19 GREENHOUSE GAS EMISSIONS

Greenhouse gases (GHGs) are gases in the atmosphere that absorb infrared light, thereby retaining heat in the atmosphere and contributing to what is known as the greenhouse effect. Scientists have concluded that human activities are adding large amounts of these GHGs to the atmosphere, increasing the amount of trapped heat. The warmer atmosphere creates changes in Earth's climate system, collectively known as climate change. The primary source of these GHGs is fossil fuel use, such as petroleum and natural gas. The Intergovernmental Panel on Climate Change (IPCC) has identified three major GHGs—carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)—that are likely cause of an increase in global average temperatures observed in the twentieth and twenty-first centuries. Other GHGs identified by the IPCC that contribute to global warming to a lesser extent are nitrogen trifluoride (NF_3), sulfur hexafluoride (SF_6), hydrofluorocarbons, perfluorocarbons, and chlorofluorocarbons.[1]

The major GHGs are briefly described as follows:

- **Carbon dioxide (CO_2)** enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, respiration, and as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH_4)** is emitted during the production, transport, and combustion of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and from the decay of organic waste in municipal landfills and wastewater treatment facilities.
- **Nitrous oxide (N_2O)** is emitted during agricultural and industrial activities as well as during combustion of fossil fuels and the decomposition of solid waste and wastewater.

[1] IPCC, 2014: *Climate Change 2014: Synthesis Report.* Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

Different GHGs trap different amounts of heat in the atmosphere over their lifetimes. The relative difference in the amount of heat trapped by different gases is known as the global warming potential (GWP). Carbon dioxide has a GWP of 1 and all other gases have a GWP relative to the value of carbon dioxide. For example, methane has a GWP of 28, meaning that one molecule of methane will trap, on average, 28 times as much heat over its lifetime in the atmosphere as 1 molecule of CO_2. The GWP is used to express GHG emissions from different gases as a single unit, known as carbon dioxide equivalent (CO_2e). For example, 1 metric ton (MT) of carbon dioxide would be expressed as 1 $MTCO_2e$, while 1 MT of methane would be expressed as 28 $MTCO_2e$. As the science of GHGs evolves, the GWPs of different gases are revised. Table 19-1 shows how GWPs of common GHGs have changed over time.

TABLE 19-1 GHG EMISSIONS AND THEIR RELATIVE GLOBAL WARMING POTENTIAL COMPARED TO CO_2

GHGs	Second Assessment Report (SAR) Global Warming Potential Relative to CO_2[a] (1995)	Fourth Assessment Report (AR4) Global Warming Potential Relative to CO_2[a] (2007)	Fifth Assessment Report (AR5) Global Warming Potential Relative to CO_2[a] (2014)
Carbon Dioxide (CO_2)	1	1	1
Methane[b] (CH_4)	21	25	28
Nitrous Oxide (N_2O)	310	298	265

Notes:
a. Based on 100-year time horizon of the GWP of the air pollutant compared to CO_2.
b. The methane GWP includes direct effects and indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO_2 is not included.

Sources: IPCC, 1995, *Second Assessment Report: Climate Change 1995*; IPCC, 2007, *Fourth Assessment Report: Climate Change 2007*; IPCC, 2014, *Fifth Assessment Report: Climate Change 2014*.

In addition to the major GHGs described herein, black carbon also contributes to climate change both directly, by absorbing sunlight, and indirectly, by depositing on snow (making it melt faster) and by interacting with clouds and affecting cloud formation. Black carbon is the most strongly light-absorbing component of particulate matter (PM) emitted from burning fuels, such as coal, diesel, and biomass. Reducing black carbon emissions globally can have immediate economic, climate, and public health benefits. California has been an international leader in reducing emissions of black carbon, with close to 95-percent control expected by

2020 due to existing programs that target reducing PM from diesel engines and burning activities.[2]

A. Regulatory Setting

This section discusses the federal, State, and local policies and regulations that are relevant to GHG emissions in Butte County.

