# FAIRFAX TOWN COUNCIL MEETING STAFF REPORT

**MEETING DATE:** March 6, 2024

**PREPARED FOR:** Mayor and Town Council

**PREPARED BY:** Sean Youra, Climate Action Coordinator

**SUBJECT:** Receive 2022 Fairfax GHG Inventory Report and Presentation

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**RECOMMENDATION**

Receive 2022 Fairfax GHG Inventory report and presentation (Attachments A and B).

**BACKGROUND**

Each year, greenhouse gas (GHG) inventory reports are completed for all Marin Climate & Energy Partnership (MCEP) member jurisdictions including Fairfax. These reports are prepared by Christine O'Rourke, Sustainability Coordinator for MCEP, with review and feedback from staff. Annual GHG inventories help the Town to monitor its progress in meeting its local GHG reduction goal to reduce emissions to zero by 2030 and meeting the statewide goal to reduce emissions 40 percent below 1990 levels by 2030. The inventories calculate individual GHGs (e.g., carbon dioxide, methane, and nitrous oxide) and convert each GHG emission to a standard metric, known as "carbon dioxide equivalents" or CO2e, to provide an apple-to-apples comparison among the various emissions. GHG emissions are reported as metric tons of carbon dioxide equivalents, or MTCO2e.

The inventories include emissions generated from the community that are categorized into seven sectors:

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

Consumption-based emissions such as from air travel and the production of goods produced outside the Town are not included in the inventories.

**DISCUSSION**

The latest Fairfax GHG inventory report for which data is available for the year 2022 is attached. Emissions decreased by 31 percent in 2022 compared to 2005 emissions levels, and 19 percent compared to 1990 levels. Fairfax still needs to reduce emissions by 28,009 MTCO2e to meet its local target of zero emissions in 2030 and 7,370 MTCO2e to meet the State target for 2030. Table 2 in the

report shows the emissions from each sector from 2005 through 2022. Fairfax has been making steady progress in reducing emissions with an average three percent reduction per year over the past couple of years.

The largest emissions reductions have occurred in the Built Environment – Electricity sector and Transportation sector. Emissions from purchased electricity consumption have declined 90 percent since 2005 largely due to the lower carbon intensity of electricity as PG&E electricity was 95 percent GHG-free in 2022 and MCE Light Green electricity was 95 percent GHG-free in 2022. Reductions in transportation emissions have largely resulted from the steadily increasing proportion of registered zero-emissions vehicles (ZEVs) including in Fairfax with about 6.2 percent of registered light-duty vehicles being ZEVs in 2022. The transportation sector continues to be the largest sector in terms of total emissions in Fairfax, accounting for 56 percent of emissions, followed by the Built Environment – Natural Gas sector at 35 percent of total emissions.

To meet both the Town and State GHG reduction targets for 2030, the Town will need to prioritize actions that reduce emissions from both the Transportation and Built Environment – Natural Gas sectors.

**FISCAL IMPACT**

None

**ATTACHMENTS**

A. 2022 GHG Inventory Report
B. Presentation Slides

# TOWN OF FAIRFAX

## GREENHOUSE GAS INVENTORY FOR COMMUNITY EMISSIONS FOR THE YEAR 2022

January 2024

Prepared by the
Marin Climate & Energy Partnership

MARIN CLIMATE & ENERGY PARTNERSHIP

# Table of Contents

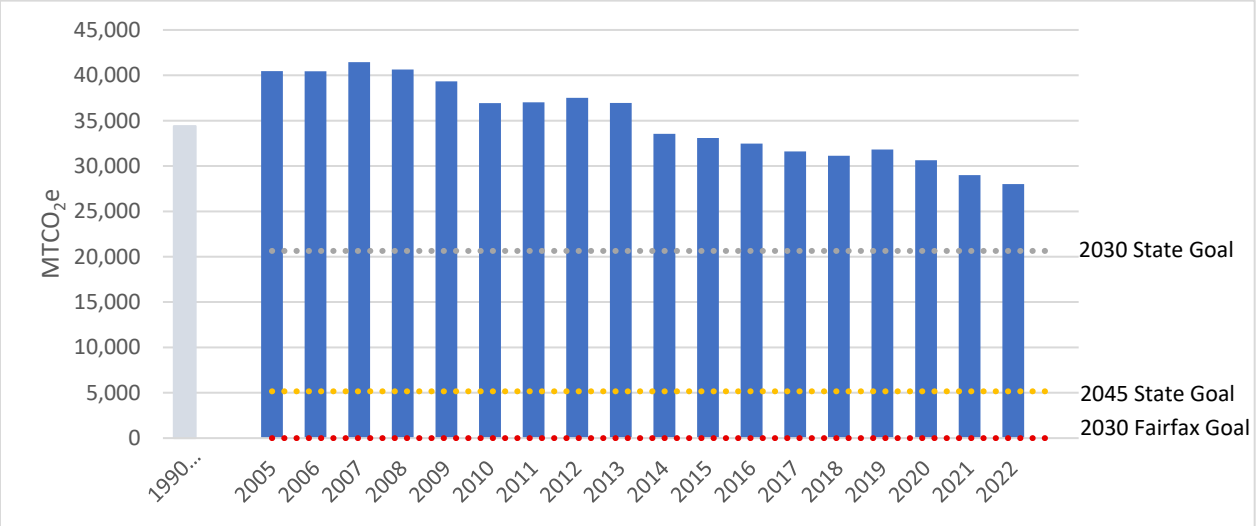
# EXECUTIVE SUMMARY

The Takeaway: Fairfax needs to accelerate emissions reductions from transportation and the built environment. Though community emissions are down 31% from 2005, the community still needs to reduce emissions another 69% to meet its local goal by 2030.

