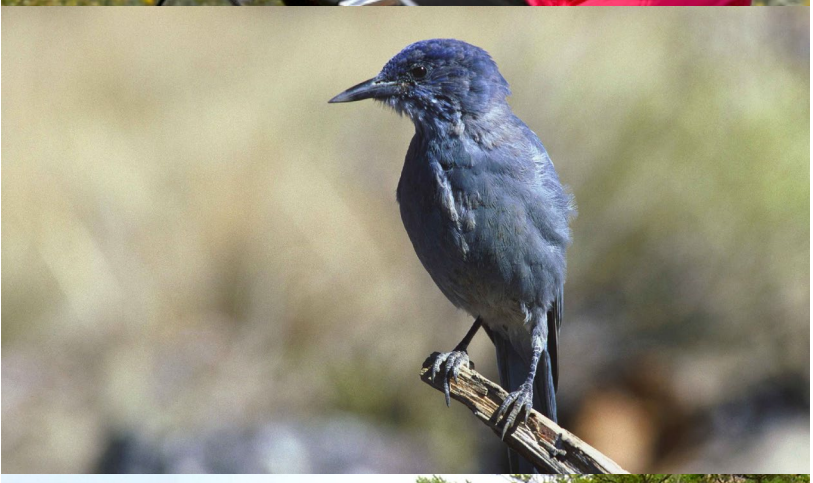

Santa Fe County, NM

2019 Inventory of Countywide Greenhouse Gas Emissions

JUNE 2022

Produced by the Santa Fe County Office of Sustainability
with Assistance from ICLEI – Local Governments for Sustainability USA

Credits and Acknowledgements

Adeline Murthy, Sustainability Specialist, Santa Fe County

Jacqueline Beam, Sustainability Manager, Santa Fe County

Paul Olafson, Deputy Director, Community Development, Santa Fe County

Joseph Montoya, Director, Community Development, Santa Fe County

Danny Valenzuela, Geologist, Santa Fe County

LeRoy Alvarado, Utilities Infrastructure Manager, Santa Fe County

John Dupuis, Utilities Division Director, Santa Fe County

Timothy Cannon, Senior Planner, Santa Fe County

Robert Griego, Planning Manager, Santa Fe County

Matthew Katz, Program Officer, ICLEI USA

Tom Herrod, Senior Program Officer, ICLEI USA

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Table of Contents

Tables and Figures

List of Tables

List of Figures

Definitions

Activity	The use of energy, materials, and/or services by members of the community that result in the creation of greenhouse gas (GHG) emissions either directly (e.g., use of household furnaces and vehicles with internal combustion engines) or indirectly (e.g., use of electricity created through combustion of fossil fuels at a power plant, consumption of goods and services whose production, transport and/or disposal resulted in creation of GHG emissions).
Activity data	Data on the magnitude of a human activity resulting in emissions taking place during a given period of time. Data on energy use, fuel used, miles traveled, input material flow, and product output are all examples of activity data that might be used to compute GHG emissions.
Anthropogenic emissions	GHG emissions that are a direct result of human activities or are the result of natural processes that have been affected by human activities.
Base(line) year emissions	GHG emissions in chosen year against which a community's emissions are compared over time.
Biochemical oxygen demand (BOD5)	The oxygen used in meeting the metabolic needs of aerobic microorganisms in water rich in organic matter (such as water polluted with sewage).
British thermal unit (Btu)	A measure of the heat content of fuels or energy sources. It is the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit at the temperature that water has its greatest density (about 39.2 degrees Fahrenheit).
Carbon dioxide (CO_2)	The most common of the six primary GHGs, consisting of a single carbon atom and two oxygen atoms, and providing the reference point for the GWP of other gases (the GWP of CO_2 is equal to 1).
Climate resilience	The ability to anticipate, prepare for, respond, and adapt to hazardous events, trends, or disturbances related to climate. Improving climate resilience involves assessing how climate change will create new, or alter current, climate-related risks to social, economic, and ecological systems, and taking equitable

	and proactive steps and policy actions to better cope with these risks.
CO_2 equivalent (CO_2e)	The universal unit for comparing emissions of different GHGs expressed in terms of the GWP of one unit of carbon dioxide.
Community	Residents, businesses, industries, and government co-located within a jurisdictionally defined area.
Double counting	Two or more reporting entities taking ownership of the same emissions or reductions, or the same reporting entity counting the same emissions twice.
Emission factor	A unique value for determining an amount of a GHG emitted on a per unit activity basis (for example, metric tons of CO_2 emitted per million Btus of coal combusted, or metric tons of CO_2 emitted per kWh of electricity consumed).
Fossil fuel	A fuel, such as coal, oil, and natural gas, produced by the decomposition of ancient (fossilized) plants and animals.
Fugitive emissions	Emissions that are not physically controlled but result from the intentional or unintentional release of GHGs. They commonly arise from the production, processing, transmission, storage and use of fuels or other substances, often through joints, seals, packing, gaskets, etc.
Global warming potential (GWP)	The ratio of radiative forcing (degree of warming to the atmosphere) that would result from the emission of one mass-based unit of a given GHG compared to one equivalent unit of carbon dioxide (CO_2) over a given period of time.
Greenhouse gas (GHG) emissions	Greenhouse gas emissions are gases that trap heat in the atmosphere. Some GHGs such as carbon dioxide occur naturally and are emitted into the atmosphere through natural processes and human activities. Other GHGs are created and emitted solely through human activities. The principal GHGs that enter the atmosphere because of human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride).
In-boundary emissions	GHG emissions released within the jurisdictional boundary of a community. Examples include GHG emissions from natural gas combustion in household furnaces and gasoline combustion in motor vehicles driven on roads within the community's jurisdictional boundary.

Intergovernmental Panel on Climate Change (IPCC)	International body of climate change scientists. The role of the IPCC is to assess the scientific, technical and socio-economic information relevant to the understanding of the risk of human-induced climate change (www.ipcc.ch).
Inventory	A comprehensive, quantified list of a community's or organization's GHG emissions and sources.
Liquefied petroleum gas (LPG)	A group of hydrocarbon-based gases derived from crude oil refining or natural gas fractionation. They include propane, propylene, butane, butylene, isobutene A-14 and isobutylene. For convenience of transportation, these gases are liquefied through pressurization.
Methane (CH_4)	One of the six primary GHGs, consisting of a single carbon atom and four hydrogen atoms, possessing a GWP of 28, and produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
Metric ton (MT)	Common international measurement for the quantity of GHG emissions, equivalent to about 2,204.6 pounds or 1.1 short tons.
Mitigation	Reduction of annual GHG emissions from a source or activity.
Mobile combustion	Emissions from the combustion of fuels in transportation sources (e.g., cars, trucks, buses, trains, airplanes, and marine vessels) and emissions from off-road equipment such as what is used in construction, agriculture, and forestry. A piece of equipment that cannot move under its own power, but that is transported from site to site (e.g., an emergency generator) is a stationary, not a mobile, combustion source.
Net zero	Net zero refers to a state in which the amount of greenhouse gases produced by human activity is balanced by the removal of greenhouse gases from the atmosphere. This condition must be achieved by 2050 to limit global warming to 1.5°C.
Nitrous oxide (N_2O)	One of the six primary GHGs, consisting of two nitrogen atoms and a single oxygen atom, possessing a GWP of 265, and typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
Process emissions	Emissions from physical or chemical processing rather than from fuel combustion. Examples include emissions from manufacturing cement, aluminum, adipic acid, ammonia, etc.

