meet five times over two months to learn about strategies and resources to improve home energy efficiency, shift to renewable energy, use low-carbon transportation, conserve water, reduce waste, and adapt to a changing climate. To start, participants calculate their household carbon footprint and then take actions to reduce their greenhouse gas emissions. Scores of San Anselmo residents have participated in the program to date.

Our community will take the following actions to engage the community to engage in emissions reductions, adaptation and conservation efforts to secure a healthy and vibrant San Anselmo well into the future.

#### What You Can Do

#1 Sign up for Resilient Neighborhoods and join a Climate Action Team.

#2 Commit to reducing your carbon footprint and preparing for climate change impacts by taking the actions identified in this Plan.

**TABLE 10: COMMUNITY OUTREACH AND ENGAGEMENT MEASURES – FROM THE COMMUNITY AND TOWN GOVERNMENT**

ID	Measure	Milestone
O-1	Community Education	# and types of outreach
O-2	Community Engagement	# and types of outreach
O-3	Advocacy	# of policies supported
O-4	Innovation and Economic Development	# of working group partners
O-5	Green Businesses	# of businesses adopting Green policies

### **O-1: Community Education**

Work with community-based outreach organizations, such as Resilient Neighborhoods, to educate and motivate community members on ways to reduce greenhouse gas emissions, increase resilience and protect nature's benefits at home, at work and in other social settings.

### **O-2: Community Engagement**

Implement a communitywide public outreach and behavior change campaign to engage residents, businesses, and consumers around the impacts of climate change, the ways individuals, neighborhoods, businesses and other organizations can reduce their GHG emissions, actively prepare for extreme events, and help create a more sustainable, resilient, and healthier community.

Create an overarching theme to articulate a long-term goal, motivate community members, and brand a comprehensive suite of GHG-reduction, adaptation and conservation programs. Prioritize promotion of programs that have the greatest greenhouse gas reduction and adaptation potential while utilizing the latest social science on behavior change.

Emphasize and encourage citizens' involvement in reaching the community's climate goals, including innovative means of tracking milestones and comparing San Anselmo's performance with other communities and with state, national and global benchmarks. Specific steps include:

- a. Conduct outreach to a wide variety of neighborhood, business, educational, faith, service, and social organizations.
- b. Inform the public about the benefits of installing energy and water efficient appliances and fixtures, electrifying homes and commercial buildings, installing solar energy systems, and purchasing 100% renewable electricity.
- c. Inform the public about the benefits of using carbon-free and low-carbon transportation modes, such as driving electric vehicles, walking, bicycling, taking public transportation, and ridesharing.
- d. Utilize and tailor existing marketing materials when available.
- e. Inform the public about the environmental benefits of eating less meat and dairy products, growing food at home, and purchasing locally-produced food.
- f. Partner with MCE, PG&E, MMWD, Marin Sanitary Service, Transportation Authority of Marin, Marin Transit, Golden Gate Transit, SMART, and other entities to promote available financing, audits, rebates, incentives, and services to the San Anselmo Community.
- g. Utilize the Town's website, newsletters, social media, bill inserts, public service announcements and advertisements, recognition programs, and other forms of public outreach.
- h. Create stories and "shareable content" that can be used by bloggers, businesses, non-profits, social media, and traditional media.
- i. Use creative methods to engage the public, such as games, giveaways, prizes, contests, simple surveys, digital tools, and "pop-up" events.
- j. Develop pilot programs using community-based social marketing and other social science-based techniques to effect behavior change.
- k. Participate in countywide outreach and education efforts, such as Drawdown Marin.



**O-3: Advocacy**

Support state and federal levels policies and actions that drive the rapid transition to GHG-free energy sources, electrification of buildings and the transportation fleet, conservation of habitat and soil, protection of ecosystem services, and other impactful measures to sharply reduce greenhouse gas emissions, prepare for the impacts of a changing climate and increase resilience to climate change extremes.

**O-4: Innovation and Economic Development**

Participate in local economic development and innovation working groups to explore public-private partnerships and develop ways to decarbonize our local economy.

**O-5: Green Businesses**

Encourage local businesses to participate in the Marin County Green Business Program through partnerships with the County, Chamber, and other business groups.



Citizen engagement is key to securing to a safe climate and healthy future. [Photo from Marin IJ.](#)



## 2. IMPLEMENTATION AND MONITORING (I)

Plans are only effective if they’re implemented and results are carefully evaluated. The Town will prepare an annual assessment of the progress it is making on implementing the measures contained in this Climate Action Plan and continue to quantify community and greenhouse gas emissions to determine if we are on track to meet our reduction targets. The Town will also develop begin quantifying adaptation measures to ensure resilience to the increasing impact climate change on the Town.

Our community will take the following actions to implement and monitor the CAP.

### What You Can Do

#1 Get involved! Attend Council meetings, Climate Action Plan implementation public forums to voice your support for actions contained in this Plan.

**TABLE 16: IMPLEMENTATION AND MONITORING MEASURES BY THE COMMUNITY AND TOWN GOVERNMENT**

ID	Measure	Milestones
I-1	Annual Monitoring	Report back
I-2	Update GHG Emissions Inventories and other metrics annually	Report back
I-3	Identify and Secure Funding Sources	# of proposals, # successful, \$ secured
I-4	Update the Climate Action Plan, Report to Town Council	Annual updates
I-5	Project Compliance Checklist	Review # completed, distributed, communicated

### I-1: Annual Monitoring

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

### I-2: Update GHG Emissions Inventories

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

### I-3: Identify and Secure Funding Sources

Identify funding sources for recommended actions, and pursue local, regional, state and federal grants as appropriate. Investigate creation of a local carbon fund or other permanent source of revenue to implement the Climate Action Plan.

### I-4: Update the Climate Action Plan

Update the Climate Action Plan regularly to incorporate new long-term reduction targets and strategies to meet those targets.





San Anselmo Town Council members Brian Colbert, John Wright and Kay Coleman, [Marin IJ photo](#).

## ACKNOWLEDGEMENTS

The Town of San Anselmo and San Anselmo Sustainability Commission prepared this report with the Marin Climate Energy Partnership (MCEP). Many thanks to the City of San Rafael for use of the City of San Rafael 2019 Draft Climate Action Plan 2030 and to DRAWDOWN: Marin for graphics and text in this document.

# APPENDICES

## APPENDIX A: State Pillars & DRAWDOWN: Marin

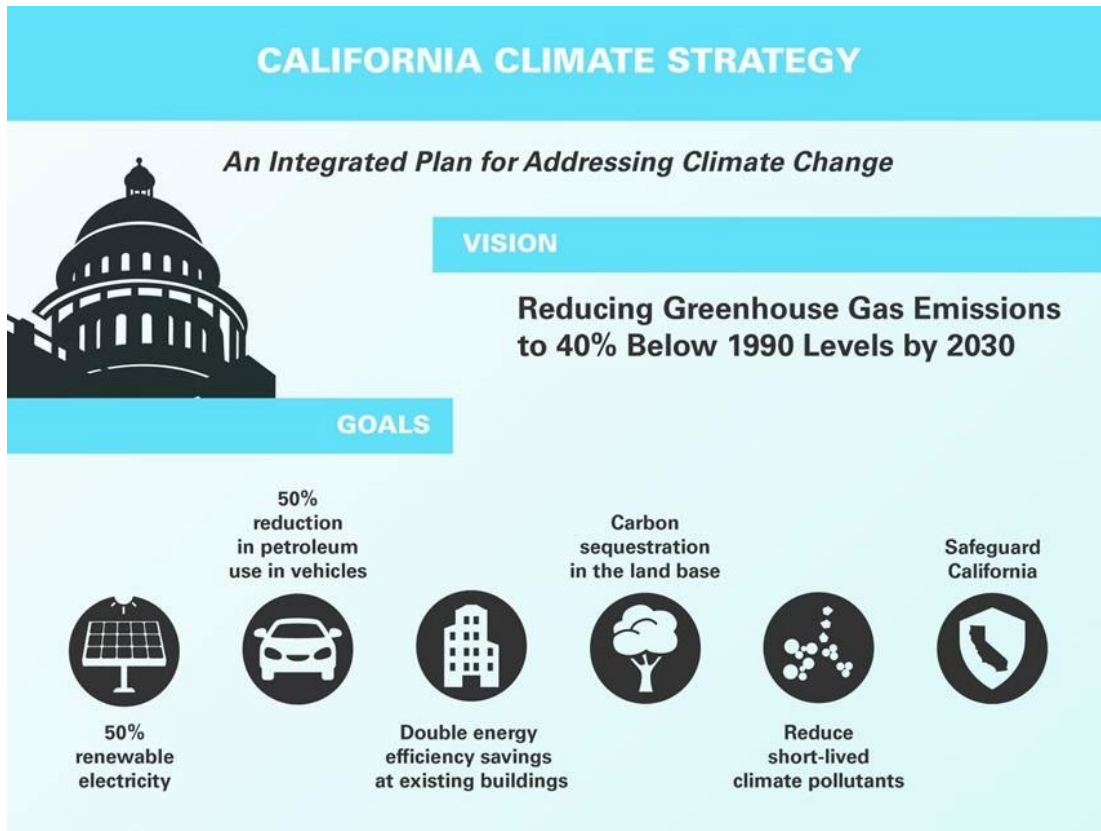


IMAGE: CALIFORNIA'S 6 PILLARS CLIMATE STRATEGY

The State of California established the [Six Pillars](#) framework in 2015 that include:

1. reducing today's petroleum use in cars and trucks by up to 50%;
2. increasing from one-third to 50% our electricity derived from renewable sources;
3. doubling the energy efficiency savings achieved at existing buildings and making heating fuels cleaner;
4. reducing the release of methane, black carbon, and other short-lived climate pollutants;
5. managing farm and rangelands, forests and wetlands so they can store carbon; and
6. periodically updating the state's climate adaptation strategy: Safeguarding California.

The measures contained in this Town of San Anselmo Climate Action Plan are designed to support and implement the Six Pillars and the goals of [California's 2017 Climate Change Scoping Plan](#) on a local level.



IMAGE: DRAWDOWN: MARIN

The County of Marin, noting the need for all residents and businesses to actively reduce emissions and plan for climate adaptation has created an engagement framework based on the research and book by local author, entrepreneur, and environmentalist [Paul Hawken](#) called [DRAWDOWN: Marin](#). DRAWDOWN: MARIN is a comprehensive, science-based, community-wide campaign to do our part to slow the impacts of climate change. It is an effort to recognize our need to reduce our "carbon footprint" and to provide a road map to doing so. Like the State's Six Pillars, there are six areas of focus: (1) 100% Renewable Energy, (2) Low-Carbon Transportation, (3) Energy Efficiency in Buildings and Infrastructure, (4) Local Food and Food Waste, (5) Carbon Sequestration, and (6) Climate Resilient Communities.