Fairfax publishes annual community greenhouse gas (GHG) emissions estimates through the Marin Climate & Energy Partnership (MCEP). Annual inventories help the Town to monitor its progress more closely in meeting its local GHG reduction goals to reduce emissions to zero by 2030 and to meet the statewide goal to reduce emissions 40% below 1990 levels by 2030. In addition to the community inventories, MCEP periodically prepares inventories for government operations emissions. 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 2022, the most recent year data is available. The inventory shows that the Fairfax community reduced emissions 31% since 2005, which is equivalent to 19% below estimated 1990 levels. Emissions dropped from about 40,468 metric tons carbon dioxide equivalents ($MTCO_2e$) in 2005 to 28,009 $MTCO_2e$ in 2022. The community emissions trend and targets are shown below in Figure 1. Fairfax needs to reduce emissions another 7,370 $MTCO_2e$ to meet the State target for 2030 and another 22,849 $MTCO_2e$ to meet the State's net zero emissions target for 2045, which includes a GHG mitigation target of 85% below 1990 levels.

FIGURE 1: FAIRFAX 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 Town of Fairfax 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 Fairfax community in 2022. 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. In particular, the Metropolitan Transportation Commission released an updated traffic model in 2023, which raised vehicle miles traveled (VMT) estimates after 2015.

## GENERAL METHODOLOGY

This inventory uses national standards for the accounting and reporting of greenhouse gas emissions. The U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, version 1.2 (July 2019) was used for the quantification and reporting of community emissions. 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, and gallons of diesel or gasoline – by emissions factors specific to the energy 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 – e.g., carbon dioxide, methane, and nitrous oxide – and converts each greenhouse gas emission to a standard metric, known as "carbon dioxide equivalents" or $CO_2e$, 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. 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 $MTCO_2e$.

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 treatment | 28 |
| **Nitrous Oxide** | $N_2O$ | Combustion, wastewater treatment | 265 |

*Source: IPCC Fifth Assessment Report (2014)*

### 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 leaked refrigerants and 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, consumption-based 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 Fairfax community resulted in approximately 40,468 metric tons of $CO_2e$.[1] In 2022, those activities resulted in approximately 28,009 metric tons of $CO_2e$, a reduction of 31% from 2005 levels, which is equivalent to 19% 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 Fairfax homes and commercial, industrial, and governmental buildings and facilities.
- The **Built Environment – Natural Gas** sector represents emissions generated from the use of natural gas in Fairfax 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 Fairfax, as well as tailpipe emissions generated by medium and heavy-duty vehicles travelling on Marin County roads based on the Town's share of certain truck-generating industries. Emissions from buses serving Fairfax while travelling on roads within the jurisdiction are also included. Electricity used to power electric vehicles is embedded in electricity consumption reported in the Built Environment – Electricity sector.
- 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 Fairfax water users.
- The **Wastewater** sector represents stationary, process and fugitive greenhouse gases that are created during the treatment of wastewater generated by the community, as well as emissions created from electricity used to convey and treat wastewater.

Table 2 shows how emissions in each sector have changed since 2005. The greatest reductions have occurred in the Built Environment - Electricity sector (-5,855 $MTCO_2e$), followed by the Transportation sector (-3.434 $MTCO_2e$).

[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.

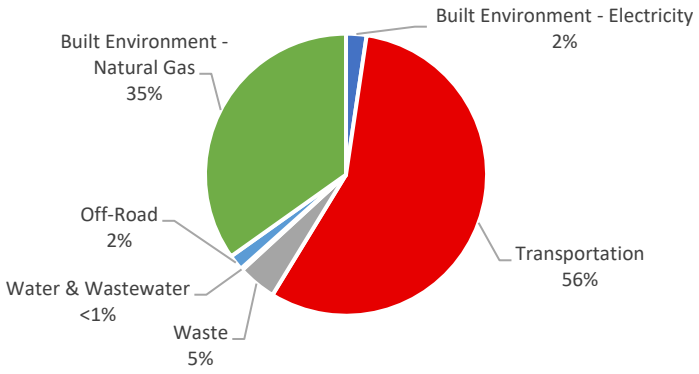
TABLE 2: EMISSIONS SUMMARY BY SECTOR ($MTCO_2E$), 2005 THROUGH 2022

| Year | Built Environment - Electricity | Built Environment – Natural Gas | Transportation | Waste | Off-Road | Water | Wastewater | Total | % Change from 2005[1] | % Change from 1990 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1990 (est.)[1] | | | | | | | | 34,398 | | |
| 2005 | 6,513 | 11,089 | 19,226 | 2,450 | 715 | 305 | 170 | 40,468 | | |
| 2006 | 6,007 | 11,461 | 19,360 | 2,433 | 749 | 267 | 164 | 40,442 | 0% | |
| 2007 | 7,578 | 11,185 | 19,042 | 2,190 | 881 | 359 | 206 | 41,442 | 2% | |
| 2008 | 7,593 | 11,153 | 18,795 | 1,825 | 730 | 331 | 211 | 40,639 | 0% | |
| 2009 | 7,068 | 10,970 | 18,586 | 1,574 | 620 | 334 | 187 | 39,339 | -3% | |
| 2010 | 5,299 | 11,246 | 17,941 | 1,548 | 558 | 192 | 153 | 36,937 | -9% | |
| 2011 | 4,670 | 11,753 | 18,264 | 1,508 | 541 | 136 | 142 | 37,015 | -9% | |
| 2012 | 4,979 | 11,277 | 18,868 | 1,560 | 530 | 146 | 150 | 37,511 | -7% | |
| 2013 | 4,464 | 11,278 | 18,778 | 1,582 | 526 | 170 | 148 | 36,946 | -9% | |
| 2014 | 3,886 | 9,430 | 17,845 | 1,591 | 521 | 152 | 126 | 33,551 | -17% | |
| 2015 | 3,709 | 9,582 | 17,395 | 1,648 | 517 | 119 | 124 | 33,095 | -18% | |
| 2016 | 3,008 | 9,787 | 17,025 | 1,941 | 511 | 89 | 113 | 32,474 | -20% | |
| 2017 | 1,462 | 10,464 | 17,042 | 2,022 | 502 | 26 | 84 | 31,601 | -22% | |
| 2018 | 1,608 | 10,260 | 16,902 | 1,791 | 489 | 9 | 75 | 31,134 | -23% | |
| 2019 | 1,792 | 10,335 | 17,458 | 1,700 | 474 | 10 | 63 | 31,831 | -21% | -7% |
| 2020 | 1,178 | 10,187 | 17,179 | 1,571 | 452 | 0 | 63 | 30,631 | -24% | -11% |
| 2021 | 1,094 | 9,996 | 16,080 | 1,295 | 476 | 0 | 63 | 29,003 | -28% | -16% |
| 2022 | 657 | 9,756 | 15,793 | 1,243 | 499 | 0 | 62 | 28,009 | -31% | -19% |
| Change from 2005 | -5,855 | -1,333 | -3,434 | -1,207 | -217 | -305 | -108 | -12,459 | | |
| % Change from 2005 | -90% | -12% | -18% | -49% | -30% | -100% | -64% | -31% | | |

