2021 Greenhouse Gas Emissions Summary Memo

July 1, 2023

CITY OF Longmont
Sustainability

LOTUS
Engineering & Sustainability

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2021 Emissions Snapshot

TARGET: Reduce greenhouse gas (GHG) emissions 66% from the 2016 baseline by 2030 (367,599 mt CO_2e).

In 2021, emissions were 943,281 metric tons of carbon dioxide equivalent (mt CO_2e).

The biggest contributors to emissions were:

Building electricity use (47%)	**Building gas use (24%)**	**On-road transportation and transit (17%)**

KEY TAKEAWAYS FROM THE 2021 INVENTORY

Emissions fell 12.8% from 2016 baseline levels primarily due to Longmont's use of renewable energy.

An increase in emissions came from solid waste due to population increase, Global Warming Potential calculation changes, a global trend in increased solid waste from the COVID-19 pandemic, and more accurate data from haulers.

Moving Longmont's energy mix to 100% renewable energy and focusing on building electrification and energy efficiency will be the most effective actions for Longmont to reach its emissions reduction goals.

Embedding Equity

The City of Longmont envisions an engaged community that promotes environmental stewardship, economic vitality, and social equity to create a sustainable and thriving future for all. This GHG inventory and memorandum serves as one tool to build toward this vision.

To equitably achieve Longmont's GHG goals, the City applies an equity lens to all of its actions so that each climate and sustainability action can benefit all.

"Throughout the United States, frontline communities have historically borne the brunt of longstanding environmental injustice including fossil fuel created degradation and it is acknowledged that these communities must actively participate in the planning, decision making, and implementation of climate action and must benefit equally from a just transition to a sustainable and equitable economy."

- Longmont 2019 Climate Emergency Resolution

LONGMONT HIGHLIGHT

The Equitable Climate Action Team (ECAT) is a City staff-led group of community members who work to assist in implementing equitable climate action through community education, outreach, and the evaluation of City programs to ensure equitable outcomes. In 2022, the team provided feedback on six climate action projects including the Beneficial Building Electrification Plan and volunteered at 12 City sponsored events.

Introduction

The City of Longmont (Longmont/the City) continues to be a leader on climate action and has committed to creating a healthier, more sustainable, and more resilient future for all community members. The City's first Sustainability Plan (2016, revised 2018) and the Climate Action Recommendations Report (2020), both include several strategies to enhance the quality of life for all community members by reducing the environmental impact of community activities, increasing access to and affordability of resources and amenities, and supporting economic resilience and prosperity. As part of the City's sustainability strategy, Longmont is committed to defining and reporting on the indicators and metrics of progress for sustainability measures, including the City's progress towards its greenhouse gas (GHG) emission reduction goals. Progress on all actions and related plans can be viewed on the Longmont Indicators website.

Greenhouse gases, also known as GHGs, are gases that are released through natural and human-caused activities that trap infrared heat in the earth's atmosphere. Human-induced GHG emissions are a major driver of climate change. The most common gases measured, and those analyzed in this report, include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHGs are reported in metric tons carbon dioxide equivalent (mt CO_2e).

In 2018, Lotus Engineering and Sustainability, LLC (Lotus) developed the City of Longmont's first GHG emissions inventory to establish a baseline year of 2016 for future inventories. The subsequent report shared the findings of the inventory and explored the GHG emission reduction potential of various sustainability strategies. Longmont has continued to contract with Lotus to provide GHG inventory updates for 2019 and 2021. The 2021 inventory was completed one year before the timeline stated in the Longmont Sustainability Plan to align with the Boulder County-wide GHG inventory update.*

This memorandum provides an overview of emissions sources and activities in 2021, as well as a comparison to the 2019 and 2016 emissions values. It also includes an update on new assumptions regarding emissions calculations.

COVID-19

While Longmont's total emissions decreased from 2019 to 2021, it is important to note that 2021 is an outlier year due to the COVID-19 pandemic. National trends saw reduced travel, decreased commercial energy usage, and increased waste disposal. Activity in Longmont followed this trend. As businesses experienced continued reduced operations, commercial building energy emissions decreased. The increased disposal of waste that was prompted by the COVID-19 pandemic was one of several factors that increased waste emissions. Reductions of national and local emissions in 2021 do not necessarily represent a new normal.

At this point, it is too soon to say whether some of the norms that formed during the pandemic, such as an increase in remote work, are durable. Similarly, it is unlikely that 2021 is fully representative of a post-pandemic system. Longmont will continue to track the trends of the pandemic to determine their persistence into the future and how the City will adjust its own strategies in response.

* Longmont's emissions in the Boulder County wide report are for the Boulder County portion of Longmont only. The report is in the process of being finalized and will be publicly available soon.

Inventory Methodology

Longmont's 2021 GHG emissions inventory provides an analysis of community-based activities in the 2021 calendar year. The inventory is compliant with the Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories* (GPC protocol).

The GPC protocol is a global standard for GHG emission accounting and reporting. It was developed and launched in 2014 and provides a template from which communities can create comparable and standard emission inventories. The protocol defines what emissions must be reported, as well as how those emissions are to be calculated and reported.

The GPC protocol includes two different reporting levels, BASIC and BASIC+:

» BASIC: The BASIC methodology covers stationary energy, in-boundary transportation, and community-generated waste (including wastewater).

» BASIC+: The BASIC+ level includes BASIC emission sources, as well as a more comprehensive coverage of emissions sources such as trans-boundary transportation; electricity transmission and distribution losses; industrial processes and product use (IPPU); and agriculture, forestry, and other land uses (AFOLU).

Longmont completed a BASIC+ inventory, which is consistent with the 2016 baseline. The specific GHGs accounted for in the inventory include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Emissions are calculated in an inventory workbook created specifically for Longmont, and results are totaled as metric tons of carbon dioxide equivalents (mt CO_2e).

The inventory categorizes emissions by scopes, sectors, and sources. Scopes are defined by globally recognized protocols and provide a very high-level view of emissions with combined sectors and sources within each scope. Per the GPC protocol, the following definitions apply to emission scopes (see Figure 1):

Scope 1: GHG emissions from sources located within the boundary (excluding grid-supplied electricity).

Scope 2: GHG emissions occurring as a result of the use of grid-supplied electricity, heat, steam and/or cooling within the boundary.

Scope 3: All other GHG emissions that occur outside the boundary as a result of activities taking place within the boundary.

* Please see the "Global Protocol for community-scale Greenhouse Gas emission inventories."

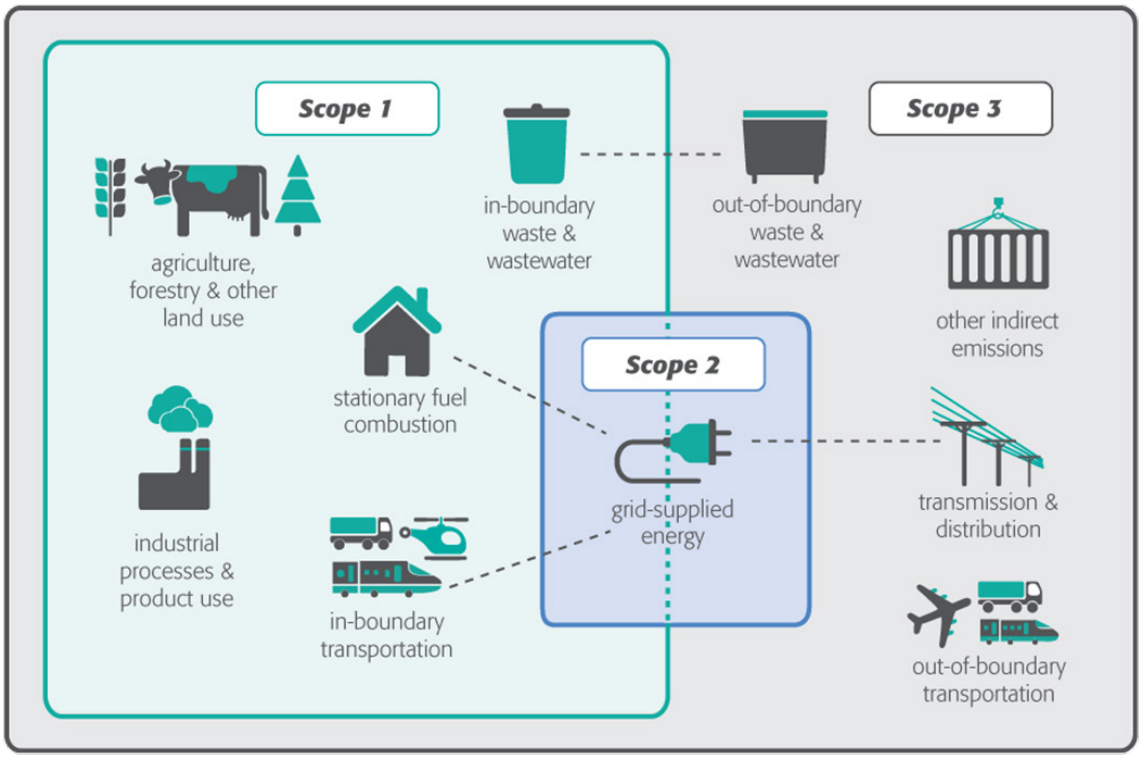

Figure 1. Definitions of emissions by scope.

