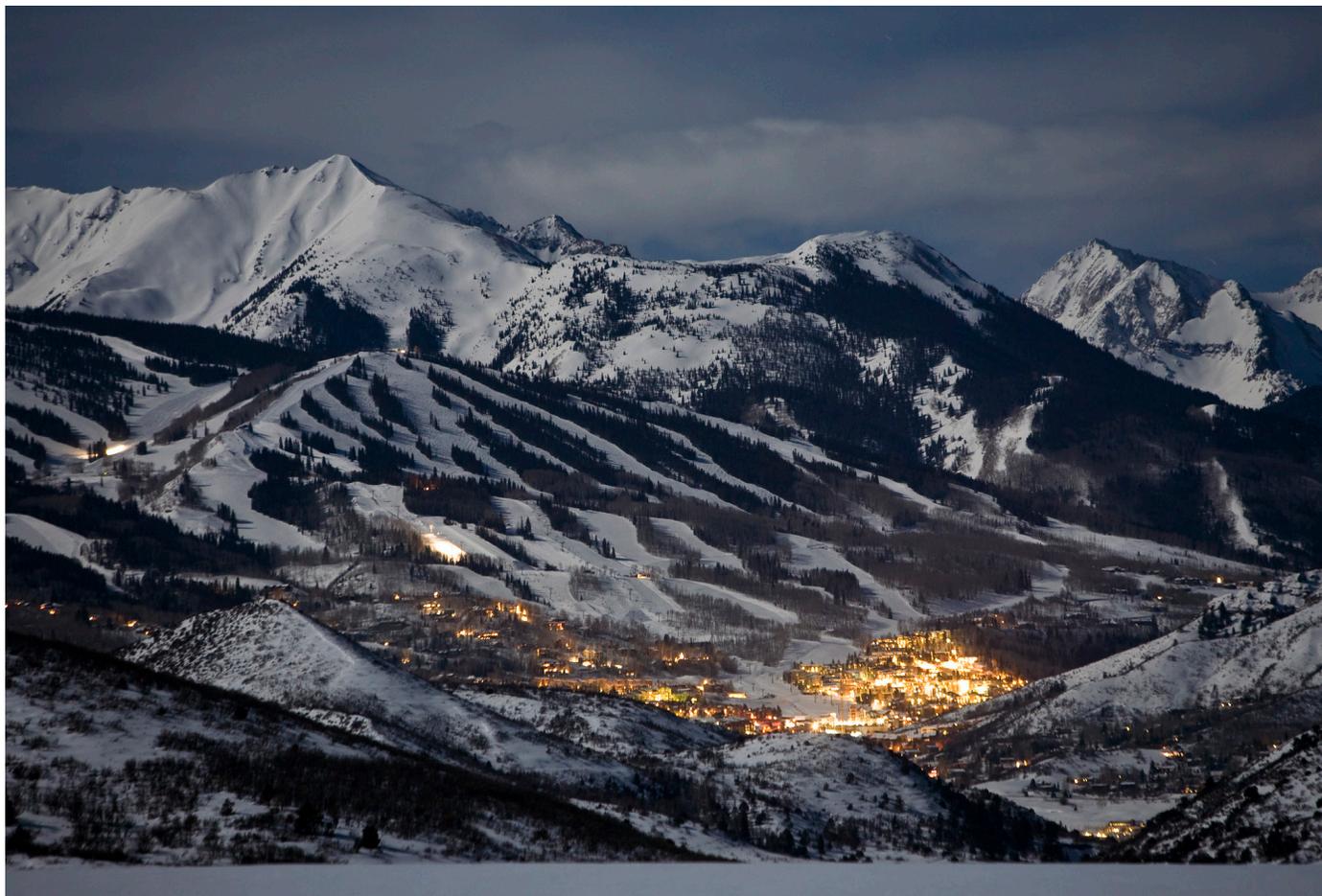


2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY



A REPORT BY THE COMMUNITY OFFICE FOR RESOURCE EFFICIENCY
PREPARED FOR THE TOWN OF SNOWMASS VILLAGE, 2016



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TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	1
EXECUTIVE SUMMARY.....	2
INTRODUCTION.....	3
METHODOLOGY.....	3
UNDERSTANDING GHG EMISSIONS.....	4
WHERE ARE EMISSIONS GENERATED.....	5
HOW ARE EMISSIONS GENERATED.....	5
GHG EMISSION TRENDS.....	6
BUILDING ENERGY SECTOR.....	6
TRANSPORTATION SECTOR.....	7
AIRPORT SECTOR.....	7
SOLID WASTE SECTOR.....	8
HOW DOES SNOWMASS VILLAGE COMPARE.....	8
BE PART OF THE SOLUTION.....	9
WORKS CITED.....	10

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

ACKNOWLEDGEMENTS

The Community Office for Resource Efficiency (CORE) performed this inventory on behalf of Snowmass Village. CORE is a nonprofit organization that works cooperatively with businesses, individuals, utilities, and government entities to create measurable improvements in energy and water efficiency in order to benefit the environment and develop a more sustainable economy.

