



SAN RAFAEL CITY COUNCIL AGENDA REPORT

Department: City Manager's Office

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City Manager Approval: _____

TOPIC: GREENHOUSE GAS EMISSIONS REPORT AND CLIMATE ACTION PRIORITIES UPDATE

SUBJECTS:

- 1. SAN RAFAEL GREENHOUSE GAS INVENTORY REPORT**
- 2. 2021-2023 TWO-YEAR WORK PLAN PRIORITIES REPORT**

RECOMMENDATIONS:

1. Accept the Greenhouse Gas Inventory and Reduction Strategy Annual Report for 2019.
2. Accept the 2021-2023 Two-Year Work Plan Priorities Report.

EXECUTIVE SUMMARY:

The City conducts annual greenhouse gas (GHG) emissions inventory reports to gauge progress toward our GHG reduction targets as reflected in our [Climate Change Action Plan 2030](#) (CCAP). The latest report is for calendar year 2019 as this is the latest data available. It shows the City has achieved a 27% reduction in GHG emissions since 2005, and a 14% reduction since 1990 levels. In addition, every two years staff submits a 2-Year Priority Action Work Plan for review and updates the City Council on achievements from the previous two years. Proposed priority focus areas include some similar areas of focus from the prior two years, including enabling more electric vehicle adoption programs, mandatory composting policies, energy efficiency programs, economic development initiatives, and adaptation planning. New proposed initiatives include exploration of community and facility microgrids.

BACKGROUND:

State of the Climate

2020 was another record-setting year with regard to the climate. August through October shattered past California temperature records, averaging over 5 degrees more than the 100-year temperature average. Wildfires scorched over 4.2 million acres. The August Complex Fire, sparked Aug. 16 in Mendocino County, burned more than 1 million acres, making it the largest fire in California history. Only 20 inches of rain fell at Lake Lagunitas in the Marin Municipal Water District watershed during all of 2020; just 40 percent of the average. In fact, 2020 was the second-

FOR CITY CLERK ONLY

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Disposition:

driest year in 90 years. In addition, 2011-2020 was the hottest decade on record. These changes to the climate affect people dramatically, especially the most vulnerable members of our community, as we experience more extreme heat days, increased flooding and storm impacts, water restrictions, increased health impacts, and higher food costs.

California Climate Goals

Greenhouse gas reduction strategies are aimed at reducing the emissions that cause climate change in an effort to keep the climate from warming 2° Celsius above preindustrial times, which is what scientists say needs to happen in order to stave off the worst effects of climate change. To date, the planet has warmed 1° Celsius. The State of California has responded to growing concerns over the effects of climate change by adopting a comprehensive approach to addressing emissions in the public and private sectors. This approach was officially initiated with the passage of the Global Warming Solutions Act of 2006 (AB 32), which requires the state to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2020. The AB 32 Scoping Plan was developed to identify strategies for meeting the AB 32 goal and was adopted by the California Air Resources Board (CARB) in December 2008. Among many other strategies, it encourages local governments to reduce emissions in their jurisdictions by 15 percent below 2005 baseline levels by 2020, and proposed longer-term goals established by Executive Order S-3-05 to reduce emissions 80 percent below 1990 levels by 2050.

In 2016, the State Legislature passed SB 32, which set interim targets of 40% reductions below 1990 levels by 2030. CARB subsequently updated its Climate Change Scoping Plan in 2017 to lay out a strategy to achieve the 2030 target. In 2018, Executive Order B-55-18 committed California to achieve carbon neutrality – the point at which the removal of carbon from the atmosphere meets or exceeds emissions – by 2045.

Climate Change Action Plan

San Rafael's first [Climate Change Action Plan \(CCAP\)](#) was developed by a 17-member Green Ribbon Committee in 2008 and adopted by the City Council in 2009. In 2011, the City incorporated the CCAP measures into General Plan 2020 as a new Sustainability Element. A GHG Emissions Reduction Strategy was also prepared to provide technical support to the Sustainability Element and adopted CCAP. In 2017, then City Councilmember Kate Colin and the City Manager's Office convened a 20-member community Working Group to update the CCAP to meet the new 2030 State targets. The Working Group developed the greenhouse gas reduction measures/activities with the assistance of 19 local subject matter experts. Over 350 San Rafael residents and business representatives gave input on the Plan, which was adopted by the City Council on [May 19, 2019](#).

Greenhouse Gas Reduction Strategy

The City's Climate Change Action Plan has also been integrated into the [Draft General Plan 2040](#) and serves as the City's Greenhouse Gas Reduction Strategy. The Strategy meets the California Environmental Quality Act (CEQA) for a "qualified" Greenhouse Gas Reduction Strategy. It commits the City to track implementation measures and emissions reductions while providing a valuable streamlining tool for reviewing new development and building projects. It allows applicants to demonstrate that they comply with Greenhouse Gas Reduction Strategy measures through utilization of a compliance checklist, saving time and cost for contractors and staff, while ensuring that GHG emissions reduction activities are included in projects. San Rafael is currently the only local jurisdiction in Marin County with such a Strategy.

As part of the CCAP implementation, a City Council Sustainability Liaison meets quarterly with

primary staff involved with implementing the CCAP as well as the president of Sustainable San Rafael, with occasional additional meetings as needed to address specific initiatives of high importance. Mayor Colin was the Liaison until January of 2021 and Councilmember Llorens Gulati is the current Liaison. As Liaison, Councilmember Llorens Gulati chairs the quarterly public CCAP implementation forums comprised of staff and interested members of the community. The Liaison's role is critical in helping staff prioritize requests from the public and in shaping projects and programs for City Council action.

Greenhouse Gas Inventory

The City measures progress toward GHG reduction goals through completion of an annual community greenhouse gas (GHG) inventory report. These reports provide the City Council with an overview of community-wide emissions as well as status of City actions accomplished in that same year. The report also fulfills the City's requirement to report annual emissions for the strategy to reduce greenhouse gas emissions. GHG emissions and reductions are calculated for various sectors, including energy, transportation, waste, and water. This is done using a common protocol all cities use to show what is called in-boundary emissions, meaning the emissions created most directly within the geographical boundary of the City. Emissions data is typically not available for a year and a half; thus, inventories have a lag time. The last community inventory was conducted in in 2020 for the 2018 calendar year.

In addition, every five years, the City conducts a municipal inventory, which provides a deep analysis of the emissions from municipal operations and facilities. The last municipal inventory was conducted in 2018 for calendar year 2016. Municipal emissions typically comprise less than 1% of community-wide emissions.

The City of San Rafael partners with the Marin Climate and Energy Partnership (MCEP) for conducting the inventory and developing the report. MCEP publishes all the results on the MCEP website, marinclimate.org, and at MarinTracker.org so that members of our community can easily access the data using an interactive map.

2-Year Priorities

Every two years staff works with the City Manager's office to identify key priorities taken from our Climate Change Action Plan to be implemented during the year. These are reviewed with our City Council Sustainability Liaison and at our Climate Change Action Plan quarterly community forum for review before finalizing and bringing to Council. This establishes a work plan for staff so that we can be efficient with City resources and not get sidetracked by other activities. The first set of Priorities was brought to Council with the CCAP 2030 and included the following action items:

1. Develop an Online CCAP Engagement Platform
2. Expand Our Electric Vehicle Charging Network
3. Implement Electric Vehicle Policies and Programs
4. Implement Mandatory Recycling
5. Plan for Climate Resilience
6. Increase Building Energy Efficiency
7. Promote Solar and Renewable Energy
8. Convene an Economic Working Group

ANALYSIS:

Greenhouse Gas Inventory Report

The 2019 Greenhouse Gas Inventory Report (Attachment A) provides the City Council with an

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overview of community-wide emissions as well as status of City actions accomplished in that same year. The report also fulfills the City's requirement to report annual emissions for the strategy to reduce greenhouse gas emissions. The Report provides broad category, best-estimate community-wide emissions data for calendar year 2019 based on publicly available data. This data shows an overall reduction of approximately 27% of community-wide emissions since 2005, including an approximate 1% reduction between 2018 and 2019. Table 1 below shows where our emissions reductions came from.

	Change in Emissions 2005-2019 (MTCO_{2e})	Percent Change 2005-2019
Transportation	-47,433	-18%
Built Environment - Electricity	-63,302	-71%
Built Environment – Natural Gas	-6,210	-7%
Waste	-5,605	-29%
Water	-2,446	-96%
Off-Road	-1,451	-31%
Wastewater	17	3%
TOTAL	126,430	-27%

Table 1: Change in Emissions by Sector

Following are a sampling of programs and policies the City undertook to reduce GHG emissions in 2019 and 2020:

- Completed and adopted Climate Change Action Plan 2030 and GHG Reduction Strategy
- Completed online engagement platform [SanRafaelClimateAction.org](https://www.sanrafaelclimateaction.org)
- Installed solar energy system at City Hall
- Installed six electric vehicle chargers at City Hall
- AB 1826 MOrE (Mandatory Organics Recycling) Compliance Plan, resources for businesses, website and video tutorials
- Hired Sustainability Fellows to assist with Zero Waste efforts in City departments and in the community
- Promoted and supported electric vehicle educational events
- Supported residential and commercial outreach programs such as Resilient Neighborhoods, Canal Community Resilience Council, California Youth Environmental Services' Green House Calls, the Chamber Green Business Committee, the Electric Vehicle Working Group, and Marin School of Environmental Leadership, among others
- Purchased and installed public recycling containers in City facilities & public areas
- Provided behavior change workshops for other agencies and community based organizations to assist in the acceleration of social science-based program delivery

The City has made significant progress towards implementation of its CCAP and has a strong commitment toward continuing to implement policies and programs. The designation of a City Council Sustainability Liaison and bi-annual review of Sustainability Priorities, as well as the

Council's decision to have staff dedicated to sustainability, demonstrates that commitment. In addition, City management and staff across all departments have embraced a sustainability ethos and provide staff time and resources toward accomplishing our sustainability goals.

The City has met its interim goal of a 25% reduction in GHG emissions from 2005 baseline by 2020. However, the new State targets and our CCAP establish a new baseline of 1990 GHG emissions for 2030 reduction targets. This 40% reduction by 2030 using the new baseline means that emissions reductions will have to be even greater to meet the mark. Continuing to compare to a 2005 baseline requires the City to help reduce community-wide emissions 49% to equal the 40% below 1990 levels by 2030 since GHG emissions were significantly lower in 1990. Translating our current reductions to a 1990 baseline means San Rafael has reduced emissions 14% since 1990. This will be a challenge and it will require creative collaborations with all of our community partners to meet our goals.