The boundaries of the 2021 GHG inventory were set as Longmont's city limits with the addition of a small amount of City-owned agricultural land outside of the city limits. The agricultural activity on the City-owned land that is outside of city limits was not included in the 2016 baseline inventory but was included in the 2019 inventory to better represent the City's emissions from agriculture.

The best practices for conducting GHG inventories, as well as the available local data for use in inventory calculations, are constantly being improved. While maintaining comparability between the 2016, 2019, and 2021 inventories is a top priority for Longmont, so is ensuring the most accurate inventory possible is created. Some sectors of the 2021 inventory include an updated methodology or improved data collection from the data providers from 2019. Where this is the case, further detail and explanation is provided.

A significant methodology change that impacts emissions throughout the report includes updated Global Warming Potentials (GWPs). These are updated with each new Intergovernmental Panel on Climate Change (IPCC) assessment report, the latest of which came out at the end of 2021. GWPs are used to convert metric tons of CH_4 and N_2O to metric tons CO_2e. In accordance with the latest IPCC report, the GWP for CH_4 has increased from 28 to 29.8 and the GWP for N_2O has increased from 265 to 273. This change specifically impacts sources of emissions that are heavier in methane and nitrous oxide content. Those emissions sources include gas, waste, wastewater, fugitive emissions, and the AFOLU sector.

2021 GHG Emissions Memo

The following sections detail the changes in emissions in Longmont from 2016 and 2019 to 2021. Several charts and graphs will depict the data and help tell Longmont's story of emission reduction toward their **goal of GHG emissions reductions of 66% from the 2016 baseline by 2030.**

Key Findings from the 2021 Inventory

Emissions

Longmont's emissions in 2021 were 943,281 mt CO_2e. Scope 2 emissions were 46% of the community's total, while Scope 1 emissions comprised 42% and Scope 3 emissions were 12% of the total. See Figure 2.

Evaluating the emissions generated by each sector within the community is essential for identifying opportunities to mitigate emissions. Figure 3 illustrates the share of emissions produced by each sector.

The use of energy (electricity and gas) to heat and power buildings in Longmont makes up 71% of the community's emissions in 2021.

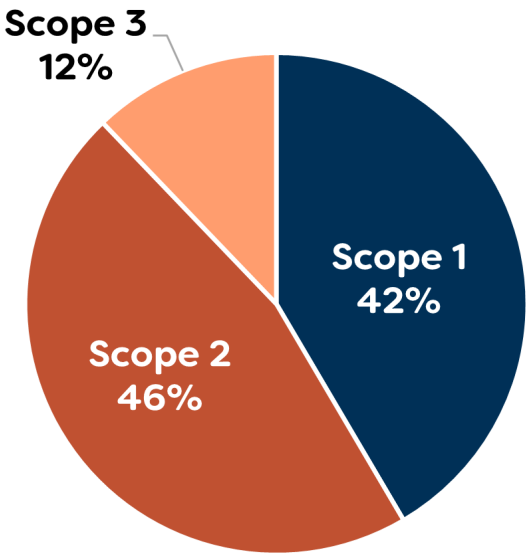

Figure 2. Longmont's 2021 emissions by scope.

» **Commercial and industrial buildings** produced 37% of the community's total emissions.

» **Residential buildings** produced slightly less, at 35% of the community's total emissions.

Commercial building emissions continue to represent the largest share of emissions from a single sector in Longmont. However, it is important to note the COVID-19 pandemic has significantly impacted these emissions, reducing commercial building emissions so they are just slightly higher than residential building emissions. This reduction can be attributed to many residents working from home and using their commercial business space less frequently. This may not be a long-term trend as the community recovers from the pandemic and employees return to in-office work. The magnitude of the pandemic's impact is illustrated in the fact that commercial energy emissions decreased by over 18% between 2019 and 2021, whereas residential energy emissions decreased by a much smaller share, just under 10%. For details on Longmont's 2021 emissions by all sources, please see the graph in Appendix A: 2021 Emissions by All Sources.

The transportation sector comprises 25% of all the community's emissions. The creation and disposal of solid waste in the community generated 3% of all emissions, and IPPU activities (using refrigerants for building cooling), AFOLU activities, and wastewater all comprise less than half of 1% of emissions in 2021. The absolute values of emissions for each sector are shown in Figure 4.

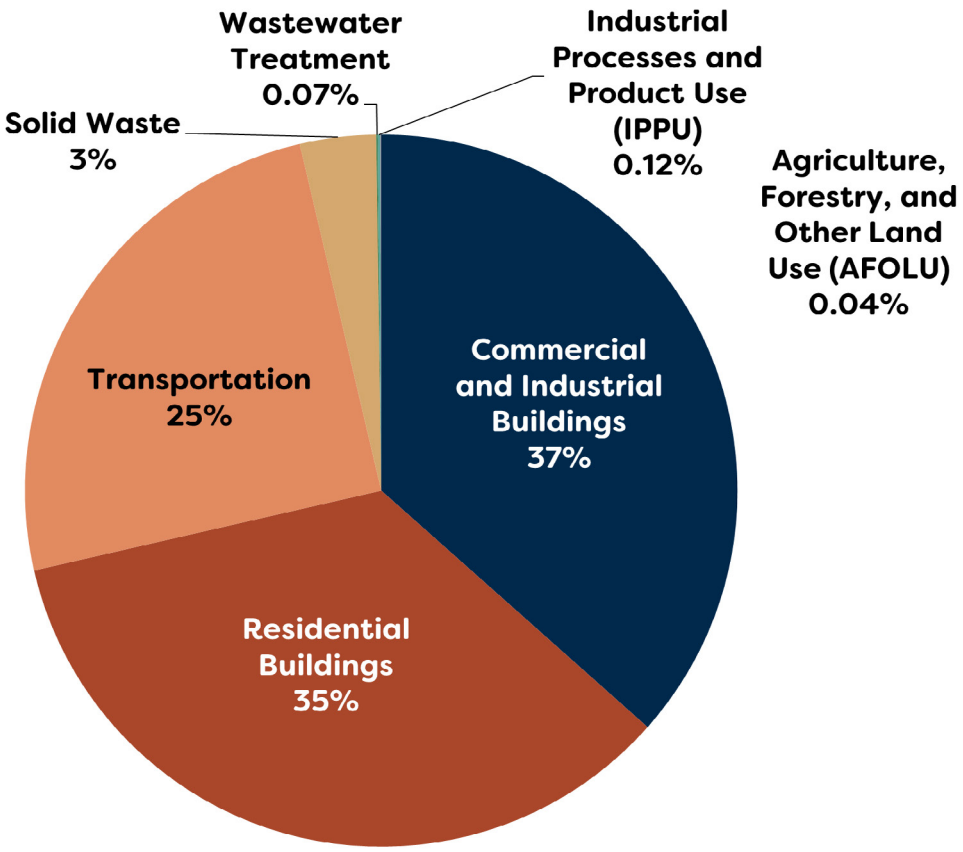

Figure 3. Longmont's 2021 emissions shares by sector.

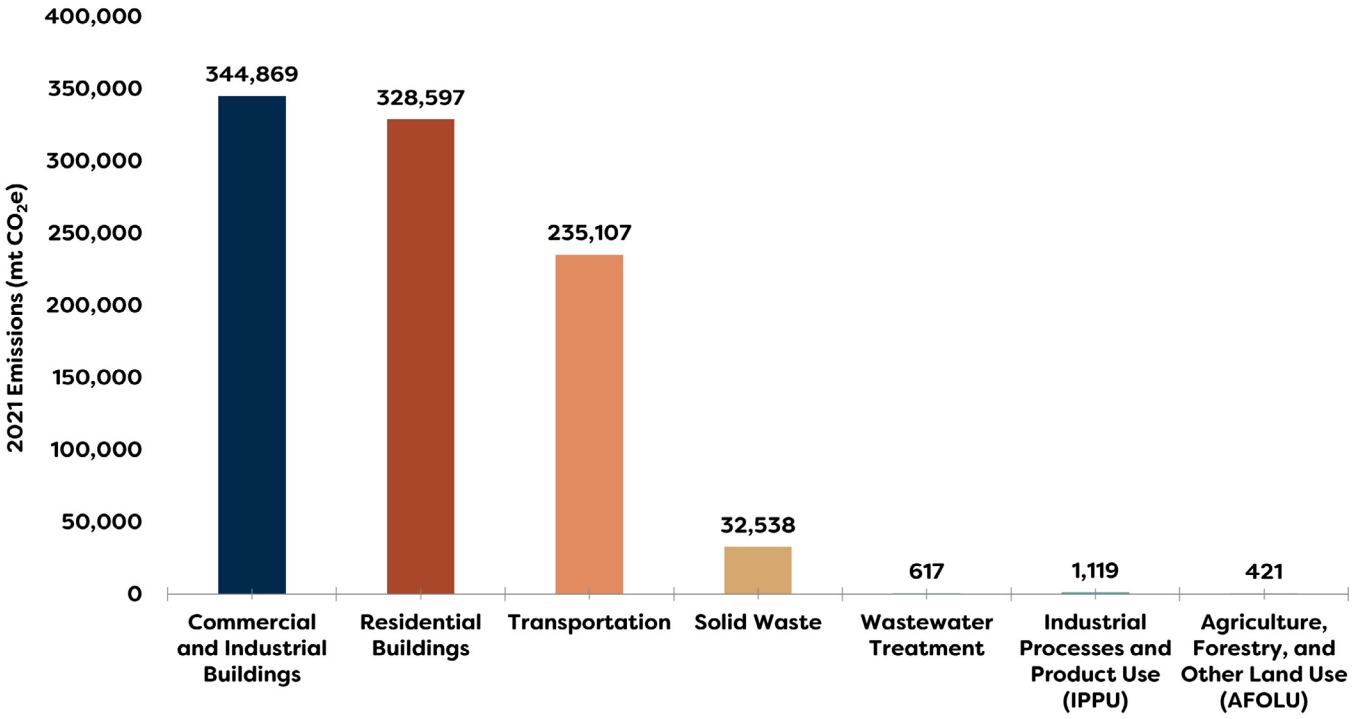

Figure 4. Longmont's 2021 emissions by sector, mt CO_2e.