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

Figure 2 shows the relative contribution of emissions from these sectors in 2022. Transportation emissions represent the largest share of communitywide emissions (56%), while the use of natural gas and propane in the Built Environment accounts for 35% of emissions.

FIGURE 2: EMISSIONS BY SECTOR, 2022

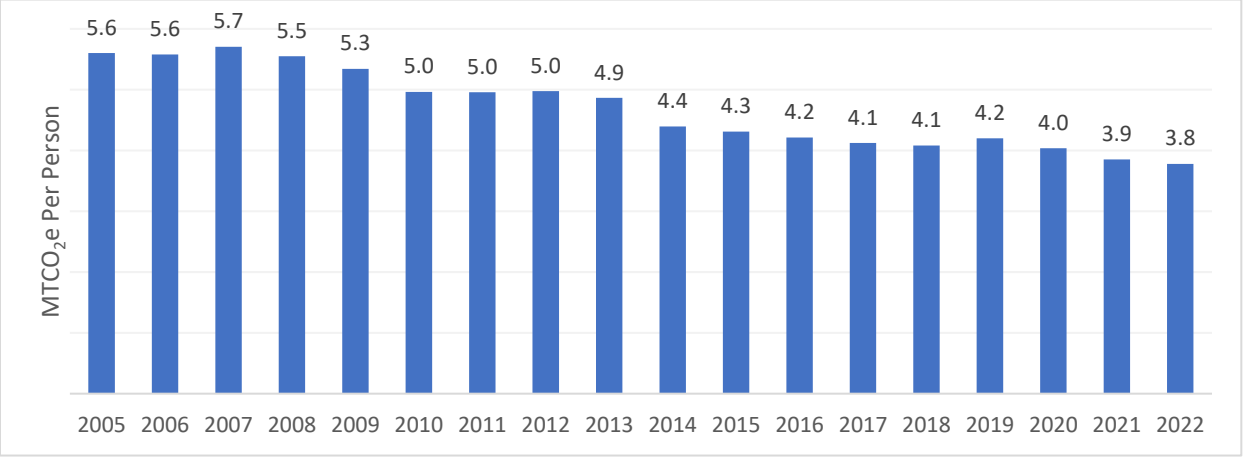



## Per Capita Emissions

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 5.6 metric tons $CO_2e$ per capita in 2005. Per capita emissions decreased 33% between 2005 and 2022, falling to 3.8 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 Fairfax, which would include consumption-based emissions resulting from air travel, the manufacturing and distribution of products and food, etc.

FIGURE 3: EMISSIONS PER CAPITA



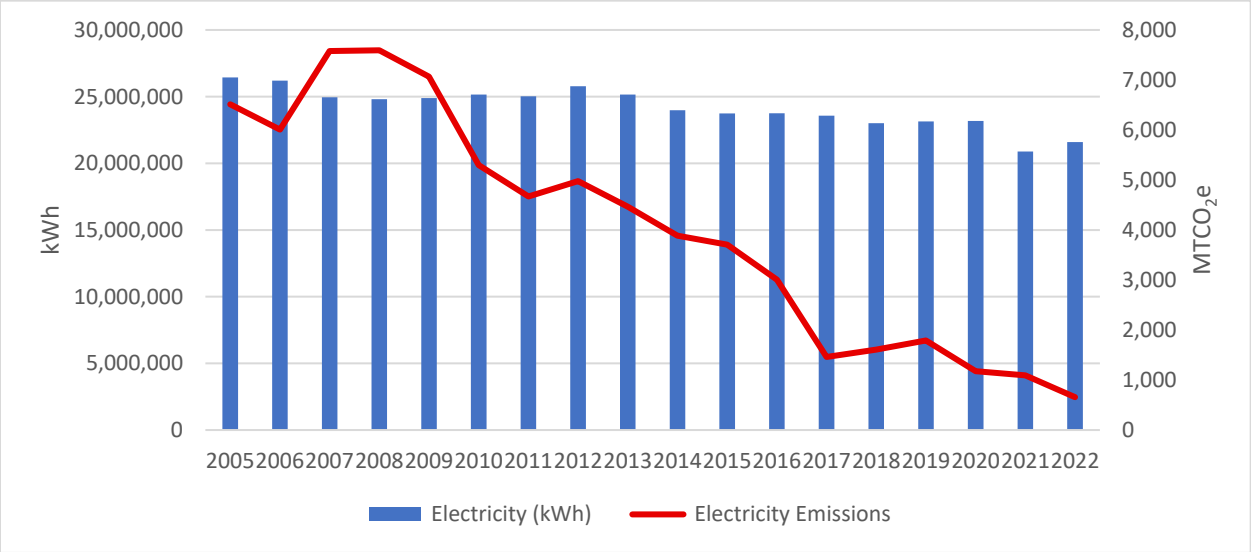
## Significant Sources of Emissions

The following sections provide a year-by-year analysis of the changes in GHG emissions from the use of electricity, natural gas, transportation, water, wastewater, and the disposal of waste. 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

Purchased electricity use in homes and businesses in Fairfax decreased approximately 18% between 2005 and 2022.[2] Greenhouse gas emissions from purchased electricity consumption decreased 90% since 2005, as shown in Figure 4. 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 2022, PG&E electricity came from a mix of renewable (38%), large hydroelectric (8%), nuclear (49%), and natural gas (5%) energy sources and was 95% GHG-free.[3] MCE Light Green electricity came primarily from renewable (60%) and hydroelectric (40%) sources and was 95% GHG-free.[4] In 2022, about 10.2% of MCE electricity purchased by Fairfax customers was 100% renewable Deep Green electricity, including electricty purchased by the Town government.

