GREENHOUSE GAS EMISSIONS INVENTORY REPORT

BASALT 2017

PRODUCED BY THE COMMUNITY OFFICE FOR RESOURCE EFFICIENCY

PUBLISHED JULY 2019

TOWN OF BASALT 1901

CORE
Community Office for Resource Efficiency
WE HELP YOU SAVE ENERGY.

TABLE OF CONTENTS:

INTRODUCTION 3
- 2017 Results
- Key Findings

CARBON FOOTPRINT 6
- Buildings
- Transportation
- Aviation
- Waste

ACKNOWLEDGEMENTS 11

APPENDICES 12
- Appendix A: Measuring Emissions
- Appendix B: Aspen Pitkin County Airport Inventory
- Appendix C: Emissions Comparison Over Time
- Appendix D: 2017 Summary Table
- Appendix E: 2014 Summary Table

INTRODUCTION

Recognizing that avoiding the most catastrophic impacts of climate change requires fast and steep reductions in greenhouse gas (GHG) emissions, the Town of Basalt signed onto "The Climate Action Plan for the Eagle County Community" and adopted the "Basalt Addendum," a pledge to pursue specific high-impact strategies. These sustainability planning frameworks include ambitious goals to slash emissions: Basalt committed to reduce emissions 25% by 2025 and 80% by 2050 (against the 2014 baseline).

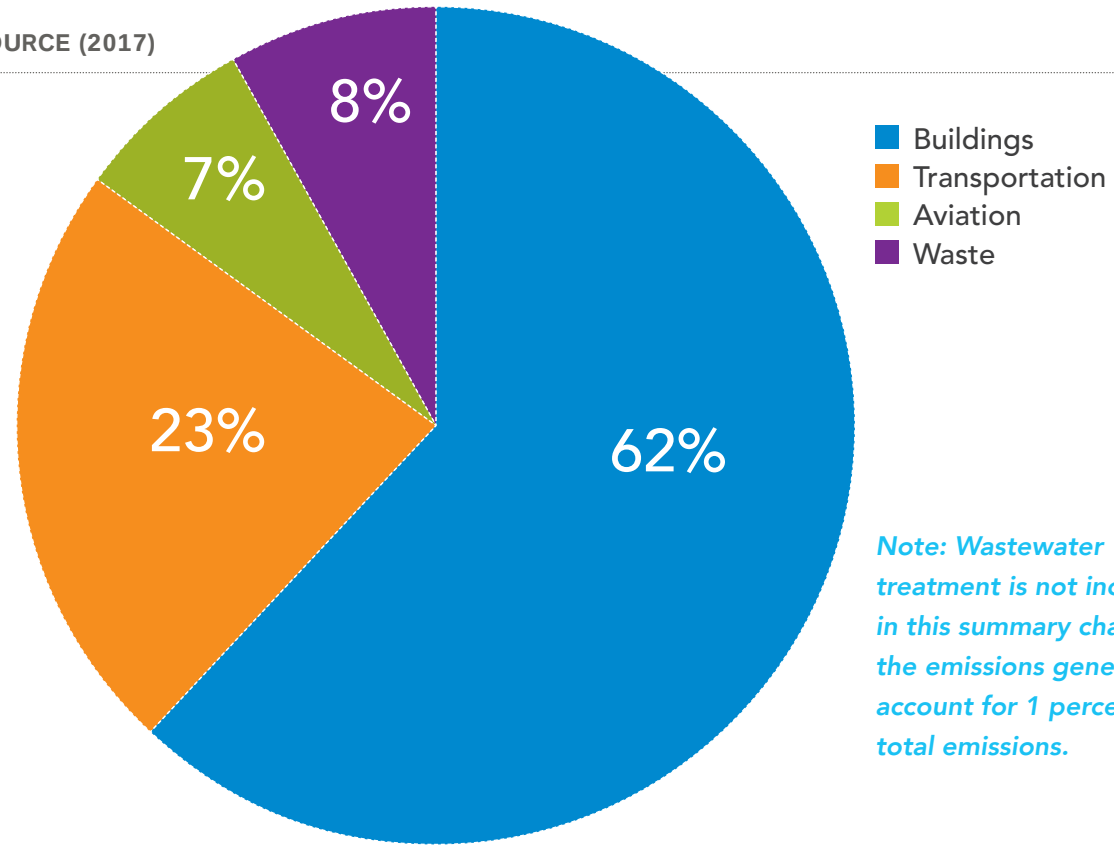
But how much effort is needed to meet those goals? And where should effort be focused? To help answer these important questions, the Town of Basalt committed to collect and analyze local emissions data (Strategy #6 of the Basalt Addendum, to provide annual progress reports). The 2017 Basalt Emissions Inventory is the second inventory, following a baseline emissions inventory measured in 2014 (published in 2017). The original 2014 inventory has been updated to reflect new analyses, techniques, and methodology; these changes are outlined in Appendix A: Measuring Emissions, and results are shown in the summary tables (Appendix D and Appendix E.)