1. Federal Regulations

The U.S. Environmental Protection Agency (EPA) announced on December 7, 2009, that GHG emissions threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat. The U.S. EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHG emissions fit within the Clean Air Act definition of air pollutants. The findings did not themselves impose any emission-reduction requirements but allowed the U.S. EPA to finalize the GHG standards proposed in 2009 for new light-duty vehicles as part of the joint rulemaking with the California Department of Transportation.[3]

To regulate GHGs from passenger vehicles, the U.S. EPA issued an endangerment finding.[4] The finding identifies emissions of six key GHGs—carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbons, hydrofluorocarbons, and sulfur hexafluoride—that have been the subject of scrutiny and intense analysis for decades by scientists in the United States and around the world. The first three constitute the majority of GHG emissions.

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[2] CARB, 2017, March 14. *Short-Lived Climate Pollutant Reduction Strategy*, https://www.arb.ca.gov/cc/shortlived/shortlived.htm

[3] U.S. EPA. 2009, December. *USEPA: Greenhouse Gases Threaten Public Health and the Environment*. Science overwhelmingly shows greenhouse gas concentrations at unprecedented levels due to human activity. https://archive.epa.gov/epapages/newsroom_archive/newsreleases/08d11a451131bca585257685005bf252.html, accessed March 4, 2021.

[4] U.S. EPA, 2009. *USEPA: Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*. https://www.epa.gov/ghgemissions/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a-clean, accessed November 21, 2019.

a. U.S. Mandatory Reporting Rule for GHGs (2009)

In response to the endangerment finding, the U.S. EPA issued the Mandatory Reporting of GHG Rule that requires substantial emitters of GHG emissions (large stationary sources, etc.) to report GHG emissions data. Facilities that emit 25,000 MT or more of CO_2e per year are required to submit an annual report.

b. Update to Corporate Average Fuel Economy Standards (2021 to 2026)

The federal government issued new Corporate Average Fuel Economy (CAFE) standards in 2012 for model years 2017 to 2025, which required a fleet average of 54.5 miles per gallon in 2025. However, on March 30, 2020, the U.S. EPA finalized the updated CAFE and GHG emissions standards for passenger cars and light trucks and established new standards, covering model years 2021 through 2026, known as the Safer Affordable Fuel Efficient (SAFE) Vehicles Final Rule for Model Years 2021 through 2026. Implementation of the SAFE standards was halted by executive action in January 2021. It is not yet known if new standards will be established.

c. U.S. EPA Regulation of Stationary Sources under the Clean Air Act

Pursuant to its authority under the Clean Air Act, the U.S. EPA has been developing regulations for new, large stationary sources of emissions, such as power plants and refineries. Under former President Obama's 2013 Climate Action Plan, the U.S. EPA was directed to develop regulations for existing stationary sources as well. On June 19, 2019, the U.S. EPA issued the final Affordable Clean Energy (ACE) rule, which became effective on August 19, 2019. The ACE rule was crafted under the current administration's Energy Independence Executive Order. It officially rescinds the Clean Power Plan rule issued during the previous administration and sets emissions guidelines for states in developing plans to limit CO_2 emissions from coal-fired power plants.

2. State Regulations

Current State of California guidance and goals for reductions in GHG emissions are generally embodied in Executive Order S-03-05, Assembly Bill (AB) 32, Senate Bill (SB) 32, Executive Order B-30-15, and SB 375. These major GHG regulations are summarized herein.

a. Executive Order S-03-05

Executive Order S-03-05, signed June 1, 2005, set the following GHG-reduction targets for the State:

- Returning to 2000 emission levels by 2010.

- Returning to 1990 emission levels by 2020.
- Reducing emissions 80 percent below 1990 levels by 2050.