In addition, it's important to note that some of the emissions reductions may be related to economic and other conditions, and changes in these conditions could slow the rate of reductions and require further actions to keep on track. For example, most scientific analyses of GHG emissions during the pandemic show a dramatic reduction in emissions due to the huge shift in work and commute patterns. This is still to be fully understood. In addition, in order to meet our CCAP targets of 80% reductions by 2050, San Rafael will need to continue to innovate and be at the forefront of local GHG reduction strategies.

Finally, regarding GHG inventories, the value of this in-boundary type of inventory is that it isolates emissions from local sources, providing a snapshot of sectors and activities that are able to be affected to some degree by local government actions. In addition, it allows for aggregating data to allow for county-wide, regional, state and larger groupings of emissions calculations. This can be helpful to understand California-wide emissions for instance or to compare to the U.S. at large. One thing it does not do however is get at the larger set of emissions driven by consumption.

A [consumption-based inventory](#) takes into account all of the “upstream” emissions from the things we buy, including the mining, manufacturing, packaging and transportation of products, which carries a lot of embedded GHG emissions. Looking at a consumption-based inventory would show a very different picture of San Rafael's GHG emissions. It could easily quadruple our emissions per capita due to the amount of materials and products we consume, mainly from imported food and goods. In San Rafael, we have chosen to include consumption messaging – our “carbon footprint” – in our engagement rather than just rely on an in-boundary inventory. This is a primary focus of the Resilient Neighborhoods program, which works county-wide to educate residents about this and help them reduce their household carbon footprint.

2019-2021 Two-Year Work Plan Priorities

Every two years staff proposes work plan priorities from the CCAP in order to be efficient with City resources and stay focused on key initiatives. These are reviewed with our Sustainability Liaison to the Council and at the quarterly CCAP implementation forums, which are open to the public, as a means of aligning the work plan with other City priorities and with community concerns. The practice of establishing two-year priorities was established due to the fact that most items require more than one year to complete. This will not preclude annual review by City Council, however, and the intention is to bring status reports on the priorities annually, along with the annual greenhouse gas inventory reports described above.

Attachment B is a report detailing the accomplishments of the past two years along with the proposed 2021-2023 Two-Year Priority Workplan. Below is a snapshot of the accomplishments from the past two years.

C.C.A.P. EARLY ACTIONS STRATEGIES 2019-2021

ACTION STRATEGY	OBJECTIVES	2021 Status Update
1. Host CCAP Online	Design and Develop website	Complete
	Develop engagement plan	Complete
2. EV Charger Expansion	Install at City Hall and other facilities	Partially Complete
	Promote rebates and programs	In Progress
3. EV Policies and Programs	Develop streamlined EV ordinance with County	Complete
	Promote Drive Clean Marin and other programs	Complete
4. Mandatory Recycling and Organics	Develop and implement AB 1826 compliance plan	Complete
	Conduct analysis with Marin Sanitary Service, other franchisors	In Progress
	Develop and adopt a local ordinance	In Progress
5. Adaptation Planning	Secure funding and conduct an adaptation planning process	In Progress
	Assist with updating General Plan specific to sea level rise adaptation	Complete
6. Solar and Renewable Energy	Seek out and support Feed in Tariff projects	Not Started
	Promote rooftop solar programs and financing	Not Started
	Promote Deep Green and Solar Choice renewable electricity	In Progress
7. Building Energy Efficiency	Promote Marin Energy Watch Partnership energy efficiency & electrification	In Progress
	Identify financial and technical resources for Building Division	In Progress
	Include incentives & technical assistance with requirements at permit counter	Not Started
8. Equitable Low Carbon Economy	Convene thought leader team to develop plan of action	In Progress.
	Conduct specific, time-limited business engagement to develop a work plan	In Progress

The 2021-2023 Two-Year Priorities are included in Attachment B as well. One major change from our original Climate Change Action Plan was to elevate economic and social equity considerations in all of our climate initiatives. Each priority has a snapshot of the measure that includes a summary, information on funding, and a high-level review of impacts related to the economy and social equity as well as potential co-benefits. Many of the actions in the CCAP 2030 will be completed using existing funding sources, grants, or other incentives and funding from utilities and community partners. Fortunately, the State is continually coming out with new programs, mandates, and funding opportunities to assist cities with climate action and adaptation planning and projects. A table showing the key objectives of the Two-Year Priorities is below. Some prior priorities will continue as they have just become more of an ongoing effort, such as continuing to

promote solar and renewable energy, our Climate Role Model program, and installation of electric vehicle charging infrastructure.

DRAFT PRIORITIES

ACTION STRATEGY	OBJECTIVES
1. Zero Emission Vehicles Policies and Programs	Develop and begin to implement a San Rafael Electric Vehicle Strategy
	Continue to transition fleet to low-carbon alternatives
	Promote Drive Clean Marin and other low-carbon transportation programs
	Develop policies to reduce off-road emissions and electrify equipment
2. Mandatory Recycling and Organics	Develop and adopt ordinance and implement programs for SB 1383 compliance in conjunction with Marin Sanitary Service and other agencies
	Identify opportunities for organic waste diversion that also sequesters carbon
3. Adaptation Planning	Secure funding and conduct adaptation planning process with focus on environmental justice & sea level rise
	Begin comprehensive adaptation planning with county-wide coordination
4. Microgrids Assessment and Development	Develop an analysis of opportunities for municipal and community microgrids with a special focus on underserved communities
	Seek funding to implement a microgrid project with community partners such as MCE Clean Energy
5. Building Energy Efficiency & Electrification	Work with Marin Energy Watch Partnership to promote energy efficiency & electrification
	Adopt new Green Building Code with analysis/option of all-electric and other reach codes
	Identify & include incentives & technical assistance with permit requirements
6. Equitable Low Carbon Economy	Convene thought leader team to develop plan of action
	Conduct specific, time-limited business engagement to develop a work plan and recommendations

In all cases, staff has communicated with and developed these draft priorities based on input from community partners such as the County of Marin Sustainability Team, Sustainable San Rafael, members of our quarterly CCAP community forums, the Marin Climate and Energy Partnership, our utility partners, and others. This allows for county-wide collaboration and resource sharing. In addition, whenever possible, staff seeks opportunities to develop work products that other cities or organizations can use as well to extend their impact. For example, we are sharing what we learned switching to renewable diesel so other cities can do the same. This alone reduces our GHG emissions in our City diesel vehicles, including fire trucks, by up to 70%.

COMMUNITY OUTREACH:

Staff has given presentations with opportunities for input and feedback to the following organizations: the CCAP quarterly implementation forums (twice), the Canal Community Resilience Council, Dominican University student and faculty Earth Day committee, and the San Rafael Chamber of Commerce Green Business Committee. Information has gone out to the public through the Sustainability email list, the City Manager's Snapshot, and through City social media channels.

FISCAL IMPACT:

There is no direct fiscal impact to accepting the report. However, funding for implementation of programs within the Two-Year Priorities (2021-2023) that require funding will come from grants, utility programs, the General Fund, and through other means. Details of potential funding sources can be found in Attachment B. Any significant impacts to the General Fund not currently included in the budget will be brought to Council for review and formal acceptance prior to execution.

RECOMMENDED ACTIONS:

1. Accept the Greenhouse Gas Inventory and Reduction Strategy Annual Report for 2019.
2. Accept the 2021-2023 Two-Year Priorities Report.

ATTACHMENTS:

Attachment A: Greenhouse Gas Emissions Reduction Strategy 2019 Annual Report
Attachment B: 2021-2023 Two-Year Sustainability Priorities with Cost / Benefit Assessments



CITY OF SAN RAFAEL

COMMUNITY GREENHOUSE GAS EMISSIONS INVENTORY FOR THE YEAR 2019

May 2021

Prepared by the
Marin Climate & Energy Partnership



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EXECUTIVE SUMMARY

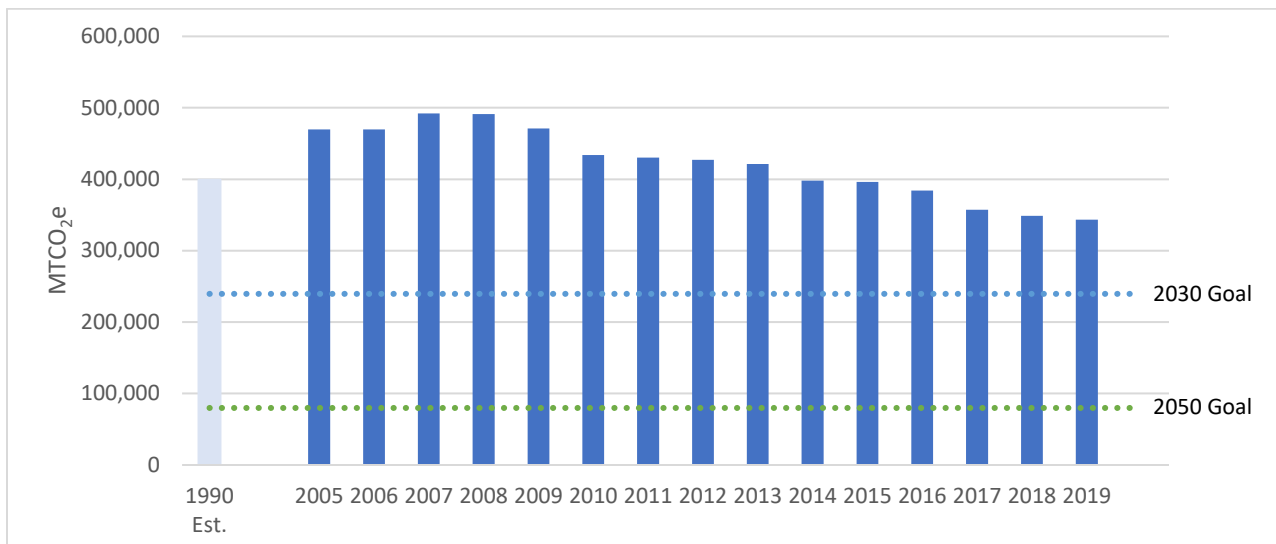
THE TAKEAWAY:

**COMMUNITY EMISSIONS ARE
DOWN 27% SINCE 2005**

San Rafael publishes annual community greenhouse gas (GHG) emissions estimates through the Marin Climate & Energy Partnership (MCEP). Annual inventories help the City to more closely monitor its progress in meeting its goal to reduce community emissions at least 40% below 1990 emissions by 2030. The City also publishes GHG emissions inventories for municipal operations approximately every five years. Municipal emissions accounted for less than 1% of community emissions when the municipal inventory was last conducted for year 2016.