The County of Marin, at the request of County youth, also passed a resolution in February 2019 calling for the federal government to pass a Green New Deal based on the resolution proposed in Congress earlier that month and affirming its commitment to the Paris Climate Accord and environmental sustainability.

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San Anselmo doesn't exist in a vacuum. While we are leveraging or trying to combat regional, state-wide, national and even international actions and trends, we also have the ability and responsibility to collaborate with other efforts and campaigns. San Anselmo is known for collaborating and it's our collective imagination and cooperative efforts that make San Anselmo such a successful and wonderful place to be. We encourage you to join us at a San Anselmo Town Council meeting or Sustainability Commission meeting to experience this first-hand.

APPENDIX B – GHG REDUCTION CALCULATIONS

APPENDIX B – GHG REDUCTION CALCULATIONS

GHG EMISSIONS REDUCTION SUMMARY Town of San Anselmo Climate Action Plan			
	Measure	2020 GHG Emissions Reductions (MTCO <sub>2</sub> e/yr)	2030 GHG Emissions Reductions (MTCO <sub>2</sub> e/yr)
<b>Local Actions</b>			
LCT-C1	Zero Emission Vehicles	-468	-5,242
LCT-C2	Bicycling	-34	-192
LCT-C2A	Bicycle Racks & Lockers	-8	-20
LCT-C3	Walking	-15	-30
LCT-C4	Safe Routes to School	-85	-86
LCT-C5	Public Transit	-135	-182
LCT-C6	Employee Trip Reduction	-36	-50
LCT-C7	Parking Requirements	0	-27
LCT-C8	Traffic System Management and Vehicle Idling	0	0
LCT-C10	Electric Landscape Equipment	-6	-24
LCT-M1	Low Emission Town Vehicles	-1	-13
LCT-M2	Low Carbon Fuels	0	-1
LCT-M3	Town Employee Commute	-4	-4
LCT-M4	Municipal Electric Landscape Equipment	0	0
EE-C1	Energy Efficiency Programs	-775	-3,077
EE-C2	Energy Audits	0	-77
EE-C3	Cool Pavement and Roofs	0	-34
EE-C4	Green Building Reach Code	-6	-27
EE-M1	Streetlights	n/a	n/a
EE-M2	Energy Efficiency Audit and Retrofits	n/a	-19
EE-M3	Energy Conservation	-3	-3
RE-C1	Renewable Energy Generation	-325	-1,686
RE-C2	GHG-Free Electricity	-3,111	-2,558
RE-C3	Building and Appliance Electrification	-5	-46
RE-M1	Solar Energy Systems for Municipal Buildings	n/a	n/a
RE-M2	Municipal Deep Green Electricity	n/a	n/a
WR-C1	Commercial Organic Waste	-140	-216
WR-C2	Residential Organic Waste	-50	-508
WR-C3	C&D and Self-Haul Waste	-19	-29
WR-C4	Mandatory Waste Diversion	-94	-664
WR-C5	Waste Processing Infrastructure	0	-581
WR-M1	Public Waste Facilities	-18	-27
WR-M2	Waste from Town Operations	-39	-58
WC-C1	Community Water Use	-160	-164
WC-M1	Municipal Water Use	n/a	n/a
<b>TOTAL - LOCAL ACTIONS</b>		<b>-5,537</b>	<b>-15,648</b>

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>State Actions</b>		
RPS	-128	-427
TITLE 24	-24	-351
Lighting Efficiency (AB 1109)	-143	-143
Residential Solar Water Heaters	-7	-7
Light and Heavy Duty Fleet Regulations	-2,631	-8,206
<b>TOTAL - STATE ACTIONS</b>	<b>-2,933</b>	<b>-9,134</b>
<b>Projected Emissions</b>		
Projected BAU Community GHG Emissions	60,624	62,128
Emissions Reduction from Local and State Actions	-8,469	-24,782
Projected Community Emissions with Local and State Actions Implemented	52,155	37,346
<b>Reduction from 2005 Baseline Emissions</b>		
2005 Community GHG Emissions	80,425	80,425
Community Emissions with Local and State Actions Implemented	52,155	37,346
% Reduction from 2005 Emissions	35%	54%
GHG Target to Meet State Goals	68,361	41,017
% Below 1990 Levels	24%	45%
Emissions per Service Population	3.22	2.26



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>ZERO EMISSION VEHICLES</b> <i>LCT-C1</i>	
<p>Reductions (MTCO<sub>2</sub>e)</p> <p style="text-align: right;">-468</p> <p style="text-align: right;">-5,242</p>	<p>2020</p> <p>2030</p>
<p>Targets</p>	<p>3,000 ZEVs registered in San Anselmo in 2030.                      162 public charging station at public and private sites by 2030.                      25% of passenger vehicles in Marin are ZEVs in 2030 (approximately 50,108 ZEVs).                      20% annual growth rate of registered ZEVs in Marin.</p>
<p>Methodology and Assumptions</p>	<p>Marin has approximately 1.5% of all ZEV rebates in California and 198,000 automobiles registered in the County. CARB's proposed strategy is to put 4.2 million ZEVs on the road by 2030, which is approximately 14% of light duty vehicles in California in 2030. In January 2018, Governor Jerry Brown issued Executive Order B-48-18 set a new goal of having a total of 5 million ZEVs in California in 2030.</p> <p>There were 2,795 Clean Vehicle Rebate Project (CVRP) rebates issued to Marin residents through 2016. CARB estimates 69% of eligible Marin vehicle owners participated in the program between Marin 2010 and March 2015. Therefore, we assume there were 4,050 ZEVs in Marin in 2016 and approximately 2% of registered vehicles in Marin. DMV data shows that there were 6,522 ZEVs registered in Marin and 462 ZEVs registered to San Anselmo residents as of 10/1/18.</p> <p>In 2018, approximately 68% of Clean Vehicle Rebate Project rebates are going to BEVs, 31% are going to PHEVs, and 1% to FCEVs. We assume 69% of EVs are BEVs and 31% are PHEVs in 2020 and 2030.</p> <p>74% of the distance PHEVs drive is electric (Smart et al, 2014).</p> <p>EV kWh/mile is 0.32 (US Dept of Energy).</p> <p>Assuming the same share of ZEV ownership in 2030 as in 2016 (1.5%) means there would be approximately 75,000 ZEVs registered in Marin by 2030, or approximately 37% of existing automobile registrations. We conservatively assume 50,100 ZEVs in Marin in 2030, or 25% of ZEVs registered in Marin. This would require an average annual growth rate of 20%. Electric vehicle sales in California grew by 20% in 2016, followed by 29% growth in 2017 (ICCT, 2018), suggesting that an annual growth rate of 20% is reasonable, especially as the number of models expands and battery technology and charging improves.</p> <p>Passenger VMT is adjusted to reflect the fact that approximately 35% of countywide commute VMT originates from workers who live outside Marin County (TAM). Measure does not apply to VMT generated by San Rafael workers and visitors who do not live in Marin.</p> <p>According to the Department of Energy, towns (population 2,500 to 50,000) need 54 public EV plugs per 1,000 PEVs, which would equal about 2,706 public EV plugs countywide for 50,100 PEVs. The analysis assumes 88% of EV charging is done at home.</p>

APPENDIX B – GHG REDUCTION CALCULATIONS

Sources	<p>California Air Resources Board, 2017 Scoping Plan.</p> <p>Smart, J., Bradley, T., and Salisbury, S., "Actual Versus Estimated Utility Factor of a Large Set of Privately Owned Chevrolet Volts," SAE Int. J. Alt. Power. 3(1):2014, doi:10.4271/2014-01-1803.</p> <p>U.S, Department of Energy, Alternative Fuels Data Center, <a href="https://www.afdc.energy.gov/vehicles/electric_emissions_sources.html">https://www.afdc.energy.gov/vehicles/electric_emissions_sources.html</a>. Sales weighted average of 2016 model year vehicles with sales in 2015: 2015 sales from "U.S. Plug-in Electric Vehicle Sales by Model" (<a href="https://www.afdc.energy.gov/data/vehicles.html">https://www.afdc.energy.gov/data/vehicles.html</a>); MPGs from 2016 Fuel Economy Guide (<a href="https://www.fueleconomy.gov/feg/">https://www.fueleconomy.gov/feg/</a>)</p> <p>The International Council on Clean Transportation, "California's continued electric vehicle market development," May 2018, <a href="https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf">https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf</a>.</p> <p>Clean Vehicle Rebate Program Rebate Statistics, <a href="https://cleanvehiclerebate.org/eng/rebate-statistics">https://cleanvehiclerebate.org/eng/rebate-statistics</a>, accessed May 1, 2018.</p> <p>Center for Sustainable Energy, "Clean Vehicle Project Participation Rates: The First Five Years (March 201-March2015), October 2015, <a href="https://cleanvehiclerebate.org/sites/default/files/attachments/2015-10%20CVRP%20Participation.pdf">https://cleanvehiclerebate.org/sites/default/files/attachments/2015-10%20CVRP%20Participation.pdf</a>, accessed May 1, 2018.</p> <p>US Department of Energy, "National Plug-In Electric Vehicle Infrastructure Analysis," September 2017. <a href="https://www.nrel.gov/docs/fy17osti/69031.pdf">https://www.nrel.gov/docs/fy17osti/69031.pdf</a></p> <p>Bay Area Air Quality Management District, Vehicle Miles Dataportal, <a href="http://capvmt.us-west-2.elasticbeanstalk.com/">http://capvmt.us-west-2.elasticbeanstalk.com/</a>, accessed 8/23/18.</p> <p>California Department of Transportation, "California County-Level Economic Forecast 2018-2050," September 2018.</p> <p>California Department of Motor Vehicles, Estimated Vehicles Registered by County for the Period January 1 through Decmber 31, 2018" and "Fuel Type by County as of 10/1/2018."</p> <p>Personal communication with Derek McGill, Planning Manager, Transportation Authority of Marin, <a href="mailto:dmcgill@tam.ca.gov">dmcgill@tam.ca.gov</a>, August 22, 2018.</p>
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APPENDIX B – GHG REDUCTION CALCULATIONS