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2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

SUMMARY

Snowmass Village has committed to reducing greenhouse gas (GHG) emissions 20 percent below 2009 levels by 2020. To measure progress towards achieving the 2020 goal, the *2014 Snowmass Village Greenhouse Gas Emissions Inventory* report provides a snapshot of current emissions.

To calculate Snowmass Village's contribution to GHG emissions, best practice methodologies were applied. As part of this analysis, the 2009 inventory was updated to account for the more robust emissions calculating procedures that have since been developed. Both the 2009 and 2014 inventories identify the five major emissions sources (building energy, transportation, airport, waste, and wastewater treatment) and calculate the magnitude of the emissions associated with each emissions source.

KEY FINDINGS

- In 2014, Snowmass Village's GHG emissions fell to 140,099 metric tons of carbon dioxide equivalent (MTCO₂e). This is a 9% decrease from 2009 emissions.
- The decline in emissions represents a significant achievement, however efforts will have to be accelerated to meet the 2020 goal.
- Snowmass Village's greatest progress has occurred in building energy use, where overall emissions decreased 11%. The next largest reduction was in transportation, with a 9% decrease.
- In emissions inventories, building energy is often one of the largest sources of emissions. In Snowmass Village, the energy (electricity, natural gas, propane) used to heat and power buildings represents almost 75% of overall emissions.
- Addressing energy consumption continues to represent the largest opportunity for further emissions reductions.
- Following transportation at 16% of total emissions is the airport (9%), solid waste (3%) and wastewater treatment (less than 1%).

NEXT STEPS

The Town of Snowmass Village should continue to develop, budget for, and plan climate-friendly programs, policies, and actions in collaboration with the Community Office for Resource Efficiency, Environmental Advisory Board, and other regional partners.

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

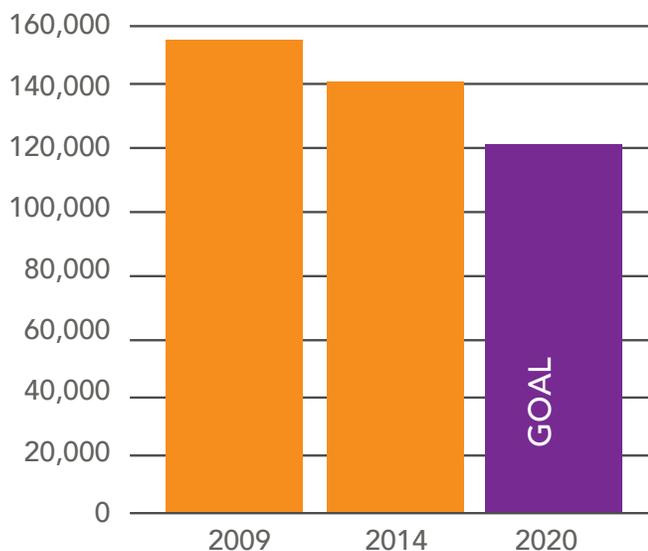
INTRODUCTION

Leading scientists agree that carbon emissions from human activities have increased the concentration of greenhouse gases (GHGs) in the atmosphere and have destabilized the Earth's climate. Locally, changes in seasonal temperatures, snowpack, and snowmelt timing have been observed. These climate change impacts have the potential to influence the Snowmass Village community in complex and profound ways: threatening the natural resources, economic prosperity, public health, and quality of life for residents and visitors alike. However, the magnitude of these impacts is dependent on the future trajectory of GHG emissions.

Snowmass Village has shown commitment to being a steward of the natural environment. To that end, the Town has recognized that local action can influence global trends and has promoted efforts to cut GHG emissions locally. In 2009, a GHG emissions inventory was created to measure the quantity and source of emissions across Snowmass Village. The Town since adopted a goal of reducing community-wide emissions 20% by 2020 (compared to the 2009 baseline) and has developed a Resiliency and Sustainability Plan to provide guidance on meeting that goal. Now, with this inventory, a measurement of 2014 GHG emissions has been developed to assess progress.