This report reviews emissions generated from the community from 2005 through 2019, the most recent year data is available. The inventory shows that the San Rafael community has reduced emissions 27% since 2005. Emissions dropped from about 469,735 metric tons carbon dioxide equivalents (MTCO_{2e}) in 2005 to 343,305 MTCO_{2e} in 2019, which is equivalent to 14% below 1990 levels. The community emissions trend and targets are shown below. San Rafael needs to reduce emissions another 103,740 MTCO_{2e} to meet the local and State target for 2030 and another 263,450 MTCO_{2e} to meet the State target for 2050, which is 80% below 1990 levels.

FIGURE 1: SAN RAFAEL GHG EMISSIONS AND TARGETS



Recognizing the need for a collaborative approach to greenhouse gas reductions, City and county leaders launched the Marin Climate and Energy Partnership (MCEP) in 2007. The City of San Rafael is a member of MCEP and works with representatives from the County of Marin and the other Marin cities and towns to address and streamline the implementation of a variety of greenhouse gas reduction measures. Funding for this inventory was provided by the Marin County Energy Watch Partnership, which administers public goods charges collected by PG&E. Community inventories are available on the MCEP website at marinclimate.org and are used to update the [Marin Sustainability Tracker](#).

INTRODUCTION

PURPOSE OF INVENTORY

The objective of this greenhouse gas emissions inventory is to identify the sources and quantify the amounts of greenhouse gas emissions generated by the activities of the San Rafael community in 2019. This inventory provides a comparison to 2005 and estimated 1990 emissions and identifies the sectors where significant reductions in greenhouse gas emissions have occurred. In some instances, previous year emissions were updated with new data and/or recalculated to ensure the same methodology was employed for all inventory years.

GENERAL METHODOLOGY

This inventory uses the national standard for the accounting and reporting of community-wide greenhouse gas emissions, the [U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, version 1.2 \(July 2019\)](#). Quantification methodologies, emission factors, and activity and source data are detailed in the appendix.

Community emissions are categorized according to seven sectors:

- Built Environment - Electricity
- Built Environment – Natural Gas
- Transportation
- Off-Road Vehicles and Equipment
- Waste
- Water
- Wastewater

CALCULATING EMISSIONS

Emissions are quantified by multiplying the measurable activity data – e.g., kilowatt hours of electricity, therms of natural gas, gallons of diesel or gasoline, etc. – by emissions factors specific to the greenhouse gas-generating source. Most emissions factors are the same from year to year. Emission factors for electricity, however, change from year to year due to the specific sources that are used to produce electricity. For example, electricity that is produced from coal generates more greenhouse gases than electricity that is generated from natural gas and therefore has a higher emissions factor. Electricity that is produced solely from renewable energy sources such as solar and wind has an emissions factor of zero.

This inventory calculates individual greenhouse gases – i.e., carbon dioxide, methane and nitrous oxide – and converts each greenhouse gas emission to a standard metric, known as “carbon dioxide equivalents” or CO₂e, to provide an apple-to-apples comparison among the various emissions. Table 1 shows the greenhouse gases identified in this inventory and their global warming potential (GWP), a measure of the amount of warming each gas causes when compared to a similar amount of carbon dioxide over 100 years. Methane, for example, is 28 times as potent as carbon dioxide over 100 years; therefore, one metric ton of methane is equivalent to 28 metric tons of carbon dioxide. Greenhouse gas emissions are reported in this inventory as metric tons of carbon dioxide equivalents, or MTCO₂e.

TABLE 1: GREENHOUSE GASES

Gas	Chemical Formula	Emission Source	Global Warming Potential
Carbon Dioxide	CO ₂	Combustion of natural gas, gasoline, diesel, and other fuels	1
Methane	CH ₄	Combustion, anaerobic decomposition of organic waste in landfills and wastewater	28
Nitrous Oxide	N ₂ O	Combustion, wastewater treatment	265

Source: IPCC Fifth Assessment Report (2014), 100-year values

TYPES OF EMISSIONS

Emissions from each of the greenhouse gases can come in a number of forms:

- **Stationary or mobile combustion** resulting from the on-site combustion of fuels (natural gas, diesel, gasoline, etc.) to generate heat or electricity, or to power vehicles and equipment.
- **Purchased electricity** resulting from the generation of power from utilities outside the jurisdictional boundary.
- **Fugitive emissions** resulting from the unintentional release of greenhouse gases into the atmosphere, such as methane from waste decomposition.
- **Process emissions** from physical or chemical processing of a material, such as wastewater treatment.

UNDERSTANDING TOTALS

The totals listed in the tables and discussed in the report are a summation of emissions using available estimation methods. Each inventoried sector may have additional emissions sources associated with them that were unaccounted for due to a lack of data or robust quantification methods. For example, greenhouse gas emissions associated with air travel and the production of goods outside the community's boundary are not included in the inventory. Additionally, the community inventory does not include refrigerants released into the atmosphere from the use of air conditioning in cars and buildings.

COMMUNITY INVENTORY

COMMUNITY INVENTORY SUMMARY

In 2005, the activities taking place by the San Rafael community resulted in approximately 469,734 metric tons of CO₂e.¹ In 2019, those activities resulted in approximately 343,304 metric tons of CO₂e, a reduction of 27% from 2005 levels, which is equivalent to 14% below 1990 levels.

The community inventory tracks emissions in seven sectors:

- The **Built Environment – Electricity** sector represents emissions generated from the use of electricity in San Rafael homes and commercial, industrial, and governmental buildings and facilities².
- The **Built Environment – Natural Gas** sector represents emissions generated from the use of natural gas in San Rafael homes and commercial, industrial, and governmental buildings and facilities. Propane used as a primary heating source is also included, although it represents less than 1% of emissions in this sector.
- The **Transportation** sector includes tailpipe emissions from passenger vehicle trips originating and ending in San Rafael, as well as a share of tailpipe emissions generated by medium and heavy-duty vehicles travelling on Marin County roads. The sector also includes emissions from Marin Transit and Golden Gate Transit buses and the SMART train as these vehicles travel within San Rafael’s boundaries. Electricity used to power electric vehicles is embedded in electricity consumption reported in the Residential Energy and Non-Residential Energy sectors.
- The **Waste** sector represents fugitive methane emissions that are generated over time as organic material decomposes in the landfill. Although most methane is captured or flared off at the landfill, approximately 25% escapes into the atmosphere.
- The **Off-Road** sector represents emissions from the combustion of gasoline and diesel fuel from the operation of off-road vehicles and equipment used for construction and landscape maintenance.
- The **Water** sector represents emissions from energy used to pump, treat, and convey potable water from the water source to the San Rafael water users.
- The **Wastewater** sector represents stationary, process and fugitive greenhouse gases that are created during the treatment of wastewater generated by the community. Emissions created from energy used to convey and treat wastewater are included in the Built Environment sectors.

¹ Baseline and historical emissions are recalculated in the annual inventory to integrate new data and improved calculation methodologies and to ensure consistent comparison across each year. For this reason, emission levels may differ from levels reported in previous inventories.

² Previous inventories categorized emissions from electricity, natural gas, and propane in the built environment according to the Residential and Non-Residential sectors. Beginning with this inventory, we are categorizing emissions in the built environment as Electricity and Natural Gas in order to align and better track with the Climate Action Plan’s goals to electrify the built environment.

Figure 2 shows the relative contribution of emissions from these sectors in 2019. Transportation emissions represent the largest share of communitywide emissions (63%), while the use of natural gas and propane in the Built Environment accounts for one-quarter of emissions.

FIGURE 2: EMISSIONS BY SECTOR, 2019

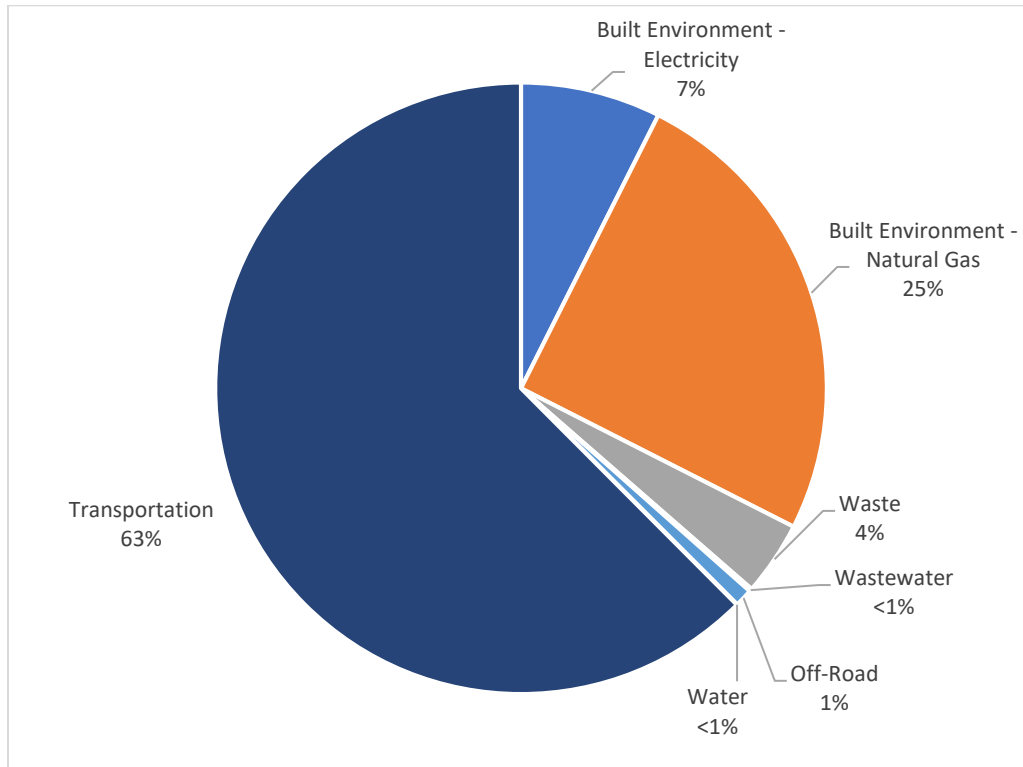


Table 2 shows how emissions in each sector have changed since 2005. The greatest reductions have occurred in the Built Environment – Electricity sector (63,302 MTCO₂e), followed by the Transportation sector (47,433 MTCO₂e) and the Built Environment – Natural Gas sector (6,210 MTCO₂e). The likely reasons for the largest emissions decreases are described in the remainder of this report.