Reporting frameworks	Various approaches or lenses that a local government can use to identify and represent GHG emissions associated with a given community.
Scope(s)	Scopes are used in the context of reporting on GHG emissions associated with individual organizational entities (e.g., the operations of a business or local government). In that context, the scopes framework can be used to categorize direct (scope 1) emissions (e.g., smoke stacks or tailpipes that release emissions within an organizational boundary), indirect energy-related (scope 2) emissions (e.g., the use of purchased or acquired electricity, heating, cooling, or steam regardless of where the energy is generated), and other indirect (scope 3) emissions not covered in scope 2 (e.g., upstream and downstream emissions from the extraction and production of purchased materials and fuels). The U.S. Community Protocol does not use scopes as a framework for categorizing emissions in community inventories because the organization-related definitions of scopes do not translate to the community scale in a manner that is applicable, clear, and valuable.
Short ton (ton)	Common measurement for a ton in the U.S. and equivalent to 2,000 pounds or about 0.907 metric tons.
Source(s)	Any physical process that releases GHG emissions into the atmosphere (e.g., vehicle exhaust from combustion of gasoline, furnace exhaust from the combustion of natural gas, power plant exhaust from combustion of coal for the production of electricity).
Stationary combustion	Emissions from the combustion of fuels to produce electricity, steam, heat, or power using equipment (boilers, furnaces, etc.) in a fixed location.

Glossary of terms courtesy of the U.S. Community Protocol for Accounting and Reporting of GHG Emissions. Version 1.2. July 2019. ICLEI–Local Governments for Sustainability USA.

Acronyms

°C	degrees Celsius
ACS	American Community Survey
AFOLU	Agriculture, Forestry and Other Land Use
BCC	Board of County Commissioners
BOD5	five-day biochemical oxygen demand
C&D	construction and demolition
CH_4	methane
CNG	compressed natural gas
CNMEC	Central New Mexico Electrical Cooperative
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DOT	U.S. Department of Transportation
eGRID	Emissions and Generation Resource Integrated Database
EIA	U.S. Energy Information Administration
EIE	Environmental Insights Explorer
EMW	Town of Estancia, City of Moriarty, and Village of Willard Gas Association
EPA	U.S. Environmental Protection Agency
EV	electric vehicle
FLIGHT	Facility Level Information on GreenHouse gases Tool
FY	fiscal year
GHG	greenhouse gas
GWh	gigawatt hour(s)
GWP	global warming potential
ICLEI	Local Governments for Sustainability (formerly International Council for Local Environmental Initiatives)
IPCC	Intergovernmental Panel on Climate Change
JMEC	Jemez Mountains Electric Cooperative
kVA	kilovolt-ampere
kWh	kilowatt hour(s)
lb(s)	pound(s)
LEARN	Land Emissions And Removals Navigator
LP	liquefied petroleum
LPG	liquefied petroleum gas
MMBtu	metric million British thermal unit
MPG	miles per gallon
MSMEC	Mora-San Miguel Electric Cooperative
MSW	municipal solid waste
MT CO_2e	metric tons of carbon dioxide equivalent
MWh	megawatt hour(s)

N_2O	nitrous oxide
NCRTD	North Central Regional Transit District
NEI	National Emissions Inventory
NM	New Mexico
NMGC	New Mexico Gas Company
NTD	National Transit Database
PNM	Public Service Company of New Mexico
SAF	Santa Fe Municipal Airport
SWMA	Santa Fe Solid Waste Management Agency
USDA	U.S. Department of Agriculture
USGCRP	U.S. Global Change Research Program
VMT	vehicle miles traveled
VRM	vehicle revenue miles

Executive Summary

Santa Fe County recognizes that greenhouse gas (GHG) emissions from human activities are catalyzing profound climate change, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of our community.

In response to the climate emergency, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries, as well as influencing regional emissions through partnerships and advocacy. Through proactive measures in land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and other steps, local governments can dramatically reduce emissions in their communities.

In June 2017, the Santa Fe County Board of County Commissioners (BCC) voted to adopt and support the goals of the Paris Agreement, committing to reducing greenhouse gas emissions within the County and the community in order to limit global mean temperature increase. In April 2021, the County joined the "Race to Zero", pledging to reduce emissions from the building sector by 60% across County facilities by 2025, and countywide by 2030. In May 2021, the BCC voted to approve the publication of the greenhouse gas emissions inventory of County government operations during the years of 2005, 2017, and 2018.[1] The BCC then approved the publication and implementation of the Greenhouse Gas Emissions Reduction Plan through Resolution 2022-4. The plan is a comprehensive guide for implementing concrete actions to reduce the County's operational emissions.

As a next step in the overarching goal of reducing greenhouse gas emissions countywide, the BCC directed staff to create a Climate Action Plan. This plan will include sector-specific strategic approaches to reduce emissions and equitably adapt to the impacts of climate change. This report quantifies the greenhouse gas emissions resulting from activities in Santa Fe County as a whole in 2019, and serves as a baseline to inform climate change mitigation targets and strategies for the Climate Action Plan.

Santa Fe County collaborated with ICLEI, a global network of local and regional governments committed to sustainable urban development, to complete this GHG emissions inventory. ICLEI provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along Five Milestones:

[1] Santa Fe County. 2021. Santa Fe County Greenhouse Gas Emissions Inventory, Baseline 2005 and Years 2017 and 2018. Retrieved from https://www.santafecountynm.gov/media/files/Sustain/Santa-Fe-County-GHG-Inventory-Operations-2005-2017-2018.pdf.

1. Conduct an inventory and forecast of local greenhouse gas emissions;
2. Establish a greenhouse gas emissions science-based target;
3. Develop a climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.

This report represents the County's completion of ICLEI's Climate Mitigation Milestone One, and provides a foundation for future work to reduce greenhouse gas emissions in Santa Fe County.

The inventory estimates all of the emissions from within the geographical boundaries of Santa Fe County, including areas that are not within the jurisdiction of the government of Santa Fe County, such as sovereign tribal nations (Pueblos of Nambe, Tesuque, San Ildefonso, and Pojoaque), incorporated municipalities (City of Santa Fe, Town of Edgewood, and part of the City of Espanola), and State and Federal lands. The selected inventory year is 2019, the most recent "normal" year. All source data is from 2019 when possible, using the best available data.

Key Findings

Inventoried GHG emissions in Santa Fe County totaled 1,858,627 MT CO_2e in 2019**.** Nearly half of this total (46%), was attributed to Transportation and Mobile Sources, the largest contributor to Santa Fe County's overall emissions in the inventory year (Figure 1). The next largest emitting sectors were Residential Energy (25%) and Commercial Energy (17%). Actions to reduce emissions in all of these sectors will be a key part of the County's Climate Action Plan going forward. Solid Waste, Water and Wastewater, Industrial

Energy, Process and Fugitive Emissions, and emissions from Agriculture, Forestry, and Other Land Uses (AFOLU) were responsible for the remaining 11% of emissions (Figure 1).

The *Community Emissions Inventory Results* section of this report provides a detailed profile of emission sources and activities within Santa Fe County—information that is key to guiding local GHG reduction efforts. These data also provide a baseline against which the County will be able to compare future emissions and demonstrate progress in reducing emissions.