*Calculation*

	2020	2030
Number of registered Marin ZEVs in 2016	4,050	4,050
Projected number of registered passenger vehicles in Marin	198,831	200,429
Percent of Marin ZEVs in target year	4%	25%
Number of Marin ZEVs in target year	8,500	50,108
Increase in ZEVs	4,450	46,058
Additional ZEVs as a percent of Marin vehicles	2.3%	23.3%
San Anselmo passenger VMT	76,119,312 miles	79,241,684 miles
VMT from non-Marin workers and visitors	11,366,466 miles	11,780,731 miles
San Anselmo passenger VMT from Marin-based vehicles	64,752,846 miles	67,460,953 miles
VMT from additional ZEVs	1,458,449 miles	15,726,508 miles
VMT driven with electricity	1,340,898 miles	14,458,952 miles
Emissions without EV program	531.2 MTCO <sub>2</sub> e	5,798.1 MTCO <sub>2</sub> e
Tailpipe emissions reduction with EV program	488.4 MTCO <sub>2</sub> e	5,330.8 MTCO <sub>2</sub> e
Electricity used by ZEVs	429,087 kWh	4,626,865 kWh
Electricity emissions from ZEVs	21 MTCO <sub>2</sub> e	88 MTCO <sub>2</sub> e
Emissions reduction	468 MTCO <sub>2</sub> e	5,242 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>BICYCLING</b> <i>LCT-C2</i>	
Reductions (MTCO <sub>2</sub> e)	2020 2030
	-34 -192
Targets	0.43 miles of Class II bike lanes constructed by 2020. 1.78 miles of Class I bike paths and 0.14 miles of Class II bike lanes constructed between 2020 and 2030.
Methodology and Assumptions	Studies cited by CAPCOA show each additional mile of bike lanes per square mile increases the share of workers commuting by bicycle by 1% (CAPCOA SDT-5). We have applied this to the following population segments: <ul style="list-style-type: none"> <li>• Live in/work in area</li> <li>• Live in/work out of area</li> <li>• Live in area/non-worker</li> <li>• Live out of area/work in area</li> </ul> The Town's draft Bicycle Master Plan identifies 1.78 miles of proposed Class I bike facilities and 0.57 miles of proposed Class II facilities. We assume 0.43 miles for 2020 facilities identified in the Plan as "mid-term") and 2.35 for 2030 (facilities identified as "mid-term" and "long-term").
Sources	Draft City of San Anselmo Bicycle Master Plan Bay Area Air Quality Management District Vehicle Miles Traveled Dataportal, <a href="http://capvmt.us-west-2.elasticbeanstalk.com/data">http://capvmt.us-west-2.elasticbeanstalk.com/data</a> . 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*

VMT generated by targeted population segments	57,671,670 VMT	60,004,139 VMT
Additional Class I/II facilities	0.4 miles	2.4 miles
New bike facilities/sq. mile	0.2	0.9
Reduction in local VMT	92,533 VMT	526,156 VMT
Emissions reductions	34 MTCO <sub>2</sub> e	191.6 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>BICYCLE RACKS AND LOCKERS</b> <i>LCT-C2A</i>	
Reductions (MTCO <sub>2</sub> e)	2020 2030
	-8 -20
Targets	10 bike racks (6-bike capacity) installed by 2020. 15 bike racks (6-bike capacity) installed between 2020 and 2030.
Methodology and Assumptions	BAAQMD Transportation Fund for Clean Air guidance indicates reduction based on the following: <ul style="list-style-type: none"> <li>• Capacity of lockers x 2 trips per day</li> <li>• Capacity of cages x 0.75 trips per day</li> <li>• Capacity of racks x 0.5 trips per day (assumed 6 bicycle capacity each)</li> <li>• 240 days of use</li> <li>• 3 miles per trip</li> </ul>
Sources	BAAQMD Transportation Fund for Clean Air Guidance FYE 2018.

*Calculation*

	2020	2030
Number of racks	10	25
Reduction in local VMT	21,600 VMT	54,000 VMT
Emissions reductions	8 MTCO <sub>2</sub> e	20 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>WALKING</b> <i>LCT-C3</i>	
Reductions (MTCO <sub>2</sub> e)	
-15	2020
-30	2030
Targets	1% reduction in VMT for vehicle trips that start and end in San Anselmo by 2020 2% reduction in VMT for vehicle trips that start and end in San Anselmo by 2030
Methodology and Assumptions	Studies cited by CAPCOA show pedestrian network improvements can reduce VMT 1-2% (CAPCOA SDT-1). We apply this to passenger vehicle trips that start and end in San Anselmo and assume a 1% reduction for 2020 and 2% for 2030.
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. Bay Area Air Quality Management District Vehicle Miles Traveled Data Portal, <a href="http://capvmt.us-west-2.elasticbeanstalk.com/data">http://capvmt.us-west-2.elasticbeanstalk.com/data</a>

*Calculation*

	2020	2030
Passenger vehicle trips starting and ending in San Anselmo	4,154,532 VMT	4,184,327 VMT
% decrease in VMT due to pedestrian improvements	1.0%	2.0%
Annual decrease in VMT	41,545 VMT	83,687 VMT
GHG emissions reductions	15 MTCO <sub>2</sub> e	30 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>SAFE ROUTES TO SCHOOL</b> <i>LCT-C4</i>	
Reductions (MTCO <sub>2</sub> e)	2020 2030
	-85 -86
Targets	Reduce school trips in family vehicle by 29%, from an average of 47% to 33%.
Methodology and Assumptions	<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> <p>We assume an elementary school (K-5) age population of 1,123 with an average trip length of 1.7 mile, a middle school (6-8) population of 696 with an average trip length of 1.7 miles, a high school (9-12) population of 700 with an average trip length of 2.3 miles, 180 school days, and an existing share of school trips completed in a family vehicle of 47% according to Safe Routes to School surveys taken at participating schools serving San Anselmo in Fall 2016.</p>
Sources	<p>US Census Bureau, American Community Survey 5-Year Estimates 2012-2016, Table B14001.</p> <p>Safe Routes to School Marin County, <a href="http://www.saferoutestoschools.org/sr2s_ross_valley.html">http://www.saferoutestoschools.org/sr2s_ross_valley.html</a></p> <p>Safe Routes to School Marin County, <a href="http://www.saferoutestoschools.org/history.html#success">http://www.saferoutestoschools.org/history.html#success</a></p>

*Calculation*

	2020	2030
School population miles travelled	1,707,568 miles	1,737,837 miles
Percent of miles driven in a family vehicle	47 %	47 %
Potential percent decrease in students driving to school	29 %	29 %
VMT avoided	232,741 VMT	236,867 VMT
Emissions reductions	85 MTCO <sub>2</sub> e	86 MTCO <sub>2</sub> e



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>PUBLIC TRANSIT</b> <i>LCT-C5</i>	
Reductions (MTCO <sub>2</sub> e)	
-135	2020
-182	2030
Targets	100% of Marin Transit buses will use renewable diesel by 2020. 50% of Marin Transit buses will be electric by 2030.
Methodology and Assumptions	Marin Transit reports 2,321,290 miles in FY 16/17. Based on data from Marin Transit, we assign 4.2% of the vehicle miles to San Anselmo. We assume 100% of VMT will be driven by buses using renewable diesel in 2020 and 50% will be driven by electric buses utilizing MCE electricity by 2030.
Sources	Derek McGill, Transportation Authority of Marin Robert Betts, Marin Transit

*Calculation*

	<b>2020</b>	<b>2030</b>
Transit miles, BAU	2,321,290 miles	2,321,290 miles
San Anselmo's share of passenger revenue miles	96,571 miles	96,571 miles
Average fleet average MPG (diesel)	4.3 MPG	4.3 MPG
Emissions, BAU	229 MTCO <sub>2</sub> e	229 MTCO <sub>2</sub> e
Renewable diesel VMT	100%	100%
Electric bus VMT	0%	50%
Emissions	94 MTCO <sub>2</sub> e	47 MTCO <sub>2</sub> e
GHG emissions reductions	135 MTCO <sub>2</sub> e	182 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>EMPLOYEE TRIP REDUCTION</b> <i>LCT-C6</i>	
Reductions (MTCO <sub>2</sub> e)	2020 2030
	-36 -50
Targets	75% of covered employers provide an employee trip reduction program. 100% of covered employers provide an employee trip reduction program.
Methodology and Assumptions	CAPCOA TRT-1 indicates VMT reduction of 5.4% for suburban center location. Employer programs include: carpooling, ride matching, preferential carpool parking, flexible work schedules for carpools, a half-time transportation coordinator, vanpool assistance, bicycle parking, showers, and locker facilities. This measure assumes voluntary employee participation. BAAQMD Transportation Fund for Clean Air guidance indicates a reduction of 0.2% of commute VMT for Guaranteed Ride Home Programs. MTC identifies 17 businesses with 50 or more employees. We assume 75% of these employers participate in the program by 2020 and all participate by 2030. We assume 240 work days per year.
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, BAAQMD Transportation Fund for Clean Air Guidance FYE 2018.

*Calculation*

	2020	2030
Number of employees working in companies with 50 or more employees	852	888
Number of employees targeted for program	639	888
Average daily VMT for San Anselmo worker	11.3	11.6
Estimated annual VMT	1,740,658	2,462,089
VMT reduction	5.6%	5.6%
Annual decrease in VMT	97,477	137,877
GHG emissions reductions	36	50

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>PARKING REQUIREMENTS</b> <i>LCT-C7</i>	
Reductions (MTCO <sub>2</sub> e)	
0	2020
-27	2030
Targets	50 parking spaces eliminated/avoided by 2030.
Methodology and Assumptions	CAPCOA Measure PDT-1 indicates a VMT reduction range of 2.5% to 12.5%, depending upon the reduction in parking requirement, with 2.5% for a 5% reduction in parking spaces and 12.5% for a 25% reduction in spaces. We assume a 10% reduction in VMT for a 20% reduction in parking spaces.  8.4 miles of daily per capita VMT is allocated to San Anselmo's community emissions in 2030. Consistent with the GHG inventory methodology, we apply a PeMS factor of 354.7 to determine annual VMT.
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.  Bay Area Air Quality Management District, Vehicle Miles Traveled Dataportal, <a href="http://capvmt.us-west-2.elasticbeanstalk.com/data">http://capvmt.us-west-2.elasticbeanstalk.com/data</a> , accessed 3/14/19.