2017 RESULTS

In 2017, the Basalt community generated 53,907 metric tons of carbon dioxide equivalent (mtCO2e), a 2 percent decrease from 2014.

- **BUILDINGS:** the energy used to heat and power buildings
- **TRANSPORTATION:** the fuel used in cars, trucks, and public transit
- **AVIATION:** the fuel used in aircraft and airport operations
- **WASTE:** emissions from the decomposition of trash and landfill operations
- **WASTEWATER:** emissions from the treatment of wastewater and the facility operation

EMISSIONS BY SOURCE (2017)



Note: Wastewater treatment is not included in this summary chart as the emissions generated account for 1 percent of total emissions.

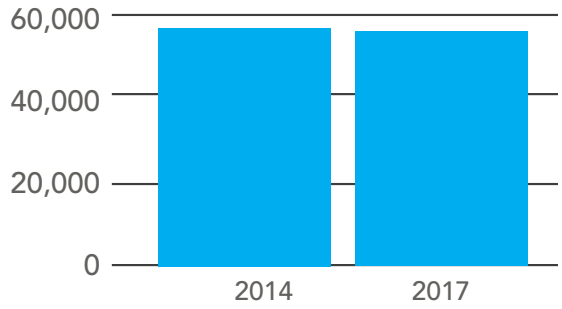
KEY FINDINGS

- Although significant sustainability efforts are being made, Basalt has a long way to go to meet the reduction goal of 25 percent by 2025.
- To meet the 2025 reduction goal, the Basalt community needs to reduce emissions 2 percent every year
- Energy used in homes and businesses is the single greatest contributor to GHG emissions across the Basalt community, and therefore represents the largest opportunity for emissions reduction.
- The energy sector experienced the greatest decrease in emissions between 2014 and 2017, largely because electricity is generated by increasingly clean and renewable sources.
- The aviation sector experienced the most dramatic increase in emissions between 2014 and 2017. However, the overall impact is limited as it represents one of the smallest slices of the emissions pie.

CARBON FOOTPRINT

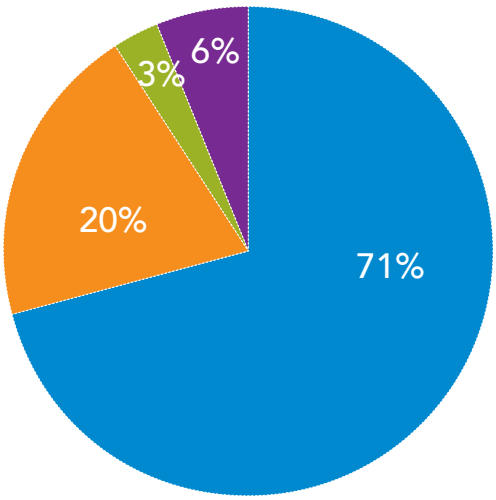
Between 2014 and 2017, the Basalt community decreased overall emissions by 904 mtCO2e, or 2 percent of overall emissions.

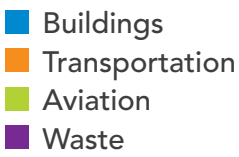
EMISSIONS REDUCTIONS OVER TIME [Overall]



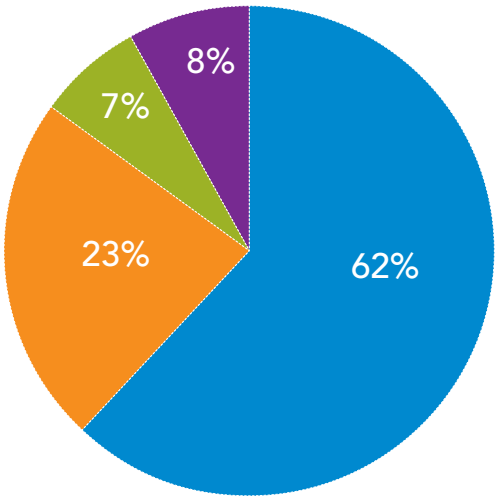
The charts below illustrate the emissions generated across each sector and how they have changed over the three-year period.