FIGURE 4: ELECTRICITY USE AND EMISSIONS




[2] Due to California Public Utility Commission data privacy rules, PG&E-generated electricity usage by commercial customers was not reported in 2022. This artificially reduces the total amount of electricity purchased by the community, but most likely does not significantly affect the overall GHG emissions due to the high GHG-free content of PG&E electricity in 2022.

[3] PG&E 2022 Power Content Label, https://www.pge.com/content/dam/pge/docs/account/billing-and-assistance/power-content-label.pdf. Nuclear and large hydro sources are considered GHG-free.

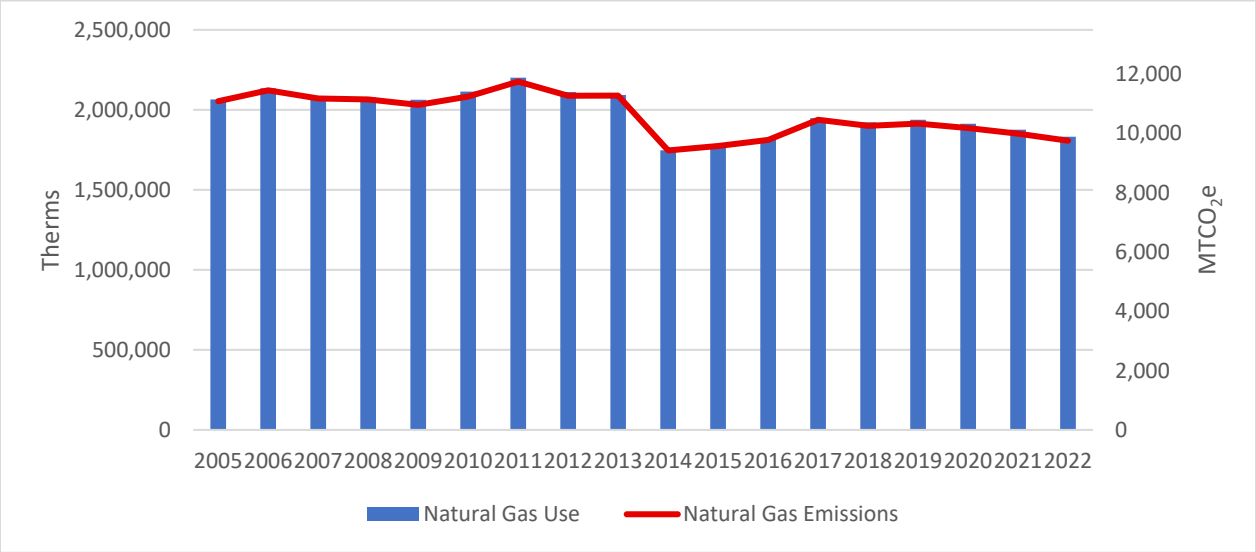
[4] MCE 2022 Power Content Label, https://www.mcecleanenergy.org/energy-suppliers/

## 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 Fairfax to fluctuate from year to year, from a high of 2.2 million therms in 2011 to a low of 1.7 million therms in 2014. Reduction in energy use may also be attributed to energy efficiency programs and rebates, local green building ordinances, and State building codes.

Natural gas consumption decreased 2% between 2021 and 2022 and was 11% below the 2005 level in 2022. Unlike electricity emissions which reflect the power content mix, natural gas emissions track the amount of natural gas consumed (Figure 5).

FIGURE 5: NATURAL GAS USE AND EMISSIONS




## Transportation

Transportation activities accounted for approximately 56% of Fairfax's emissions in 2022. According to the transportation model and annual data the Town uses to calculate passenger and commercial vehicle miles, vehicle miles traveled (VMT) have increased approximately 3% since 2005 and was flat between 2021 and 2022.

Transportation emissions have decreased 18% since 2005 due to more fuel-efficient and alternatively fueled cars (Figure 6). As shown in Figure 7, most transportation emissions come from passenger vehicles, accounting for 82% of transportation emissions in 2022. Marin County continues to be a leader in zero emission vehicles (ZEVs) – second only to Santa Clara County – with 15,449 ZEVs in Marin at the end of 2022, or about 7.5% of registered automobiles. ZEVs include battery electric cars, plug-in hybrid electric cars, hydrogen fuel cell cars, and zero-emission motorcycles. Fairfax had 430 ZEVs by the end of 2022, or 6.2% of registered light-duty vehicles.[5]

While it is difficult to pinpoint exactly how each land use and transportation policy affects emissions, the Town has undertaken many efforts to reduce transportation emissions. The Town encourages workforce housing through its

[5] 272 BEVs and 158 PHEVs.

Housing Element and has made it easier for residents to use carbon-free modes of transportation, such as bicycling and walking, through improvements to the transportation network. The Town has also promoted electric vehicle adoption by installing publicly available EV charging stations and adopting green building codes that require more EV charging stations to be installed for new construction and remodels of existing buildings than State requirements.