*Calculation*

	2020	2030
Annual VMT per resident, as attributed in GHG Inventory	2,922 VMT	2,968 VMT
Number of parking spaces subject to program	0 spaces	250 spaces
Number of parking spaces reduced through program	0 spaces	50 spaces
VMT generated by project	0 VMT	742,095 VMT
VMT reduced by program	0 VMT	74,210 VMT
Total emissions reductions	0 MTCO <sub>2</sub> e	27 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>ELECTRIC LANDSCAPE EQUIPMENT</b> <i>LCT-C10</i>	
Reductions (MTCO <sub>2</sub> e) -6 -24	2020 2030
Targets	25% of leaf blowers are electric by 2020. 100% of leaf blowers are electric by 2030.
Methodology and Assumptions	Leaf blowers consumed 52,148 gallons of gasoline and 42 gallons of diesel fuel in Marin County in 2016 (OFFROAD2007). Similar to the off-road emissions inventory, we assume 5.1% of emissions are attributable to San Anselmo based on its share of countywide households in 2016. We assume a 25% reduction for 2020 due to the Town's efforts to encourage use of electric leaf blowers and a 100% reduction in 2030 due to the Town's action to ban all gasoline and diesel-powered leaf blowers by 2030.
Sources	OFFROAD2007

*Calculation*

	2020	2030
Leaf blower gasoline consumption, BAU	2,685 gallons	2,715 gallons
Leaf blower diesel consumption, BAU	2 gallons	2 gallons
Emissions from leaf blowers, BAU	24 MTCO <sub>2</sub> e	24 MTCO <sub>2</sub> e
Emissions reductions	6 MTCO <sub>2</sub> e	24 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>ZERO AND LOW EMISSION TOWN VEHICLES</b> <i>LCT-M1</i>	
Reductions (MTCO <sub>2</sub> e) -1 -13	2020 2030
Targets	5% improvement in fuel efficiency of Town vehicles that use gasoline by 2020. 50% improvement in fuel efficiency of Town vehicles that use gasoline by 2030.
Methodology and Assumptions	As vehicles are replaced, there will be opportunities to purchase/lease electric vehicles or improve vehicle fuel efficiency with similar models. We assume the Town continues to purchase Deep Green electricity for vehicle charging.
Sources	Town of San Anselmo

*Calculation*

	2020	2030
Town vehicle fleet tailpipe emissions, 2016 (gasoline)	25 MTCO <sub>2</sub> e	25 MTCO <sub>2</sub> e
Fuel efficiency improvement for fleet	5 %	50 %
Emissions reductions	1 MTCO <sub>2</sub> e	13 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>LOW CARBON FUELS</b> <i>LCT-M2</i>					
Reductions (MTCO <sub>2</sub> e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 50%;">0</td> <td style="text-align: center; width: 50%;">2020</td> </tr> <tr> <td style="text-align: center;">-1</td> <td style="text-align: center;">2030</td> </tr> </table>	0	2020	-1	2030
0	2020				
-1	2030				
Targets	25% of diesel use is replaced with renewable diesel by 2020. 100% of diesel use is replaced with renewable diesel by 2030.				
Methodology and Assumptions	Emission factor for renewable diesel derived from data from Nexgen Fuel.				
Sources	Town of San Anselmo 2016 Greenhouse Gas Emissions Inventory <a href="http://www.nexgenfuel.com/fleets-commercial-use/">http://www.nexgenfuel.com/fleets-commercial-use/</a>				

*Calculation*

	2020	2030
Diesel use, BAU	174 gallons	174 gallons
Renewable diesel percentage	25%	100%
Emissions from diesel fuel	0 MTCO <sub>2</sub> e	2 MTCO <sub>2</sub> e
Emissions from renewable diesel fuel	0 MTCO <sub>2</sub> e	1 MTCO <sub>2</sub> e
Emissions reductions	0 MTCO <sub>2</sub> e	1 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>TOWN EMPLOYEE COMMUTE</b> <i>LCT-M3</i>					
Reductions (MTCO <sub>2</sub> e)	<table border="0"> <tr> <td style="text-align: right;">-4</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-4</td> <td>2030</td> </tr> </table>	-4	2020	-4	2030
-4	2020				
-4	2030				
Targets	5.6% reduction in employee commute VMT by 2020.				
Methodology and Assumptions	<p>CAPCOA Measure TRT-1. VMT reduction is 5.4% for a suburban center location.</p> <p>BAAQMD Transportation Fund for Clean Air guidance indicates a reduction of 0.2% of commute VMT for Guaranteed Ride Home Programs.</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>BAAQMD Transportation Fund for Clean Air Guidance FYE 2018.</p>				

*Calculation*

	2020	2030
Employee commute VMT, BAU	203,479 VMT	203,479 VMT
Reduction in VMT	5.6%	5.6%
VMT avoided	11,395 VMT	11,395 VMT
Emissions reduction	4 MTCO <sub>2</sub> e	4 MTCO <sub>2</sub> e



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>ENERGY EFFICIENCY PROGRAMS</b> <i>EE-C1</i>	
Reductions (MTCO <sub>2</sub> e) -775 -3,077	2020 2030
Targets	Electricity and natural gas consumption is reduced an average of 1% per year between 2016 and 2030.
Methodology and Assumptions	<p>We are forecasting an annual electricity savings of 1% and an annual natural gas savings of 1% based on the following:</p> <p>The National Action Plan for Energy Efficiency states among its key findings "consistently funded, well-designed programs are cutting annual savings for a given program year of 0.15 to 1 percent of energy sales."</p> <p>The American Council for an Energy-Efficiency Economy (ACEE) reports for states already operating substantial energy efficiency programs, energy efficiency goals of one percent, as a percentage of energy sales, is a reasonable level to target.</p> <p>MCE Clean Energy's Implementation Plan states "MCE's goal is to increase annual savings through energy efficiency programs to two percent (combined MCE and PG&amp;E programs) of annualized electric sales...by the end of 2018."</p> <p>Electricity consumption declined an average of 1.1% per year in San Anselmo between 2005 and 2016. Natural gas consumption declined an average of 1.2% per year between 2005 and 2016.</p>
Sources	<p>Marin Clean Energy Revised Community Choice Aggregation Implementation Plan and Statement of Intent, July 18, 2014.</p> <p>National Action Plan for Energy Efficiency, July 2006, Section 6: Energy Efficiency Program Best Practices (pages 5-6).</p> <p>Energy Efficiency Resource Standards: Experience and Recommendations, Steve Nadel, March 2006 ACEEE Report E063 (pages 28-30).</p>

*Calculation*

	2020	2030
Residential and commercial electricity use, 2016	46,054,540 kWh	46,054,540 kWh
Electricity savings less State actions	797,970 kWh	5,403,424 kWh
Residential and commercial natural gas use, 2016	3,123,612 therms	3,123,612 therms
Natural gas savings	124,944 therms	437,306 therms
GHG emissions reductions	775 MTCO <sub>2</sub> e	3,077 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>ENERGY AUDITS</b> <i>EE-C2</i>					
Reductions (MTCO <sub>2</sub> e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">0</td> <td style="width: 50%;">2020</td> </tr> <tr> <td style="text-align: center;">-77</td> <td>2030</td> </tr> </table>	0	2020	-77	2030
0	2020				
-77	2030				
Targets	75 housing units implement energy efficiency projects between 2020 and 2030 due to ordinance requiring energy audits at time of sale.				
Methodology and Assumptions	<p>Assumes program will be implemented in 2020 and program will require audits at time of sale but energy efficiency projects will be voluntary. Assumes 5% of audited housing units will implement energy efficiency upgrades based on findings from the City of Berkeley's Building Energy Saving Ordinance. Assume 31% Btu energy use reduction based on demonstrated Energy Upgrade California projects completed in Marin County between June 2010 and May 2012.</p> <p>151 housing units sold annually, based on 2005-2018 average (Marin County Assessor).</p>				
Sources	<p>Marin County Assessor,  <a href="http://www.marincounty.org/depts/ar/divisions/assessor/sales">http://www.marincounty.org/depts/ar/divisions/assessor/sales</a>                      City of Berkeley, "Building Energy Savings Ordinance (BESO) Findings through Nov. 2016," December 7, 2016,  <a href="https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Energy%20Commission%20Presentation%20Berkeley.pdf">https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Energy%20Commission%20Presentation%20Berkeley.pdf</a></p> <p>Marin County Energy Watch Partnership, Dana Armanino, Sustainability Planner, County of Marin, <a href="mailto:darmanino@marincounty.org">darmanino@marincounty.org</a></p>				

*Calculation*

	2030
Average household electricity use 2016	5,636 kWh
Average household natural gas use 2016	481 therms
Number of housing units sold annually	151 units
Number of housing units provided energy audits	1,509 units
Percent of participating housing units	5%
Number of housing units implementing energy efficiency projects	75 units
Electricity reduction	31%
Natural gas reduction	31%
Annual electricity savings	131,854 kWh
Natural gas savings	11,244 therms
Electricity emissions reduction	18 MTCO <sub>2</sub> e
Natural gas emissions reduction	60 MTCO <sub>2</sub> e
<b>Total GHG emissions reduction</b>	<b>77 MTCO<sub>2</sub>e</b>

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>COOL PAVEMENT AND ROOFS</b> <i>EE-C3</i>					
Reductions (MTCO <sub>2</sub> e)	<table border="0"> <tr> <td style="text-align: right;">0</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-34</td> <td>2030</td> </tr> </table>	0	2020	-34	2030
0	2020				
-34	2030				
Targets	10% of paved surfaces converted to high-albedo surfaces by 2030.				
Methodology and Assumptions	<p>On average, for metropolitan areas studied, vegetation covers about 29-41% of the area, roofs 19-25%, and paved surfaces 29-39% (Akbari, 2008). For San Anselmo, assumed paved surfaces cover 29%. Assume 10% will be replaced with high albedo content by 2030. Pavement has a potential for a 0.15 to 0.25 increase in albedo (Akbari, 2008); we have conservatively assumed a 0.15 change in albedo. <math>0.29 * 0.15 * 0.15 =</math> Net change of 0.006525 for 2020.</p> <ul style="list-style-type: none"> <li>- a 10K decrease in temperature for a 0.25 increase in albedo (Akbari)</li> <li>- 10 Kelvin = 10 Celsius</li> <li>- Electricity demand in cities increases by 2–4% for each 1 degree Celsius increase. Assume 3% for San Anselmo.</li> </ul>				
Sources	Akbari, Hashem and Rose, Leanna Shea, "Urban Surfaces and Heat Island Mitigation Potentials," Journal of the Human-Environmental System, Vol. 11; No. 2: 85-101, 2008.				