EMISSIONS BY SOURCE (2014)



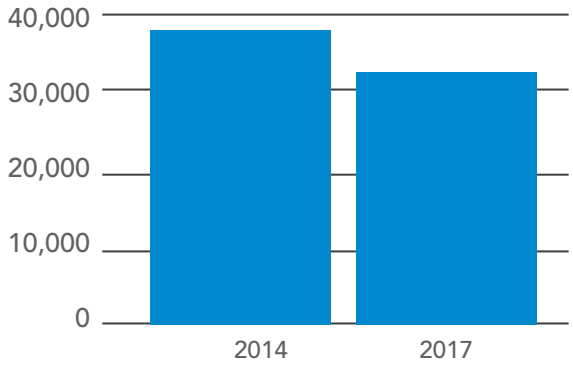


EMISSIONS BY SOURCE (2017)

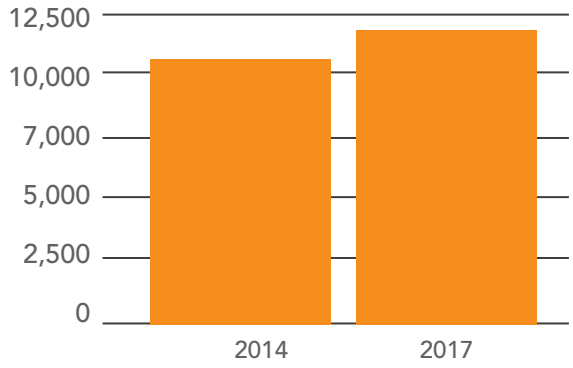


The charts below illustrate the emissions generated across each sector and how they have changed over the three-year period.

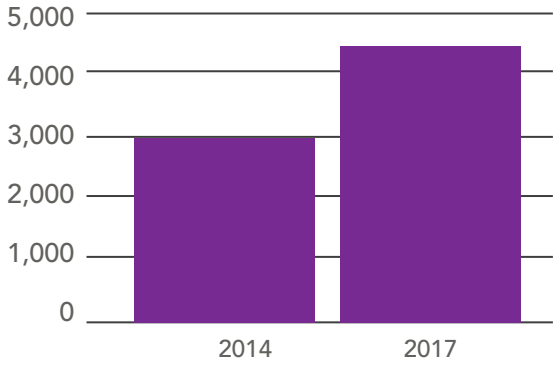
BUILDING EMISSIONS TRENDS (MTCO2E)



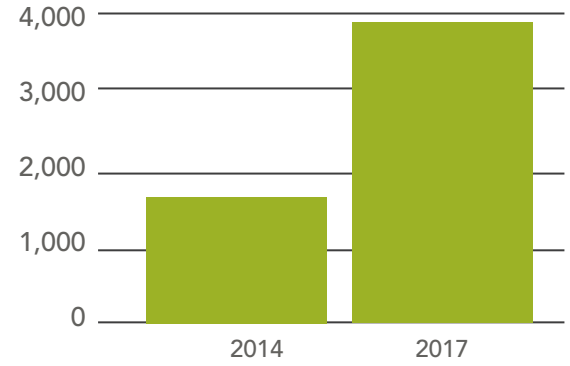
TRANSPORTATION EMISSIONS TRENDS (MTCO2E)



WASTE EMISSIONS TRENDS (MTCO2E)



AVIATION EMISSIONS TRENDS (MTCO2E)



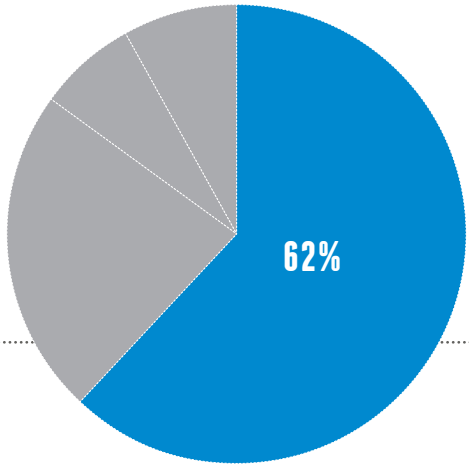
Note: A number of factors drive the emissions changes. In many cases, specific causes of emissions reductions and increases are difficult to pin down. The sections on the following pages provide an overview of the factors that have affected each sector, methodology used to arrive at results, and other key considerations.