TABLE 2: EMISSIONS SUMMARY BY SECTOR (MTCO₂E), 2005 THROUGH 2019

Year	Built Environment - Electricity	Built Environment - Natural Gas	Transportation	Waste	Water	Wastewater	Off-Road	Total	% Change from 2005	% Change from 1990 ²
1990 (est.) ¹								399,274		
2005	88,767	92,247	261,912	19,075	2,535	484	4,714	469,734	0%	
2006	83,610	95,425	264,685	18,913	2,187	485	4,550	469,855	0%	
2007	111,739	92,455	262,812	17,101	2,976	488	4,407	491,978	5%	
2008	112,024	93,985	263,594	14,205	2,721	490	4,262	491,281	5%	
2009	101,128	92,767	257,666	12,223	2,759	492	4,116	471,151	0%	
2010	76,081	93,296	246,324	12,006	1,556	496	3,976	433,735	-8%	
2011	71,120	96,073	245,884	11,719	1,106	499	3,950	430,350	-8%	
2012	72,887	90,344	246,261	12,155	1,197	503	3,897	427,245	-9%	
2013	68,978	89,797	244,294	12,331	1,386	507	3,840	421,132	-10%	
2014	62,192	76,304	241,458	12,470	1,279	518	3,774	397,995	-15%	
2015	61,473	77,920	238,583	12,922	962	492	3,690	396,042	-16%	
2016	50,152	81,715	232,160	15,205	790	553	3,600	384,175	-18%	
2017	26,618	85,650	224,706	15,917	232	544	3,501	357,168	-24%	
2018	26,148	85,625	218,948	14,125	82	502	3,384	348,814	-26%	
2019	25,464	86,037	214,479	13,470	89	501	3,264	343,304	-27%	-14%
Change from 2005	-63,302	-6,210	-47,433	-5,605	-2,446	17	-1,451	-126,430		
% Change from 2005	-71%	-7%	-18%	-29%	-96%	3%	-31%	-27%		

¹ Per California Air Resources Board guidance, 1990 levels are estimated at 15% below 2005 levels.

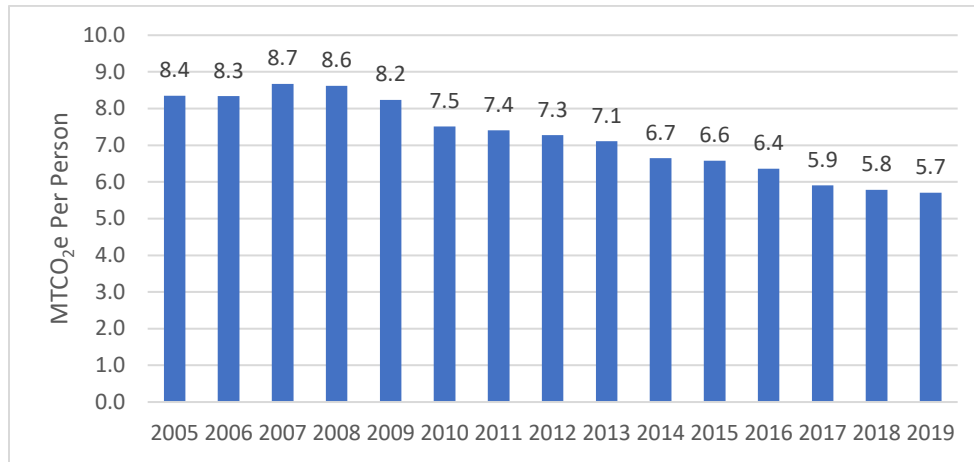
² In 2019, San Rafael adopted a Climate Action Plan that established a goal to reduce emissions 40% below 1990 levels by 2030. This column will track that progress over time.

PER CAPITA EMISSIONS

Per capita emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one community’s emissions with neighboring cities and against regional and national averages. That said, due to differences in emission inventory methods, it can be difficult to produce directly comparable per capita emissions numbers. Per capita emission rates may be compared among Marin jurisdictions, although some jurisdictions may have higher rates due to the presence of commercial and industrial uses.

Dividing the total communitywide GHG emissions by residents yields a result of 8.4 metric tons CO₂e per capita in 2005. Per capita emissions decreased 32% between 2005 and 2019, falling to 5.7 metric tons per person. Figure 3 shows the trend in per capita emissions over time. It is important to understand that this number is not the same as the carbon footprint of the average individual living in San Rafael, which would include lifecycle emissions, emissions resulting from air travel, etc.

FIGURE 3: EMISSIONS PER CAPITA



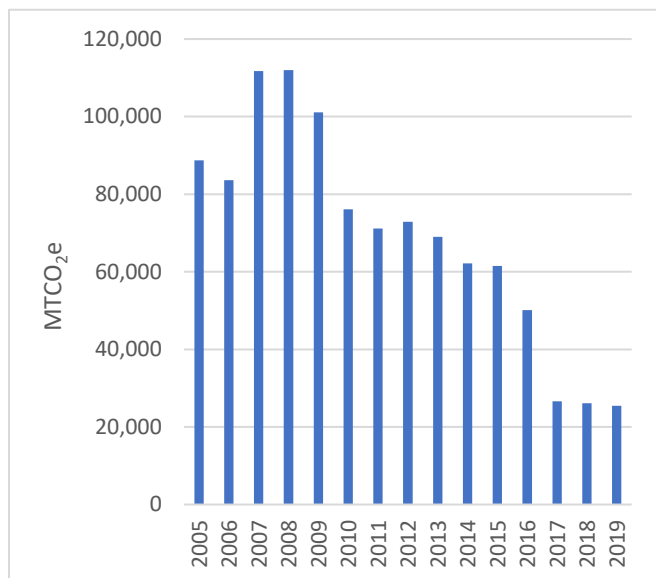
MAJOR SOURCES OF EMISSIONS

The following sections provide a year-by-year analysis of the changes in source GHG emissions in the Built Environment, Transportation, Waste and Water sectors. Whenever possible, each section discusses the change in emissions from previous years and the likely influence of state and local programs or policies and external factors on reducing emissions.

BUILT ENVIRONMENT - ELECTRICITY

Electricity use in homes and businesses in San Rafael decreased about 12% between 2005 and 2019. Greenhouse gas emissions from electricity consumption decreased 71% since 2005, as shown in Figure 3. This is primarily due to the lower carbon intensity of electricity. PG&E has been steadily increasing the amount of renewable energy in its electricity mix. In 2019, PG&E electricity came from a mix of renewable (29%), large hydroelectric (27%), and nuclear (44%) energy sources and was virtually GHG-free.³ The carbon intensity of MCE Light Green electricity was more carbon intensive in 2019 than the previous two years but was still below the 10-year average. In 2019, about 12.4% of MCE electricity purchased by San Rafael customers was 100% renewable Deep Green electricity, including electricity purchased by the City government.

FIGURE 4: ELECTRICITY EMISSIONS

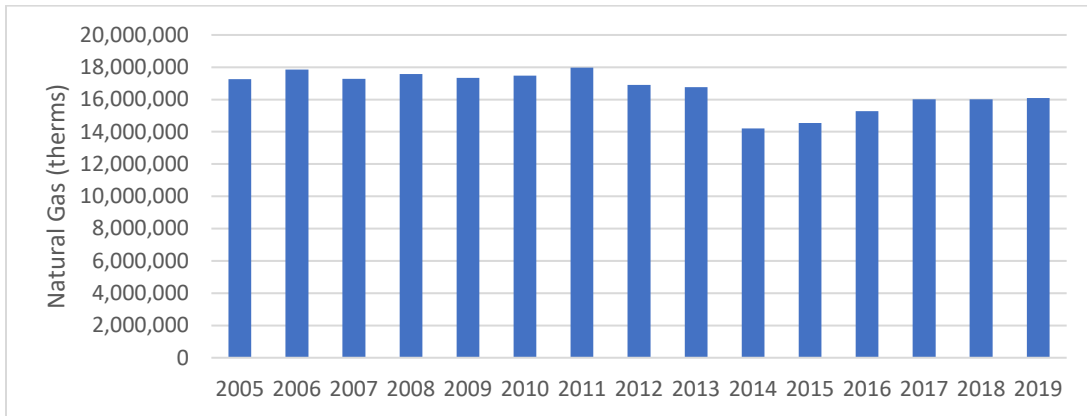


³ PG&E, 2019 Power Mix, https://www.pge.com/pge_global/common/pdfs/your-account/your-bill/understand-your-bill/bill-inserts/2020/1220-PowerContent-ADA.pdf

BUILT ENVIRONMENT - NATURAL GAS

Natural gas is used in residential, commercial, and industrial buildings to provide space and water heating and power appliances. Use of natural gas is highly variable depending on the weather conditions. This variability has led natural gas use consumption in San Rafael to fluctuate from year to year, from a high of 18 million therms in 2011 to a low of 14.2 million therms in 2014. Natural gas consumption rose slightly between 2018 and 2019 and was 7% below the 2005 level.

FIGURE 5: NATURAL GAS USE



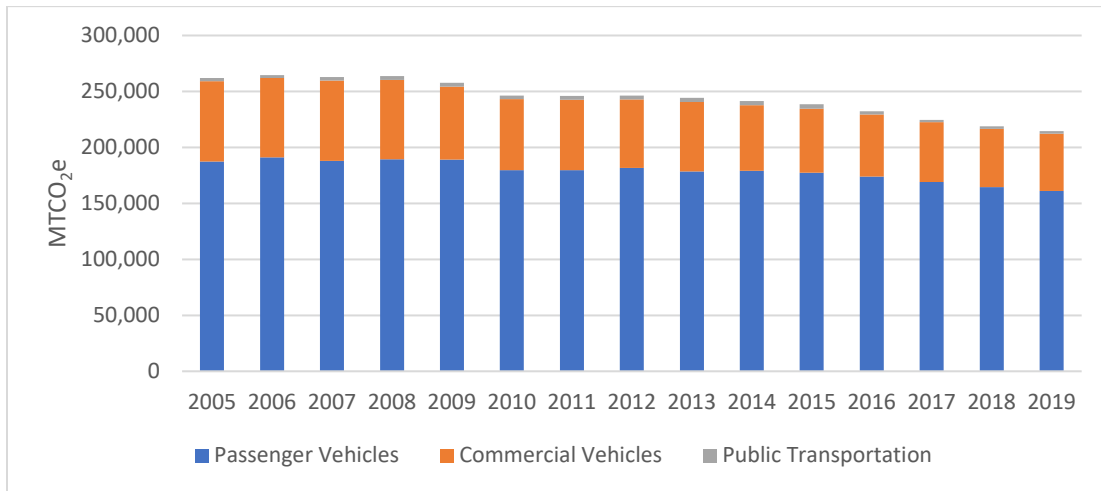
Reduction in energy use may also be attributed to energy efficiency programs and rebates, local green building ordinances, and State building codes. California’s goal is to require all new residential and commercial buildings to be zero net energy by 2030.