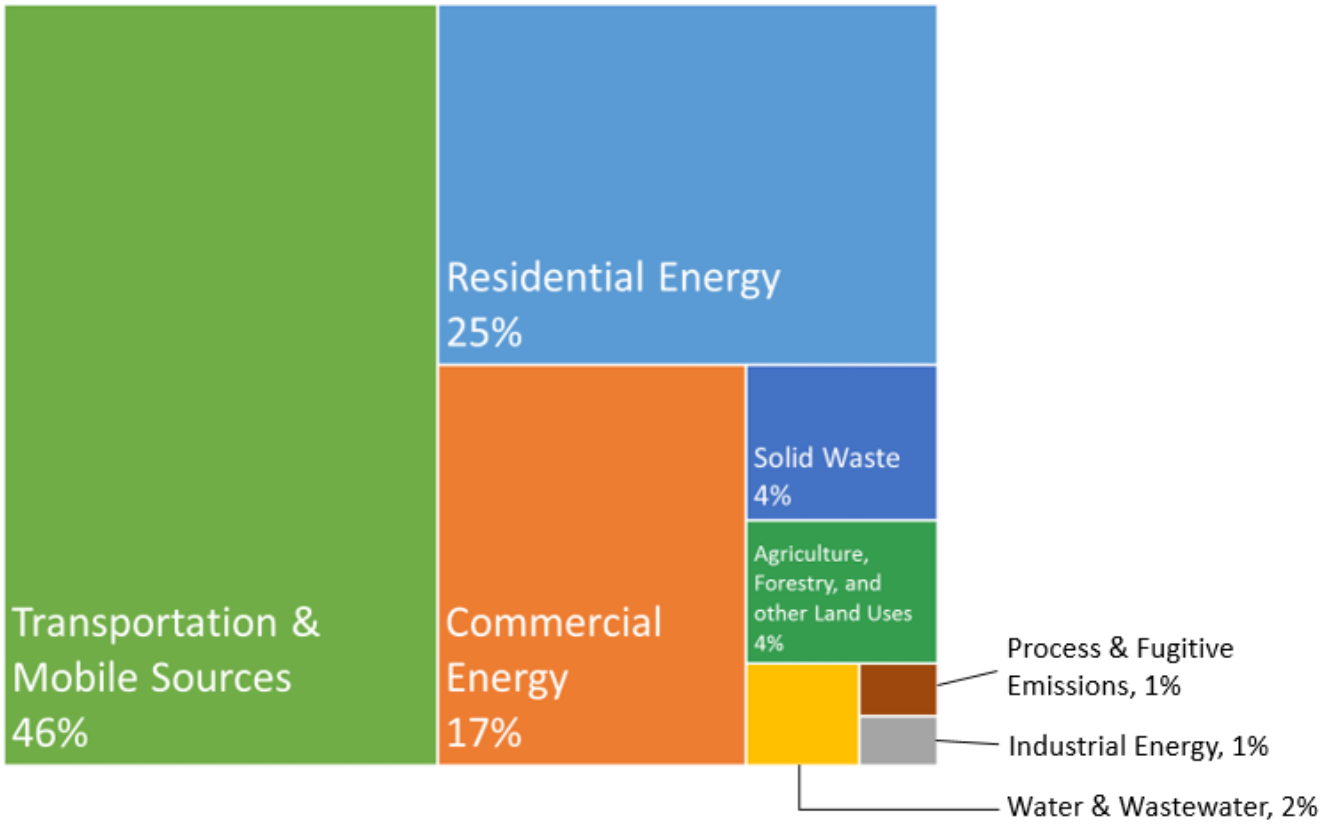

Figure 1: Countywide Emissions by Sector

Introduction to Climate Change

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities are increasing the concentration of greenhouse gases and changing the global climate. The most significant contributor is the burning of fossil fuels for transportation, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise, threatening the safety, quality of life, and economic prosperity of global communities. Although the natural greenhouse effect is needed to keep the earth warm, the rapid release of greenhouse gases into the atmosphere from human activities is enhancing the greenhouse effect, leading to too much heat and radiation trapped in the atmosphere and resulting in life-threatening changes in the earth's climate. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report confirms that human activities have unequivocally caused an increase in carbon emissions.[2] Many regions of the globe, including Santa Fe County, are already experiencing the consequences of global climate change.

The IPCC further reports that human activities are estimated to have already caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is expected to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (high confidence). Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts (high confidence), but these emissions alone are unlikely to cause global warming of 1.5°C (medium confidence). Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C (high confidence). These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation strategies (high confidence).[3]

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[2]IPCC, 2021: Summary for Policymakers. *In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press.

[3]IPCC, 2018: Summary for Policymakers. *In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W.

According to the 2018 National Climate Assessment, the southwestern U.S. is experiencing intensifying droughts, wildfires, and occasional large floods due in part to human-caused climate change. The integrity of Southwest forests and other ecosystems and their ability to provide natural habitat, clean water, and economic livelihoods have declined as a result of recent droughts and wildfires. Traditional foods, natural resource-based livelihoods, cultural resources, and the spiritual well-being of Indigenous peoples in the Southwest are increasingly affected by climate hazards. Drought, heat, and reduction of winter chill hours can harm crops and livestock, exacerbate competition for water among agriculture and municipal uses, and increase future food insecurity. Declining water supplies for people and nature is increasing the need for equitable allocation of water to accommodate a growing population in the Southwest. New Mexico, including Santa Fe County, is at particular risk for increases in extreme heat events. Heat waves increase the exposure of people to heat stroke and other illnesses that could result in death.[4] Heat extremes and changes in precipitation will also influence the distribution and occurrence of vector-borne diseases like the West Nile virus, plague, and hantavirus pulmonary syndrome, which already disproportionately affect the Southwest region.[5]

Many communities in the United States have started to take responsibility for addressing climate change at the local level. Reducing fossil fuel use in the community can have many benefits in addition to reducing greenhouse gas emissions. More efficient use of energy decreases utility and transportation costs for residents and businesses. Local land use planning that incentivizes retrofitting homes and businesses to be more efficient stimulates the economy through the creation of local jobs and businesses in this specialized industry. Reducing fossil fuel use also improves air quality and residents' health.[6]

Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.

[4] USGCRP, 2016: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 312 pp. doi:10.7930/J0R49NQX.

[5] U.S. Global Change Research Program. 2018. National Climate Assessment – Ch. 25: Southwest. Retrieved from https://nca2018.globalchange.gov/chapter/25/.

[6] Vohra, K., A. Vodonos, J. Schwartz, E.A. Marais, M.P. Sulprizio, and L.J. Mickley. 2021. Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem. *Environmental Research*. Volume 195, 110754. https://doi.org/10.1016/j.envres.2021.110754.