BUILDINGS

Building-sector emissions are from the energy used to heat and power homes and businesses.

Emissions from the buildings sector totaled 32,896 mtCO2e in 2017, accounting for 62 percent of Basalt's emissions.

Emissions from this sector have decreased 14 percent since 2014.



KEY FINDINGS:

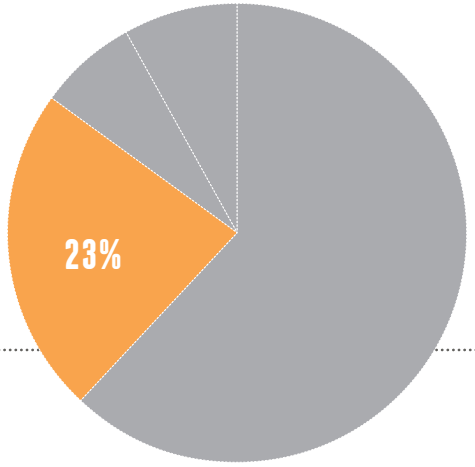
- **Electricity is getting cleaner.** Holy Cross Energy's electricity is increasingly green. In 2014, 20 percent of Holy Cross Energy's electric mix was generated by renewable or clean sources. By 2017, that ratio increased to 39 percent.
- **A cleaner electric grid significantly impacts emissions.** Between 2014 and 2017, the total amount of electricity used by homes and businesses increased 3 percent, while overall electric emissions decreased by 21 percent because of the greater renewable content of the electric grid and local solar photovoltaic (PV) systems.
- **Businesses in Basalt generate a larger share of emissions than homes.** Due to the limited number of commercial buildings and the proportionally large amount of emissions, businesses represent the greatest opportunity for emissions reduction.
- **More building emissions are from electricity than natural gas or propane.** As the electric grid gets cleaner, it is possible to reduce, and perhaps someday eliminate, carbon-based energy sources.
- **Advancing building codes and energy-efficiency programs has been shown to decrease energy usage.** Constructing homes sustainably from the start and retrofitting existing building stock are key to driving down energy consumption.

TRANSPORTATION

Transportation-sector emissions are from the fuel used in cars, trucks, and public transit. This does not include aviation, which is its own sector.

Emissions from the transportation sector totaled 12,033 mtCO2e in 2017, accounting for 23 percent of Basalt's emissions.

Emissions from this sector have increased 10 percent since 2014.



KEY FINDINGS:

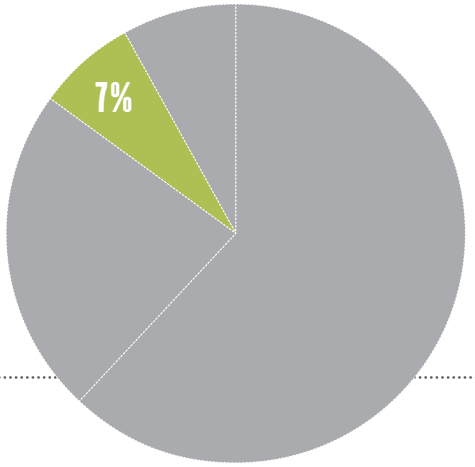
- **Transportation is the second-largest source of emissions in Basalt.** This is in alignment with regional and national trends, which show buildings and transportation as the primary contributors of emissions.
- **Motorists coming to and leaving Basalt traveled more than 32 million vehicle miles in 2017.** Location-based cell phone data was used to estimate the total vehicle trips made into and out of the community and the length of those trips.
- **The majority of emissions are from the gasoline used in passenger vehicles.** Gasoline-powered cars and trucks represent the vast majority of trips taken by the Basalt community.
- **People can choose more sustainable modes of transportation.** Public transportation accounted for only 5 percent of transportation emissions, a relatively small impact on overall emissions. Buses have the ability to move around more people, with a lower environment impact. **WE-cycle has proven that bike share programs help to eliminate short vehicle trips.**
- **The Roaring Fork Transportation Authority (RFTA) strives to use efficient vehicles and fuels.** All RFTA buses rely on some form of alternative fuel, either compressed natural gas or a biofuel blend, which emits fewer GHG pollutants as compared to conventional transportation fuels.
- **Electric vehicles make up a small, but growing, percentage of vehicles on the road.** In 2017, only 1.5 percent of vehicles in Colorado were electric.