TRANSPORTATION

Transportation activities accounted for approximately 63% of San Rafael’s emissions in 2019. Although vehicle miles traveled have increased approximately 3% since 2005, transportation emissions have decreased 18% due to more fuel-efficient and alternatively fueled cars. As shown in Figure 6, most transportation emissions comes from passenger vehicles, accounting for 75% of transportation emissions in 2019. Marin County continues to be a leader in zero emission vehicles (ZEVs) – second only to Santa Clara County – with 8,600 ZEVs in Marin at the end of 2019, or about 4% of registered automobiles. ZEVs include battery electric cars, plug-in hybrid electric cars, hydrogen fuel cell cars, and zero-emission motorcycles. San Rafael had nearly 2,000 ZEVs by the end of 2019.

While it is difficult to pinpoint exactly how each land use and transportation policy affects emissions, the City has undertaken many efforts to reduce transportation emissions. The City encourages workforce housing and has made improvements to the transportation network to make it easier for residents to bicycle, walk, and take public transportation. The City has also promoted electric vehicle adoption by installing chargers and providing free electricity at municipal EV charging stations.

FIGURE 6: TRANSPORTATION EMISSIONS

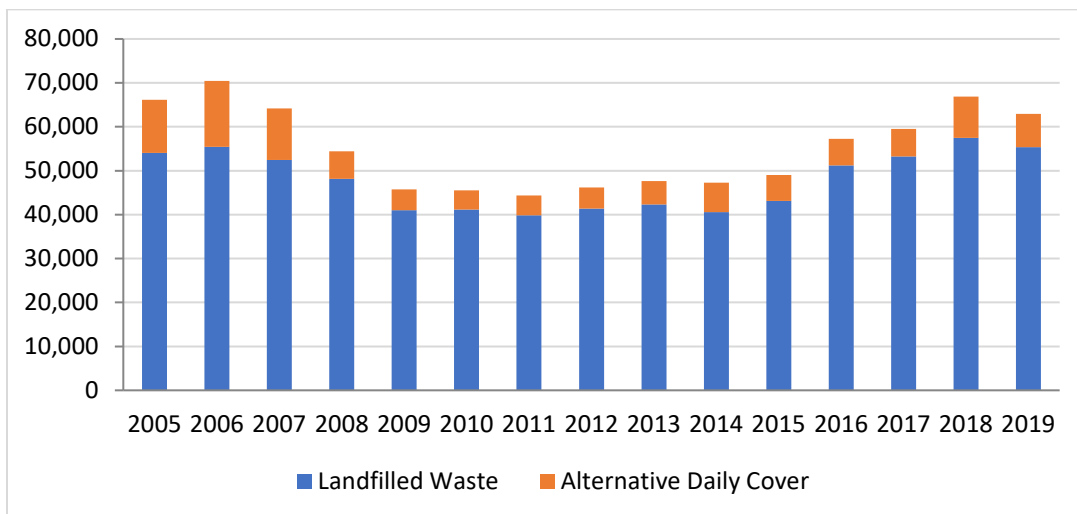


Note: Public transportation includes emissions from Marin Transit and Golden Gate Transit fixed-route buses and the SMART train.

WASTE DISPOSAL

Waste generated by the community hit a low in 2011 but has since increased as shown in Figure 7 (based on countywide disposal data). Total landfilled waste (including alternative daily cover)⁴ decreased 6% between 2018 and 2019 but was 5% below the 2005 baseline. Emissions from waste disposal decreased 29% due to the lower organic content of material used for alternative daily cover.

FIGURE 7: DISPOSED WASTE

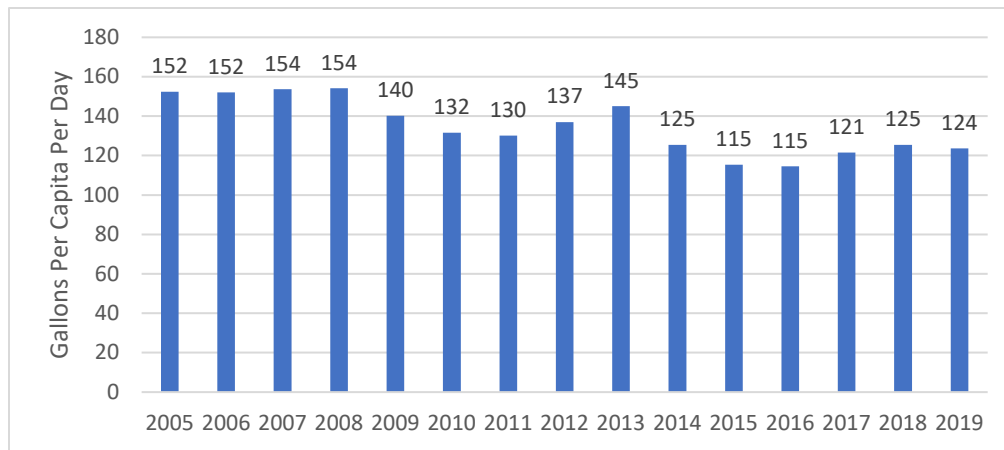


⁴ Alternative daily cover is cover material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.

WATER USE

Per capita water use declined 19% since 2005. Emissions, which are based on an estimate of energy used to pump, treat, and convey water from the water source to the City limits, dropped 96% between 2005 and 2019. The reduction is primarily due to the lower carbon intensity of electricity. The Marin Municipal Water District (MMWD) began purchasing MCE Deep Green electricity in mid-2017. The Sonoma County Water Agency (SCWA), which supplies approximately 24% of MMWD's water in 2019, uses renewable and carbon-free sources for its electricity needs; a small amount of emissions comes from stationary and mobile combustion of fuels used in SCWA's operations.

FIGURE 8: PER CAPITA WATER USE



Source: Marin Municipal Water District

MMWD provides rebates and programs to reduce water use. Rebates are available to replace fixtures with high-efficiency clothes washers and to purchase cisterns and rain barrels. MMWD provides free home and landscape water-use evaluations as well as free high-efficiency showerheads and faucet aerators. The City of San Rafael actively promotes water conservation and MMWD rebates and programs to residents and businesses.

APPENDIX: COMMUNITY INVENTORY

Community GHG Emissions Summary Table

Jurisdiction: City of San Rafael

Population: 60,207 (CA Department of Finance)

Number of Households: 23,136 (CA Department of Finance)

Inventory Year: 2019

Date Prepared: April 30, 2021

Reporting Framework: Communitywide Activities

ID	Emissions Type	Source or Activity	Included, Required Activities	Included, Optional Activities	Excluded (IE, NA, NO or NE)	Notes	Emissions (MTCO ₂ e)
1.0	Built Environment						
1.1	Use of fuel in residential and commercial stationary combustion equipment	Both	•				86,037
1.2	Industrial stationary sources	Source			NE		
1.3	Power generation in the community	Source			NO		
1.4	Use of electricity in the community	Activity	•			Includes transmission and distribution losses	25,464
1.5	District heating/cooling facilities in the community	Source			NE		
1.6	Use of district heating/cooling facilities in the community	Activity			NE		
1.7	Industrial process emissions in the community	Source			NO		
1.8	Refrigerant leakage in the community	Source			NE		
2.0	Transportation and Other Mobile Sources						
2.1	On-road passenger vehicles operating within the community boundary	Source			IE	Obtained data for preferred activity-based method instead	
2.2	On-road passenger vehicles associated with community land uses	Activity	•				161,106
2.3	On-road freight and service vehicles operating within the community boundary	Source			IE	Obtained data for preferred activity-based method instead	
2.4	On-road freight and service vehicles associated with community land uses	Activity	•				51,027
2.5	On-road transit vehicles associated with community land uses	Activity		•			2,004
2.6	Transit rail vehicles operating with the community boundary	Source		•			342
2.7	Use of transit rail travel by the community	Activity			NE		

2.8	Inter-city passenger rail vehicles operating within the community boundary	Source			NO		
2.9	Freight rail vehicles operating within the community boundary	Source			NO		
2.10	Marine vessels operating within the community boundary	Source			NE		
2.11	Use of ferries by the community	Activity			NE		
2.12	Off-road surface vehicles and other mobile equipment operating within the community boundary	Source		•			3,264
2.13	Use of air travel by the community	Activity			NE		
3.0	Solid Waste						
3.1	Operation of solid waste disposal facilities in the community	Source			NE		
3.2	Generation and disposal of solid waste by the community	Activity	•			Includes alternative daily cover	13,470
4.0	Water and Wastewater						
4.1	Operation of water delivery facilities in the community	Source			IE	Energy use is included in 1.1 and 1.4	
4.2	Use of energy associated with use of potable water by the community	Activity	•				89
4.3	Use of energy associated with generation of wastewater by the community	Activity	•			Energy use is included in 1.1 and 1.4	
4.4	Process emissions from operation of wastewater treatment facilities located in the community	Source			NE	Wastewater treatment facilities are located in the community but only process emissions associated with generation of wastewater by the community are reported in 4.5	
4.5	Process emissions associated with generation of wastewater by the community	Activity	•				501
4.6	Use of septic systems in the community	Source			NE		
5.0	Agriculture						
5.1	Domesticated animal production	Source			NE		
5.2	Manure decomposition and treatment	Source			NE		
6.0	Upstream Impacts of Communitywide Activities						
6.1	Upstream impacts of fuels used in stationary applications by the community	Activity			NE		
6.2	Upstream and transmission and distribution (T&D) impacts of purchased electricity used by the community	Activity			IE	Transmission and distribution losses included in 1.4	
6.3	Upstream impacts of fuels used by water and wastewater facilities for water used and wastewater generated within the community boundary	Activity			IE		
6.4	Upstream impacts of select materials (concrete, food, paper, carpets, etc.) used by the whole community.	Activity			NE		

Legend

IE – Included Elsewhere: Emissions for this activity are estimated and presented in another category of the inventory. The category where these emissions are included should be noted in the explanation.