Stationary Energy Emissions

Of the 72% of emissions from energy to heat, cool, and power buildings, 47% are from using electricity and 24% are from gas use. **Addressing and reducing fossil fuel consumption in buildings in the community (and supporting renewable energy adoption) continues to be one of Longmont's largest opportunities to reduce overall community emissions.**

Longmont is served by two electricity providers: Longmont Power and Communications (LPC, the City-owned utility) and Xcel Energy; LPC provides power to over 99% of the community. It should be noted that electricity emissions for LPC were calculated using the City's load share ratio of emissions from electricity supplied by Platte River Power Authority (Platte River). The load share ratio represents the emissions from the power produced and procured by Platte River on behalf of the City. See Figure 5 for Longmont's 2021 load share mix from Platte River. Longmont and the other owner communities have all committed to 100% renewable electric supply by 2030 and are working closely with Platte River to support the utility in providing all clean, renewable power for its customers while maintaining affordability and reliability.

Load Share Ratio Emissions are attributable to Longmont based on the total electricity used within the community and the resource mix used to generate that electricity by Platte River. Platte River first meets community load with renewable resources and Tariff 7 agreements, and then supplies the remainder with market-generated electricity, which currently includes fossil mixes.

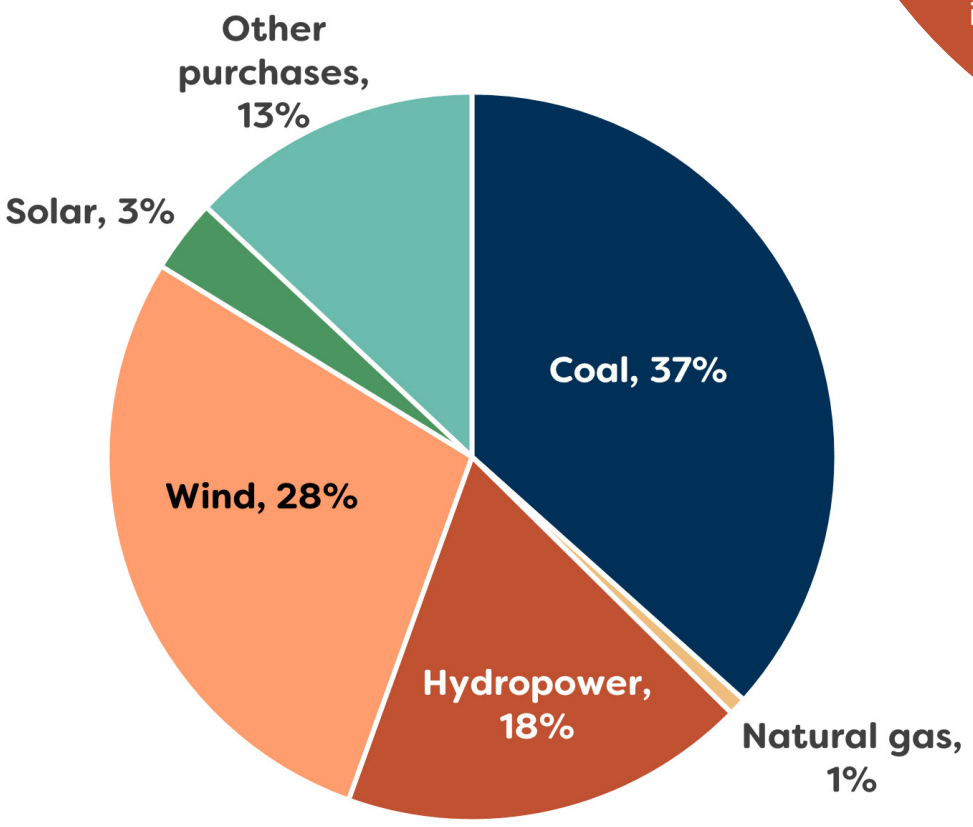

Figure 5: Longmont's load share energy mix from Platte River in 2021, with nearly 50% representing carbon-free energy production.

LONGMONT HIGHLIGHT

Longmont Power & Communications is implementing multiple projects to support the transition to 100% renewable electric supply and reduce energy usage in buildings. Recent efforts include hiring a consultant to create a Smart Grid Roadmap and Capital Improvement Program Plan, launching an automated utility data portal to help large buildings owners complete building benchmarking, implementing projects at City facilities, and developing a Beneficial Building Electrification Plan.

As a member-owner of Platte River, Longmont also calculates and reports the City's additional equity share emissions as an information-only item. Equity share emissions are based off Longmont's 26.1% ownership in Platte River. While Longmont's load share represents emissions attributable directly to electrical energy used within the community, Longmont's additional equity share emissions represent the emissions attributable to Longmont from all power generated, bought, and sold by Platte River. In 2021, Longmont's additional equity share emissions from ownership in Platte River were 307,035 mt CO_2e; when added to Longmont's BASIC+ emissions, the additional equity share represents 24% of the community's emissions. The additional equity share emissions are reported as information-only because they represent emissions from the generation of power that is not consumed in the community and thus outside the scope of the inventory. Figure 6 depicts Longmont's emissions by source including the City's equity share emissions. See Appendix B: Emissions Including Equity Share for visuals depicting Longmont's emissions by sector, including the City's equity share emissions.

Additional equity share emissions represent the total emissions that are attributable to Longmont from the City's ownership in Platte River that are not also included in the City's load share emissions.

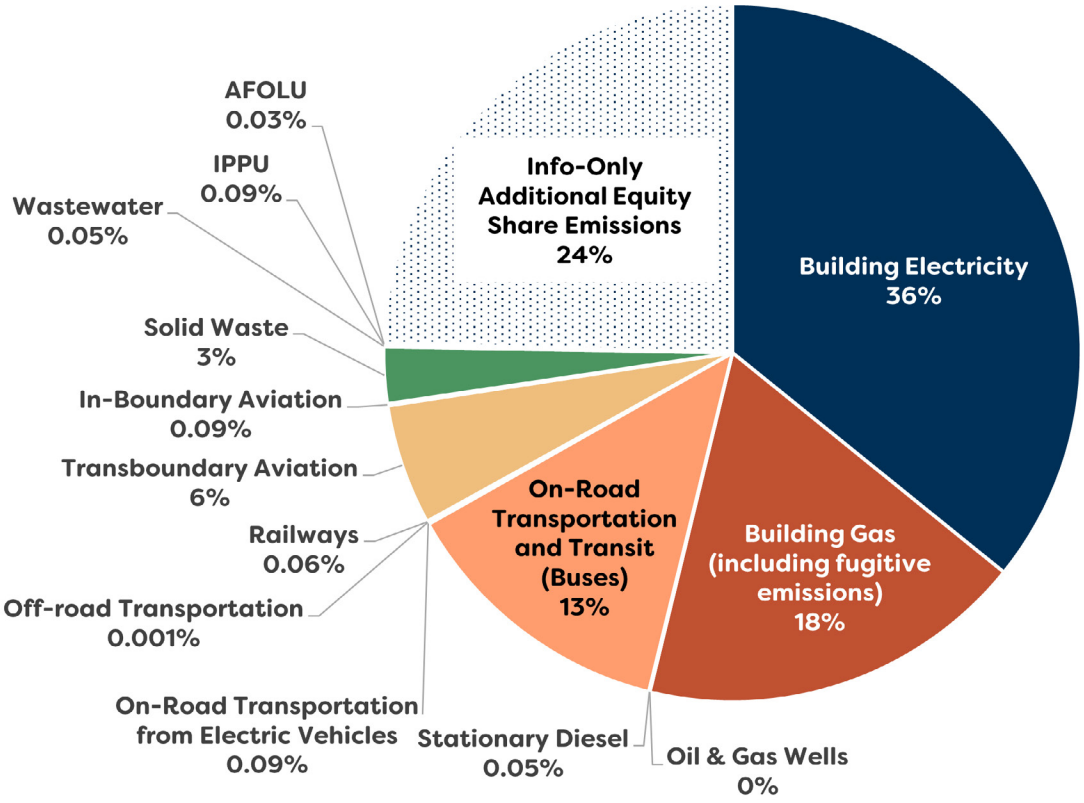

Figure 6: Longmont's emissions by source including the City's equity share emissions from 2021.

Electricity Use

» Commercial electricity use generated most of Longmont's stationary energy emissions at 37%.

» Residential electricity use generated 28% of all stationary energy emissions.

» Transmission and distribution losses, which occur in the process of supplying power from the utility to the consumer, generated 2% of stationary energy emissions.

Building Gas Use

» The residential sector uses more gas than the commercial sector, with residential gas generating 19% of stationary energy emissions.

» Commercial gas generated 13% of emissions.

» Fugitive emissions from gas system leakage generated 1% of stationary energy emissions.