AVIATION

Aviation-sector emissions are from the fuel dispensed to aircrafts at the Aspen Pitkin County Airport (ASE) and airport operations.

Emissions from the aviation sector totaled 3,939 mtCO2e in 2017, accounting for 7 percent of Basalt's emissions.

Emissions from this sector have increased 116 percent since 2014.



KEY FINDINGS:

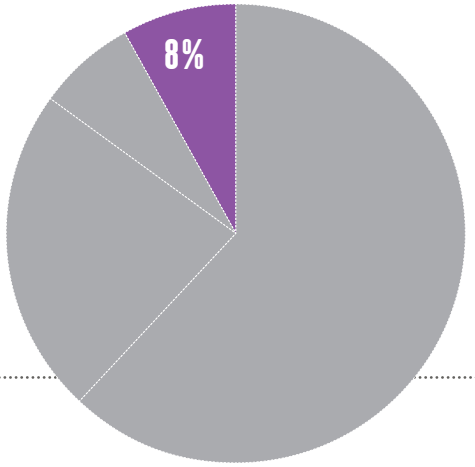
- **ASE monitors emissions closely.** ASE was one of the first airports in the United States to prepare a comprehensive emissions inventory and has continued to regularly compile inventories to identify opportunities to reduce emissions. Most recently, the 2017 inventory was published in 2019 (Appendix B).
- **Only 5 percent of ASE emissions are allocated to Basalt.** This number represents an estimate of the percentage of airport passengers that begin or end their trip in Basalt. The responsibility for aviation emissions is shared among users.
- **Emissions from aircraft fuel, ground support equipment, and energy are captured.** The fuel loaded into aircraft (both private and commercial) represents that greatest share of aviation emissions.
- **A limited portion of aviation-related emissions are locally controlled.** The Federal Aviation Administration and the airlines largely control the amount and type of aircraft fuel sold at ASE.
- **There was growth in the number of flights and the distances flown, compared with 2014.** Aircraft jet fuel sales in 2017 increased 40 percent over 2014 levels due to increased aircraft operations and distances the aircraft are traveling.

WASTE

Waste-sector emissions are from the decomposition of organic materials at the landfill and landfill operation.

Emissions from the waste sector totaled 4,396 mtCO2e in 2017, accounting for 8 percent of Basalt's emissions.

Emissions from this sector have increased 46 percent since 2014.



KEY FINDINGS:

- **Municipal Solid Waste is the most significant waste-emissions source.** Emissions from household and business trash (referred to as "municipal solid waste" or "MSW") are greater than the emissions from construction and demolition waste (C&D). MSW accounts for 78 percent of waste emissions.
- **When food scraps break down in a landfill, the carbon impact is greater.** When organic materials (like food scraps and yard waste) decompose in a landfill, they release methane, a GHG that is more potent than carbon dioxide. However, when they decompose in a compost pile, they release less harmful GHG emissions and can be reused to build soil and increase agricultural yield. Increasing the amount of organic materials diverted from the landfill can have a significant impact on overall emissions.
- **The collection and transportation of waste is also analyzed in this analysis.** The study estimates that only 2 percent of waste emissions are from the delivery of trash from the Basalt community to disposal at the landfill.

WASTEWATER

Wastewater emissions are from the treatment of wastewater and the facility operation.

Emissions from the wastewater sector totaled 436 mtCO2e in 2017, accounting for 1 percent of Basalt's emissions.

Emissions from this sector have decreased 32% percent since 2014.