b. Assembly Bill 32

Also known as the Global Warming Solutions Act, AB 32 was signed August 31, 2006, to reduce California's contribution of GHG emissions. AB 32 follows the 2020 tier of emissions reduction targets established in Executive Order S-03-05. Under AB 32, the California Air Resources Board (CARB) prepared the *2008 Climate Change Scoping Plan*, the *2014 Climate Change Scoping Plan,* and the *2017 Climate Change Scoping Plan.*

c. Executive Order B-30-15

Executive Order B-30-15, signed April 29, 2015, sets a goal of reducing GHG emissions within California to 40 percent of 1990 levels by year 2030. Executive Order B-30-15 also directs CARB to update the Scoping Plan to quantify the 2030 GHG-reduction goal for the state and requires state agencies to implement measures to meet the interim 2030 goal as well as the long-term goal for 2050 in Executive Order S-03-05. It also requires the Natural Resources Agency to conduct triennial updates of the California adaption strategy, Safeguarding California, to ensure climate change is accounted for in state planning and investment decisions.

d. Senate Bill 32 and Assembly Bill 197

In September 2016, SB 32 and AB 197 were signed into law, making the Executive Order goal for year 2030 into a statewide mandated legislative target. AB 197 established a joint legislative committee on climate change policies and requires CARB to prioritize direct emissions reductions rather than the market-based cap-and-trade program for large stationary, mobile, and other sources. Executive Order B-30-15 and SB 32 required CARB to prepare another update to the Scoping Plan to address the 2030 target for the state. On December 14, 2017, CARB adopted the *2017 Climate Change Scoping Plan Update* (2017 Scoping Plan) to address the 2030 target for the state. The 2017 Scoping Plan establishes a new emissions limit of 260 $MMTCO_2e$ for the year 2030, which corresponds to a 40-percent decrease in 1990 levels by 2030.[5]

[5] CARB, 2017, *California's 2017 Climate Change Scoping Plan: The Strategy for Achieving California's 2030 Greenhouse Gas Target*, https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf, accessed March 18, 2019.

e. Senate Bill 375

In 2008, SB 375, the Sustainable Communities and Climate Protection Act, was adopted to connect the GHG emissions-reductions targets established in the 2008 Scoping Plan to local land use decisions that affect travel behavior. Its intent is to reduce GHG emissions from light-duty trucks and automobiles (excludes emissions associated with goods movement) by aligning regional long-range transportation plans, investments, and housing allocations to local land use planning to reduce vehicle miles traveled (VMT) and vehicle trips. Specifically, SB 375 required CARB to establish GHG emissions-reduction targets for each of the 18 metropolitan planning organizations (MPOs). The Butte County Association of Governments (BCAG) is the MPO for Butte County and its jurisdictions. Pursuant to the recommendations of the Regional Transportation Advisory Committee (RTAC), CARB adopted per-capita reduction targets for each of the MPOs rather than a total magnitude reduction target. The reduction targets for BCAG are 6-percent reduction in per-capita vehicle-related emissions for 2020 and 7 percent for 2035, relative to 2005 levels.

3. Local Regulations

a. Butte County Air Quality Management District

The Butte County Air Quality Management District (BCAQMD) is the local air district responsible for local air quality regulation in Butte County. The BCAQMD's primary responsibility is to regulate stationary sources and develop plans to achieve and maintain air quality standards. CARB and the U.S. EPA have jurisdiction over controlling emissions from mobile sources. The BCAQMD has jurisdiction over air quality matters in Butte County. Formerly a department of the Butte County government, it is now an independent special district under California law.

BCAQMD's mission to improve air quality includes adopting and enforcing rules and regulations to attain and maintain air quality standards, issuing permits for and inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring air quality and meteorological conditions, awarding grants to reduce mobile emissions, implementing public outreach campaigns, assisting Butte County jurisdictions in addressing climate change, and updating and evaluating consistency with the Northern Sacramento Valley Air Quality Attainment Plan.

The stationary "direct" sources of air contaminants over which the BCAQMD has permit authority include, but are not limited to, power plants, gasoline stations, dry cleaners, internal combustion engines, and surface coating operations. BCAQMD does not, however, exercise permit authority over "indirect" emission sources.

Indirect sources are contributors to air pollution and include facilities and land uses that may not emit significant amounts of pollution directly themselves, but are responsible for indirect emissions, such as:

- Motor vehicle trips attracted to or generated by a land use;
- On-site combustion of natural gas and propane for heating;
- Architectural coatings (paints, stains) and consumer products; and
- Landscape maintenance.