Greenhouse Gas Inventory as a Step Toward Carbon Neutrality

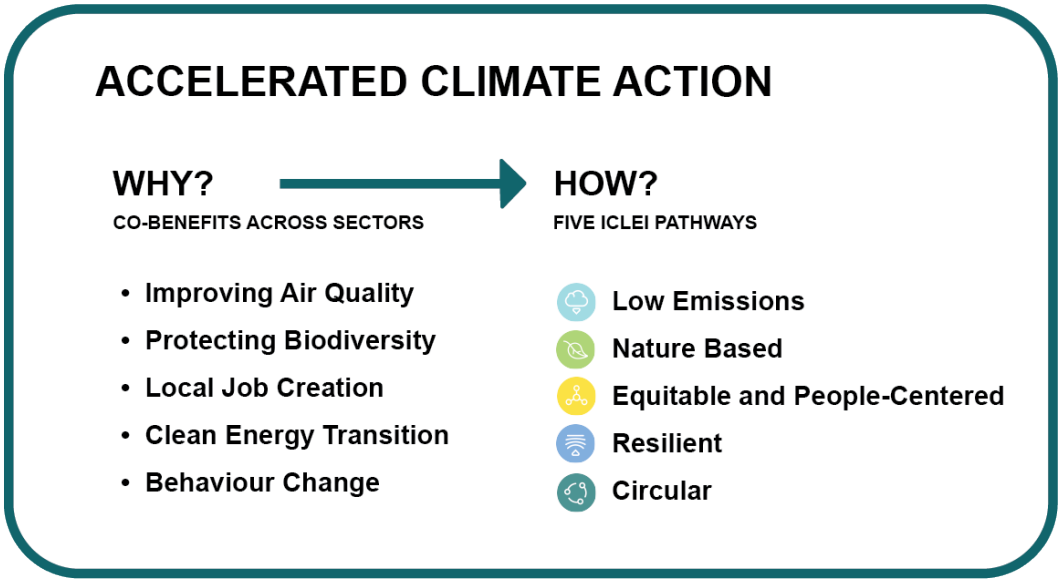
Facing the climate crisis effectively requires the concerted efforts of the organizations that are closest to the communities dealing with the impacts of climate change. Santa Fe County serves all unincorporated areas in the County and is charged with the responsibility of addressing the community needs associated with the impacts of climate change.

Cities, towns and counties are well placed to define coherent and inclusive plans that address integrated climate action: climate change mitigation, adaptation, equity, and resilience. Creating a roadmap for climate neutrality requires Santa Fe County to identify priority sectors for action, while considering climate justice, inclusiveness, local job creation and other benefits of sustainable development.

To complete this inventory, Santa Fe County utilized tools and guidelines from ICLEI, which provides authoritative direction for greenhouse gas emissions accounting and defines climate neutrality as follows:

> The targeted reduction of greenhouse gas (GHG) emissions and GHG avoidance in government operations and across the community in all sectors to an absolute net zero emission level at the latest by 2050. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes.

To achieve ambitious emissions reductions, and move toward climate neutrality, Santa Fe County aims to set a clear goal and act rapidly following a holistic and integrated approach. Climate action is an opportunity for Santa Fe County community members to experience a wide range of co-benefits, such as creating socio-economic opportunities and reducing poverty and inequality, while improving the health of people and the environment.



ICLEI Climate Mitigation Milestones

In response to the climate emergency, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries, as well as influencing regional emissions through partnerships and advocacy. Through proactive measures in land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and other steps, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts.

ICLEI provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along Five Milestones, also shown in Figure 2:

1. Conduct an inventory and forecast of local greenhouse gas emissions;
2. Establish a greenhouse gas emissions science-based target;
3. Develop a climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.

Figure 2: ICLEI Climate Mitigation Milestones

Science-based targets are climate goals calculated in line with the latest climate science, that represent a community's fair share of the ambition necessary to meet the Paris Agreement commitment of keeping warming below 1.5°C. To achieve this goal, the IPCC states that global emissions must be reduced by 50% by 2030 and net zero by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations and communities reduce their emissions by more than 50% by 2030.

The outcome of the fifth milestone will determine if adjustments to the strategies in the climate action plan are needed in order to meet the County's emissions reduction target and other climate action goals.

This report represents the County's completion of ICLEI's Climate Mitigation Milestone One, and provides a foundation for future work to reduce greenhouse gas emissions in Santa Fe County.

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. This report presents emissions from the Santa Fe County community as a whole. The government operations inventory[7] is mostly a subset of the community inventory, as shown in Figure 3. For example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles.

As local governments continue to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. This inventory uses the approach and methods provided by the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions, which is described in the next section.

Figure 3: Relationship between Community and Government Operations Inventories

Three greenhouse gases are included in this inventory: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Many of the charts in this report represent emissions in "carbon dioxide equivalent" (CO_2e) values, calculated using the global warming potentials (GWP) for methane and nitrous oxide from the IPCC 5th Assessment Report[8] (Table 1).

Table 1: Global Warming Potential Values

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO_2)	1
Methane (CH_4)	28
Nitrous Oxide (N_2O)	265

[7] Santa Fe County. 2021. Santa Fe County Greenhouse Gas Emissions Inventory, Baseline 2005 and Years 2017 and 2018. Retrieved from www.santafecountynm.gov/media/files/Sustain/Santa-Fe-County-GHG-Inventory-Operations-2005-2017-2018.pdf.

[8] IPCC, 2013: *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.

Community Emissions Protocol

Version 1.2 of the U.S. Community Protocol for Accounting and Reporting GHG Emissions[9] was released by ICLEI in 2019, and represents a national standard in guidance to help U.S. local governments develop effective community GHG emissions inventories. It establishes reporting requirements for all community GHG emissions inventories, provides detailed accounting guidance for quantifying GHG emissions associated with a range of emission sources and community activities, and provides a number of optional reporting frameworks to help local governments customize their community GHG emissions inventory reports based on their local goals and capacities.

The community inventory in this report includes emissions from the five Basic Emissions Generating Activities required to be in compliance with the U.S. Community Protocol. These activities are:

- Use of electricity by the community
- Use of fuel in residential and commercial stationary combustion equipment
- On-road passenger and freight motor vehicle travel
- Use of energy in potable water and wastewater treatment and distribution
- Generation of solid waste by the community

This inventory also includes emissions from the following activities:

- Wastewater processing
- Fugitive emissions from natural gas leakage
- Land use
- Off-road equipment and transportation
- Aviation

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to greenhouse gas emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by "sources" located within the community boundary, and 2) GHG emissions produced as a consequence of community "activities".

[9] ICLEI. 2019. US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2. Retrieved from https://icleiusa.org/us-community-protocol/.

Source	Activity
Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere (e.g., combustion of gasoline in transportation; combustion of natural gas in electricity generation; methane emissions from a landfill).	The use of energy, materials, and/or services by members of the community that result in the creation of GHG emissions either directly (e.g., use of household furnaces and vehicles with internal combustion engines) or indirectly (e.g., use of electricity created through combustion of fossil fuels at a power plant, consumption of goods and services whose production, transport and/or disposal resulted in GHG emissions).

The distinction between sources and activities can help local governments decide how to group the emissions numbers they might gather for the purpose of reporting. For example, a purely source-based emissions inventory could be summed to estimate total emissions released within the community's jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective on the efficiency of the community, even when the associated emissions occur outside the jurisdictional boundary. By reporting on both GHG emissions sources and activities, local governments can develop and promote a deeper understanding of GHG emissions associated with their communities.

The sources and activities framework alleviates the need to utilize the "scopes" concept common in other types of organization-focused inventories, such as those developed using the Local Government Operations Protocol.[10] The U.S. Community Protocol does not use scopes as a framework for categorizing emissions in community inventories because the organization-related definitions of scopes for corporate and government operations accounting does not translate to the community scale in a manner that is clear and consistently applicable as an accounting framework.

Base Year

The inventory process requires the selection of a base year with which to compare current and future emissions. Santa Fe County's community greenhouse gas emissions inventory utilizes 2019 as its baseline year, since it is the most recent year for which the necessary data are available during a "normal" year. Emissions calculations are thus based on the best available data in the year 2019. Comparing future emissions to the anomalous pandemic years of 2020 and 2021 would very likely result in a skewed understanding of GHG emissions associated with Santa Fe County.

[10] *Local Government Operations Protocol*, ICLEI USA, California Air Resources Board, California Climate Action Registry, and The Climate Registry.

Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

Most emissions sources in this inventory are quantified using calculation-based methodologies. Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see appendix for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh of electricity). For this inventory, calculations were made using ICLEI's ClearPath tool, a standard GHG inventory and forecasting tool for local governments.[11]

Community Emissions Inventory Results

The total countywide emissions for the 2019 inventory are shown in Table 2 and Figure 4. Figure 4 shows the contribution of each sector to the total emissions. Transportation and Mobile Sources was the largest contributor, followed by Residential Energy and Commercial Energy. On-road gasoline passenger vehicles are the largest source of emissions, contributing to 29% of inventoried GHG emissions in Santa Fe County.

Figure 5 shows the CO_2e emissions and removals from forests and trees outside of forests. Carbon emissions from land use change (e.g. forest to settlement) and forest disturbances (e.g. wildfires) were included in the emissions inventory in the Agriculture, Forestry, and Other Land Uses sector. Carbon removals were not included in the inventory, since the purpose of this GHG emissions inventory is to quantify total gross emissions, rather than net emissions. However, having an understanding of carbon removals from forests and trees outside of forests is beneficial for carbon sequestration and climate change mitigation planning purposes.

[11] ICLEI USA. 2022. ClearPath. Retrieved from https://icleiusa.org/clearpath/.

Table 2: Countywide Emissions Inventory

Sector	Fuel or Source	2019 Usage	Usage Unit	2019 Emissions (MT CO_2e)
Residential Energy	Electricity	452,581,440	kWh	233,889
	Natural Gas	38,994,622	Therms	207,399
	LPG	462,252	MMBtu	29,386
	Fuel Oil	11,568	MMBtu	861
			Residential Energy Total	**471,535**
Commercial Energy	Electricity	361,899,780	kWh	189,415
	Natural Gas	21,892,172	Therms	116,437
	Propane	134,970	MMBtu	8,376
	Fuel Oil	122,835	MMBtu	9,146
			Commercial Energy Total	**323,374**
Industrial Energy	Electricity	23,283,250	kWh	10,160
			Industrial Energy Total	**10,160**
On-Road Transportation	Gasoline (passenger vehicles)	1,292,496,980	VMT	539,276
	Diesel (passenger and freight vehicles)	137,889,231	VMT	203,660
Transit	All Fuel Types	1,975,531	VMT	725
Aviation	All Fuel Types	707,210	MMBtu	56,003
Off-Road	All Fuel Types	-	-	60,360
Rail	Diesel	54,289,028	Gallons	3,673
			Transportation Total	**863,698**
Solid Waste	Waste Generated	163,817	Tons	77,576
	Landfill Gas Flaring	14,192,162	Cubic Feet/Year	37
			Solid Waste Total	**77,612**
Water and Wastewater	Potable Water Treatment and Supply Energy	123,534	MMBtu	18,397
	Wastewater Treatment Energy	39,048	MMBtu	4,009
	Fugitive Emissions from Septic Systems	24,121	Service Population	2,931
	Wastewater Treatment Processes	126,237	Service Population	4,811
			Water and Wastewater Total	**30,148**
Agriculture, Forestry, and Other Land Uses	Ranching and Farming	-	-	20,080
	Agriculture Energy Use	8,999,096	kWh	3,906
	Forest Disturbances and Land Use Change	-	-	47,499
			Agriculture, Forestry, and Other Land Uses Total	**71,485**
Process and Fugitive Emissions	Fugitive Emissions from Natural Gas Distribution	61,189,792	Therms	10,616
			Process and Fugitive Emissions Total	**10,616**
			Total Countywide Emissions	**1,858,627**