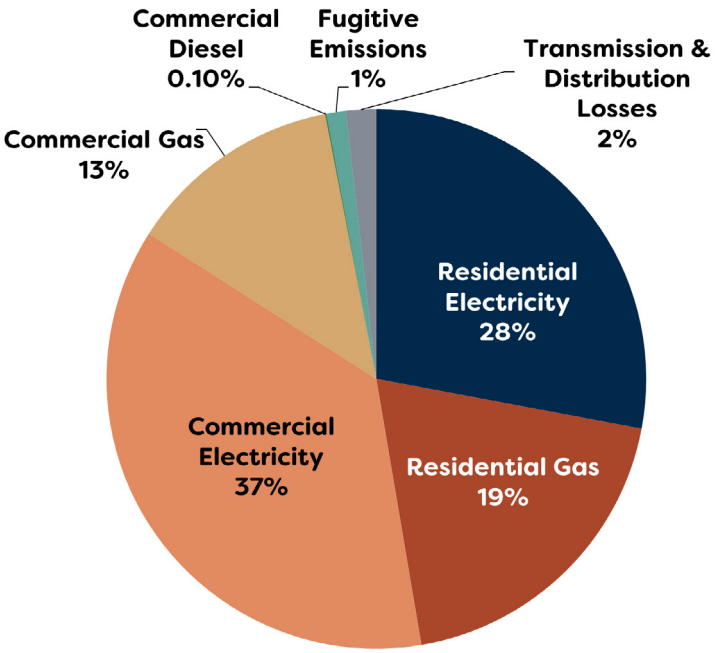

Figure 7: Longmont's stationary energy emissions detail, 2021.

LONGMONT HIGHLIGHT

In 2021, the last two active oil and gas wells within the city limits closed. Longmont has implemented regulations and legal agreements to eliminate oil and gas surface impacts in the City. Learn more about oil, gas, and the associated air quality here.

It should be noted that the calculation of fugitive emissions from gas leakage is based on currently available data and best practices for calculating emissions for these sources. Stationary commercial diesel use generated one tenth of one percent of stationary emissions. See Figure 7.

The methodology for calculating emissions from the stationary energy sector remained the same between the 2016, 2019, and 2021 inventories.

Stationary Energy Trends

Longmont's stationary energy emissions are trending lower despite an increasing population and national trends of increased residential energy due to COVID-19. As Longmont continues to work with its power provider to reduce the carbon intensity of the resource mix, and as the City pursues building electrification programs and supports energy efficiency investments throughout both the residential and commercial building sectors, these emissions are likely to continue to decrease even as the City grows and returns to higher commercial and industrial energy use with changes in COVID-19 work-from-home policies.

Transportation Emissions

Figure 8 depicts emissions within the transportation sector.

- 60% are from gasoline vehicles;
- 30% are from passenger travel at Denver International Airport (DIA) that is attributable to Longmont;
- 8% are from diesel vehicles;
- 1% are from transit activity;
- 1% are from local air travel occurring at Longmont's Vance Brand Airport;
- 0.5% are from electric vehicles (EVs); and
- 0.3% are from railways.

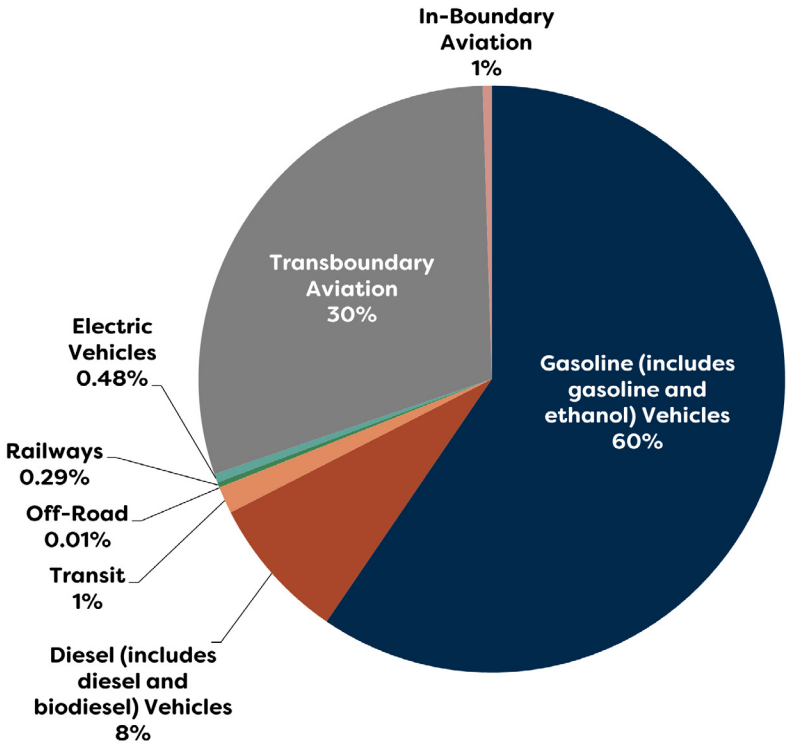

Figure 8: 2021 Longmont transportation emissions detail.

On-Road

Most on-road emissions come from passenger vehicles that are gasoline-powered. In 2021, there was an update to the methodology from the 2016 and 2019 inventories to calculate vehicle miles traveled (VMT) and on-road emissions. This update will allow for more consistent data collection in the future and does not significantly impact the comparability across inventories. Details can be found in Appendix C.

The number of EVs in the community was determined based on the number of battery EVs registered in Longmont in Boulder County. Data from Weld County was unavailable and was assumed to be minimal. Since 2016, battery EVs and EV VMT have increased from 142 EVs and 195,292 VMT, respectively, to 1,141 EVs and 4,631,318 VMT in 2021. Because LPC provides electricity to most of the community, EV emissions were calculated using the LPC emissions factor.

Transit

Transit activity (which includes activity from the Regional Transportation District [RTD] buses and demand response services, the FLEX bus, and Via Mobility Services [Via] demand response services) on Longmont roads accounted for 1% of all transportation in 2021. Since 2016, the available data on transit activities and the information provided by transit service providers, including RTD, has become significantly more detailed and useful for calculating emissions. The 2016 inventory did not include activity from the Via demand response service or the FLEX buses; these activities were included in the 2019 and 2021 inventories.

LONGMONT HIGHLIGHT

The City is implementing multiple programs to reduce emissions from vehicles and increase non-single occupant vehicle travel. Projects include launching an electric vehicle charging station rebate program, expanding accessibility at all transit stops, participating in the Ride Free transit program for local buses, and expanding alternative fuel vehicles to 25% of the City's fleet by 2025. To help expand alternative fuel fleet vehicles, staff applied for and was awarded a state Charge Ahead Colorado grant for over $200k to install nine new level 2 and three new level 3 charging stations across multiple City facilities in 2023.

Railways

In 2021, railways in Longmont generated considerably more emissions than in 2016 and slightly less emissions than 2019; this is the result of updated calculation method due to the availability of higher-quality and more localized data. In 2021, railway emissions data was calculated from the EPA with emissions estimates by County.

Aviation

2021 emissions from aviation have decreased 50% since 2016, primarily due to updated methodology for attributing activity at DIA to Longmont. In 2016, 3.4% of DIA's total fuel use was allocated to Longmont based on the share of the population in Longmont compared to the Denver Regional Council of Government's (DRCOG) service area population, which was used as a proxy for DIA's service area. In 2019, specific data on the Colorado population served by DIA was available, which resulted in a lower share of fuel use at the airport being attributable to Longmont. In 2021, DIA's fuel use attributed to Longmont has been scaled down to only that which can be attributed to origin/destination operations, not all operations. This way, Longmont won't be responsible for fuel use associated with connecting operations.

Transportation Trends

Longmont has seen an increase in the number of EV registrations by residents and businesses. Since 2016, registered battery EVs have increased from 142 to 1,141 in 2021—increasing from 0.19% of all registered vehicles in 2016 to 1.22% of all registered vehicles in 2021. This number is higher than the 2021 Colorado state average for EV registrations of 0.88%. Continuing to support the growth of the EV market, in combination with efforts to increase renewable energy in the electricity supply mix for the community and increasing use of alternative transportation and public transit, will help to continue driving down on-road transportation emissions over the coming years.

Waste and Wastewater Emissions

Emissions from solid waste and wastewater together account for just over 3% of Longmont emissions in 2021, with most of those emissions, 98%, generated from the collection and disposal of solid waste generated by the community. Waste emissions increased by 54% between 2016 and 2021. This increase is largely due to population increases, GWP calculation changes, a global trend in increased solid waste from the COVID-19 pandemic, and more accurate data from haulers. See Appendix C for more details.

Emissions from wastewater treatment have remained steady over the three inventories. The central reason why wastewater emissions did not increase with population growth in 2021 was due to the diversion of biogas for use in sanitation vehicles. Almost 19% of total emissions from wastewater treatment were diverted to on-road emissions.

Waste Trends

Solid waste trends have increased significantly since 2016 due to more accurate commercial hauler data in 2021, an increasing population, the disposal of more waste during the COVID-19 pandemic, and a change in the value of the methane GWP. Longmont's efforts to curb solid waste, such as setting new goals for waste reduction, working with local haulers to provide accurate data, and encouraging waste diversion to recycle and compost will be key in reducing waste emissions in the future.