*Calculation*

	2020	2035
Percent of city covered in pavement	29%	29%
Percent of paved area with high albedo	0%	10%
Albedo change	0.000	0.004
Temperature decrease	0.000 Celsius	0.174 Celsius
Reduction in electricity use	0 kWh	247,410 kWh
Reduction in emissions	0 MTCO <sub>2</sub> e	34 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>GREEN BUILDING REACH CODE</b> <i>EE-C4</i>	
Reductions (MTCO <sub>2</sub> e) -6 -27	Implementation action: 2020 2030
Targets	Ordinance requiring 15% improvement in energy efficiency over base code adopted beginning with 2019 building code cycle.
Methodology	CAPCOA Measure BE-1 used for estimating building energy savings. Assumed ordinance is adopted in 2020.
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*

<b>Residential</b>	<b>2020</b>	<b>2030</b>
Percent over Title 24 Energy Requirements	15 %	15 %
New construction electricity use, BAU	139,779 kWh	597,440 kWh
New construction electricity use, after Title 24	100,641 kWh	0 kWh
Additional reduction in electricity use	1,110 kWh	0 kWh
New construction natural gas use, BAU	11,920 therms	50,949 therms
New construction natural gas use, after Title 24	8,582 therms	25,474 therms
Additional reduction in natural gas use	1,146 therms	3,400 therms
GHG emissions reductions	6 MTCO <sub>2</sub> e	18 MTCO <sub>2</sub> e

<b>Commercial</b>	<b>2020</b>	<b>2030</b>
Percent over Title 24 Energy Requirements	15 %	15 %
New construction electricity use, BAU	0 kWh	671,008 kWh
New construction electricity use, after Title 24	0 kWh	335,504 kWh
Additional reduction in electricity use	0 kWh	13,085 kWh
New construction natural gas use, BAU	0 therms	23,384 therms
New construction natural gas use, after Title 24	0 therms	11,692 therms
Additional reduction in natural gas use	0 therms	1,263 therms
GHG emissions reductions	0 MTCO <sub>2</sub> e	9 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>STREETLIGHTS</b> <i>EE-M1</i>	
Reductions (MTCO <sub>2</sub> e)	n/a 2020 n/a 2030
Targets	Complete conversion of remaining streetlights to LED by 2030.
Methodology and Assumptions	The Town had converted 645 of its 670 streetlights by 2016. The action assumes the Town will convert the remaining, mostly lantern-type, fixtures by 2030. We assume the Town continues to purchase Deep Green electricity for Town facilities.
Sources	Town of San Anselmo Public Works Department

*Calculation*

Electricity savings	4,778 kWh
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APPENDIX B – GHG REDUCTION CALCULATIONS

<b>ENERGY EFFICIENCY AUDIT AND RETROFITS</b> <i>EE-M2</i>	
Reductions (MTCO <sub>2</sub> e) n/a -19	2020 2030
Targets	Complete lighting and hot water circulating pump upgrades by 2020 and remaining projects by 2030.
Methodology and Assumptions	Projects to be completed are as follows: 1) Install energy-efficient lighting at Town Hall 2) Install energy-efficiency lighting at Community Center 3) Install energy-efficiency lighting at Corporate Yard 4) Replace hot water circulating pump motor at Community Center 5) Modify radiator at Community Center 6) Replace HVAC system at Town Hall  Calculation assumes the Town will continue to purchase Deep Green electricity.
Sources	Marin Energy Management reports for the Town of San Anselmo, June 6, 2007, and August 14, 2008.

*Calculation*

Project	Annual Electricity Savings (kWh)	Annual Natural Gas Savings (therms)
Lighting - Town Hall	9,821	
Lighting - Community Center	24,472	
Lighting - Corporate Yard	342	
Hot water circulating pump motor - Community Center	241	
Radiator - Community Center		110
HVAC system - Town Hall		3,539
Total savings	34,876	3,649
Emissions reductions (MTCO <sub>2</sub> e) 2020	n/a	19

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>ENERGY CONSERVATION</b> <i>EE-M3</i>	
Reductions (MTCO <sub>2</sub> e)	
-3	2020
-3	2030
Targets	Reduce energy use in municipal buildings by 5%.
Methodology and Assumptions	Energy management software is proven to reduce energy consumption by 10% through identifying inefficiencies within operations. A 5% reduction in energy use for miscellaneous behavioral changes by staff and mechanical operations, and upgrading to Energy Star equipment were assumed.
Sources	San Anselmo 2016 GHG Inventory

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*Calculation*

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Electricity consumption in municipal buildings, 2016	339,884 kWh
Electricity use in municipal buildings	44 MTCO <sub>2</sub> e
Natural gas use in municipal buildings	69 MTCO <sub>2</sub> e
Percent reduction in energy use	5%
Reduction in electricity consumption	16,994 kWh
GHG emissions reductions	3 MTCO <sub>2</sub> e



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>RENEWABLE ENERGY GENERATION</b> <i>RE-C1</i>	
Reductions (MTCO <sub>2</sub> e)	2020 2030
-325 -1,686	
Targets	Commercial and solar energy installations grow at an average annual rate of 15% through 2020 and then slows until reaching a 30% market penetration in 2030.
Methodology and Assumptions	<p>According to Project Sunroof, 76% of San Anselmo buildings have roofs that are solar-viable. These 3,600 roofs have the capacity for 40.4 MW DC and could generate 55,800,000 kWh per year, which is more than the total electricity usage in San Anselmo in 2016. Project Sunroof estimates there are 273 existing solar installations in San Anselmo.</p> <p>Calculation assumes annual growth rates of 15% for residential systems and 15% for non-residential systems based on California Distributed Generation Statistics data, which shows countywide growth of 13.2% for residential systems and 19.7% for commercial systems, excluding government facilities. Growth continues at an annual 15% rate and then slows until reaching a 30% market penetration in 2030 (after reaching 20-30% market penetration, studies show that the annual growth rate typically slows until it eventually drops to 4% in a mature market). The estimate of PV to be installed is restricted to installations on existing homes and commercial properties, excluding government facilities.</p>
Sources	<p>Solar Electric Power Association, "Utility Solar Market Snapshot: Sustained Growth in 2014," May 2015, <a href="https://www.solarelectricpower.org/media/322918/solar-market-snapshot-2014.pdf">https://www.solarelectricpower.org/media/322918/solar-market-snapshot-2014.pdf</a></p> <p>Project Sunroof, <a href="https://www.google.com/get/sunroof/data-explorer/place/ChIJ2cX8c6yXhYARECyKE9Ek1Q/">https://www.google.com/get/sunroof/data-explorer/place/ChIJ2cX8c6yXhYARECyKE9Ek1Q/</a>, accessed March 19, 2019.</p> <p>California Distributed Generation Statistics, "NEM Currently Interconnected Data Set," <a href="https://www.californiadgstats.ca.gov/downloads/">https://www.californiadgstats.ca.gov/downloads/</a>, January 31, 2018.</p>

*Calculation*

	2020	2030
Estimated residential PV generation, 2016	2,336,702 kWh	2,336,702 kWh
Annual growth rate	15%	12%
Projected residential PV generation	4,086,906 kWh	11,419,723 kWh
Additional residential PV generation	1,750,204 kWh	9,083,022 kWh
Estimated non-residential PV generation, 2016	817,680 kWh	817,680 kWh
Annual growth rate	15%	12%
Projected non-residential PV generation	1,430,128 kWh	3,996,096 kWh
Additional non-residential PV generation	612,448 kWh	3,178,416 kWh
Additional electricity produced by distributed PV	2,362,652 kWh	12,261,437 kWh
GHG emissions reductions	325 MTCO <sub>2</sub> e	1,686 MTCO <sub>2</sub> e



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>GHG-FREE ELECTRICITY</b> <i>RE-C2</i>	
Reductions (MTCO <sub>2</sub> e)	
-3,111	2020
-2,558	2030
Targets	MCE electricity is 94% GHG-free by 2020 and 100% GHG-free by 2030.
Methodology and Assumptions	The MCE 2019 Resource Integration Plan states that MCE electricity is projected to be 94% GHG-free in 2020 and 100% GHG-free by 2022. We have conservatively estimated a future GHG emission factor by assuming the remainder will be system power using the current emission factor set by CARB of 943.57736 lbs CO <sub>2</sub> /MWh. MCE supplied 73.1% of the total electricity load in San Anselmo in 2016. Assumes same percentage of Deep Green electricity as in 2016.
Sources	MCE 2019 Integrated Resource Plan (November 2018). <a href="https://www.mcecleanenergy.org/wp-content/uploads/2019/01/MCE-2019-Integrated-Resource-Plan_11-8-2018_V_12-21-18.pdf">https://www.mcecleanenergy.org/wp-content/uploads/2019/01/MCE-2019-Integrated-Resource-Plan_11-8-2018_V_12-21-18.pdf</a> Personal communication, Justin Kudo, MCE Manager of Account Services, <a href="mailto:jkudo@marinenergyauthority.org">jkudo@marinenergyauthority.org</a> , July 14 and 15, 2016.

*Calculation*

	2020	2030
Electricity use, BAU	46,387,388 kWh	47,396,569 kWh
Electricity saved through State actions	869,273 kWh	1,802,217 kWh
Less electricity saved through local energy efficiency and renewable energy actions	3,161,731 kWh	18,057,210 kWh
Net electricity use	42,356,384 kWh	27,537,142 kWh
Projected MCE electricity use (73.1% of total)	30,980,103 kWh	20,141,085 kWh
Electricity emissions w/MCE BAU	3,934 MTCO <sub>2</sub> e	2,558 MTCO <sub>2</sub> e
Electricity emissions w/MCE	823 MTCO <sub>2</sub> e	0 MTCO <sub>2</sub> e
GHG emission reductions	3,111 MTCO <sub>2</sub> e	2,558 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>BUILDING AND APPLIANCE ELECTRIFICATION</b>	
<i>RE-C3</i>	
Reductions (MTCO <sub>2</sub> e)	2020 2030
	-5 -46
Targets	9 cooktops, 14 water heaters and 28 heating systems are replaced with electric versions by 2030 through a Building Decarbonization incentive program.
Methodology and Assumptions	Potential number of appliance replacements is based on a Marin County grant application for a Building Decarbonization Pilot Program, which proposes to provide cash rebates for natural gas appliance swap-outs. The pilot program application estimates the following number of replacements during the pilot program period: stoves and cooktops, 20; water heaters, 30; and furnaces and heating systems, 60. We assume 5.1% of the replacements will take place in San Anselmo homes based on San Anselmo's share of countywide households. We assume the program can grow at an annual rate of 25% with continued rebates and program implementation.
Sources	2009 California Residential Appliance Saturation Study, Volume 2, Page 23. <a href="http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-V2.PDF">http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-V2.PDF</a> County of Marin, Marin County Building Decarbonization Pilot Program for BAAQMD Climate Protection Grant Application, May 8, 2018.