FIGURE 6: VEHICLE MILES TRAVELED AND TRANSPORTATION EMISSIONS

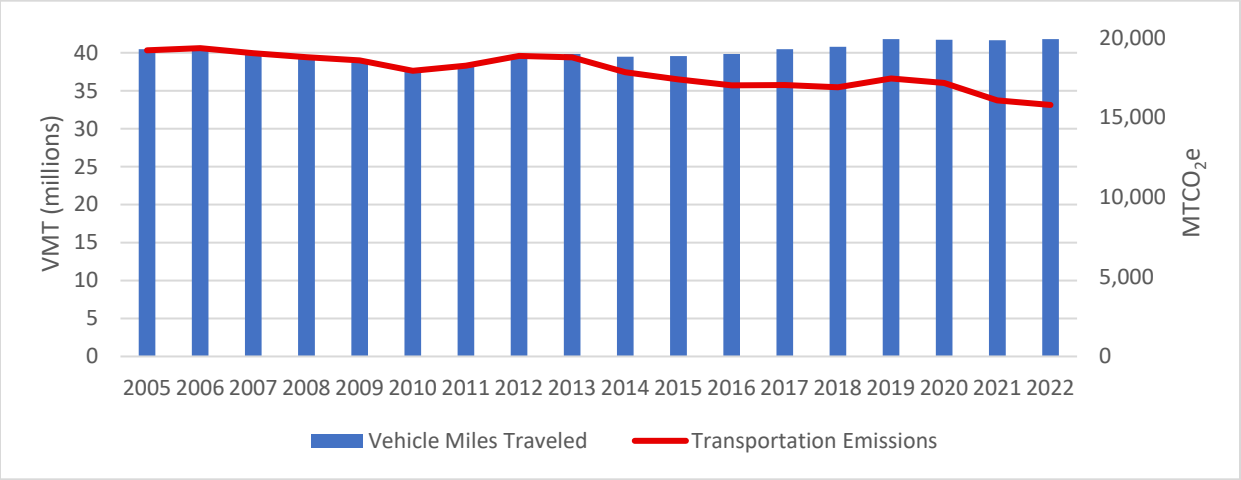
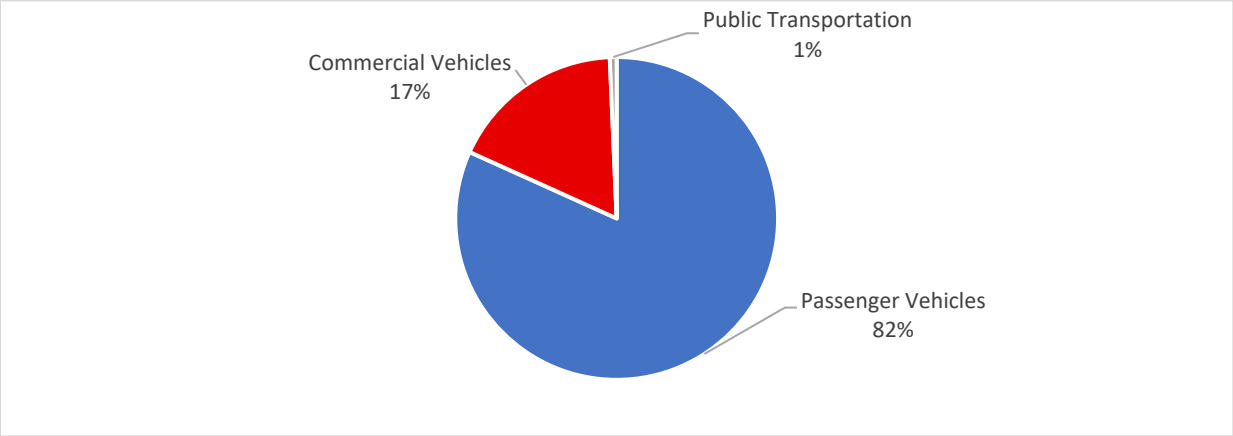



FIGURE 7: TRANSPORTATION EMISSIONS BY VEHICLE CATEGORY

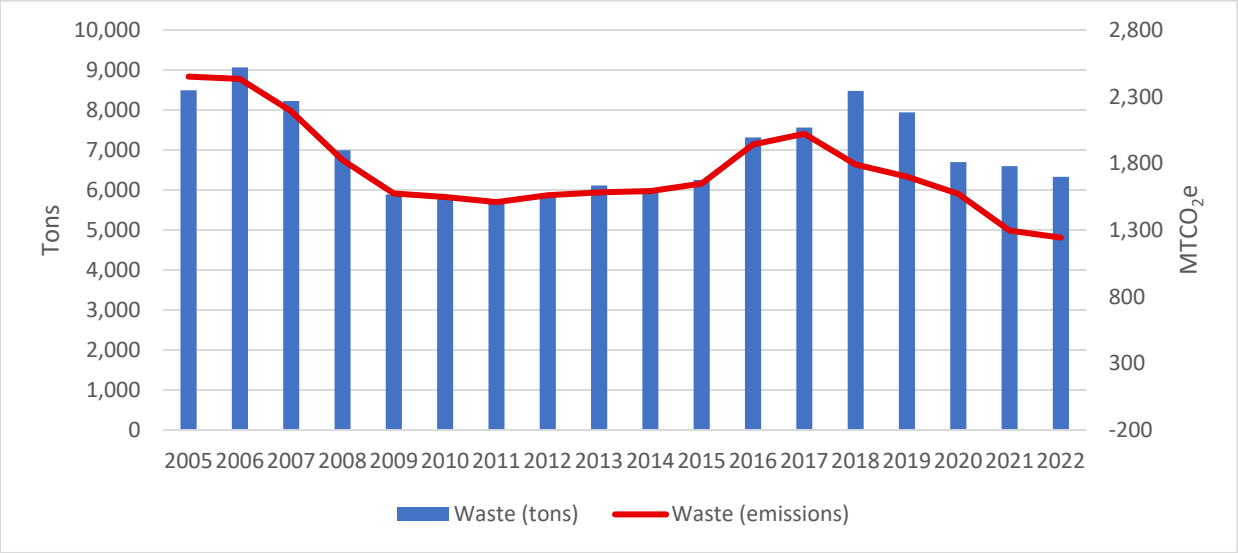



*Note: Public transportation represents emissions from Marin Transit and Golden Gate Transit fixed-route buses.*

## Waste Disposal

Landfilled waste generated by the community decreased 4% between 2021 and 2022 and was 25% below the 2005 level by 2022 as shown in Figure 8 (based on countywide disposal data). Total landfilled waste includes alternative daily cover.[6] Emissions from waste disposal decreased 49% due to the lower organic content of landfilled waste (based on statewide waste characterization studies) and material used for alternative daily cover. Marin Sanitary Service, Zero Waste Marin, and the Town continue to provide outreach and education to residents and businesses on proper waste sorting and the Town continues to install more public multi-stream waste receptacles.