NE – Not Estimated: Emissions occur but have not been estimate or reported (e.g., data unavailable, effort required not justifiable).

NA – Not Applicable: The activity occurs but does not cause emissions; explanation should be provided.

NO – Not Occurring: The source or activity does not occur or exist within the community.

Community Emissions Data Sources and Calculation Methodologies

Sector/ID	Emissions Source	Source and/or Activity Data	Emission Factor and Methodology
1.0 Built Environment			
1.1 Stationary Combustion	Stationary Combustion (CO ₂ , CH ₄ & N ₂ O)	Known fuel use (meter readings by PG&E) and estimated fuel use (American Community Survey 5-Year Estimates, and U.S. Energy Information Administration Household Site Fuel Consumption data).	Default CO ₂ , CH ₄ & N ₂ O emission factors by fuel type (U.S. Community Protocol v. 1.1, Appendix C, Tables B.1 and B.3). U.S. Community Protocol v. 1.1, Appendix C, Method BE.1.1 and BE.1.2.
1.4 Electricity Use	Electricity Use (CO ₂ , CH ₄ & N ₂ O)	Known electricity use (meter readings by PG&E and MCE) and estimated direct access electricity consumption.	Verified utility-specific emission factors (PG&E and MCE) and eGrid subregion default emission factors. U.S. Community Protocol v. 1.1, Appendix C, Method BE.2.1.
	Electric Power Transmission and Distribution Losses (CO ₂ , CH ₄ & N ₂ O)	Estimated electricity grid loss for Western region from eGrid.	U.S. Community Protocol v. 1.1, Appendix C, Method BE.4.1.
2.0 Transportation and Other Mobile Sources			
2.2 On-Road Passenger Vehicle Operation	On-Road Mobile Combustion (CO ₂)	Estimated passenger vehicle miles traveled associated with origin and destination land uses (Metropolitan Transportation Commission, http://capvmt.us-west-2.elasticbeanstalk.com/data).	CO ₂ for on-road passenger vehicles quantified in the EMFAC2017 model. Passenger vehicle emissions calculated according to U.S. Community Protocol v. 1.1, Appendix D, Method TR.1.A.
	On-Road Mobile Combustion (CH ₄ & N ₂ O)	Estimated vehicle miles traveled associated with origin and destination land uses (Metropolitan Transportation Commission, http://capvmt.us-west-2.elasticbeanstalk.com/data).	CH ₄ and N ₂ O for on-road passenger vehicles quantified in the EMFAC2017 model and adjusted for IPCC AR5 100-year values. Passenger vehicle emissions calculated according to U.S. Community Protocol v. 1.1, Appendix D, Method TR.1.A.
2.4 On-Road Freight and Service Truck Freight Operation	On-Road Mobile Combustion (CO ₂)	Estimated commercial vehicle miles traveled within the boundary (Metropolitan Transportation Commission utilizing Plan Bay Area 2040 and the 2017 Regional Transportation Plan).	CO ₂ for on-road commercial vehicles quantified in the EMFAC2017 model. Emissions allocated utilizing LEHD data according to U.S. Community Protocol v. 1.1, Appendix D, Method TR.2.A.
	On-Road Mobile Combustion (CH ₄ & N ₂ O)	Estimated commercial vehicle miles traveled within the boundary (Metropolitan Transportation Commission utilizing Plan Bay Area 2040 and the 2017 Regional Transportation Plan).	CH ₄ and N ₂ O for on-road commercial vehicles quantified in the EMFAC2017 model and adjusted for IPCC AR5 100-year values. Emissions allocated utilizing LEHD data according to U.S. Community Protocol v. 1.1, Appendix D, Method TR.2.A.
2.5 On-Road Transit Operation	On-Road Mobile Combustion (CO ₂)	Estimated vehicle miles traveled within the boundary (Marin Transit and Golden Gate Transit) and estimated diesel fuel efficiency for transit fleet (Golden Gate Transit). Fuel type provided by Marin Transit and Golden Gate Transit.	Renewable diesel emission factor provided by NEXGEN . U.S. Community Protocol v. 1.1, Appendix D, Method TR.4.A.
	On-Road Mobile Combustion (CH ₄ & N ₂ O)	Estimated vehicle miles traveled within the boundary (Marin Transit and Golden Gate Transit) and estimated diesel fuel efficiency for transit fleet (Golden Gate Transit). Fuel type provided by Marin Transit and Golden Gate Transit.	Renewable diesel emission factor provided by NEXGEN . U.S. Community Protocol v. 1.1, Appendix D, Method TR.4.B.

2.6 Passenger Rail	Mobile Combustion (CO ₂ , CH ₄ & N ₂ O)	Estimated train-miles by multiplying the number of train cars per day (in both directions, according to the SMART published schedule) by the railway track mileage located within the community boundary (Marin Map). Average Diesel Multiple Unit fuel efficiency provided by SMART.	U.S. Community Protocol v. 1.1, Appendix D, Method TR.5. Emission factors from Equation TR.5.2.
2.12 Off-Road Vehicles and Equipment	Off-Road Mobile Combustion (CO ₂)	Estimated fuel use from OFFROAD 2007 for Lawn and Garden and from OFFROAD2017 for Construction equipment. All categories are allocated by share of countywide households.	CO ₂ emissions calculated according U.S. Community Protocol v. 1.1, Appendix D, Method TR.8. Emission factors provided in Table TR.1.6.
	Off-Road Mobile Combustion (CH ₄ & N ₂ O)	Estimated fuel use from OFFROAD 2007 for Lawn and Garden and from OFFROAD2017 for Construction equipment. All categories are allocated by share of countywide households.	CH ₄ and N ₂ O emissions calculated according to U.S. Community Protocol v. 1.1, Appendix D, Method TR.8. Emission factors provided in the Local Government Operations Protocol Table G.11 and G.14.
3.0 Solid Waste			
3.2 Solid Waste Generation and Disposal	Fugitive Emissions from Landfilled Waste (CH ₄)	Estimated landfilled tons based on reporting to CalRecycle by Marin County Solid and Hazardous Waste JPA and allocated to jurisdiction based on share of countywide population. Waste characterization based on the Statewide Waste Characterization Study (2008 and 2014) and Alternative Daily Cover by Jurisdiction of Origin and Material Type as reported to CalRecycle.	Emission factors calculated utilizing U.S. Community Protocol for Accounting and Report of Greenhouse Gas Emissions, Version 1.1, July 2013, Appendix E, Method SW.4.
4.0 Water and Wastewater			
4.2 Water Supply & Conveyance, Treatment and Distribution	Electricity Use (CO ₂)	Water consumption data provided by Marin Municipal Water District (MMWD). Electricity consumption data provided by MMWD. Sonoma County Water Agency (SCWA) delivery amount provided by SCWA .	Verified utility-specific emission factors (PG&E, MCE and SCWA). Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.14.
	Electricity Use (CH ₄ & N ₂ O)	Water consumption data provided by Marin Municipal Water District (MMWD). Electricity consumption data provided by MMWD.	eGrid subregion default emission factors. Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.14.
4.5 Treatment of Wastewater	Stationary Emissions from Combustion of Digester Gas (CH ₄)	Known amount of digester gas produced per day and known percent of methane in digester gas provided by Central Marin Sanitation Agency. Known amount of digester gas produced per day (2016) and known percent of methane in digester gas (2017) provided by Las Gallinas Valley Sanitary District.	Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.1.a.
	Stationary Emissions from Combustion of Digester Gas (N ₂ O)	Known amount of digester gas produced per day and known percent of methane in digester gas provided by Central Marin Sanitation Agency. Known amount of digester gas produced	Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.2.a.

		per day (2016) and known percent of methane in digester gas (2017) provided by Las Gallinas Valley Sanitary District.	
	Process Emissions from Wastewater Treatment Plant without Nitrification or Denitrification	Estimated population served by wastewater treatment plant provided by Central Marin Sanitation Agency.	Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.8.
	Process Emissions from Wastewater Treatment Plant with Nitrification or Denitrification	Estimated population served by wastewater treatment plant provided by Las Gallinas Valley Sanitary District (2010 data).	Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.7.
	Fugitive Emissions from Effluent Discharge (N ₂ O)	Estimated population served by wastewater treatment plant provided by Central Marin Sanitation Agency. Assumed significant industrial or commercial input.	Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.12(alt).
	Fugitive Emissions from Effluent Discharge (N ₂ O)	Estimated population served by wastewater treatment plant provided by Las Gallinas Valley Sanitary District. Assumed no significant industrial or commercial input.	Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.12.



2021-2023 Two-Year Sustainability Program Priorities

CCAP 2030 Goal: 40% reductions in greenhouse gas emissions from 1990 levels (GHG's)

2019-2021 Accomplishments

GENERAL

- Secured Beacon Award for Interim Accomplishments in energy savings from the Institute for Local Government

LOW-CARBON TRANSPORTATION

- Installed 6 electric vehicle chargers at City Hall
- Streamlined our electric vehicle charger permit process and offered template to other cities and towns
- Switched to Renewable Diesel for all City diesel vehicles, including fire trucks
- Hosted a Bike to the Ballpark event with Transportation Authority of Marin and the San Rafael Pacifics
- Promoted transit, electric vehicle, and e-bike events, incentives, and programs

ENERGY EFFICIENCY & RENEWABLE ENERGY

- Conducted audits of City facilities and launched an energy efficiency retrofit project at two facilities
- Promoted County-wide Electrify Marin rebate program and technical resources, MCE Deep Green and PG&E Solar Choice renewable electricity programs, and home energy workshops

WASTE REDUCTION

- Continued to host a Climate Corps Fellow to assist with zero waste programs, including single-use take-out plastics reduction at restaurants, illegal dumping programs and outreach, waste reduction activities in City facilities, and other community outreach activities
- Partnered with the Mattress Recycling Council to offer bulky item drop-off events in the Canal neighborhood with a focus on mattress recycling
- Created compliance process, website and support resources including how-to videos for businesses to comply with AB 1826 mandatory organics recycling law
- Created new surplus equipment policy focused on reuse

WATER CONSERVATION

- Created web resources for water conservation, including Mayor's Water Conservation Pledge