*Calculation*

	2020	2030
Estimated annual natural gas use for stoves and cooktops	31 therms	31 therms
Estimated annual natural gas use for water heaters	188 therms	188 therms
Estimated annual natural gas use for space heating and cooling	213 therms	213 therms
Estimated annual electricity use for stoves and cooktops	71 kWh	71 kWh
Estimated annual electricity use for water heaters	1,382 kWh	1,382 kWh
Estimated annual electricity use for space heating and cooling	3,096 kWh	3,096 kWh
Number of units stoves and cooktops replaced	1 units	9 units
Number of units water heaters replaced	2 units	14 units
Number of furnaces and heating systems replaced	3 units	28 units
Natural gas savings	971 therms	9,044 therms
Electricity consumption	11,661 kWh	108,598 kWh
GHG emissions reduction	5 MTCO <sub>2</sub> e	46 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>SOLAR ENERGY SYSTEMS FOR MUNICIPAL BUILDINGS</b> <i>RE-M1</i>	
Reductions (MTCO <sub>2</sub> e)	
n/a	2020
n/a	2030
Targets	Install 65 KW AC solar energy system on a municipal building by 2030.
Methodology and Assumptions	Town staff indicates that a PV system may be feasible at the Isabel Cook Community Center, particularly if the facility is renovated or rebuilt. We assume a 65 KW AC system as analyzed for the Town's 2011 Climate Action Plan. Calculation assumes the Town will continue to purchase Deep Green electricity for municipal operations.
Sources	Town of San Anselmo Climate Action Plan, April 2011. Application for Renewable Clean Energy Bonds dated July 13, 2007.

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*Calculation*

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Projected electricity generated by PV system at Community Center	109,656 kWh
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APPENDIX B – GHG REDUCTION CALCULATIONS

<b>COMMERCIAL ORGANIC WASTE</b> <i>WR-C1</i>	
Reductions (MTCO <sub>2</sub> e) -140 -216	2020 2030
Targets	Outreach to XX business by 2020 and another XX businesses after 2020. 30% are compliant.
Methodology and Assumptions	<p>Passed in 2014, AB 1826 requires businesses to recycle their organic waste, depending on the amount of waste they generate per week. Organic waste means food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste. The law phases in mandatory recycling of commercial organics over time. In 2017, businesses that generate 4 cubic yards of organic waste per week must arrange for organic waste recycling services and divert all organic waste they produce. In 2019, the law extends to businesses that generate 4 cubic yards or more of commercial solid waste. The State law is intended to reduce statewide disposal of organic waste by 50% by 2020. If that target is not met, the law will be extended to cover businesses that generate 2 cubic yards or more of commercial solid waste.</p> <p>Marin Sanitary Service (MSS), the Town's franchised waste hauler, reports that of the XX commercial accounts in San Anselmo, only XX were subject to AB 1826 in 2017. Of these, MSS has identified XX businesses that are non-compliant, including some of the largest organic waste producers in San Anselmo. MSS identifies businesses that do not subscribe to a recycling service as non-compliant. Some of these businesses may self-haul their waste and could potentially be in compliance. In 2019, the law will cover XX businesses in San Anselmo. After 2020, the law could cover XX businesses in San Anselmo.</p> <p>The Town can assist Zero Waste Marin (a.k.a., the Marin Hazardous and Solid Waste Joint Powers Authority) and Marin Sanitary Service by conducting outreach, maintaining a registry of all businesses (including self-haulers) to track compliance with AB 1826, and hiring additional MSS or City dedicated to these efforts.</p> <p>According to CalRecycle, 55% of franchised commercial waste is recoverable for compost and mulch and paper recycling.</p> <p>This measure makes the following assumptions: XX% of landfilled waste is generated by commercial uses; 60% of commercial waste will be subject to AB 1826 by 2020; and 90% of commercial waste will be subject to AB 1826 by 2030. Based on current compliance rates, this measure assumes 30% of all businesses that meet the 2019 threshold will be compliant by 2020 and 30% of all business that meet the post-2020 threshold will be compliant by 2030.</p>

APPENDIX B – GHG REDUCTION CALCULATIONS

Sources	Personal communication with Kim Schiebly, Marin Sanitary Service, Kim.Scheibly@marinsanitary.com CalRecycle, 2014 Disposal-Facility-Based Characterization of Solid Waste in California: Significant Tables and Figures, <a href="https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/SigTableFig.pdf">https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/SigTableFig.pdf</a>
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*Calculation*

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	2020	2030
Commercial waste as a percentage of total landfilled waste	35%	35%
Commercial landfilled waste (excluding self-haul, sludge and municipal waste)	3,443 tons	3,525 tons
Waste generated by covered businesses	2,066 tons	3,173 tons
Recoverable organic waste generated by covered businesses (55%)	1,136 tons	1,745 tons
Percent diverted from landfill	30%	30%
Tons diverted from landfill	341 tons	524 tons
GHG emissions reduction	140 MTCO <sub>2</sub> e	216 MTCO <sub>2</sub> e



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>RESIDENTIAL ORGANIC WASTE</b>	
<i>WR-C2</i>	
Reductions (MTCO <sub>2</sub> e)	
-50	2020
-508	2030
Targets	5% diversion of residential organic waste by 2020 and 50% by 2030.
Methodology and Assumptions	This measure continues and expands activities already occurring, including quarterly mailings by Marin Sanitary Service (MSS), tabling at community events, a marketing campaign by Zero Waste Marin, and community education by Resilient Neighborhoods. Under this measure, the Town will utilize its website, communication tools, and social media to promote these activities and expand their reach, and encourage MSS to increase and expand their outreach through other channels such as on-bill and email response messaging. A 2014 Marin Sanitary Service waste characterization study found that 38% of residential solid waste sent to the landfill was compostable organic waste (30% food scraps, 4% food-soiled paper, and 4% plant debris). MSS reports that 9,589 tons of residential waste was collected in 2015 and estimates that approximately 1% of food waste is currently collected and composted. Curbside collection of food waste has been available in San Anselmo since 2010 with weekly service for co-collection of plant debris and food scraps. Based on MSS's experience, this measure assumes an additional 5% of residential organic waste will be diverted by 2020 due to education and outreach activities. Based on the current residential waste diversion rate of 72%, we assume 50% of residential organic waste can be diverted by 2030.
Sources	Personal communication with Kim Schiebly, Marin Sanitary Service, Kim.Scheibly@marinsanitary.com

*Calculation*

	2020	2030
Residential waste as a percent of total landfilled waste	65%	65%
Residential landfilled waste (excluding self-haul, sludge and municipal waste)	6,505.3 tons	6,660.4 tons
Compostable organic waste generated by residents	2,472.0 tons	2,531.0 tons
Percent diverted from landfill	5%	50%
Tons diverted from landfill	124 tons	1,265 tons
GHG emissions reduction	50 MTCO <sub>2</sub> e	508 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>CONSTRUCTION AND DEMOLITION DEBRIS AND SELF-HAUL WASTE</b>	
<i>WR-C3</i>	
Reductions (MTCO <sub>2</sub> e)	<p style="text-align: center;">-19     2020</p> <p style="text-align: center;">-29     2030</p>
Targets	50% diversion of C&D waste by 2020 and 75% by 2030.
Methodology and Assumptions	<p>San Anselmo currently complies with the State’s Green Building Code (CALGreen) by requiring development projects to direct all construction and demolition (C&amp;D) materials to a certified facility that diverts at least 65% of nonhazardous C&amp;D debris to recycle or salvage. However, recoverable material is still deposited in the landfill, primarily due to self-haul activity (clean-up and loads that are generated from projects not covered by CALGreen), and C&amp;D loads that contain low percentages of recoverable material. The Town can help to maximize the amount of recoverable material by providing outreach and education to waste generators, and by working with the County and CalRecycle to require processing of all loads for recoverable materials at the landfill or processing facility. MSS already processes all loads, but other facilities may not and/or charge a higher fee to do so, which discourages diversion.</p> <p>According to Zero Waste Marin, 357.96 tons of self-haul and debris box waste originating in San Anselmo was landfilled in 2016. According to statewide solid waste characterizations studies, self-haul waste contains approximately 28% lumber, 3% paper, and 10% green waste, all of which could be diverted from the landfill. The measure assumes that 50% of this waste can be diverted by 2020 and 75% can be diverted by 2030, based on State mandates (SB 1383).</p>
Sources	<p>Personal communication with Garth Schultz, R3 Consulting Group, gschultz@r3cgi.com</p> <p>Personal communication with Judith Silver, Zero Waste Marin, jsilver@marincounty.org</p> <p>CalRecycle, "2014 Disposal-Facility-Based Characterization of Solid Waste in California: Significant Tables and Figures," October 6, 2015.</p>

*Calculation*

	2020	2030
Self-haul landfilled waste	360.6 tons	368.8 tons
Recoverable organic waste (26.4%)	95.2 tons	97.4 tons
Percent organic material diverted from landfill	50%	75%
Tons diverted from landfill	48 tons	73 tons
GHG emissions reduction	19 MTCO <sub>2</sub> e	29 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>MANDATORY WASTE DIVERSION</b> <i>WR-C4</i>	
Reductions (MTCO <sub>2</sub> e) -94 -664	2020 2030
Targets	Increase commercial AB1826 compliance rate to 50% and increase residential organic waste diversion rate to 80% by 2030.
Methodology and Assumptions	<p>This measure assumes San Anselmo will adopt a mandatory waste diversion ordinance similar to the one adopted by the City of Palo Alto in January 2016 (Palo Alto Municipal Code Chapter 5.20). Palo Alto requires all residents, visitors, and businesses to place their discards in the appropriate container – recycle, compost, or garbage. There are four stopes to compliance: 1) subscribe to recycle, compost, and garbage service from the city’s contract hauler; 2) set-up color-coded and labeled containers in convenient locations for patrons, employees, and residents; 3) train and educate tenants, residents, contractors and janitors about how to properly sort their waste and to ensure requirements are met; and 4) sort waste into proper containers. Requirements are phased in over time as follows:</p> <p>April 1, 2016: Commercial customers generating 8 cubic yards or more of garbage per week. Multifamily buildings with 5 or more units and shared service. Food service establishments.</p> <p>January 1, 2017: Commercial customers generating 2 cubic yards or more of garbage per week.</p> <p>January 1, 2018: All commercial customers.</p> <p>Drivers perform regular monitoring of contamination in the solid waste, recycle, and compost containers. The City’s waste hauler’s staff may also perform random site visits. Violators are subject to penalties. Residential compliance is based on the honor system.</p> <p>This measure assumes a similar ordinance would require all commercial accounts and multifamily buildings with 5 or more units to comply by 2020. We assume that a mandatory diversion ordinance could increase the AB 1826 compliance rate to 50% by 2030. Assuming that the ordinance is expanded to require residents to comply, we estimate an overall 80% compliance rate for residential compostable organic waste by 2030.</p>
Sources	<p>City of Palo Alto,  <a href="http://www.cityofpaloalto.org/gov/depts/pwd/zerowaste/projects/ordinance.asp">http://www.cityofpaloalto.org/gov/depts/pwd/zerowaste/projects/ordinance.asp</a>                      CalRecycle, "2014 Disposal-Facility-Based Characterization of Solid Waste in California: Significant Tables and Figures," October 6, 2015.</p>