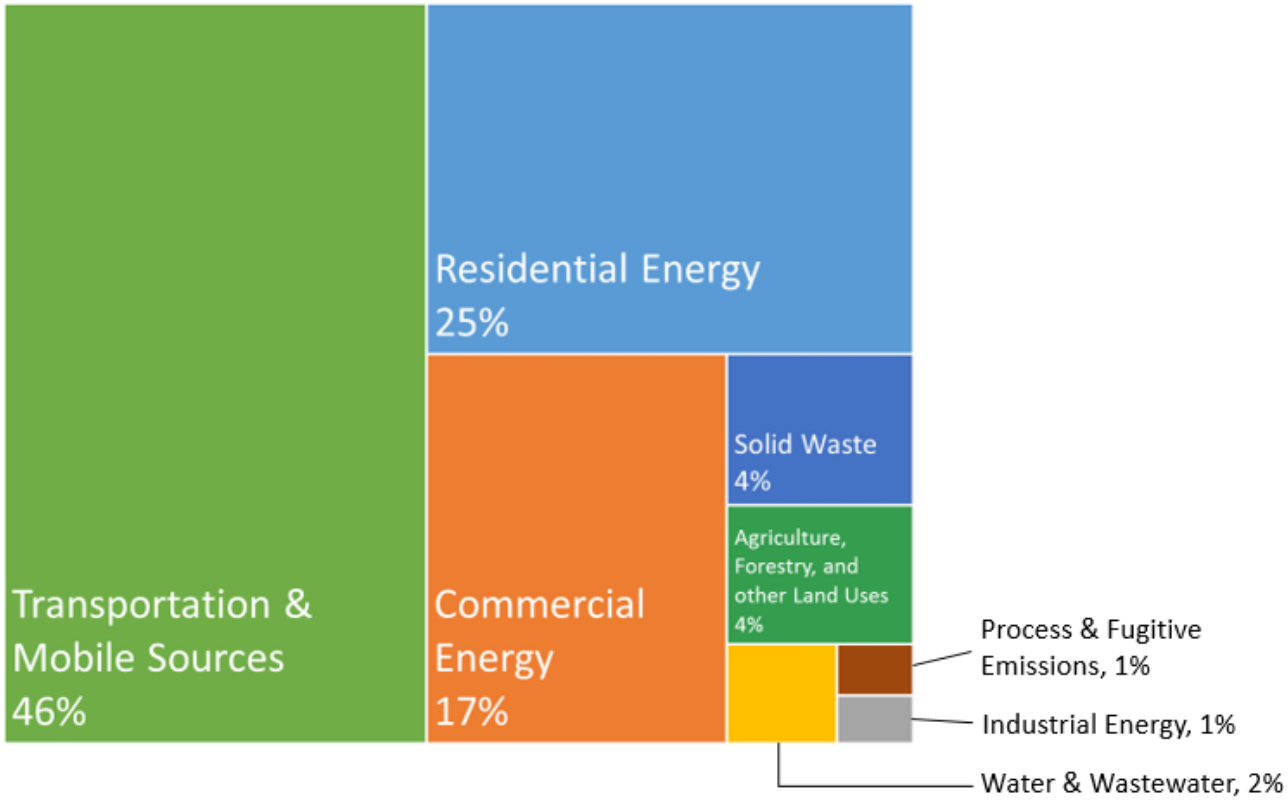


Figure 4: Countywide Emissions by Sector

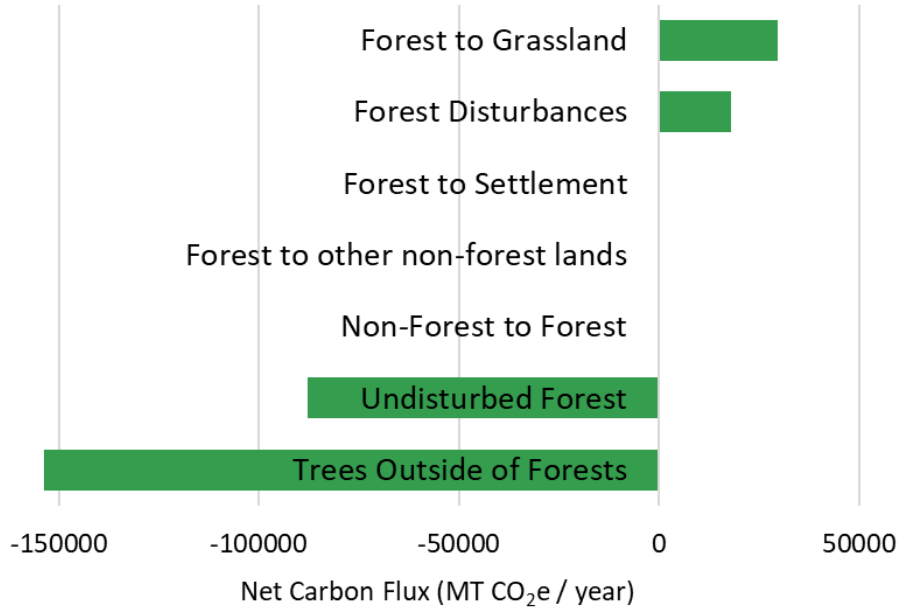


Figure 5: Emissions and Removals from Forests and Trees Outside of Forests

Next Steps

This inventory will be used to focus and prioritize actions to reduce emissions. Based on the inventory results, the following areas have the greatest potential for emission reductions:

- Transportation, especially emissions from passenger vehicles
- Residential energy use
- Commercial energy use

Completion of another GHG inventory in two to five years is recommended in order to assess progress resulting from emission-reducing programs and actions that are implemented. The detailed methodology section of this report, as well as notes and attached data files in the ClearPath tool, will be helpful to complete a future inventory consistent with this one.

Conclusion

This inventory marks the completion of Milestone One of the Five ICLEI Climate Mitigation Milestones. The next steps are to forecast emissions, set an emissions reduction target, and build upon the existing Santa Fe County sustainability goals with a more robust climate action plan that identifies specific quantifiable strategies to meet the emissions reduction target. Santa Fe County will continue to track key energy use and emissions indicators on an on-going basis. Future GHG emissions inventories will need to be updated on a regular basis, especially as plans are implemented, to ensure measurement and verification of impacts. Regular inventories also allow for "rolling averages" to provide insight into sustained changes over time.

Transportation and buildings are responsible for the largest portion of GHG emissions in Santa Fe County and therefore, reduction actions in transportation and the built environment must be prioritized through significant adjustments and changes in infrastructure, land use planning, and ordinances. The County has set a goal of reducing emissions from the building sector by 60% across County facilities by 2025, and countywide by 2030, and is implementing a number of programs to reach these goals. Similar commitments and targets need to be made in the transportation sector.

According to the 2020 Santa Fe County Housing Study,[12] 38% of workers in Santa Fe County commute from outside of the County, with 22% having a commute that is greater than 50 miles. A quarter of these workers earn $1,230 per month or less, while the median house sale price in Santa Fe County in 2019 was nearly $435,000 and the median rent was $1,030. Addressing transportation emissions presents a challenge that is entangled with the rising cost of living and inaccessibility of affordable housing in the

[12] Reagan, S. 2021. *2020 Santa Fe County Housing Data*. UNM Bureau of Business and Economic Research. Retrieved from http://52.26.4.43/media/publications/SantaFeCountyHousing2020Finalf.pdf.

County. Collaborative land use planning with the County, City of Santa Fe, and Santa Fe Metropolitan Planning Organization is needed to make the drastic changes necessary for workers and residents to reduce vehicle use by creating environments where the community can work and live without using a vehicle. Strategies to achieve this include higher density development, investing in equitable transportation infrastructure for all modes of transportation (including biking, walking, and transit), and addressing the increasing cost of living. These initiatives align with the County's Sustainable Growth Management Plan[13] and Community Development Department's vision of a healthy, affordable, and connected community with equitable access to live, work, and play in Santa Fe County.

The Intergovernmental Panel on Climate Change (IPCC) states that to meet the Paris Agreement commitment of keeping warming below 1.5°C, global emissions must be reduced by 50% by 2030 and reach net zero by 2050. Equitably reducing global emissions by 50% requires that those most responsible, the high-emitting, wealthier nations, reduce their emissions by more than 50% by 2030. More than ever, it is imperative that countries, regions, and local governments set targets that are ambitious enough to slash carbon emissions between now and mid-century. Science-based targets are calculated climate goals, in line with the latest climate science, that represent a community's fair share of the global ambition necessary to meet the Paris Agreement commitment. To achieve the science-based target, community education, involvement, and partnerships will be instrumental. In addition to equitable land use planning, the County will collaborate with ICLEI staff to identify a science-based target that incorporates a fair share consideration of the County's historic contributions to global GHGs as part of the County's climate action plan.

This inventory shows that communitywide transportation patterns as well as residential and commercial energy are particularly important to focus on in the climate action plan, due to the substantial and positive impact eliminating these emissions can have. Through careful, strategic planning, and the implementation of best practices, Santa Fe County can align actions that achieve the emissions reduction target with wider environmental, economic, social, and health benefits for community members in the decades to come.

[13] Santa Fe County. 2015. *Santa Fe County Sustainable Growth Management Plan.* Retrieved from https://www.santafecountynm.gov/media/files/SustainableGrowthManagementPlanAdoptedbyResolution2015-155.pdf.

Appendix: Methodology Details

The following tables show each activity, related data sources, and notes and assumptions about the data.

Energy

Table 3: Energy Data Sources

Activity	Data Source(s)	Data Notes and Assumptions
Countywide		
Residential, commercial, and industrial electricity consumption	Public Service Company of New Mexico (PNM), Jemez Mountains Electric Cooperative (JMEC), Central New Mexico Electrical Cooperative (CNMEC), and Mora-San Miguel Electric Cooperative (MSMEC)	• PNM: Residential meters are billed on residential rates 1A & 1B. Commercial includes multifamily apartment buildings, businesses, large users such as hospitals and universities, institutional/government buildings, wastewater treatment facilities, and transit vehicle energy. Industrial facilities are based on meter type. Electricity used for water supply and wastewater treatment was subtracted from total commercial electricity use, and electricity use from residential domestic wells was subtracted from total residential electricity use to avoid double counting. • JMEC: Residential includes single family dwellings and multifamily apartment buildings. Commercial includes businesses, large users like hospitals, universities, institutional/government buildings, and wastewater treatment facilities. Industrial is based on kVA size (how much power is required to run equipment). • CNMEC: Residential includes single family dwellings or apartments, including farm homes. Commercial includes businesses and institutional/government buildings. Industrial includes electricity consumed by pipeline pumping stations, wind farms, solar farms, etc. • MSMEC: Utility provided data for entire utility service area, which spans four counties. Electricity use of Santa