LONGMONT HIGHLIGHT

In 2018, the City of Longmont began construction of a project at the Wastewater Treatment Plant (WWTP) to make fuel from gas produced in the treatment of Longmont's sewage. The project converts biogas (generated through anaerobic digestion at the WWTP) into clean Renewable Natural Gas (RNG). The RNG produced is being used to power part of the City's fleet of trash trucks.

LONGMONT HIGHLIGHT

On Sept. 27, 2022, Longmont City Council passed an updated Zero Waste Resolution, a non-binding document that sets new targets and guides future decision-makers on reducing waste in the Longmont community. The new Resolution sets a new target of 75% of trash diverted from the landfill by 2030 and 95% by 2050.

Industrial Processes and Product Use

The IPPU sector includes activities such as manufacturing and other industrial processes, as well as the use of refrigerants in buildings. In Longmont, the only relevant activity in this sector is refrigerant use. The use of refrigerants comprised 0.1% of the 2021 inventory. However, data on refrigerant use is not widely available, and in some cases is protected by company confidentiality. Lotus estimates emissions from refrigerants based on the amount of commercial building square footage within the city and assumes that 25% of the square footage is air conditioned using R-134a, the most commonly used refrigerant. This methodology for calculating emissions remains unchanged from the 2016 inventory.

Agriculture, Forestry, and Other Land Use

Activities in the AFOLU sector that are relevant for Longmont include emissions from a small number of livestock (specifically, cows) within the city limits and on land owned by the City but outside of city limits. Emissions from AFOLU activities comprised less than 0.1% of Longmont's total emissions in 2021, and emissions from the AFOLU sector have decreased by nearly 33% since 2016. This decrease can be attributed to higher-quality data available on the agricultural activities occurring in the community as well as an improved methodology for calculating emissions that uses data from the EPA's State Inventory Tool* specific to Colorado to estimate total agricultural emissions.

* Refer to the EPA's State Inventory and Projection Tool.

Avoided Emissions: Recycling and Renewable Energy

Although the GPC does not allow cities to subtract avoided emissions from using renewable energy or recycling of products, these avoided emissions were calculated and included in the inventory as 'information-only' items so that Longmont can understand the impact of these programs and activities into the future.

In 2021, Longmont avoided creating an additional 102,268 mt CO_2e (which represents 11% of the community's total emissions) using renewable energy, community recycling, and composting activities. See Figure 9.

Most of these avoided emissions, 91%, were from recycling activities.

7% were from renewable energy use in the community, including hydropower owned by LPC and on-site solar on commercial and residential buildings in the community.

Compost comprised 2% of avoided emissions.

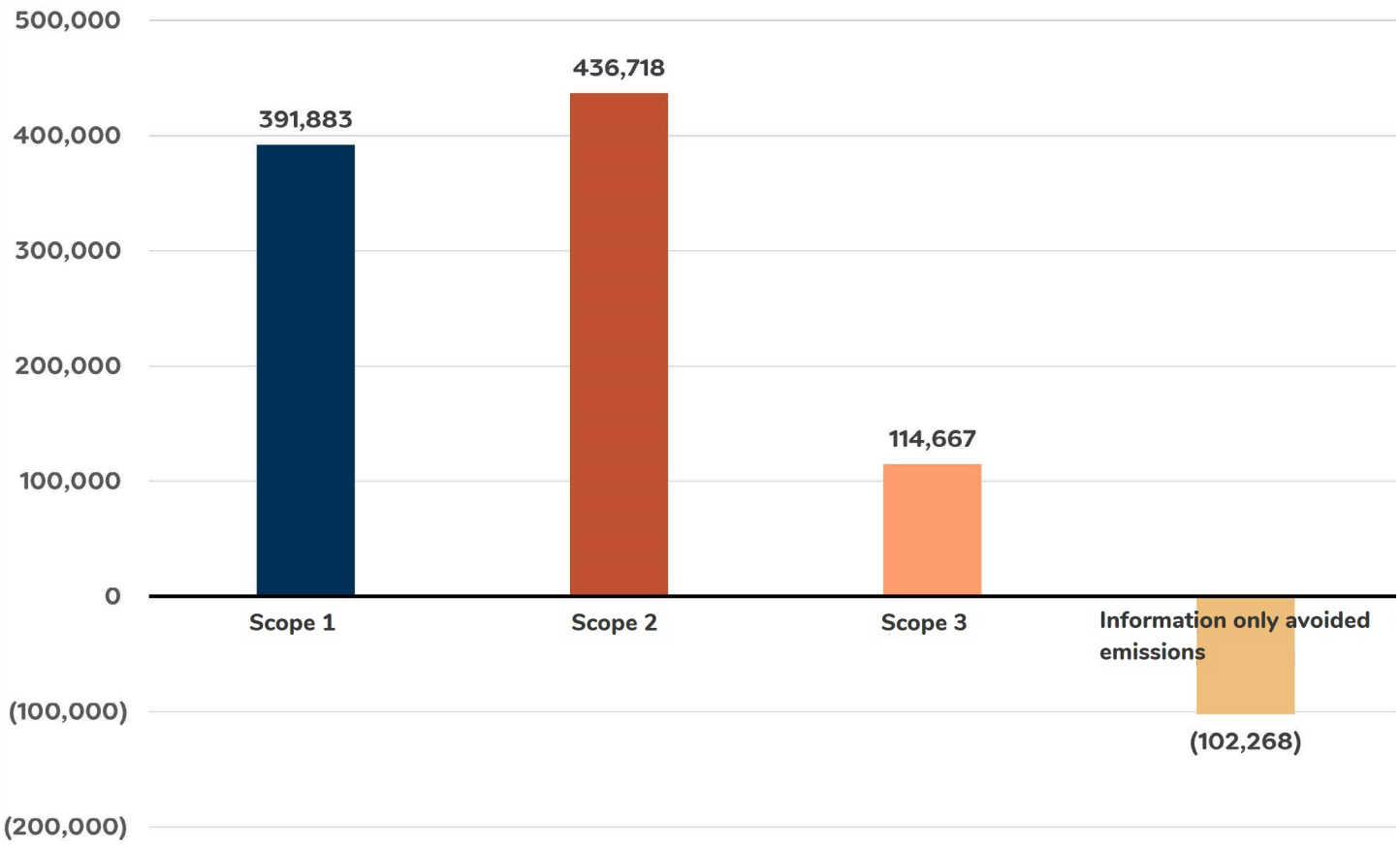

Figure 9: Longmont's emissions by scope and avoided emissions, 2019.

Longmont Emissions Over Time

Normalized Emissions

Normalizing emissions data for population and households can be helpful when comparing emissions profiles over the years. In 2021, Longmont generated 9.8 mt CO_2e per resident and 26 mt CO_2e per household. This reflects a steady reduction in per capita and household emissions since 2016. See Figure 10. Longmont's emissions per capita and per household have decreased by approximately 16% since 2016 due to programs that the City has developed and implemented such as waste diversion programs and working with Platte River to reduce the carbon intensity of the electricity mix for the City, as well as updated data and methodology for the inventory since 2016.

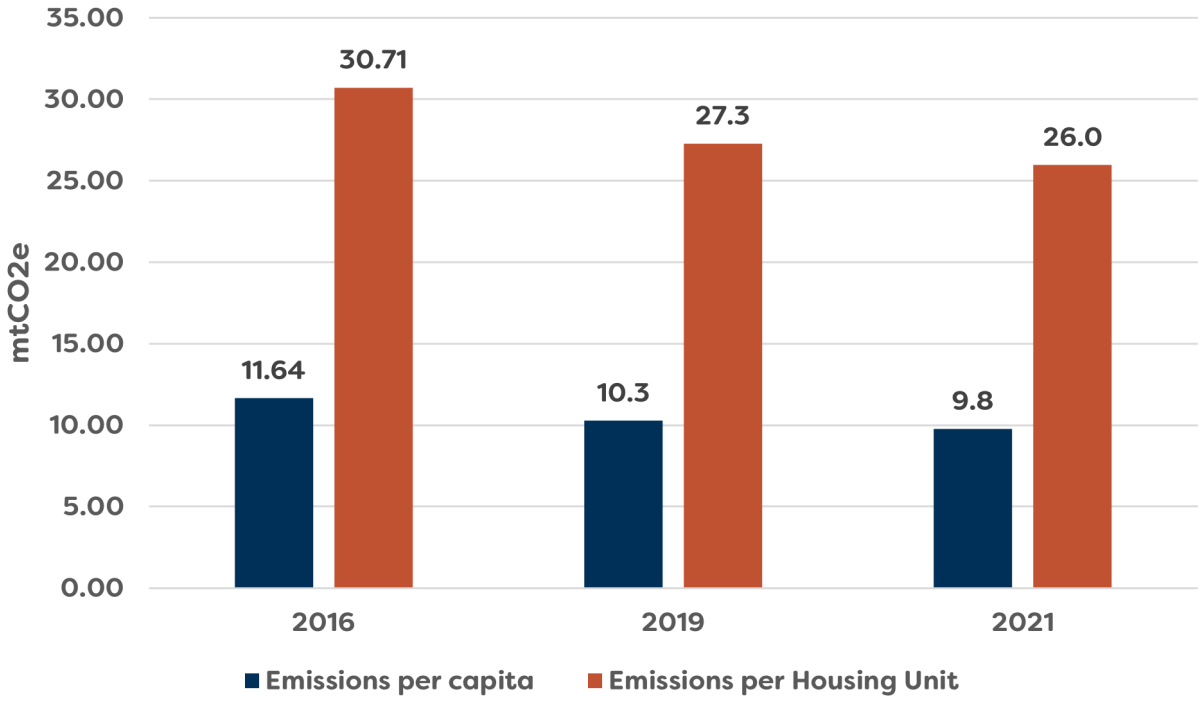

Figure 10. Longmont's normalized emissions for population and households.