KEY FINDINGS:

- **The energy used at wastewater treatment plants represents the greatest single source of wastewater emissions.** This is made up of the electricity and natural gas used to power wastewater operations.
- **Naturally occurring treatment processes also release emissions.** All wastewater must be treated before being discharged into the river, since nitrate (and other forms of nitrogen) in the water pose significant environmental and public health threats. During the process of removing nitrogen, nitrous oxide emissions are released into the atmosphere.

ACKNOWLEDGEMENTS

This report was prepared by the Community Office for Resource Efficiency (CORE) on behalf of the Town of Basalt. Since 1994, CORE has been helping the Roaring Fork Valley save energy and cut carbon emissions to mitigate climate change. Working together, we advance "CORE Values": clean air, sustainable energy, stable climate, strong economy, and healthy community.

This analysis relied on information and support from a variety of sources. Special thanks to Cathy Hall at the Pitkin County Landfill, Jason White at the Roaring Fork Transportation Authority (RFTA), Chris Hildred at Holy Cross Energy, and the Aspen-Pitkin County Airport staff, without whom this report would not have been possible.

The Basalt Green Team and its supporting partners provided key input and direction, including Gerry Terwilliger, Doug Goldsmith, Dave Mullaney, Amanda Poindexter, Mary Weiner, Mike Steiner abd Chris Bilby.

FOR MORE INFORMATION CONTACT:

Susan Philp, Planning Director: Town of Basalt, susan.philp@basalt.net
Sara Nadolny, Staff Planner: Town of Basalt, sara.nadolny@basalt.net

Primary Author: Sarah Gruen, Community Sustainability Manager, CORE
Graphic Design: Traci Schalow, Kindred Collective

APPENDIX A: MEASURING EMISSIONS

This inventory accounts for the three most prevalent GHGs: carbon dioxide (CO2), methane, and nitrous oxide. For uniform and consistent reporting, all inventory results are listed in metric tons of carbon dioxide equivalent (mtCO2e). This measurement standard takes into account the global-warming potential of each gas (heat-trapping ability and atmospheric lifespan) and represents it in terms of the amount of CO2 that would have the same impact.

METHODOLOGY

The inventory was completed in accordance with the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions developed by the International Council for Local Environmental Initiatives (ICLEI). Following this industry-accepted standard ensures the inclusion of major emissions sources, consistency, and relevancy.

EMISSIONS SOURCES

We acknowledge that this estimate of emissions does not represent the entirety of emissions generated across the community. Some significant emissions sources that are not reflected in this report include the emissions generated from the creation of food and goods and the transportation of those products to Basalt; the extraction and processing of natural gas; and the transmission and distribution of electricity. These and other activities are excluded from our analysis as they are either too challenging to quantify or lack a robust accounting methodology. Nevertheless, it's important to note that these activities contribute to the community's overall climate impact and should be considered as part of emissions-reduction strategies.

APPENDIX B: ASPEN-PITKIN COUNTY AIRPORT INVENTORY

The *Aspen Pitkin County Airport 2017 Greenhouse Gas Inventory* was published in 2019. The inventory follows a standard airport greenhouse gas protocol.

BELOW IS THE SUMMARY OF THE REPORT'S FINDINGS:

User/Source Category	2017 CO2 (tons/year)	Percent of User	Percent of Total
Airport-owned/controlled			
Facilities/Stationary Sources	1,334	77.2%	1.6%
Ground Support Equipment	256	14.8%	0.3%
Ground Access Vehicles			
Passenger vehicles (on-airport roads)	15	0.9%	0.0%
Hotel shuttles (on-airport roads)	6	0.3%	0.0%
Rental Cars (on-airport roads)	6	0.4%	0.0%
Airport Employee Commute (all roads)	111	6.4%	0.1%
Subtotal	**1,728**	**100.0%**	**2.1%**
Airlines/Tenants/Aircraft Operator-owned/controlled			
Aircraft			
Approach	3,357	4.3%	4.1%
Taxi/Idle/Delay	2,503	3.2%	3.1%
Takeoff	10,183	13.2%	12.5%
Climb out	2,556	3.3%	3.1%
Residual/Cruise/APU	54,281	70.3%	66.5%
Sub-total	72,879	94.4%	89.3%
Ground Support Equipment	4,319	5.6%	5.3%
Ground Access Vehicles			
Tenant GAV	0	0.0%	0.0%
Tenant Employee Commute (all roads)	29	0.0%	0.0%
Stationary Sources	0	0.0%	0.0%
Subtotal	**77,227**	**100.0%**	**94.7%**
Public-owned/controlled			
Passenger Vehicles (off-airport roads)	584	22.4%	0.7%
Rental Car Travel (on-airport roads)	2,022	77.4%	2.5%
Hotel Shuttles (off airport roads)	6	0.2%	0.0%
Subtotal	**2,612**	**100.0%**	**3.2%**
Total	**81,566**		**100%**