*Calculation*

	2020	2030
Additional commercial organic waste diverted	227.3 tons	872.6 tons
Additional residential organic waste diverted	0.0 tons	759.3 tons
GHG emissions reduction	94 MTCO <sub>2</sub> e	664 MTCO <sub>2</sub> e



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>WASTE PROCESSING INFRASTRUCTURE</b> <i>WR-C5</i>	
Reductions (MTCO <sub>2</sub> e)	
0	2020
-581	2030
Targets	Increase diversion rate of recoverable organic waste to 95% by 2030.
Methodology and Assumptions	This measure assumes that new solid waste processing infrastructure is procured by 2030, but not 2020. Waste processing infrastructure could ultimately ensure that 95% of all recoverable organic waste collected by the franchised waste hauler is diverted from the landfill by 2030.
Sources	Personal communication with Kim Schiebly, Marin Sanitary Service, Kim Schiebly, Kim.Schiebly@marinsanitary.com CalRecycle, 2014 Disposal-Facility-Based Characterization of Solid Waste in California: Significant Tables and Figures, <a href="https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/SigTableFig.pdf">https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/SigTableFig.pdf</a>

*Calculation*

	2020	2030
Landfilled waste, excluding self-haul and sludge	10,525 tons	10,762 tons
Tons diverted by other measures		3,637 tons
Diversion target (95% for 2030)		5,112 tons
Remaining tons to be diverted		1,475 tons
Recoverable organic waste (50% of total)	5,262 tons	5,381 tons
GHG emissions reduction	0 MTCO <sub>2</sub> e	581 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>WASTE FROM PUBLIC WASTE FACILITIES</b> <i>WR-M1</i>	
Reductions (MTCO <sub>2</sub> e)	
-18	2020
-27	2030
Target	50% of recoverable organic waste currently landfilled is diverted by 2020 and 75% is diverted by 2030.
Methodology and Assumptions	This measure assumes 50% of recoverable organic waste currently landfilled could be diverted by 2020 and 75% could be diverted by 2030.
Sources	Personal communication with Charlie Wicke, Marin Sanitary Service, Charlie.Wicke@marinsanitary.com

*Calculation*

	2020	2030
Waste collected in public containers	182 tons	182 tons
Recoverable organic waste (50%)	91 tons	91 tons
Percent of organic waste diverted from landfill	50%	75%
Tons organic waste diverted from landfill	45 tons	68 tons
GHG emissions reduction	18 MTCO <sub>2</sub> e	27 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>WASTE FROM TOWN OPERATIONS</b> <i>WR-M2</i>	
Reductions (MTCO <sub>2</sub> e)	
-39	2020
-58	2030
Targets	50% of recoverable organic waste currently landfilled is diverted by 2020 and 75% is diverted by 2030.
Methodology and Assumptions	This measure assumes 50% of recoverable organic waste currently landfilled could be diverted by 2020 and 75% could be diverted by 2030.
Sources	Personal communication with Charlie Wicke, Marin Sanitary Service, Charlie.Wicke@marinsanitary.com

*Calculation*

	2020	2030
Waste generated by Town operations	395 tons	395 tons
Recoverable organic waste (50%)	197 tons	197 tons
Percent diverted from landfill	50%	75%
Tons organic waste diverted from landfill	99 tons	148 tons
GHG emissions reduction	39 MTCO <sub>2</sub> e	58 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>COMMUNITY WATER USE</b> <i>WC-C1</i>	
Reductions (MTCO <sub>2</sub> e) -160 -164	2020 2030
Targets	1% annual water consumption reduction.
Methodology and Assumptions	<p>District-wide Marin Municipal Water District (MMWD) water consumption fell 19.6% between 2005 and 2015, or approximately 2% per year. We conservatively assume water consumption will continue to fall an average of 1% per year based on the following legislation and water conservation programs:</p> <ul style="list-style-type: none"> <li>-The Town has adopted CALGreen Tier 1 for residential buildings, which requires additional water conservation actions above the base code.</li> <li>-MMWD's regulations meet or exceed State law that requires single family homes and commercial and multi-family buildings to replace all non-compliant plumbing fixtures when remodeling and upon resale (resale requirement for commercial and multi-family buildings will be in effect on January 1, 2019).</li> <li>-MMWD provides rebates for water-efficient toilets, clothes washers, hot water recirculation systems, turf replacement, pool covers, mulch, graywater systems, and rain barrels.</li> <li>-MMWD provides residential and commercial building and landscape water audits and free-water saving devices (faucet aerators, showerheads, toilet leak test dye tablets, hose nozzles, etc.).</li> <li>-MMWD provides residential and commercial building and landscape water audits and free-water saving devices (faucet aerators, showerheads, toilet leak test dye tablets, hose nozzles, etc.).</li> <li>-MMWD has adopted a landscape water conservation ordinance which applies to all new construction and rehabilitated landscape projects requiring a building permit, plan check, or design review. Irrigation controllers are required under CALGreen.</li> <li>-New commercial and multi-family construction is required to meet CALGreen code. MMWD requires all plumbing installed, replaced, or moved on any new or existing service to have high efficiency fixtures and meet minimum requirements.</li> <li>-MMWD has adopted a Water Waste Ordinance and requires drinking water and linen washing upon request at restaurants and hotels.</li> <li>-MMWD requires applicants for new water service and applicants requesting an enlarged water service for substantial residential or commercial remodels to install a graywater recycling system to reuse the maximum practicable amount of graywater on site.</li> <li>-MMWD conducts outreach and provides water conservation information to water users on its website.</li> <li>-MMWD provides virtual water-friendly garden tours on its website and the City partners with the Marin Master Gardeners to provide demonstration gardens at Falkirk Cultural Center.</li> </ul>



## APPENDIX B – GHG REDUCTION CALCULATIONS

APPENDIX B – GHG REDUCTION CALCULATIONS

	<p>GHG reduction calculations are based upon the following:</p> <ul style="list-style-type: none"> <li>-The California Energy Commission estimates that it takes 3,500 kWh of electricity per million gallons to convey, treat and distribute water from the water source to the customer in northern California.</li> <li>-MMWD began purchasing 100% renewable electricity in 2017 and Sonoma County Water agency, which provides approximately 25% of water, began purchasing 100% renewable electricity in 2015. We assume the water agencies will continue this practice.</li> </ul>
Sources	<p>Personal communication with Carrie Pollard, Sonoma Marin Water Saving Partnership</p> <p>The Climate Registry for Sonoma County Water Agency emission factors</p> <p>Refining Estimates of Water-Related Energy Use in California, California Energy Commission, Dec. 2006</p>

*Calculation*

	2020	2030
Water consumption, BAU	516 MG	527 MG
Annual water consumption reduction	1 %	1 %
Potential annual water savings	21 MG	74 MG
Electricity saved	72,215 kWh	258,452 kWh
GHG emissions reduction from water conservation	6 MTCO <sub>2</sub> e	23 MTCO <sub>2</sub> e
GHG reduction from 100% renewable electricity	154 MTCO <sub>2</sub> e	141 MTCO <sub>2</sub> e
GHG emissions reduction	160 MTCO <sub>2</sub> e	164 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>MUNICIPAL WATER USE</b> <i>WC-M1</i>	
Reductions (MTCO <sub>2</sub> e) n/a n/a	2020 2030
Targets	20% reduction in electricity used for irrigation and pumping.
Methodology and Assumptions	We assume electricity used for irrigation and pumping systems will be reduced 20% due to water-efficient landscaping and efficiency upgrades. We assume the Town continues to purchase Deep Green electricity for all municipal operations.
Sources	San Anselmo 2016 Greenhouse Gas Inventory

*Calculation*

	2020	2030
Electricity used for irrigation and pumps	4,462 kWh	4,462 kWh
Reduction in electricity use (20%)	892 kWh	892 kWh

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>LIGHT AND HEAVY DUTY FLEET REGULATIONS</b>					
<i>State Action</i>					
Program Description	Current federal and State regulations and standards will reduce transportation emissions from the light and heavy duty fleet. These include: <ol style="list-style-type: none"> <li>1. Pavley Standards which increase fuel economy standards for light-duty vehicles for 2009-2016 model years.</li> <li>2. Advanced Clean Cars Program which will reduce greenhouse gas and smog emissions for light-duty vehicles sold between 2017 and 2025. New automobiles will emit 34 percent fewer GHG emissions and 75 percent fewer smog-forming emissions.</li> <li>3. ARB Tractor -Trailer Greenhouse Gas Regulations which accelerate the use of low rolling resistance tires and aerodynamic fairing to reduce GHG emissions in the heavy-duty truck fleet.</li> <li>4. Heavy Duty GHG Emissions Standards (Phase One) which establish GHG and fuel efficiency standards for medium duty and heavy duty engines and vehicles for 2014-2018 model years.</li> </ol>				
Reductions (MTCO <sub>2</sub> e)	<table border="0"> <tr> <td style="text-align: right;">-2,631</td> <td>2020</td> </tr> <tr> <td style="text-align: right;">-8,206</td> <td>2030</td> </tr> </table>	-2,631	2020	-8,206	2030
-2,631	2020				
-8,206	2030				
Methodology and Assumptions	Anticipated emissions reductions resulting from implementation of these light and heavy duty fleet regulations are modeled in EMFAC2017. In order to be consistent with the methodology used in City's Greenhouse Gas Inventory, results are adjusted to reflect the global warming potential of methane and nitrous oxide as reported in the IPCC Fifth Assessment Report.				
Sources	California Air Resources Board, EMFAC2017 v.1.0.2. California Air Resources Board, EMFAC2014 Volume III - Technical Documentation, v1.0.7, May 12, 2015				