Snowmass Village emissions have declined almost 9% between 2009 and 2014 from 153,695 metric tons of carbon dioxide equivalent to 140,099 metric tons. Following this trajectory, Snowmass Village will have to maintain and expand the critical climate work it is doing to achieve its 2020 target.

FIGURE 1. PROGRESS TOWARDS EMISSION REDUCTION GOAL (MTCO₂E)



METHODOLOGY

An industry-accepted methodology and data-reporting tool were employed to calculate the emissions generated across Snowmass Village in 2014. Since the creation of the benchmark inventory (2009), more robust calculation and tracking standards have been developed. For comparability purposes and to better assess trends, the 2009 and the 2014 inventory now both align with the International Council for Local Environmental Initiatives' standards: the US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. This is widely accepted as the best practice

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

inventory methodology used by governments across the world, including regional partners Eagle County and the City of Aspen.

The report was prepared in 2016 using data that was collected in 2015 and 2016. The calendar year 2014 represents the most current data available and aligns with regional emissions inventory efforts.

UNDERSTANDING GHG EMISSIONS

The severity of climate change has been linked to the concentration of GHGs, which trap heat in the atmosphere. GHGs can be generated in a variety of ways, but the man-made emissions from everyday activities (such as the use of fossil fuels for generating electricity, heating homes, and driving around town) are the focus of this inventory.

This inventory quantifies the most prevalent GHGs that contribute to climate change: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). All emission results are represented in metric tons of carbon dioxide equivalent (MTCO₂e) to represent each gas' relative potency (atmospheric lifetime and heat-trapping ability) in an equivalent volume of CO₂. To calculate potency (100-year potentials), the values defined in the Intergovernmental Panel on Climate Change's 5th Assessment Report are applied.

GHG emissions are not tangible; the CO₂ from tailpipes of vehicles or a household cannot be seen. To put emissions results into context, researchers rely on visualization. For the Snowmass Village community, a year of emissions can be represented as 140,000 air balloons taking off.¹

FIGURE 2. A METRIC TON OF CO₂ VISUALIZED AS A HOT AIR BALLOON



WHERE ARE EMISSIONS GENERATED?

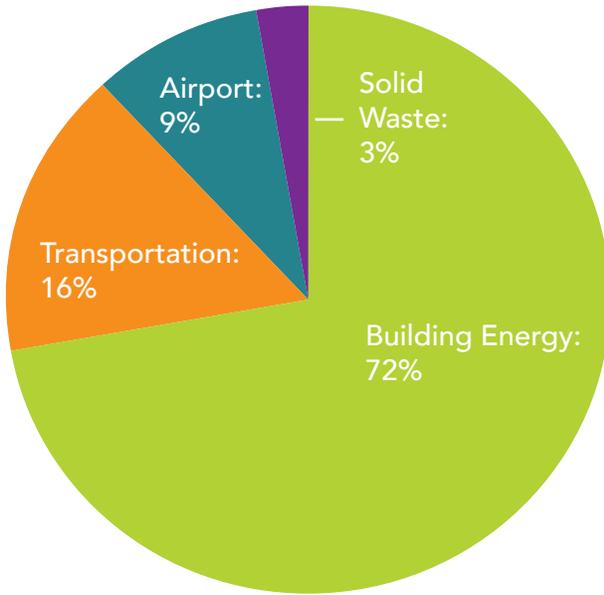
This inventory analyzes the main generation sources of GHG emissions. These sources have been categorized into five sectors:

¹ Eagle County. "Climate Action Plan for the Eagle County Community."