Based on Lotus's recent experience and research, this level of per capita and per household emissions is lower than the national average across the United States* in 2021. Longmont has exceeded the state of Colorado's goal for emissions of 10.4 mt CO_2e per capita by 2035. The City's per capita emissions are lower than the recent averages for the cities of Denver and Boulder. Longmont's normalized per capita emissions are equal to the City of Lakewood's 2018 inventory. Longmont's household emissions are trending slightly higher than neighboring cities.** See Table 1.

* The national inventory was conducted using a different protocol than what was used for Longmont's, while the Denver, Boulder, and Lakewood inventories are all GPC BASIC+. Additionally, national inventories and those for larger communities may include activities related to industrial processes and energy generation (such as oil and gas refining, power generation, mining, etc.) that do not occur in Longmont and therefore are not included in the City's inventory. These activities are generally intensive and result in a significant number of emissions being generated.

** Longmont had 39,504 households according to the 2021 Community Profile.

Table 1: Normalized emissions benchmarking.

Inventory Boundary	Inventory Year	Emissions per capita (mt CO_2e)	Emissions per Household (mt CO_2e)
City of Longmont	**2021**	**9.8**	**26.0**
City of Denver	2021	11.2	25.3
City of Boulder	2021	11.0	25.2
City of Lakewood	2018	9.8	22.0
State of Colorado	2019	21.9	56.4
United States	2021	14.2	49.7

Longmont's Emissions Trends

The greatest share of the reduction in emissions between 2016 and 2019 was due to changes in methodology, specifically regarding changes to the electric emissions factor and emissions from air travel. The changes between 2019 and 2021 are due to the impacts of the COVID-19 pandemic and adjusted GWP calculations. Longmont aligns with national trends of commercial and industrial energy use going down while solid waste emissions are rising.

Table 2 demonstrates the changes in emissions for major sectors between 2016, 2019, and 2021 in Longmont (also see Figure 11).

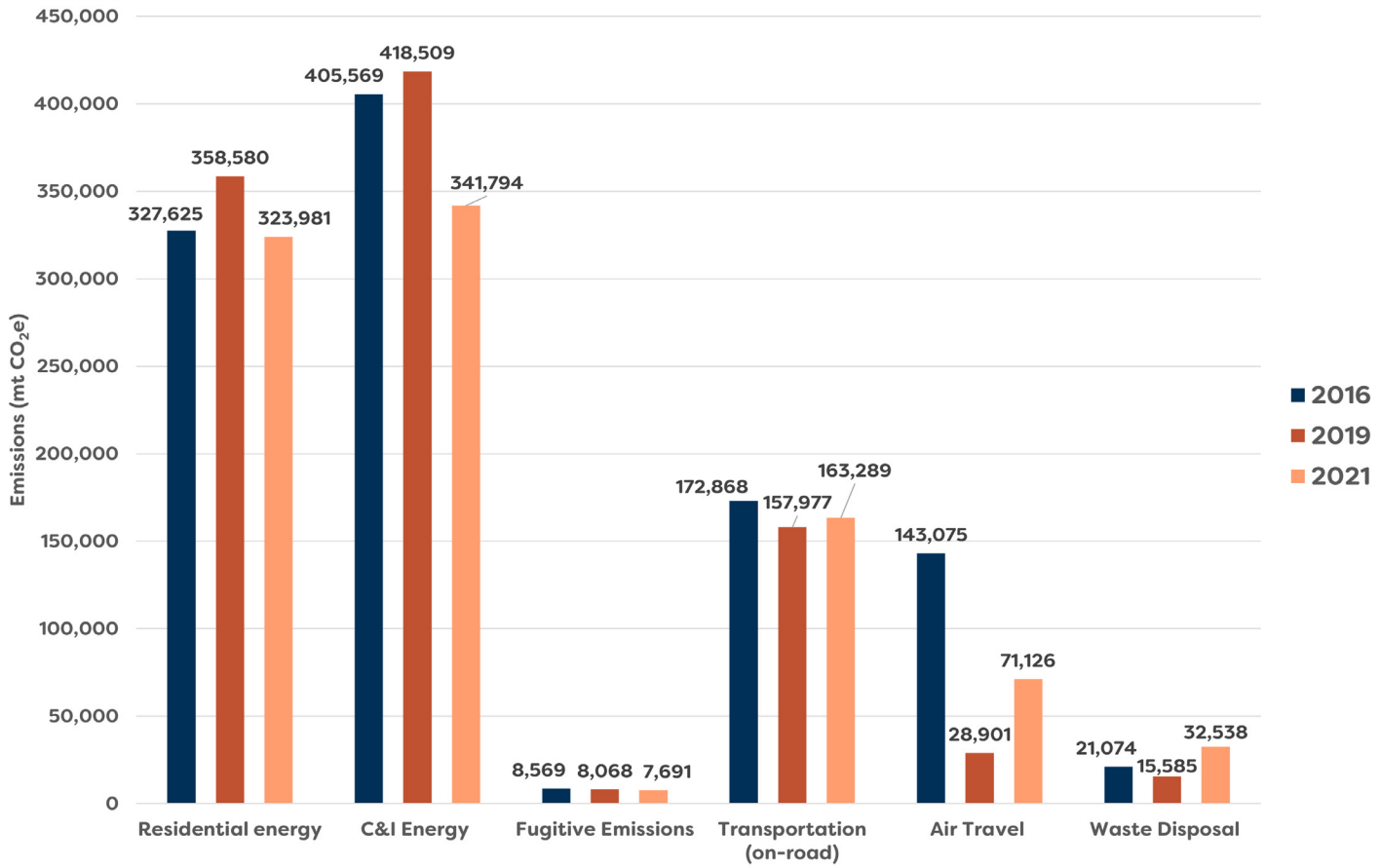

Figure 11: 2016, 2019, and 2021 comparison for Longmont's major emissions categories.

Table 2. Comparison between emissions in 2016, 2019, and 2021.

Emissions	Units	2016	2019	2021	% Change from 2016 to 2021	Reason for Change
Residential Energy	mt CO_2e	327,625	358,580	323,981	-1.1%	Calculation methodology
C&I Energy	mt CO_2e	405,569	418,509	341,794	-15.7%	Calculation methodology and COVID-19
Fugitive Emissions	mt CO_2e	8,569	8,068	7,691	-10.2%	Calculation methodology
Total Stationary Energy	**mt CO_2e**	**741,763**	**785,157**	**673,466**	**-9.2%**	**Calculation methodology and COVID-19**
Transportation (on-road)	mt CO_2e	172,868	157,977	163,289	-5.5%	Activity data and calculation methodology
Railways	mt CO_2e	37	813	691	1,768.4%	Calculation methodology
Air Travel	mt CO_2e	143,075	28,901	71,126	-50.3%	Calculation methodology
Total Transportation	**mt CO_2e**	**315,980**	**187,692**	**235,107**	**-25.6%**	**Calculation methodology**
Waste Disposal (Landfill)	mt CO_2e	21,074	15,585	32,538	54.4%	Activity data, GWPs, and COVID-19
WWTP Process	mt CO_2e	588	630	617	5.0%	Population growth and use of RNG in sanitation fleet
Total Waste	**mt CO_2e**	**21,662**	**16,215**	**33,155**	**53.1%**	**Activity data and COVID-19**
Total IPPU	**mt CO_2e**	**1,142**	**1,510**	**1,119**	**-2.0%**	**Activity data**
Total AFOLU	**mt CO_2e**	**626**	**503**	**421**	**-32.7%**	**Activity data**
Total Emissions	**mt CO_2e**	**1,081,173**	**991,076**	**943,268**	**-12.8%**	**Activity data and COVID-19**
Emissions per capita	mt CO_2e / capita	11.6	10.3	9.8	-16.1%	Activity data and calculation methodology
Emissions per dwelling	mt CO_2e/ dwelling	30.7	27.3	26.0	-15.5%	Activity data and calculation methodology
Emissions per job	mt CO_2e / job	24.0	20.0	18.7	-22.0%	Activity data and calculation methodology

Conclusion

The City of Longmont continues to be a local and regional leader on climate action and the 2021 GHG inventory illustrates the City's commitment to data collection and accuracy in accounting for emissions. Despite a population increase of nearly 7,000 people (7.29%) from the 2016 baseline, Longmont has reduced emissions by nearly 13%. The primary reason for this decrease has been the continued transition to 100% renewable electric supply.

LONGMONT HIGHLIGHT

As a result of Council leadership and committed, cross-departmental work on climate action, the City of Longmont has received an "A" through the CDP reporting platform—a global nonprofit dedicated to environmental disclosure of emissions. The City was recognized by CDP as one of only 122 A-list cities and counties across the world that is taking bold leadership on environmental action and transparency, despite the pressures of a challenging global economic situation.

To make continued progress towards the City's emission reduction goal of reducing GHG emissions 66% from the 2016 baseline by 2030, the City must prioritize the transition to 100% renewable electric supply as seen in Figures 12 and 13. This strategy has the greatest impact on emission reductions and the benefits from building and vehicle electrification are dependent on its implementation. Energy efficiency, although not a large impact on emission reductions, is critical to reducing the overall electric load which helps enable the transition to 100% renewable electric and the corresponding benefits.