		Fe County MSMEC customers was estimated based on ratio of population in entire service area and population in Santa Fe County service area. Residential includes single family dwellings and seasonal residents, and commercial includes small and large businesses. No industrial energy use was reported.
Residential, commercial, and industrial natural gas consumption	New Mexico Gas Company (NMGC) and EMW Gas Association (EMW)	• NMGC: Residential includes single-family residential units. Multi-family apartment buildings are classified as residential if each single family unit is individually metered, otherwise they are classified as commercial. Commercial includes small, medium, and large volume primary business activity, including churches, master metered multi-unit residential structures, and institutional/government buildings. Natural gas used in the water and wastewater sector was subtracted from commercial natural gas consumption to avoid double counting. No industrial facilities were reported. • EMW: Natural gas use was estimated by multiplying the average residential and commercial natural gas use per household of NMGC customers by the number of households served by EMW.
Residential LPG and Fuel Oil Consumption	U.S. Census	Non-utility fuel consumption was estimated by multiplying the average residential NMGC natural gas use per household by the Santa Fe County household count in the "House Heating Fuel" section of the 2019 U.S. Census ACS 5-Year Estimates Subject Table, *Physical Housing Characteristics for Occupied Housing Units* (https://data.census.gov/cedsci/table?q=S25&g=0500000US35049&tid=ACSST5Y2019.S2504&hidePreview=true). This assumes that if a household is using natural gas for heating, cooking etc., the same amount of energy would be used if a similar household was using propane or another fuel for heating and cooking. In the Census table, the house heating fuel categorized as "Bottled, tank, or LP gas," was assumed to be LPG for entry into ClearPath. Similarly, the house heating fuel categorized as "Fuel oil, kerosene, etc.," was assumed to be Distillate Fuel Oil No. 2 for entry into ClearPath.
Commercial Propane Consumption	U.S. Environmental Protection Agency (EPA) FLIGHT and U.S.	• EPA FLIGHT: 2019 propane consumption from Caja Del Rio Landfill was reported to EPA FLIGHT. Recommended by ICLEI to include in commercial energy sector even

	Energy Information Administration (EIA)	though this is a solid waste facility. No other facilities in Santa Fe County were required to report to the EPA in 2019, meaning no single industrial facility besides the landfill emitted more than 25,000 MT CO_2e. • EIA: Additional commercial propane consumption was estimated by scaling statewide propane usage from EIA to the population of Santa Fe County.
Commercial Fuel Oil Consumption	U.S. Energy Information Administration (EIA)	Commercial fuel oil consumption was estimated by scaling statewide fuel oil usage from EIA to population of Santa Fe County.

Table 4: 2019 Emissions Factors for Electricity Consumption

Emissions Factor	CO_2 (lbs/MWh)	CH_4 (lbs/GWh)	N_2O (lbs/GWh)
eGRID[14]	952.3	68.0	10.0
PNM	1,175	117.8	16.9

Transportation

Table 5: Transportation Data Sources

Activity	Data Source	Data Notes and Assumptions
Countywide		
Vehicle miles traveled	Google Environmental Insights Explorer (EIE), U.S. Energy Information Administration (EIA), U.S. Department of Transportation (DOT), and U.S. Environmental Protection Agency (EPA)	The Travel Demand Model (also known as Origin-Destination Model) was used to account for on-road passenger emissions. This takes into account 100% of in-boundary trips (trips that begin and end inside Santa Fe County) and 50% of transboundary trips (trips that begin outside of Santa Fe County and end outside of Santa Fe County). The 2019 National Default Vehicle Fuel Efficiency and Emission Factors was used for the vehicle mix and emission factors, which sources data from EIA, DOT, and EPA (see Table 6). Vehicle miles traveled (VMT) data was sourced from Google EIE. Note that on-road freight emissions are likely included in this inventory record since Google EIE VMT data accounts for all private on-road transportation. Also note that the energy required for EV

[14] U.S. Environmental Protection Agency, Emissions & Generation Resource Integrated Database (eGRID).

		charging is captured in the residential and commercial energy sectors.
Transit	National Transit Database (NTD) and North Central Regional Transit District (NCRTD)	• Santa Fe Trails: Fuel use (diesel, CNG, and gasoline) was sourced from NTD. Diesel fuel use accounts for buses only, CNG fuel use accounts for demand response vehicles and buses, and gasoline fuel use accounts for demand response vehicles only. Annual vehicle revenue miles (VRM) were sourced from NTD Transit Agency Profile. Total VRM for Santa Fe Trails in 2019 was 1,230,563. ClearPath VRM entries are proportional to gallons of fuel used across the three Santa Fe Trails inventory records for each fuel type. • NCRTD: Both fuel use and VRM (for fiscal year 2019, not calendar year 2019) were received directly from the transit agency. Transit agency provided data for entire service area. Total annual fuel use was 176,332.02 gallons propane, and total VRM was 1,433,335. Total service population was 289,292. Fuel usage and VRM in Santa Fe County was allocated based on population of Santa Fe County (150,358).
Aviation	2019 Albuquerque Sunport Sustainable Airport Master Plan and 2015 GHG Emissions Inventory of the City of Santa Fe and Santa Fe County	• Albuquerque Sunport: Fuel data is from 2013. This is the latest data available as per the 2019 Sustainable Airport Master Plan, available here: https://cabq.legistar.com/LegislationDetail.aspx?ID=3980533&GUID=B64634BD-18CC-4443-A8D2-6F1A62CBE438&Options=ID%7cText%7c&Search=r-19-168 (page 59 in Chapter 4). 10% of fuel consumption was attributed to Santa Fe County. This follows the same methodology as the 2015 GHG Emissions Inventory of the City of Santa Fe and Santa Fe County, available here: https://static1.squarespace.com/static/5c3b5ceb50a54f1affe9404f/t/60b7ef509349e87551654d24/1622667091655/Santa+Fe+2015+GHG+Emissions+Inventory_Mar.9.17.pdf (page 22). • Santa Fe Municipal Airport (SAF): Fuel data is from the 2015 GHG Emissions Inventory of the City of Santa Fe and Santa Fe County, since fixed-based operators were unable to provide data for 2019. 100% of fuel consumption was attributed to Santa Fe County under the assumption that the vast majority of passengers

		arriving to or departing from SAF are conducting activities in Santa Fe County (e.g. tourism, business). • All fuel purchases were assumed to be associated with domestic passenger flights, not domestic freight. Both airports had no international flights in 2019.
Off-Road Vehicles and Non-Road Equipment	National Emissions Inventory (NEI)	Includes non-road engines and equipment, such as lawn and garden equipment, construction equipment, engines used in recreational activities, and portable industrial, commercial, and agricultural engines. Data is from 2017 National Emissions Inventory, the latest data available. The next NEI data release will be for data year 2020. Link to NEI data query page: https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data#dataq. Link to NEI data documentation: https://www.epa.gov/sites/default/files/2021-02/documents/nei2017_tsd_full_jan2021.pdf.
Rail	Amtrak Fiscal Year (FY) 2019 and 2020 Annual Reports, 2019 Rail Runner Program Evaluation Report, and National Transit Database (NTD)	Fuel usage was calculated by allocating total network route miles and fuel usage to miles of track in Santa Fe County. • Amtrak: 21,400 route miles in Amtrak's network, of which 39.6 are in Santa Fe County. Amtrak has one stop in Santa Fe County (Lamy). Total route miles was sourced from Amtrak's FY20 annual report, and miles within Santa Fe County was measured using Google Earth. Fuel quantity was sourced from Amtrak's FY19 annual report. Link to Amtrak's annual reports: https://www.amtrak.com/sustainability-reports. • Rail Runner: 97 route miles in Rail Runner's network, of which 25.2 are in Santa Fe County. Total route miles was sourced from 2019 Program Evaluation Report, and miles within Santa Fe County was measured using Google Earth. Fuel quantity was sourced from NTD. Link to Rail Runner's Program Evaluation Report: https://nmlegis.gov/Entity/LFC/Documents/Program_Evaluation_Reports/Cost,%20Effectiveness%20and%20Operations%20of%20the%20New%20Mexico%20Railrunner.pdf.

For vehicle transportation, average miles per gallon and emissions factors for CH_4 and N_2O were applied to each vehicle type. The factors used are shown in Table 6.