SEQUESTRATION AND ADAPTATION

- Started adaptation and resilience planning with the County of Marin and community partners
- Created CityofSanRafael.org/Adaptation web resource pages
- Assisted with creation of General Plan documents related to flooding and sea level rise
- Participated in regional planning collaboratives with Bay Conservation and Development Commission, Bay Area Climate Adaptation Network and Bay Adapt
- Planted 100 trees in collaboration with State agencies and community volunteers



SAN RAFAEL

THE CITY WITH A MISSION

COMMUNITY ENGAGEMENT

- Created Climate Role Model program for CCAP website, featuring local businesses, nonprofits, and individuals taking climate action.
- Created several Waste Wise Business Spotlight case studies to support commercial recycling
- Supported Chamber Green Business Committee and green business events, including Marin Sustainable Enterprise Conference and Green Business Program offerings
- Supported Resilient Neighborhoods by hosting and promoting classes through Recreation
- Continued active engagement with Marin Climate and Energy Partnership as well as community partners and programs such as Bike to Work Day, Canal Community Resilience Council, Drive Clean Marin, Marin Commutes, and Sustainable San Rafael among others
- Established a core team and framework for an Equitable Low-Carbon Economy Working Group

2021-2023 Two-Year Sustainability Program Priorities

CCAP 2030 Goal: 40% reductions in greenhouse gas emissions from 1990 levels (GHG's)

DRAFT PRIORITIES

ACTION STRATEGY	OBJECTIVES
1. Zero Emission Vehicles Policies and Programs	Develop and begin to implement a San Rafael Electric Vehicle Strategy
	Continue to transition fleet to low-carbon alternatives
	Promote Drive Clean Marin and other low-carbon transportation programs
	Develop policies to reduce off-road emissions and electrify equipment
2. Mandatory Recycling and Organics	Develop and adopt ordinance and implement programs for SB 1383 compliance in conjunction with Marin Sanitary Service and other agencies
	Identify opportunities for organic waste diversion that also sequesters carbon
3. Adaptation Planning	Secure funding and conduct adaptation planning process with focus on environmental justice & sea level rise
	Begin comprehensive adaptation planning with county-wide coordination
4. Microgrids Assessment and Development	Develop an analysis of opportunities for municipal and community microgrids with a special focus on underserved communities
	Seek funding to implement a microgrid project with community partners such as MCE Clean Energy
5. Building Energy Efficiency & Electrification	Work with Marin Energy Watch Partnership to promote energy efficiency & electrification
	Adopt new Green Building Code with analysis/option of all-electric and other reach codes
	Identify & include incentives & technical assistance with permit requirements
6. Equitable Low Carbon Economy	Convene thought leader team to develop plan of action
	Conduct specific, time-limited business engagement to develop a work plan and recommendations



1. Zero Emission Vehicles Policies and Programs Cost & Benefits Snapshot

Potential GHG Reduction

30,345 MTCO₂e, or about 31% of the City's total 2030 reductions goal.

Summary

Measure LCT-C1: *Develop a Zero Emission Vehicle Plan that will result in 25% of passenger vehicles in San Rafael to be zero emission vehicles (ZEVs), including plug-in electric vehicles (EVs) and hydrogen fuel cell electric vehicles, by 2030.* This item includes 13 actions the City could do to decrease emissions by helping to increase the number of ZEVs in use by residents and businesses in San Rafael. Some actions will require additional analysis. The first step in completing this early priority item will be to develop the ZEV Plan, which would incur no costs other than staff time, and requires no additional staff resources than currently allocated. Additional efforts include promoting ZEV incentives and campaigns and developing policies to reduce off-road emissions and increase the availability of electric vehicle chargers in strategic locations. An update to the City's Fleet Policy will be conducted as well.

Funding

No cost to the City for developing the Strategy or the Fleet Policy, and staff is already working closely with the Transportation Authority of Marin and Marin Climate and Energy Partnership to develop a Countywide Strategy that San Rafael can participate in. Direct costs to the City for implementation will likely include installation of EV chargers and wayfinding and parking signage. Potential costs include trenching, wiring, electrical upgrades, installation, and parking infrastructure changes. Most, if not all, of these costs can be offset by grants and incentives from PG&E, MCE Clean Energy, the Transportation Authority of Marin, the Bay Area Air Quality Management District, the State, and other agencies or programs. All current charger installations all been funded in this way, although ongoing maintenance falls to the General Fund and Parking Services. The majority of the ZEV Plan's actions, such as the development of policies and ordinances and participation in outreach and behavior change campaigns, will be carried out by staff and community partners and will not incur additional costs to the City at this time.

Economy and Social Equity

Potential opportunities and impacts to the local economy include additional costs to builders, property owners and developers for installing the wiring and infrastructure necessary to meet new mandates. However, there are a variety of rebates and incentives available to help offset those costs in situations where there is multi-family or workplace parking. In addition, the addition of EV chargers may increase property values, especially as ZEVs gain in popularity and demand. Currently, a ZEV costs more than a

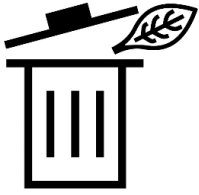
similar internal combustion engine model, but the annual cost of ownership is lower because electricity is cheaper than gas, and ZEVs do not require oil changes and other types of maintenance.¹

Currently there is very little opportunity for residents of multifamily dwellings to charge vehicles at home. Having more EV charger availability in apartment complexes, public parking lots, and workplace settings will enable renters to acquire EVs and plug-in hybrids. Local sales and tax revenue could go up or down slightly depending on availability of ZEVs at local dealers and rate of adoption. There will also be indirect market benefits to local contractors who will be providing services and supplies for these efforts. There are also State and regional programs and incentives directed at lower-income individuals and renters to purchase ZEVs. And MCE Clean Energy offers multifamily charger rebates as well.

Co-Benefits

The primary benefit for this activity is to make it easier for citizens to get charging for electric vehicles and to remove obstacles to citizens' ability to acquire electric vehicles. Co-benefits include health benefits from less particulate matter and airborne pollutants, including volatile organic compounds, nitrogen oxides, carbon monoxide, and sulfur dioxide. In addition, there are opportunities to aid in simplifying permitting and procedures for other construction permits, increased customer satisfaction at the counter, and less time and expense for vehicle maintenance for consumers since EVs do not require oil and filter changes.

¹ Borlaug et al., Joule 4, 1470–1485
July 15, 2020 a 2020 Elsevier Inc. <https://doi.org/10.1016/j.joule.2020.05.013>



2. Mandatory Recycling and Organics Cost & Benefits Snapshot

Potential GHG Reduction

9,680 MTCO₂e, or about 10% of the City's total 2030 reductions goal.

Summary

WR-C4: *Adopt an ordinance requiring mandatory subscription to and participation in waste diversion activities, including recycling and organics collection provided by Marin Sanitary Service. Consider including phased implementation of the ordinance, penalties, and practical enforcement mechanisms.* With the passage of SB 1383 the State is requiring local jurisdictions to pass enforceable local recycling and organics diversion mandates by January 1, 2022. This item would require an analysis of the challenges and opportunities here in San Rafael, including the potential of partnering with the other agencies that have solid waste franchises with Marin Sanitary Service (MSS). There is a need for more capacity for the anticipated large quantities of organic material that is mandated to be diverted from landfills, as well as for the recovery of edible food, also mandated by SB 1383. Having more local facilities to process organic materials, potentially in a way that produces energy or sequesters carbon could offer multiple benefits. Coordination Countywide will be essential to enable adequate recovery of edible food through programs such as ExtraFood.org. In addition, the City will be required to purchase certain amounts of compost and mulch generated by the law as a way of creating demand and enabling a circular economy around organic materials.

Funding

Typically, funding for an analysis that would affect ratepayers is conducted through the rates and has no direct cost to the City. An analysis is underway in conjunction with the other MSS franchisors in the range of \$155,000 which will be shared equitably between ratepayers of all jurisdictions. The near-term rate impact relating to planning for SB 1383 compliance is anticipated to be in the .08 to .3% range depending on the outcome of a Zero Waste Marin funding proposal. Actual and ongoing implementation of the law will most likely have an additional, significant, and as of yet unknown cost to the City and ratepayers, which will be determined during upcoming compliance planning efforts.

Economy and Social Equity

Potential opportunities and impacts to the local economy include increased costs of doing business for commercial customers, the potential of increased or decreased rates for customers depending on how much they can reduce their landfill garbage service, and the potential for new types of business that could serve solid waste generators with large amounts of organic materials. Potentially, extra costs of doing business may be passed along to customers or even to renters in multifamily dwellings. Program development should focus on ways to mitigate potential costs to the most economically



disadvantaged. Local facilities and programs to manage, sort, and process the increase in organic materials could provide new local jobs.

Co-Benefits

There could be co-benefits from working together more closely on recycling and diversion activities county-wide by making it easier for the public to understand and comply, and by providing more opportunities for adequate recycling. Increased recycling and composting saves landfill space and lengthens the amount of time we are able to use our local landfill. New, local business models to address increased amounts of edible food recovery and organic materials recovery could provide jobs for local residents. The establishment of new, local facilities to process organic food waste, and/or the processing of woody materials removed through fire prevention efforts could create energy such as is being done at Central Marin Sanitation Agency or be dispersed on local farmland and open space to sequester carbon as is being done by the Marin Carbon Project.



3. Adaptation Planning Cost & Benefits Snapshot

Summary

SA-C4: *Prepare for and adapt to a rising sea level.* **SA-C5:** *Prepare for and respond to the expected impacts of climate change.* These items represent San Rafael’s commitment to prepare for the effects of climate change, some of which are already upon us: rising seas and increased flooding, drought, health impacts from extreme heat and poor air quality, and the increased likelihood and prevalence of wildfires and landslides. Many projects and resources are available to San Rafael including the County’s BayWAVE sea level rise vulnerability assessment, San Rafael’s General Plan 2040 and the Resilient by Design Challenge project focused on East San Rafael among others. The first step for this early priority item is to identify funding to continue the work that’s already been done toward developing a full-fledged adaptation plan. Simultaneously the City needs to work Countywide and regionally and seek effective means of coordination and collaboration, specifically through alignment in our Local Hazard Mitigation Plans.