Embedding equity is also a key priority of the City. Energy efficiency actions can support reducing household and business energy bills. Similarly, even though multi-modal transportation activities have a smaller impact than zero emission vehicle strategies, transportation via bus, walking, rolling, or biking can often be more affordable and accessible than purchasing a new zero emission vehicle and can benefit local air quality. Lastly, Figures 12 and 13 only show the projections based on what is within the scope of the GHG inventory. As discussed in the avoided emissions section, waste diversion can increase avoided emissions by reducing the need for new materials or capturing carbon. Learn more in the 2019 Longmont Waste Life Cycle Analysis.

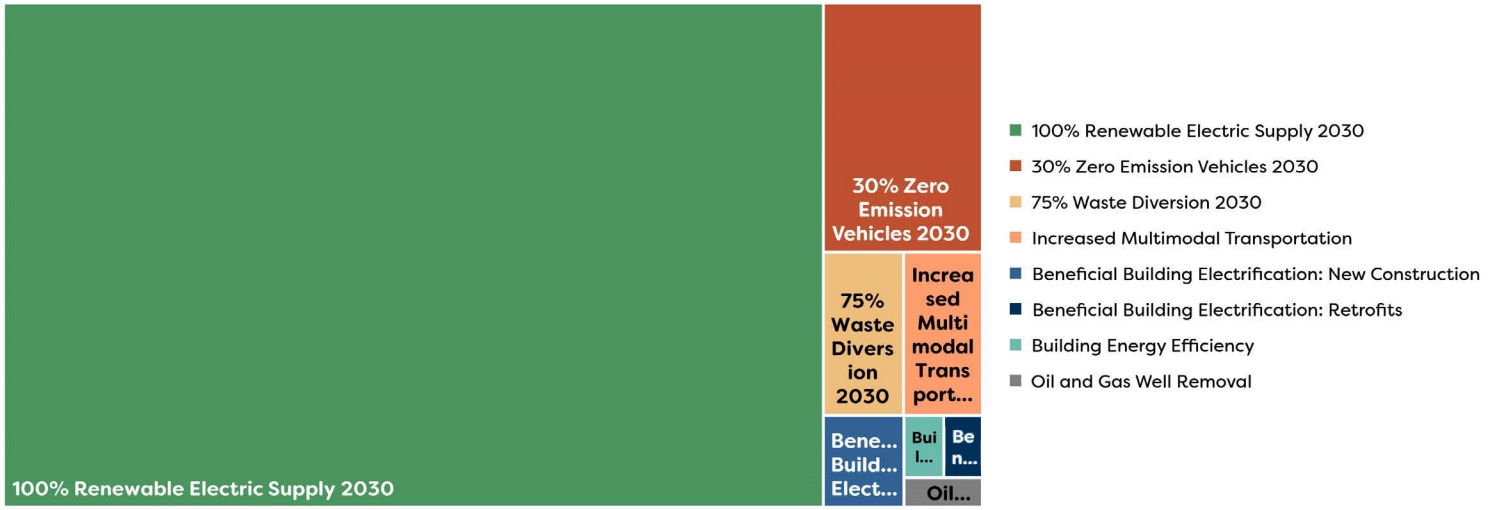

Figure 12. 2030 reduction impact by strategy type.

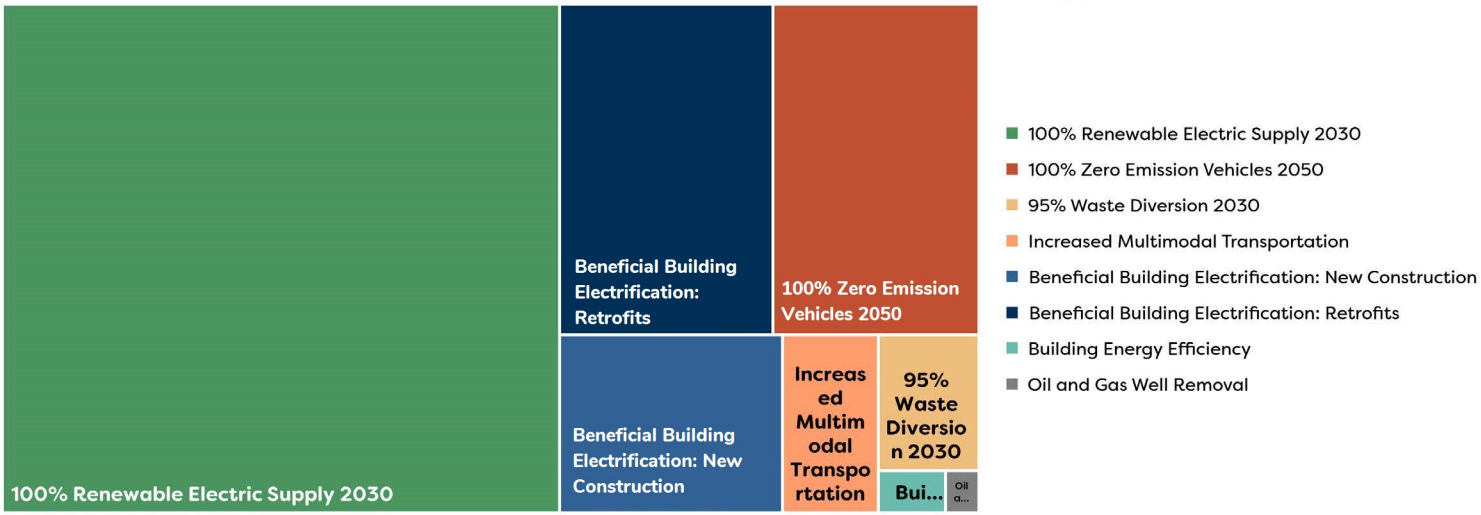

Figure 13. 2050 reduction impact by strategy type.

As the City continues to implement actions to reduce greenhouse gas impact, it should continue to prioritize the transition to 100% renewable electric energy supply while continuing to implement and expand strategies that support a safe, healthy and equitable future for all community members.

To track the status of all greenhouse gas actions, visit the Longmont Indicators website.

Glossary

Equity Share Emissions—Emissions that are attributable to Longmont based on the City's 26.1% ownership in Platte River Power Authority (Platte River) and the total emissions from power generated, bought, and sold by Platte River. These emissions are considered information-only.

- **Additional Equity Share Emissions**—The total emissions that are attributable to Longmont from the City's ownership in Platte River that are not also included in the City's load share emissions.

Greenhouse gases (GHGs)—Gases that are released through natural and human-caused activities that trap infrared heat in the earth's atmosphere. Human-induced GHG emissions are a major driver of climate change. The most common gases measured, and those analyzed in this report, include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHGs are reported in metric tons of CO_2 equivalent.

The Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC protocol)—A global standard for GHG emission accounting and reporting. It was developed and launched in 2014 and provides a template from which communities can create comparable and standard emission inventories. The protocol defines what emissions must be reported, as well as how those emissions are to be calculated and reported.

Load Share Ratio Emissions—Emissions that are attributable to Longmont based on the total electricity used within the community and the resource mix used to generate that electricity by Platte River. Platte River first meets community load with renewable resources and Tariff 7 agreements, and then supplies the remainder with market-generated electricity.

Stationary Energy Emissions—Emissions generated by using energy in residential, commercial, and industrial buildings in the community, as well as fugitive emissions from oil and gas activities. This includes emissions from the use of electricity, gas, and stationary diesel in buildings, as well as transmission and distribution losses, fugitive emissions from gas system leakage, and fugitive emissions from oil and gas wells.

Transportation Emissions—Emissions generated through transportation activities in the community, including on-road vehicular travel, transit activity, railways, and aviation activity both occurring at Vance Brand Airport within Longmont, as well as activity that occurs at Denver International Airport and is attributable to Longmont.