Table 6: 2019 MPG and Emissions Factors by Vehicle Type
(Source: U.S. Energy Information Administration)

Fuel	Vehicle type	MPG	CH_4 g/mile	N_2O g/mile
Gasoline	Passenger cars & motorcycles	24.1	0.0183	0.0083
Gasoline	Light truck	17.6	0.0193	0.0148
Gasoline	Heavy truck	5.37	0.0785	0.0633
Diesel	Passenger car	24.1	0.0005	0.001
Diesel	Light truck	17.6	0.001	0.0015
Diesel	Heavy truck	6.39	0.0051	0.0048

Wastewater

Table 7: Wastewater Data Sources

Activity	Data Source	Data Notes and Assumptions
Countywide Operations		
Nitrogen Discharge	City of Santa Fe Utilities and Population-based	City of Santa Fe activity data was received directly from the utility. Two additional inventory records (process N_2O emissions from wastewater treatment and nitrogen discharge) were included to account for the population served by the several small wastewater treatment plants in Santa Fe County. The population was assumed to be the same as the population served by community water systems. The wastewater treatment systems were assumed to be predominately anaerobic, with no nitrification-denitrification processes.
Digester Gas Combustion/Flaring		
Nitrification-Denitrification		
Process Emissions from Wastewater Treatment Lagoons	Santa Fe County Utilities	Activity data was received directly from the utility. The ClearPath default of 32.5% was used as the fraction of BOD5 removed in primary treatment. The ClearPath default of 1.25 was used as the industrial discharge multiplier.
Energy used in wastewater facilities	Santa Fe County Utilities, City of Santa	Activity data was received directly from the respective utilities. Electricity usage of the Quill Wastewater Treatment Plant (Santa Fe County Utilities) was estimated

	Fe Utilities, and Population-based	based on average use in 2018/19. An additional inventory record was included to account for the energy used in the several small community wastewater plants. The population served by these small plants was assumed to be the same as the population served by community water systems. Energy use was estimated by multiplying the population served by small plants by the average energy use per person in the City and County wastewater utility systems. Community wastewater systems were assumed to all be in PNM and NMGC's service areas since those two utilities serve 85% of Santa Fe County residents.
Fugitive Emissions from Septic Systems	Population-based	A population-based calculation was used in ClearPath to quantify fugitive emissions from septic system. Population that uses septic systems was inferred by subtracting the total population of Santa Fe County by the number of people served by Santa Fe County's wastewater utility, the City of Santa Fe's wastewater utility, and the population served by other community wastewater systems.

Potable Water

Table 8: Potable Water Data Sources

Activity	Data Source	Data Notes and Assumptions
Countywide		
Energy used in the treatment and supply of potable water	Santa Fe County Utilities, City of Santa Fe Utilities, New Mexico Drinking Water Watch	• Santa Fe County and City of Santa Fe Utilities: Activity data was received directly from the respective utilities. • Community Water Systems: Energy use was estimated by multiplying the population served by community water systems by the average energy used per person in the City and County water utility systems. Population of community water systems was sourced from New Mexico Drinking Water Watch: https://dww.water.net.env.nm.gov/NMDWW/index.jsp. Community water systems were assumed to all be in PNM and NMGC's service areas since those two utilities serve 85% of Santa Fe County residents. • Domestic Wells: Population using domestic wells was inferred by subtracting the total population of Santa Fe County by the number of people served by Santa Fe

		County's water utility, the City of Santa Fe's water utility, and the population served by community water systems. Energy use was estimated by multiplying population using domestic wells by the average electricity use per person in the City and County water utility systems. This method does not take into account residents with multiple wells. All wells were assumed to all be in PNM's service area since PNM serves approximately 85% of Santa Fe County residents.

Solid Waste

Table 9: Solid Waste Data Sources

Activity	Data Source	Data Notes and Assumptions
Countywide		
Waste generated	Santa Fe Solid Waste Management Agency (SWMA) and U.S. Environmental Protection Agency (EPA)	Activity data was received directly from SWMA. The Caja del Rio Landfill serves all households in Santa Fe County and all businesses. Waste characterization was assumed to be 100% municipal solid waste (MSW) due to the lack of local or state waste characterization studies. A separate inventory record was created for construction and demolition waste (C&D), since SWMA provided a tonnage amount for that waste category. Both MSW and C&D factor sets used EPA averages. MSW source: https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials. C&D source: https://www.epa.gov/sites/default/files/2020-03/documents/final_cd-eol-management_2015_508.pdf (Table ES-1). Note that solid waste collection and transportation emissions are included in the Transportation & Mobile Sources sector.
Landfill gas flaring	Santa Fe Solid Waste Management Agency (SWMA)	Activity data was received directly from SWMA. Flare emissions account for entire landfill tonnage, not just tonnage reported in 2019.

Agriculture, Forestry, and Other Land Uses

Table 10: Agriculture, Forestry, and Other Land Uses Data Sources

Activity	Data Source	Data Notes and Assumptions
Countywide		
Ranching and Farming	USDA Census of Agriculture, U.S. National GHG Emissions Inventory, and New Mexico 2018 GHG Emissions Inventory	• Ranching: Livestock headcount data was sourced from 2017 USDA Ag Census: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/New_Mexico/. Emission factors were sourced from IPCC (2006), refined for U.S. National GHG Emissions Inventory. • Farming: Emissions from farming practices were estimated by scaling statewide farming emissions to the cropland area in Santa Fe County. Only Agricultural Soil Management and Urea Fertilization were downscaled to the cropland area of Santa Fe County since Enteric Fermentation and Manure Management were likely covered by ranching emissions. Cropland area for both Santa Fe County and New Mexico were sourced from 2017 USDA Ag Census: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/New_Mexico/. Statewide GHG emissions were sourced from New Mexico 2018 GHG Emissions Inventory: https://cnee.colostate.edu/wp-content/uploads/2020/10/New-Mexico-GHG-Inventory-and-Forecast-Report_2020-10-27_final.pdf.
Agriculture Energy Use	Central NM Electric Coop (CNMEC) and Mora-San Miguel Electric Coop (MSMEC)	CNMEC and MSMEC reported electricity use from the agricultural sector. CNMEC included energy use from irrigation wells and livestock wells. MSMEC included energy use from agricultural buildings and irrigation. Electricity usage of MSMEC was estimated based on ratio between the population in MSMEC's total service area and the population of Santa Fe County residents served by MSMEC.
Forest Disturbances and Land Use Change	ICLEI Land Emissions and Removals Navigator (LEARN)	Activity data was sourced from LEARN tool: https://icleiusa.org/LEARN/. The most recent data year at time of this inventory was 2016. Forest disturbances include forest area loss and emissions from fire, insect/disease, and harvest/other.

Fugitive Emissions

Table 10: Fugitive Emissions Data Sources

Activity	Data Source	Data Notes and Assumptions
Countywide		
Fugitive Emissions from Natural Gas Distribution	New Mexico Gas Company (NMGC)	Includes fugitive emissions from natural gas use in residential, commercial, and water & wastewater sectors. Activity data (total natural gas usage) was received from NMGC. Emissions factors and other inputs (leakage rate, energy density, gas density, % CH_4, and % CO_2) were ClearPath defaults.

Inventory Calculations

The 2019 inventory was calculated following the U.S. Community Protocol and ICLEI's ClearPath software. As discussed in the *Inventory Methodology* section, the IPCC 5th Assessment was used for global warming potential (GWP) values to convert methane and nitrous oxide to CO_2 equivalent units. ClearPath's inventory calculators allow for input of the sector activity (e.g. kWh or VMT) and emissions factors to calculate the final CO_2e emissions.