The BCAQMD works with BCAG to ensure a coordinated approach in the development and implementation of transportation plans throughout the county. This coordination ensures compliance with pertinent provisions of the Clean Air Act and California Clean Air Act, as well as with related transportation legislation.

b. Butte County Climate Action Plan

The Butte County Board of Supervisors approved the County's first Climate Action Plan (CAP) on February 25, 2014. Butte County General Plan 2030 directed preparation, adoption, and implementation of the CAP to assist the State of California in meeting the GHG reduction goals for 2020. The CAP incorporates programs and actions to reduce GHG emissions, address climate change adaptation, improve community resilience to hazardous conditions associated with climate change, and improve quality of life in the county. The County is updating the CAP in 2021 to include reduction targets for 2030 and 2050 along with reductions strategies and an implementation program to achieve the targets. For more information on climate change-related hazards, refer to Chapter 17, Hazards and Safety.

B. Greenhouse Gas Emissions in California

In 2019, the State updated the statewide GHG emissions inventory for 2000 to 2017 emissions using the GWPs in IPCC's AR4.[6] Based on these GWPs, California produced 424.10 $MMTCO_2e$ GHG emissions in 2017. California's transportation sector was the single largest generator of GHG emissions, producing 40.1 percent of the state's total emissions. Industrial sector emissions made up 21.1 percent, and electric power generation made up 14.7 percent of the state's emissions inventory. Other major sectors of GHG emissions include commercial and residential (9.7

[6] Methodology for determining the statewide GHG inventory is not the same as the methodology used to determine statewide GHG emissions under AB 32 (2006).

percent); agriculture and forestry (7.6 percent); high GWP gases, such as refrigerants and leaks from industrial equipment (4.7 percent); and recycling and waste (2.1 percent).[7]

California's GHG emissions have followed a declining trend since 2007. In 2017, emissions from routine GHG-emitting activities statewide were 424 $MMTCO_2e$, 5 $MMTCO_2e$ lower than 2016 levels. This represents an overall decrease of 14 percent since peak levels in 2004 and 7 $MMTCO_2e$ below the 1990 level and the state's 2020 GHG target. During the 2000 to 2017 period, per-capita GHG emissions in California have continued to drop from a peak in 2001 of 14.0 $MTCO_2e$ per capita to 10.7 $MTCO_2e$ per capita in 2017, a 24-percent decrease. Overall trends in the inventory also demonstrate that the carbon intensity of California's economy (the amount of carbon pollution per million dollars of gross domestic product [GDP]) is declining, representing a 41-percent decline since the 2001 peak, while the state's GDP has grown 52 percent during this period. For the first time since California started to track GHG emissions, California uses more electricity from zero-GHG sources (hydro, solar, wind, and nuclear energy). [8]

C. Potential Climate Change Impacts for California

In California and western North America, observations of the climate have shown: (1) a trend toward warmer temperatures with an increase in extremely hot days and nights; (2) increase in the area burned by wildfires; (3) a smaller fraction of precipitation falling as snow; (4) an increase in frequency of drought and an increase in consecutive dry years; and (5) a shift (5 to 30 days earlier) in the timing of spring flower blooms.[9] Overall, California has become drier over time, with five of the eight years of severe to extreme drought occurring between 2007 and 2016, and unprecedented dry years in 2014 and 2015. Statewide precipitation has become

[7] CARB, 2019, August 26. *2019 Edition California Greenhouse Gas Inventory for 2000-2017: By Category as Defined in the 2008 Scoping Plan.* https://www.arb.ca.gov/cc/inventory/data/data.htm. Accessed March 4, 2021.

[8] CARB, 2019, August 26. *California Greenhouse Emissions for 2000 to 2017: Trends of Emissions and Other Indicators.* https://www.arb.ca.gov/cc/inventory/data/data.htm, accessed November 21, 2019.