Source: Aspen Pitkin County Airport 2017 Greenhouse Gas Inventory

The aviation sector of the unincorporated Pitkin County community accounts for emissions from four categories:

- Airport-owned and airport-controlled ground-support vehicles (256 metric tons)
- Tenant aircraft (72,879 metric tons)
- Tenant ground-support equipment (4,319 metric tons)
- Facilities/stationary sources (1,334 metric tons)

These four categories amount to 78,788 metric tons.

In accord with ICLEI guidance, communities that measure an airport's GHG emissions should only report the aviation emissions of the portion of passengers that begin or end their travel in the community. If 50 percent of the passengers begin or end their travel in the community, then the community's inventory should only report 50 percent of the emissions associated with the airport. Using this approach ensures that airport emissions are not double counted.

Using the AirSage traffic data collected in 2017, we estimated that 5 percent of passengers using ASE began or ended their trips in Basalt that year. Therefore, 5 percent of the 78,788 metric tons of total aviation emissions — 3,939 metric tons — were allocated to Basalt.

APPENDIX C: EMISSIONS COMPARISON OVER TIME

	2014 CO2 Equivalent Metric tons CO2e		2017 CO2 Equivalent Metric tons CO2e		% Change Against Baseline Percent
Buildings: Electricity					
Residential Electricity	10,308	mtCO2e	7,767	mtCO2e	-25%
Commercial Electricity	14,276	mtCO2e	11,548	mtCO2e	-19%
Total Electricity	24,584	mtCO2e	19,315	mtCO2e	-21%
Buildings: Natural Gas					
Residential Natural Gas	7,691	mtCO2e	7,389	mtCO2e	-4%
Commercial Natural Gas	6,150	mtCO2e	6,192	mtCO2e	1%
Total Natural Gas	13,841	mtCO2e	13,581	mtCO2e	-2%
Total Buildings	**38,425**	**mtCO2e**	**32,896**	**mtCO2e**	**-14%**
Waste					
Mixed Solid Waste	2,182	mtCO2e	3,444	mtCO2e	58%
Construction & Demolition Waste	621	mtCO2e	714	mtCO2e	15%
Collection & Transportation	71	mtCO2e	104	mtCO2e	46%
Facility Operation	139	mtCO2e	133	mtCO2e	-4%
Total Waste	**3,013**	**mtCO2e**	**4,395**	**mtCO2e**	**46%**
Transportation: Passenger Vehicles					
Gasoline	10,273	mtCO2e	11,331	mtCO2e	10%
Diesel	637	mtCO2e	702	mtCO2e	10%
Total Passenger Vehicles	10,910	mtCO2e	12,033	mtCO2e	10%
Transportation: Public Transit					
Public Transit	384	mtCO2e	586	mtCO2e	53%
Total Public Transit	384	mtCO2e	586	mtCO2e	53%
Total Transportation	**11,294**	**mtCO2e**	**12,619**	**mtCO2e**	**12%**
Aviation					
Aircraft Fuel	1,449	mtCO2e	3,644	mtCO2e	151%
Facility Operation	371	mtCO2e	295	mtCO2e	-20%
Total Aviation	**1,820**	**mtCO2e**	**3,939**	**mtCO2e**	**116%**
Wastewater					
Wastewater Treatment	644	mtCO2e	436	mtCO2e	-32%
Total Wastewater	**644**	**mtCO2e**	**436**	**mtCO2e**	**-32%**
Total	**55,196**	**mtCO2e**	**54,285**	**mtCO2e**	**-2%**