*Calculation*

	2020	2030
Passenger VMT BAU	76,119,312 VMT	79,241,684 VMT
Passenger VMT, net reductions from other measures	74,281,123 VMT	63,658,542 VMT
Commercial VMT BAU	3,489,383 VMT	3,553,391 VMT
Bus VMT BAU	844,251 VMT	720,054 VMT
Emissions, BAU	32,662 MTCO <sub>2</sub> e	28,651 MTCO <sub>2</sub> e
Emissions with regulations	30,031 MTCO <sub>2</sub> e	20,445 MTCO <sub>2</sub> e
Reduction in emissions	2,631 MTCO <sub>2</sub> e	8,206 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>RENEWABLE PORTFOLIO STANDARD</b> <i>State Action</i>	
Program Description	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 percent by 2010 and to 33 percent by 2020. Senate Bill 350, passed in September of 2015, increases the renewable requirement to 50 percent by the end of 2030. Senate Bill 100, passed in September 2018, accelerated the RPS standard to 60 percent by 2030 and zero-carbon by 2045.
Reductions (MTCO <sub>2</sub> e) -128 -427	2020 2030
Methodology and Assumptions	<p>This State Action assumes PG&amp;E and Direct Access entities will meet the Renewable Portfolio Standard requirements and that these entities will carry the same share of the community's electricity load as in 2016. GHG reductions related to MCE's GHG reduction policies are quantified separately as a local action.</p> <p>California Public Utilities Code Section 454.52 requires each load-serving to procure at least 50 percent eligible renewable energy resources by 2030 and to meet the economywide reductions of 40% below 1990 levels by 2030.</p> <p>The CPUC calculator version 3c provides projected emission factors for 2020. For 2030, the CPUC has set electric sector GHG reductions at a level that represents a 50% reduction from 2015 levels. We therefore apply a 50% reduction to PG&amp;E and DA 2015 emission factors to forecast 2030 emission factors.</p>
Sources	<p>GHG Calculator, version 3c_Oct2010. <a href="https://ethree.com/public_projects/cpuc2.php">https://ethree.com/public_projects/cpuc2.php</a></p> <p>PG&amp;E, "Greenhouse Gas Emission Factors: Guidance for PG&amp;E Customers," November 2015, <a href="https://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf">https://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf</a></p> <p>California Public Utilities Commission "CPUC Adopts Groundbreaking Path to Reduce Greenhouse Gases in Electric Sector," Press Release Docket #: R.16-02-007, Feb. 8, 2018.</p>

*Calculation*

	2020	2030
Electricity use, BAU	46,387,388 kWh	47,396,569 kWh
Electricity saved through other State actions	869,273 kWh	1,802,217 kWh
Electricity saved through local actions	3,161,731 kWh	18,057,210 kWh
Net electricity use (PG&E)	8,777,956 kWh	5,706,810 kWh
Net electricity use (DA)	2,598,324 kWh	1,689,248 kWh
Electricity emissions, BAU	1,802 MTCO <sub>2</sub> e	1,171 MTCO <sub>2</sub> e
Electricity emissions w/RPS	1,673 MTCO <sub>2</sub> e	745 MTCO <sub>2</sub> e
GHG emission reductions	128 MTCO <sub>2</sub> e	427 MTCO <sub>2</sub> e



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>TITLE 24 ENERGY EFFICIENCY STANDARDS</b> <i>State Action</i>					
Program Description	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 California Energy Commission'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.				
Reductions (MTCO <sub>2</sub> e)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; padding-right: 20px;">-24</td> <td>2020</td> </tr> <tr> <td style="text-align: right; padding-right: 20px;">-351</td> <td>2030</td> </tr> </table>	-24	2020	-351	2030
-24	2020				
-351	2030				
Methodology	We assume that residential buildings will be zero net electricity by 2020 and all buildings will be zero net energy by 2030.				
Sources	<p>California Energy Commission, <a href="http://www.energy.ca.gov/title24/2013standards/background.html">http://www.energy.ca.gov/title24/2013standards/background.html</a></p> <p>California Energy Commission, <a href="http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-5-31-Item-05-Adoption_Hearing_Presentation.pdf">http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-5-31-Item-05-Adoption_Hearing_Presentation.pdf</a></p> <p>California Energy Commission, <a href="https://www.lgc.org/wordpress/wp-content/uploads/2016/02/2016-Energy-Standards-Overview-California-Energy-Commission.pdf">https://www.lgc.org/wordpress/wp-content/uploads/2016/02/2016-Energy-Standards-Overview-California-Energy-Commission.pdf</a></p>				

APPENDIX B – GHG REDUCTION CALCULATIONS

*Calculation*

	2016 Reductions from 2013 Standards (assumed for development after 2017)	Projected average reduction 2020-2030 from 2015 baseline	
		Electricity Savings	Natural Gas Savings
<b>Reductions from Title 24 Upgrades</b>			
Residential New Construction	28.00%	100%	50%
Non-residential New Construction	5.00%	50%	50%

**Projected Residential Development with Title 24 Energy Reductions**

	2017-2020	2021-2030	TOTAL through 2020	GHG Reductions through 2020	TOTAL through 2030	GHG Reductions through 2030
New Residential (units)	25	106	31		137	
Electricity Use BAU	139,779	597,440	139,779		737,219	
Electricity Use Savings	39,138	597,440	39,138	5	636,578	85
Natural Gas Use BAU	11,920	50,949	11,920		62,869	
Natural Gas Use Savings	3,338	25,474	3,338	18	28,812	153

**Projected Non-Residential Development with Title 24 Energy Reductions**

	2017-2020	2021-2030	TOTAL through 2020	GHG Reductions through 2020	TOTAL through 2030	Reductions through 2030
Electricity Use BAU	39,763	671,008	39,763		710,771	
Electricity Use Savings	1,988	335,504	1,988	0	337,492	51
Natural Gas Use BAU	1,386	23,384	1,386		24,770	
Natural Gas Use Savings	69	11,692	69	0	11,761	63



APPENDIX B – GHG REDUCTION CALCULATIONS

<b>LIGHTING EFFICIENCY</b>					
<i>State Action</i>					
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 <sub>2</sub> e)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; padding-right: 10px;">-143</td> <td>2020</td> </tr> <tr> <td style="text-align: right; padding-right: 10px;">-143</td> <td>2030</td> </tr> </table>	-143	2020	-143	2030
-143	2020				
-143	2030				
Methodology and Assumptions	<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> <p>The CEC reports that between 2008 and 2010, interior residential lighting electricity dropped 7%, and commercial interior lighting electricity dropped 13%, and commercial outdoor lighting dropped 6 percent. We assume 1/4 of the remaining goal will be achieved between 2016 and 2018.</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. &lt;<a href="http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf">http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf</a>&gt;</p> <p>California Lighting Technology Center at UC Davis for the California Energy Commission, "Achieving Energy-Efficient Lighting in California," Sept. 2015, <a href="http://www.energy.ca.gov/2015publications/CEC-500-2015-085/CEC-500-2015-085.pdf">http://www.energy.ca.gov/2015publications/CEC-500-2015-085/CEC-500-2015-085.pdf</a></p> <p>Navigant Consulting, Inc., "2010 U.S. Lighting Market Characterization," U.S. Department of Energy, January 2012, p. 42. Accessed March 26, 2015. &lt;<a href="http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf">http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf</a>&gt;</p>				

APPENDIX B – GHG REDUCTION CALCULATIONS

*Calculation*

	2020	2030
Residential electricity indoor lighting use, 2016	7,446,758 kWh	7,446,758 kWh
Commercial electricity use, 2016	15,940,158 kWh	15,940,158 kWh
Commercial indoor lighting use, 2016	828,888 kWh	828,888 kWh
Commercial outdoor lighting use, 2016	4,606,706 kWh	4,606,706 kWh
Reduction in residential electricity use	800,526 kWh	800,526 kWh
Reduction in commercial indoor lighting use	24,867 kWh	24,867 kWh
Reduction in commercial outdoor lighting use	218,819 kWh	218,819 kWh
GHG emission reductions	143 MTCO <sub>2</sub> e	143 MTCO <sub>2</sub> e

APPENDIX B – GHG REDUCTION CALCULATIONS

<b>RESIDENTIAL SOLAR WATER HEATERS</b> <i>State Action</i>	
Program Description	The Residential Solar Water Heater Program (AB 1470) created a \$350 million 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)	<p style="text-align: right;">-7     2020</p> <p style="text-align: right;">-7     2030</p>
Methodology and Assumptions	<p>Natural gas solar water heaters reduce natural gas use by 130 therms (U.S. Department of Energy 2010)</p> <p>Electric solar water heaters reduce electricity use by 2,429 kWh (U.S. Department of Energy 2010)</p> <p>An average of 0.013 water heaters per home will be replaced as a result of the strategy in 2020 (California Air Resources Board 2008)</p> <p>85% of California homes use natural gas for water heating, 4% use propane/LPG, and 11% use electricity (U.S. Energy Information Administration 2009)</p> <p>The program began in 2010. We assume 2/7ths of the energy savings will occur by 2017.</p>
Sources	<p>U.S. Department of Energy, "ENERGY STAR Water Heater Market Profile," September 2010, p. 15. Accessed March 27, 2015. &lt;<a href="https://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/Water_Heater_Market_Profile_2010.pdf">https://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/Water_Heater_Market_Profile_2010.pdf</a>&gt;</p> <p>U.S. Energy Information Administration, 2009 Residential Energy Consumption Survey, Table HC8.11, "Water Heating in U.S. Homes in West Region, Division, and States, 2009." Accessed March 26, 2015. &lt;<a href="http://www.eia.gov/consumption/residential/data/2009/#undefined">http://www.eia.gov/consumption/residential/data/2009/#undefined</a>&gt;</p>

*Calculation*

	2020	2030
Number of housing units, 2016	5,549	5,549
Number of solar water heaters installed, 2017	10	10
Percent electric water heaters	11%	0
Percent natural gas water heaters	89%	1
Reduction in electricity use	2,753 kWh	2,753 kWh
Reduction in natural gas use	1,192 therms	1,192 therms
GHG emission reductions	7 MTCO2e	7 MTCO2e