FIGURE 8: DISPOSED WASTE AND EMISSIONS

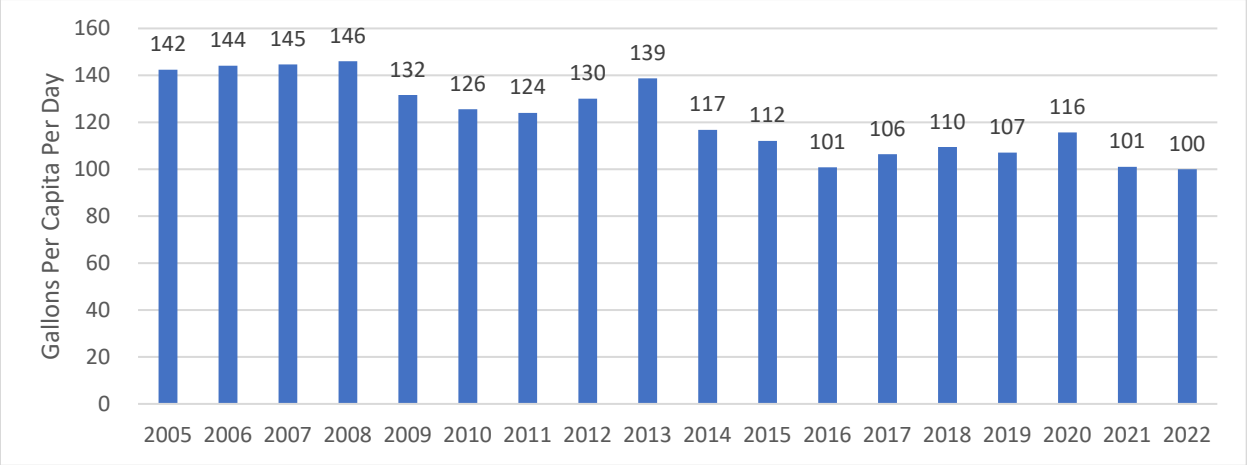



## Water Use

Per capita water use declined 30% since 2005, as shown in Figure 9 (based on Marin Water district-wide data). Emissions, which are based on an estimate of energy used to pump, treat, and convey water from the water source to the Town limits, dropped 100% between 2005 and 2022 due to the water agencies' use of carbon-free electricity. Marin Water purchases MCE Deep Green for its electricity needs, and the Sonoma County Water Agency, which supplies approximately 20% of Marin Water's water, uses renewable and carbon-free sources for its electricity.

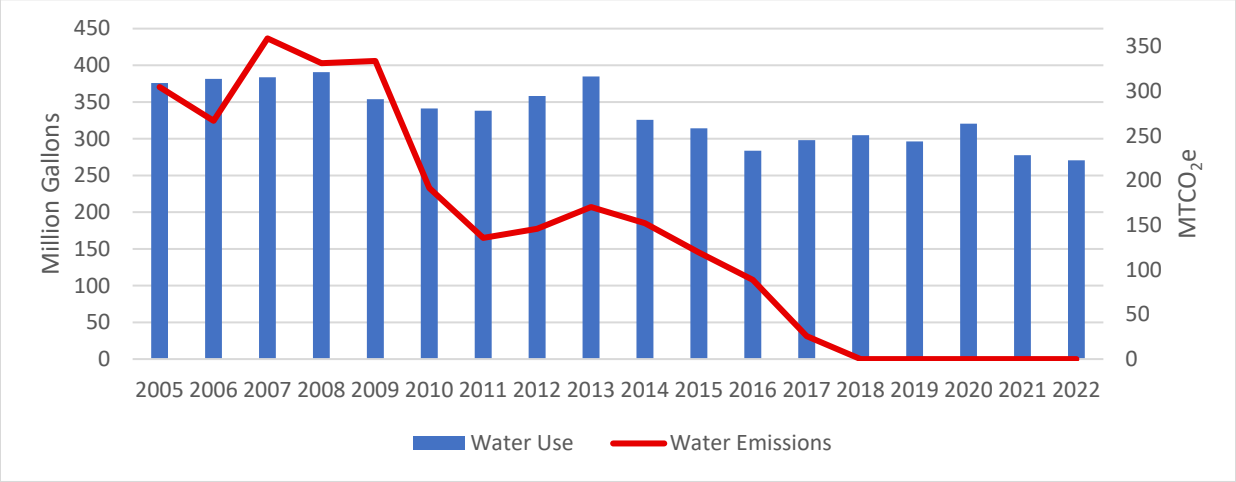
[6] Alternative daily cover is material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.

FIGURE 9: PER CAPITA WATER USE




*Source: Marin Water*

FIGURE 10: WATER CONSUMPTION AND EMISSIONS




Marin Water 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. Marin Water provides free home and landscape water-use evaluations as well as free high-efficiency showerheads and faucet aerators. The Town promotes Resilient Neighborhoods Climate Action Workshops that teach residents how to conserve water among other climate actions.

## WASTEWATER

The Central Marin Sanitation Agency (CMSA), located in San Rafael, has two anaerobic digesters that process primary sludge, thickened waste-activated sludge, and organic waste to produce biogas. The biogas is used to generate heat and renewable electricity via the cogeneration system. CMSA normally produces 100% of the facility's power needs, and, at times, exports renewable energy to the grid, which is procured by MCE. As a result, emissions from the use of energy in the wastewater treatment process have essentially been eliminated. Greenhouse gas emissions are also created from the wastewater treatment process itself. These emissions have increased 8% since 2005 as Fairfax's population has increased. Overall, wastewater emissions have declined 64% since 2005.