APPENDIX D: 2017 SUMMARY TABLE

	Physical Units		CO2 Equivalent		Percent of Total
	kWh, therms, gallons		Metric tons CO2e		Percent
Building Energy: Electricity					
Residential Electricity	14,400,172	kWh	7,767	mtCO2e	14%
Commercial Electricity	21,408,832	kWh	11,548	mtCO2e	21%
Total Electricity	35,809,004	kWh	19,315	mtCO2e	36%
Building Energy: Natural Gas					
Residential Natural Gas	1,389,274	therms	7,389	mtCO2e	14%
Commercial Natural Gas	1,164,130	therms	6,192	mtCO2e	11%
Total Natural Gas	2,553,404	therms	13,581	mtCO2e	25%
Total Building Energy	**various**	**units**	**32,896**	**mtCO2e**	**61%**
Solid Waste					
Mixed Solid Waste	4,148	tons	3,444	mtCO2e	6%
Construction & Demolition Waste	765	tons	714	mtCO2e	1%
Collection & Transportation	n/a	n/a	104	mtCO2e	0%
Facility Operation	n/a	n/a	133	mtCO2e	0%
Total Solid Waste	**various**	**units**	**4,396**	**mtCO2e**	**8%**
Transportation: Passenger Vehicles					
Gasoline	30,432,687	VMT	11,331	mtCO2e	21%
Diesel	1,639,471	VMT	702	mtCO2e	1%
Total Passenger Vehicles	32,072,158	VMT	12,033	mtCO2e	22%
Transportation: Public Transit					
Public Transit	259,510	VMT	586	mtCO2e	1%
Total Public Transit	259,510	VMT	586	mtCO2e	1%
Total Transportation	**32,331,668**	**VMT**	**12,619**	**mtCO2e**	**23%**
Aviation					
Aircraft Fuel	n/a	n/a	3,644	mtCO2e	7%
Facility Operations	n/a	n/a	295	mtCO2e	1%
Total Airport	**n/a**	**n/a**	**3,939**	**mtCO2e**	**7%**
Wastewater					
Treatment	n/a	n/a	436	mtCO2e	1%
Total Wastewater Treatment	**n/a**	**n/a**	**436**	**mtCO2e**	**1%**
		Total	**54,286**	**mtCO2e**	**100%**

APPENDIX E: 2014 SUMMARY TABLE

	Physical Units		CO2 Equivalent		Percent of Total
	kWh, therms, gallons		Metric tons CO2e		Percent
Buildings: Electricity					
Residential Electricity	14,366,271	kWh	10,308	mtCO2e	19%
Commercial Electricity	19,897,164	kWh	14,276	mtCO2e	26%
Total Electricity	34,263,435	kWh	24,584	mtCO2e	45%
Buildings: Natural Gas					
Residential Natural Gas	1,446,072	therms	7,691	mtCO2e	14%
Commercial Natural Gas	1,156,353	therms	6,150	mtCO2e	11%
Total Natural Gas	2,602,425	therms	13,841	mtCO2e	25%
Total Buildings	**various**	**units**	**38,425**	**mtCO2e**	**70%**
Waste					
Mixed Solid Waste	2,628	tons	2,182	mtCO2e	4%
Construction & Demolition Waste	665	tons	621	mtCO2e	1%
Collection & Transportation	n/a	n/a	71	mtCO2e	0%
Facility Operation	n/a	n/a	139	mtCO2e	0%
Total Waste	**various**	**units**	**3,014**	**mtCO2e**	**5%**
Transportation: Passenger Vehicles					
Gasoline	27,590,821	VMT	10,273	mtCO2e	19%
Diesel	1,486,374	VMT	637	mtCO2e	1%
Total Passenger Vehicles	29,077,195	VMT	10,910	mtCO2e	20%
Transportation: Public Transit					
Public Transit	170,221	VMT	384	mtCO2e	1%
Total Public Transit	170,221	VMT	384	mtCO2e	1%
Total Transportation	**29,247,416**	**VMT**	**11,294**	**mtCO2e**	**20%**
Aviation					
Aircraft Fuel	n/a	n/a	1,449	mtCO2e	3%
Facility Operation	n/a	n/a	371	mtCO2e	1%
Total Aviation	**n/a**	**n/a**	**1,821**	**mtCO2e**	**3%**
Wastewater					
Treatment	n/a	n/a	644	mtCO2e	1%
Total Wastewater	**n/a**	**n/a**	**644**	**mtCO2e**	**1%**
		Total	**55,198**	**mtCO2e**	**100%**