[9] California Climate Action Team, 2006. Climate Action Team Report to Governor Schwarzenegger and the Legislature.

increasingly variable from year to year, with the driest consecutive four years occurring from 2012 to 2015.[10]

According to the California Climate Action Team—a committee of representatives from 14 State agencies—even if actions could be taken to immediately curtail climate change emissions, global surface temperature change for the end of the twenty-first century is likely to exceed 1.5 degrees Celsius (°C) (1.1 degrees Fahrenheit [°F]) of warming relative to 1850.[11] Consequently, some impacts from climate change are now considered unavoidable. Global climate change risks to California are described herein and are shown in Table 19-2. For more information on climate change-related hazards, refer to Chapter 17, Hazards and Safety.

TABLE 19-2 SUMMARY OF GHG EMISSIONS RISK TO CALIFORNIA

Impact Category	Potential Risks
Public Health Impacts	Heat waves may be more frequent, hotter, longer, and occur earlier and later in the year Poor air quality made worse Higher temperatures increase ground-level ozone (i.e., smog) levels Some diseases or pests may be newly present or more active
Water Resource Impacts	Decreasing Sierra Nevada snowpack Challenges in securing adequate water supply Faster snowmelt Potential reduction in hydropower Loss of winter recreation
Agricultural Impacts	Increasing temperature Increasing threats from pests and pathogens Expanded ranges of agricultural weeds Declining productivity Irregular blooms and harvests

[10] Office of Environmental Health Hazards Assessment, 2018. *Indicators of Climate Change in California*. https://oehha.ca.gov/climate-change/2018-indicators-climate-change-california, accessed February 19, 2021.

[11] IPCC, 2013. "Summary for Policymakers." In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA., page 20.

Impact Category	Potential Risks
Coastal Sea-Level Impacts	Accelerated sea-level rise Increasing coastal floods Shrinking beaches Ocean acidification Worsened impacts on infrastructure
Forest and Biological Resource Impacts	Increased risk and severity of wildfires Lengthening of the wildfire season Movement of forest areas Conversion of forest to grassland Declining forest productivity Increasing threats from pest and pathogens Shifting vegetation and species distribution Altered timing of migration and mating habits Loss of sensitive or slow-moving species

Sources: California Climate Change Center, 2012, *Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risks from Climate Change in California*; California Energy Commission, 2006. *Our Changing Climate: Assessing the Risks to California, 2006 Biennial Report*, CEC-500-2006-077; California Energy Commission, 2009. *The Future Is Now: An Update on Climate Change Science, Impacts, and Response Options for California.* CEC-500-2008-0077; California Natural Resources Agency, 2014. *Safeguarding California: Reducing Climate Risk, An Update to the 2009 California Climate Adaptation Strategy.*

D. Existing Conditions

As part of the work updating the County's CAP in 2021, the County prepared a set of new and revised GHG inventories, which are technical analyses to assess the total annual GHG emissions attributed to the unincorporated areas of Butte County from various activities. A GHG inventory is the first step in creating a strategy to reduce Butte County's annual emissions.

GHG emissions are generated by various activities that are largely commonplace in daily life. Some daily activities release GHG emissions in the location of the activity, such as GHGs released by driving a gasoline- or diesel-fueled vehicle. On the other hand, some activities cause GHG emissions to be released elsewhere, such as someone using electricity to power their home, which generates GHG emissions in the location of the power plant that supplies the power, and not in the home itself. Therefore, Butte County must consider the GHG emissions caused by activities attributed to the community, including GHG emissions generated both inside and outside their jurisdictional boundaries.

The County has two types of GHG inventories: community-wide inventories and County operations inventories.

- The community-wide GHG inventory identifies GHG emissions that result from activities of residents, employees, visitors, and other community members occurring within the community. Examples include residents driving cars, homes using water, and businesses using electricity.
- The County operations GHG inventory summarizes emissions that are a direct result of Butte County's government operations. Examples include electricity and water used in County buildings or the fuel used for County vehicles.

As part of the CAP Update, the County prepared new 2019 community-wide and County operations GHG inventories.

1. Community-wide GHG Inventory

The community-wide GHG inventory assessed GHG emissions from the following 10 categories of activities, known as sectors. Table 19-3 shows the total GHG emissions in 2019 along with the proportion each sector contributed to overall emissions.