# APPENDIX: COMMUNITY INVENTORY

## Community GHG Emissions Summary Table

Jurisdiction: Town of Fairfax
Population: 7,410 (CA Department of Finance)
Number of Households: 3,287 (CA Department of Finance)

Inventory Year: 2022
Date Prepared: January 31, 2024
Reporting Framework: Communitywide Activities

| ID | Emissions Type | Source or Activity | Included, Required Activities | Included, Optional Activities | Excluded (IE, NA, NO or NE) | Notes | Emissions ($MTCO_2e$) |
|---|---|---|---|---|---|---|---|
| 1.0 | Built Environment | | | | | | |
| 1.1 | Use of fuel in residential and commercial stationary combustion equipment | Both | ● | | | | 9,756 |
| 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 | 657 |
| 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 | ● | | | | 12,910 |
| 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 | ● | | | | 2,774 |
| 2.5 | On-road transit vehicles associated with community land uses | Activity | | ● | | | 108 |
| 2.6 | Transit rail vehicles operating with the community boundary | Source | | | NO | | |
| 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 | | | NO | | |
| 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 | | ● | | | 499 |
| 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 | | | NO | | |
| 3.2 | Generation and disposal of solid waste by the community | Activity | ● | | | | 1,243 |
| 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 | ● | | | | q |
| 4.3 | Use of energy associated with generation of wastewater by the community | Activity | ● | | | | 0 |
| 4.4 | Process emissions from operation of wastewater treatment facilities located in the community | Source | | | NO | | |
| 4.5 | Process emissions associated with generation of wastewater by the community | Activity | ● | | | | 62 |
| 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 | Included in 4.2 and 4.3. | |
| 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 ($CO_2$, $CH_4$ & $N_2O$) | 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 $CO_2$, $CH_4$ & $N_2O$ emission factors by fuel type (U.S. Community Protocol v. 1.1 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 ($CO_2$, $CH_4$ & $N_2O$) | Known electricity use (meter readings by PG&E and MCE) and estimated direct access electricity consumption. Commercial PG&E electricity consumption failed the CPUC 15/15 rule and was not reported or included in this report. | 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 ($CO_2$, $CH_4$ & $N_2O$) | 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, CAPVMT Data Portal 2.0 (mtcanalytics.org)). | $CO_2$ for on-road passenger vehicles quantified in the EMFAC2021 v.1.0.2 model. Passenger vehicle emissions calculated according to U.S. Community Protocol v. 1.1, Appendix D, Method TR.1.A. |
| | On-Road Mobile Combustion ($CH_4$ & $N_2O$) | Estimated vehicle miles traveled associated with origin and destination land uses (Metropolitan Transportation Commission, CAPVMT Data Portal 2.0 (mtcanalytics.org)). | $CH_4$ and $N_2O$ for on-road passenger vehicles quantified in the EMFAC2021 v.1.0.2 model. 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 2050). | $CO_2$ for on-road commercial vehicles quantified in the EMFAC2021 v.1.0.2 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 ($CH_4$ & $N_2O$) | Estimated commercial vehicle miles traveled within the boundary (Metropolitan Transportation Commission utilizing Plan Bay Area 2050). | $CH_4$ and $N_2O$ for on-road commercial vehicles quantified in the EMFAC2021 v.1.0.2 model. 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 ($CH_4$ & $N_2O$) | 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. |
| 2.12 Off-Road Vehicles and Equipment | Off-Road Mobile Combustion ($CO_2$) | Estimated fuel use from OFFROAD 2021 v.1.0.1 for Lawn and Garden and 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 ($CH_4$ & $N_2O$) | Estimated fuel use from OFFROAD 2021 for Lawn and Garden and Construction equipment. All categories are allocated by share of countywide households. | $CH_4$ and $N_2O$ 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, 2014, 2018 and 2021) 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 (district-wide gpcd) and electricity consumption provided by Marin Municipal Water District (MMWD). | 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 ($CH_4$ & $N_2O$) | Water consumption (district-wide gpcd) 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. | Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.1.a. |
| | Stationary Emissions from Combustion of Digester Gas ($N_2O$) | Known amount of digester gas produced per day and known percent of methane in digester gas provided by Central Marin Sanitation Agency. | Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.2.a. |
| | 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. |

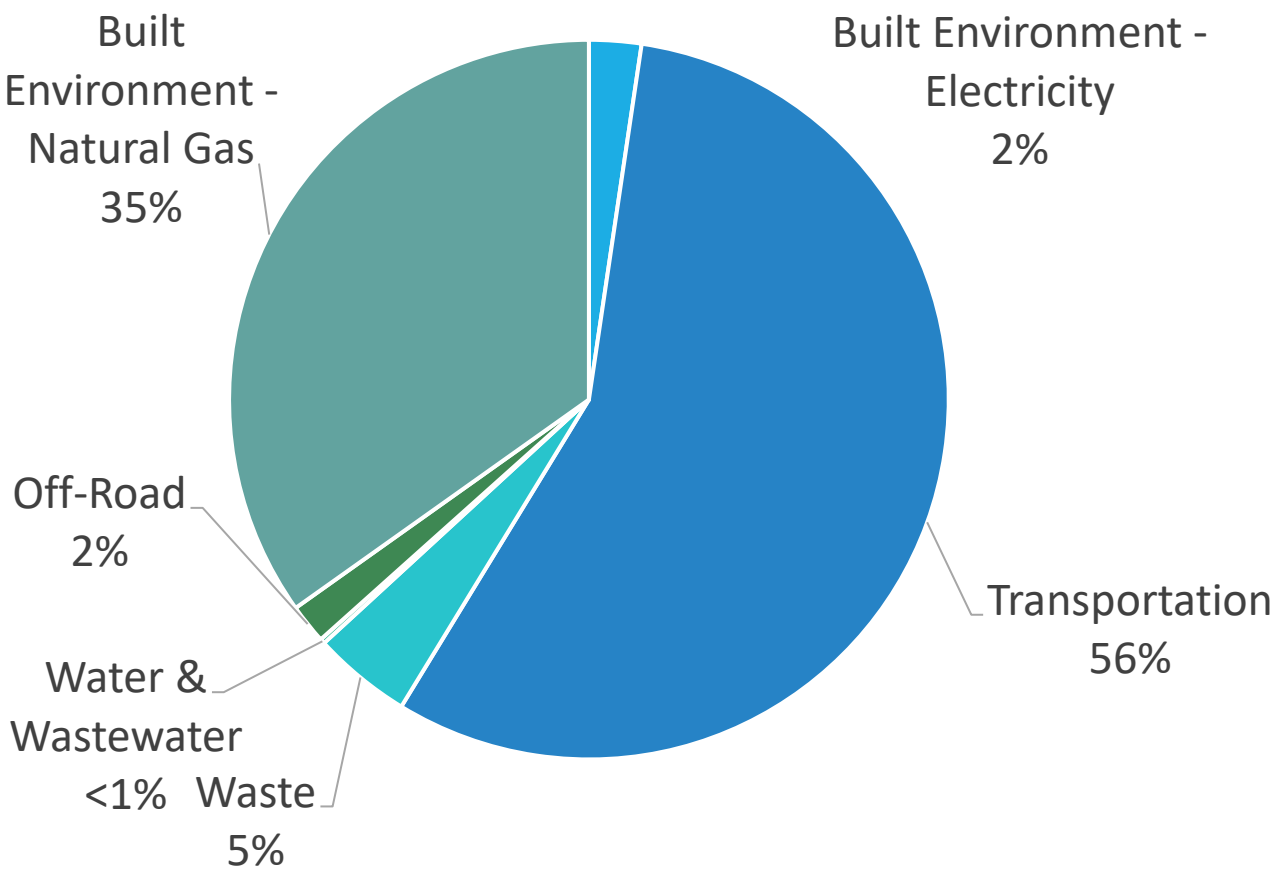
| | | | |
|---|---|---|---|
| | Fugitive Emissions from Effluent Discharge ($N_2O$) | Estimated population served by wastewater treatment plant provided by Central Marin Sanitation Agency. Assumed significant industrial or commercial input. | Emissions calculated according to U.S. Community Protocol v. 1.1, Appendix F, Method WW.12(alt). |