Funding

Costs to develop an adaptation plan that prepares for multiple hazards could be in the several hundreds of thousands of dollars, which are currently not budgeted and to which there is no current revenue source. However, there are a number of funding sources available, mostly grants, that could be leveraged from State agencies such as the State Coastal Conservancy, from private foundations such as the Marin Community Foundation, and from a variety of other sources such as Prop 1 and Prop 68 funds, Measure AA, and the Funders’ Network among others. Staff will work with our community partners to identify funding to accomplish this measure. This item does not include implementation of adaptation measures, which will require multiple millions of dollars and new funding models.

Economy and Social Equity

The potential negative impacts to San Rafael are significant and daunting. Studies show a potential loss to property of [\\$7 billion](https://baykeeper.org/shoreview/economic-loss.html)² to San Rafael during a significant flood event with a three-foot rise in sea levels. Those most vulnerable are often those with the least means to respond and recover: those with limited income, resources and local support systems, including residents of the Canal Neighborhood, older adults, and people with disabilities. Efforts to plan for adaptation and resilience must prioritize those most vulnerable and with the least means. Fortunately, State guidance and funding mechanisms are most often now placing priority on or mandating that funding recipients have robust social equity components in their projects. San Rafael has already done a lot in this area and is building our capacity to engage and include low income and communities of color in our planning efforts.

² <https://baykeeper.org/shoreview/economic-loss.html>

Co-Benefits

Increasingly, insurers are looking at climate change in their policies and portfolios. Cities with adequate climate action and adaptation strategies and implementation will be better able to continue to sell bonds for projects and maintain good credit ratings. As planning and projects go forward there is potential for people in hazard zones that are being addressed to escape higher premiums or discontinuance of coverage. All planning efforts should look at co-benefits that also reduce greenhouse gas emissions or provide other short-term needs while planning for long-term impacts. For example, when looking at energy resilience, there are opportunities to not only provide for electricity during a disaster, but also provide it at lower costs and through renewable means, providing benefit to the community outside of a disaster scenario. In addition, infrastructure projects to protect areas of San Rafael will require labor and could provide jobs with valuable skills training for local residents and contractors.



4. Microgrids Assessment and Development Cost & Benefits Snapshot

Potential GHG Reduction

10,940 MTCO₂e, or about 11% of the City's total 2030 reductions goal.

Summary

RE-C1: Renewable Energy Generation *Accelerate installation of residential and commercial solar and other renewable energy systems.* **RE-C4: 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.* **RE-M1: 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.* These measures and the activities associated with them aim to reduce the carbon intensity of electricity being delivered to homes, businesses, and municipal buildings here in San Rafael while increasing resiliency in the face of energy disruptions. The City and its partners will need to assess current barriers and opportunities to the installation of solar energy and battery backup systems to identify opportunities for facility or community microgrids. The City has done initial assessments and has begun to partner with our utilities and agency partners such as PG&E, MCE Clean Energy, and the Marin Climate and Energy Partnership (MCEP) to identify opportunity sites, funding, and technical assistance.

Funding

Initial costs associated with this effort are minimal and mostly comprise staff time commitment from the Sustainability Program and community and utility partners. The cost of solar is at all-time lows and residents and businesses that have adequate space, sun exposure, and energy offset potential can recoup their costs fairly quickly. However, the costs for battery storage are significant. The State and California Public Utilities Commission are putting together programs, technical assistance, and funding opportunities to enable more microgrids and new technologies to contend with public safety power shutoffs and other power disruptions, particularly in disadvantaged communities. Should opportunities for the City be identified, grants would be sought to offset costs. Other funding mechanisms include on-bill financing and other zero-to-low interest loans and would most likely be brought to Council for approval. Community microgrid projects would require funding by utilities, property owners, and through loans and grants and would not require City funding.

Economy and Social Equity

Renewable energy generally is a net benefit financially to adopters. For example, most solar projects include return on investment that amplifies over time reducing energy costs for the building owners. There are a variety of funding mechanisms that can allow property owners to own, lease, or procure



solar through power purchase agreements with no money down such as the City did with its four municipal solar installations. Solar energy systems on affordable housing can be a great benefit to renters, especially if they participate in payment of electricity. However, there is usually a “split incentive” in that property owners do not see the financial benefits of the solar they install if renters are paying the bills. Thus, the incentive is minimal and often requires additional encouragement. Nonprofit housing collaboratives currently tend to have more interest and incentives as exemplified in the Canal Alliance’s property that was a beneficiary of a Grid Alternatives solar project.³

Co-Benefits

Solar rooftop systems and local solar with energy storage have the potential to increase local energy resilience during a disaster. They also provide a hedge against increases in electricity rates. Less fossil-fuel based electricity reduces overall pollution and their associated health impacts, which tends to benefit lower-income communities that are often located closer to energy generation plants.⁴ New State legislation to recycle solar panels and batteries could provide new jobs and a circular economy locally and will be explored in the economic working group in Priority 6.

³ News Release “Marin Residents and Local Nonprofits Join Together to Bring Solar Energy to Recent Immigrants”
<https://gridalternatives.org/sites/default/files/Solar%20for%20Canal%20Alliance%20Press%20Release.pdf>

⁴ PSE Healthy Energy “Natural Gas Powerplants in California’s Disadvantaged Communities”, April 2017
https://www.psehealthyenergy.org/wp-content/uploads/2017/04/CA.EJ_Gas_Plants.pdf



5. Building Energy Efficiency and Electrification Cost & Benefits Snapshot

Potential GHG Reduction

18,280 MTCO₂e, or about 19% of the City's total 2030 reductions goal.

Summary

EE-C4: 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.* **EE-C5: 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. Work county-wide to make it easier for contractors and building counter staff to simplify applications and identify incentives.*

Every three years the State of California updates the Green Building codes and local governments have the opportunity to go beyond by adopting stronger reach codes. These two CCAP 2030 measures go hand-in-hand in trying to build a customer experience that removes barriers to adoption of green building practices while meeting or exceeding new State building code requirements. The County of Marin led a county-wide effort to help cities achieve our GHG reduction goals while ensuring a positive experience for builders and property owners and has developed a model ordinance San Rafael should consider. In addition, the Green Building codes will be revised in 2022 and there will be opportunities for San Rafael to consider all-electric building requirements as well as reach codes for electric vehicle chargers among other things.

Funding

Currently there are no costs associated with this effort other than staff time commitment from the Building Division and the Sustainability Program. Staff will leverage the work being done and coordinated by the County, the Marin Climate and Energy Partnership, and the Bay Area Regional Energy Network (BayREN). Should there be activities identified that would incur costs, funding would be identified from department budgets, grant or other external sources, or for significant program costs would be brought to City Council for approval first.

Economy and Social Equity

There are some concerns that increased costs associated with green building codes could add to the costs of an already expensive real estate market. As a percentage, Green Building reach codes have been estimated to add 1-2% to construction costs in California.⁵ However, net operating costs are lowered, and when these costs are reduced, the value of a commercial project increases while occupancy costs decrease.⁶ Therefore, reach codes should ideally seek to reduce ongoing costs of ownership to balance out any increased cost in rents. When it comes to the built environment, programs like MCE Clean Energy's Green and Healthy Homes program should be supported to assist with getting renters healthier and more efficient homes while reducing energy bills. Additionally, there are rebates and incentives available for many types of green building measures such as energy efficient lighting and low-flow fixtures.

Co-Benefits

There are many potential co-benefits to Green Building reach codes beyond the long-term occupancy savings, including having healthier, more efficient homes, better heating, less indoor air pollution, among others. In addition, there are other GHG reduction benefits outside of building energy due to the codes, including less water use, less emissions from waste disposal, and reduction in transportation related GHGs. Finally, many CalGreen mandates have co-benefits relating to other environmental impacts studied in Environmental Impact Reports, such as reducing water demand, criteria air pollutants, and waste disposal.⁷ Work on this program in combination with the permit and process streamlining already in-process at the City will continue to improve the public user experience and staff satisfaction as well.

⁵ Steve Pellegren, "Sustainability Is Vital, but Adds To the Cost of Building In California", National Real Estate Investor, October 26, 2015 <https://www.nreionline.com/multifamily/sustainability-vital-adds-cost-building-california>

⁶ Nora Knox, "Green Building Costs and Savings", U.S. Green Building Council, March 25, 2015 <https://www.usgbc.org/articles/green-building-costs-and-savings>

⁷ Louise Mazingo & Ed Arens, "Quantifying the Comprehensive Greenhouse Gas Co-Benefits Of Green Buildings", Center for Environmental Design, UC Berkeley, October 24, 2014. <https://ced.berkeley.edu/research/faculty-projects/water-waste-transportation-benefits-green-buildings>



6. Equitable Low Carbon Economy Cost & Benefits Snapshot

Summary

CE-C4: Innovation and Economic Development: *Convene an economic development and innovation working group to explore public-private partnerships and develop ways to decarbonize our local economy while spurring sustainable enterprise and equitable employment.* This measure will allow the City to leverage the talents of local business owners and managers, thought leaders, and regional subject matter experts to understand what the opportunities are for San Rafael to create a low-carbon economy. This will involve convening a working group and engaging leaders in local business, workforce development, nonprofit, and economic development in a time-limited, facilitated engagement to identify key recommendations, work projects, and funding mechanisms to help San Rafael strengthen our local economy with a focus on sustainability and good, local jobs.

Funding

Costs associated with this effort include hiring a facilitator and providing adequate supplies and food and beverage for gatherings and presentations, estimated at \$10,000. This has been included in the proposed Sustainability Program budget for fiscal year 2021-2022. It should be noted that both the State and Federal government are proposing budget measures to support the green economy and pathways to good employment that we hope to position San Rafael for through this process.

Economy and Social Equity

The marriage of economy and social equity is nowhere as evident and necessary as with this CCAP 2030 measure, and a successful low-carbon economy will most likely require good, green jobs and training programs. Enhanced economic activity should benefit as many as possible. Marin is home to many potential partners to assist, including the College of Marin, Dominican University, Marin Economic Forum, Canal Alliance, Community Action Marin, MCE Clean Energy, Marin Community Foundation, the Workforce Alliance of the North Bay, Conservation Corps North Bay, Multicultural Center of Marin, and others, including partners in Sonoma.

Co-Benefits

There are many potential co-benefits to strengthening and diversifying our local economy and prioritizing innovation and emissions reductions. These include benefits to ecosystem resilience, trade, employment, health, energy security, and business competitiveness. In addition, efforts to build collaborations have other benefits to the City and community including new opportunities for public-private partnerships, enhanced community engagement opportunities for other programs and projects, and infusion of expertise and insights into City processes and services.