- **Agriculture** includes GHG emissions from various agricultural activities, including agricultural equipment, crop cultivation and harvesting, and livestock operations.
- **Transportation** includes GHG emissions created by driving on-road vehicles, including passenger and freight vehicles.
- **Residential energy** includes GHG emissions attributed to the use of electricity, natural gas, and propane in residential buildings.
- **Nonresidential energy** includes GHG emissions attributed to the use of electricity and natural gas in nonresidential buildings.
- **Solid waste** includes the GHG emissions released from trash collected in the unincorporated areas of Butte County, as well as collective annual emissions from waste already in place at the Neal Road Landfill.
- **Off-road equipment** includes GHG emissions from equipment that does not provide on-road transportation, such as tractors for construction or equipment used for landscape maintenance.

- **Water and wastewater** accounts for the electricity used to transport every gallon of water or wastewater, as well as direct emissions resulting from the processing of waste material.
- **Stationary sources** are those emitted at large industrial sites, commercial businesses, warehouses, or power plants.
- **Land use and sequestration** includes GHG emissions absorbed and stored in trees and soils as part of healthy ecosystems and released into the atmosphere from development of previously undeveloped land.
- **Wildfire** includes emissions released as a result of wildfires.

TABLE 19-3 PROPORTIONS OF ANNUAL COMMUNITY-WIDE 2019 GHG EMISSIONS BY SECTOR

Sector	2019 $MTCO_2e$	2019 Proportion of Total
Agriculture	501,630	50%
Transportation	229,110	23%
Residential energy	90,730	9%
Solid waste	61,120	6%
Off-road equipment	59,310	6%
Nonresidential energy	37,350	4%
Water and wastewater	16,960	2%
Total Annual $MTCO_2e$	**996,210**	**100%**
Land use and sequestration	-346,340	—
Wildfire and controlled burns*	15,730	—

*Emissions related to wildfire and controlled burns are included as an informational item; information on stationary sources not available at the time of preparation.

All numbers are rounded to the nearest 10.

In 2019, the agriculture sector accounted for the largest share of GHG emissions in Butte County, with 50 percent of emissions. The transportation sector accounted for approximately 23 percent of emissions. Residential energy accounted for approximately 9 percent of total emissions, while solid waste and off-road equipment each made up 6 percent of total emissions. Nonresidential energy accounted for 4 percent of emissions while water and wastewater accounted for approximately 2 percent.

1. County Operations GHG Inventory

A County operations GHG inventory summarizes GHG emissions that are a direct result of Butte County's government operations. The County operations GHG inventory assessed six sectors, as listed below. Table 19-4 shows the total GHG emissions in 2019 along with the proportion each sector contributed to overall emissions.

- **Energy** includes the GHG emissions of electricity and natural gas used to power County buildings, facilities, and operations.
- **Commute** covers GHG emissions that result from the total annual miles that County staff drive to get to and from work.
- **Fleet** includes the GHG emissions released by County vehicles based on the total gallons of fuel used.
- **Solid waste** accounts for the GHG emissions released from the collection of trash at County buildings and facilities, as well as emissions from waste in place at the County-operated Neal Road facility.
- **Water and wastewater** accounts for the energy used to transport and process the water used and the wastewater generated at County buildings and facilities.
- **Refrigerant** includes the amounts of refrigerants used to refill air conditioners in County buildings and vehicles.

TABLE 19-4 PROPORTIONS OF ANNUAL COUNTY OPERATIONS 2019 GHG EMISSIONS BY SECTOR

Sector	2019 $MTCO_2e$	2019 Proportion of Total
Energy	2,640	6%
Commute	5,330	12%
Fleet	5,140	11%
Solid Waste	32,310	71%
Water and Wastewater	60	Less than 1%
Refrigerant	20	Less than 1%
Total Annual $MTCO_2e$	**45,500**	**100%**

The largest share of annual GHG emissions generated by County operations was from the solid waste sector, with 71 percent of emissions. The commute and fleet sectors made up the second- and third-largest share of emissions with 12 and 11 percent, respectively. GHG emissions from the energy sector contributed a total of 6 percent while water and wastewater and refrigerants each contributed less than 1 percent.

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