Appendix A: 2021 Emissions by All Sources

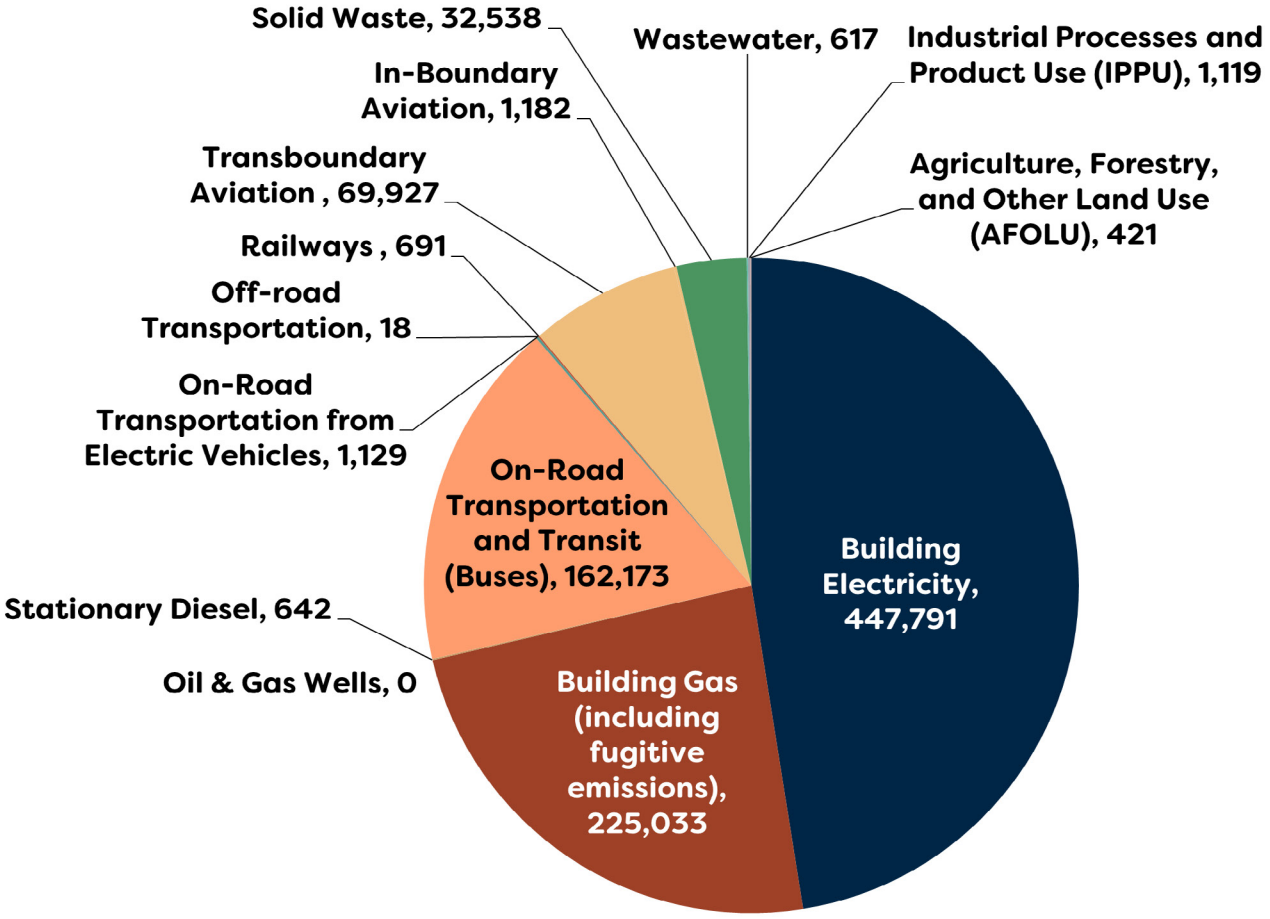

Figure 14: Longmont's 2021 BASIC+ emissions by all sources.

Appendix B: 2021 Emissions Including Equity Share

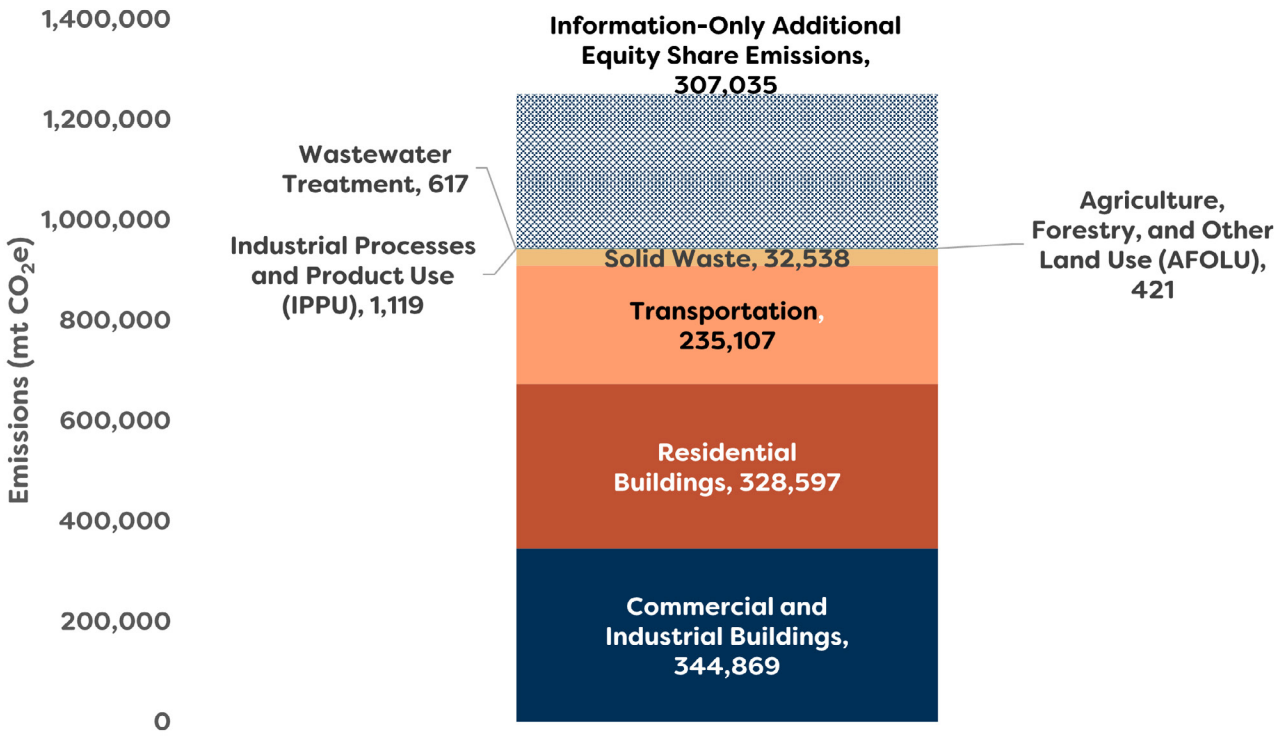

Figure 15: Longmont's 2021 emissions by sector, BASIC+ and equity share, mt CO_2e.

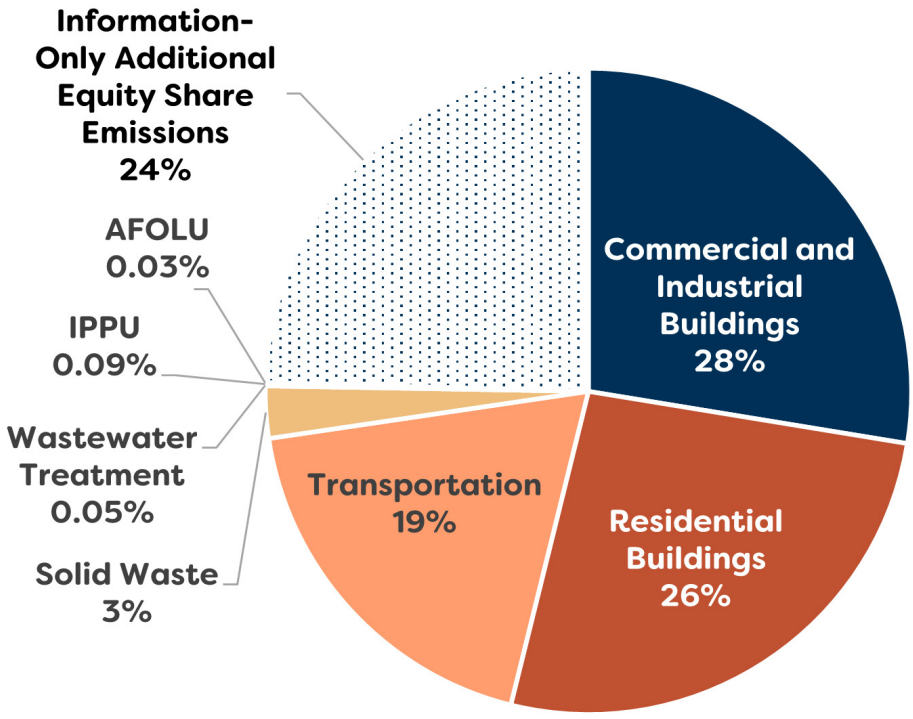

Figure 16: Longmont's 2021 emissions by sector, BASIC+ and equity share.

Appendix C: Methodology Details

Overall Inventory Changes

Global Warming Potentials (GWPs) were updated to those in the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6) report from 28 to 29.8 for methane (CH_4), and from 265 to 273 for nitrous oxide (N_2O).

Transportation

» A new source was used for EV registrations (now from Boulder County).

» An updated methodology was used to calculate VMT and on-road emissions:

- VMT data came from Longmont.
- Vehicle registration data came from CO Dept of Revenue.
- CDPHE VMT model was used, with data broken down by vehicle type [passenger vehicle, light truck, etc.].
- Registration data was used to find the proportion of gasoline to diesel passenger and light duty vehicles.
- CDPHE data was used to find the proportion of VMT between the six vehicle type categories [motorcycles, passenger vehicles, light duty trucks, buses, single unit trucks (box trucks like FedEx trucks), and semi-trucks].
- VMT is delineated between the six vehicle types and the two fuel types.

» In 2020, Longmont purchased RNG powered sanitation vehicles. The RNG comes from the Longmont wastewater treatment plant. The emissions from the RNG are tabulated in On-Road emissions as the vehicles are the end use of the RNG.

» Railway data is now from the EPA. They provide emissions estimates by County. This was scaled down using rail miles in Longmont vs. Boulder County total. No rail miles exist in the Weld County proportion of Longmont.

» Denver International Airport (DEN) Transboundary emissions methodology changed. DEN's fuel use is scaled down to just that which can be attributed to origin/destination operations, not all operations. This way, Longmont won't be responsible for fuel use associated with connecting operations.

Waste

» Solid waste: ReTRAC data requires haulers to report the quantity of waste hauled to the communities in Boulder County. This is better quality data than what Longmont has received in the past.

» Wastewater: CNG that is used by the sanitation trucks is subtracted from the digester gas produced.

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