MARIN CLIMATE & ENERGY PARTNERSHIP

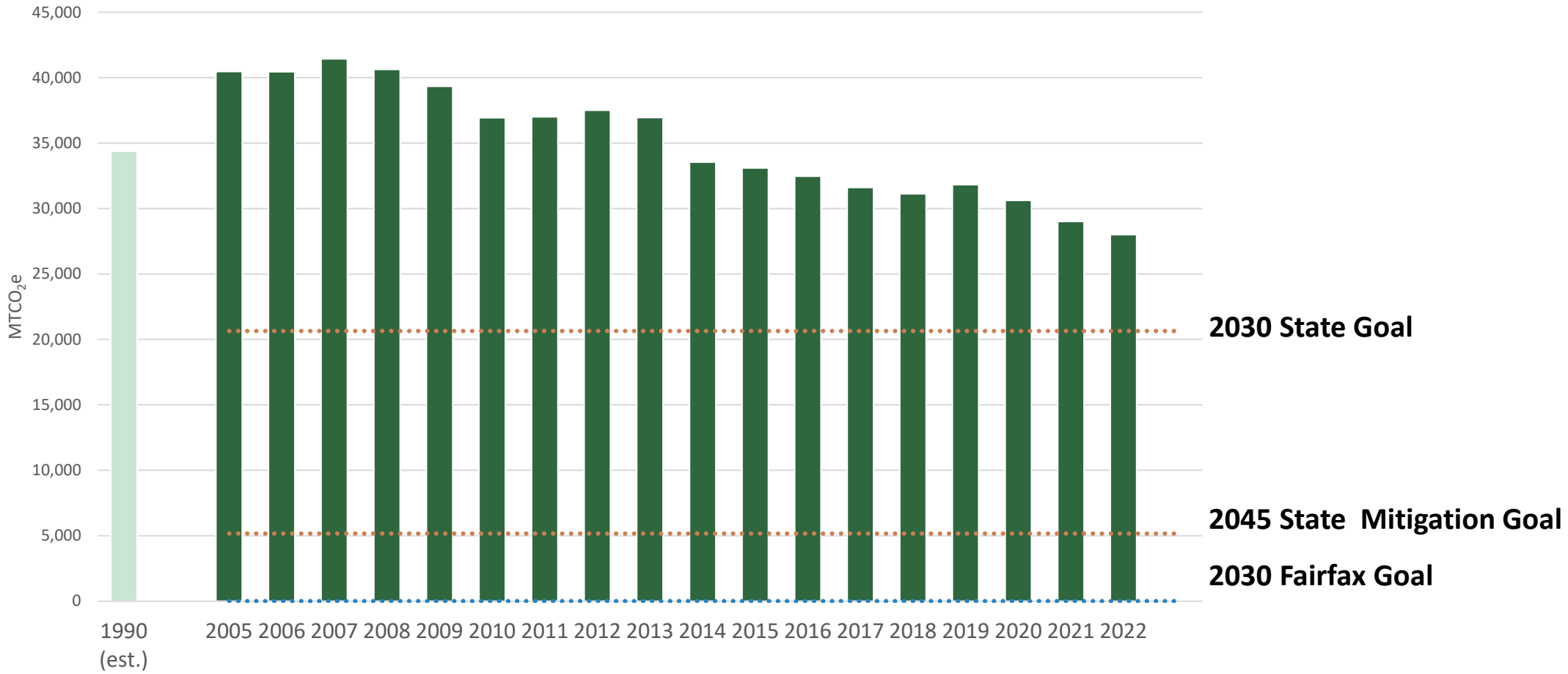
# Town of Fairfax
# 2022 GHG Inventory Report

March 6, 2024

# Emissions by Source



# Emissions Down 19% Since 1990



# Sector Highlights

***Since 2005…***

- Electricity emissions down 90% due to lower carbon intensity of electricity
- Natural gas emissions down 11%
- Vehicle miles traveled (VMT) up 3%
- Transportation emissions down 18% due to better fuel efficiency and more ZEVs
  - 7.5% ZEVs in Marin County in 2022
  - 6.2% ZEVs in Fairfax in 2022
- Waste disposal in landfills down 25%
- Waste emissions down 49% due to lower organic content in landfilled waste

***Best opportunity to significantly reduce emissions further is to electrify everything – vehicles, hot water heaters, heating systems, and appliances***

MARIN CLIMATE & ENERGY PARTNERSHIP

# Questions?