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

- **BUILDING ENERGY:** the electricity, natural gas, and propane used to heat and power buildings
- **TRANSPORTATION:** the fuel used for passenger vehicles and for public transit
- **AIRPORT:** the fuel used for aircraft and ground support vehicles, as well as facility operation
- **SOLID WASTE:** the decomposition of solid waste, and landfill facility operation
- **WASTEWATER:** the processing and the treatment of wastewater

FIGURE 3. GHG EMISSIONS BY SECTOR



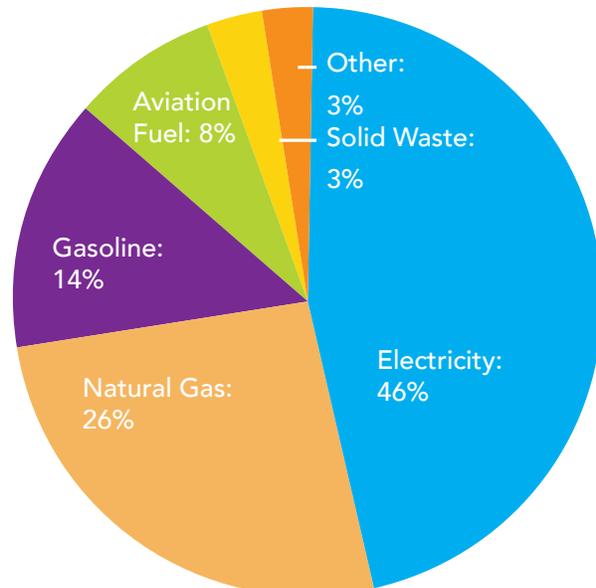
Consistent with regional and national trends, the majority of emissions were generated from the energy used in buildings, followed by the fuel used to transport people and goods.

Note: The Wastewater sector is not included in this report as the emissions generated from wastewater-related activities account for less than 1% of overall emissions.

HOW ARE EMISSIONS GENERATED?

In addition to examining emissions by sector, examining emissions by fuel source can help to reveal trends. Electricity represented the greatest contributor of fuel-sourced emissions. Natural gas and the gasoline for vehicles were major contributors as well. Aviation fuel, decomposing landfilled waste, propane, and alternative fuels (such as biodiesel) contributed a lesser amount of overall emissions.

FIGURE 4. GHG EMISSIONS BY SOURCE



2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

GHG EMISSION TRENDS

Broadly speaking, emission trends are impacted by the amount of fuel (electricity, natural gas, gasoline, diesel) consumed, as well as the carbon intensity (GHG emissions per unit) of the fuel. A number of different factors contributed to community emissions, including the fuel efficiency of vehicles, use of renewable energy, and changes in household energy use.

Table 1 summarizes the changes in emissions by sector. A combination of increases in some sectors (Airport) and decreases in others (Building Energy, Transportation and Waste) contribute to the overall emissions reduction of 9%. Reductions in the Building Energy sector drove the bulk of the emissions reduction.

TABLE 1. GHG EMISSION TRENDS

SECTOR	2009 EMISSIONS	2014 EMISSIONS	PERCENTAGE CHANGE
	metric ton CO ₂ e	metric ton CO ₂ e	Percent
Building Energy	112,144	99,611	-11%
Transportation	26,220	23,930	-9%
Airport	9,984	11,975	20%
Solid Waste	5,074	4,533	-10%

Comparing GHG emissions to factors that traditionally influence the generation of emissions, such as population and economic activity, can help to contextualize results. It is significant that the overall decrease in emissions occurred over a period of economic prosperity (as measured by sales tax). Between 2009 and 2014, sales tax increased 29%. During the same period the population remained relatively stable.²

It is also worth noting that this data shows the relationship between two data points. Continuing to monitor emissions is key to determine whether or not results are indicative of a trend.

BUILDING ENERGY SECTOR

SEVENTY TWO PERCENT OF OVERALL EMISSIONS WERE GENERATED BY THE USE OF ENERGY (ELECTRICITY, NATURAL GAS, AND PROPANE) USED TO HEAT AND POWER BUILDINGS. THIS IS 4.5 TIMES LARGER THAN ANY OTHER SECTOR.

- Approximately half of all energy consumed in Snowmass Village in 2014 was natural gas, however a far greater share of emissions was from electricity. This is because of the carbon intensity of the electricity serving Snowmass Village. The majority of the electricity was generated by fossil fuels, with over half supplied by coal-fired power plants.³
- Between 2009 and 2014 the carbon intensity of the grid-supplied electricity decreased, as did overall Building Energy sector emissions. During this period Holy Cross Energy increased the portion of electricity generated by less carbon-intensive fuels such as solar or hydro power.
- However, the biggest factor influencing the decline of overall emissions was a reduction of energy consumed in homes and businesses between 2009 and 2014.
- Factors that may have influenced emission reductions include energy efficiency projects and the installation of local renewable energy sources (such as rooftop solar photovoltaic systems).

² US Census Bureau. "2015 Population Estimates."
³ Holy Cross Energy. "2014 CO2 Emissions Report."

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

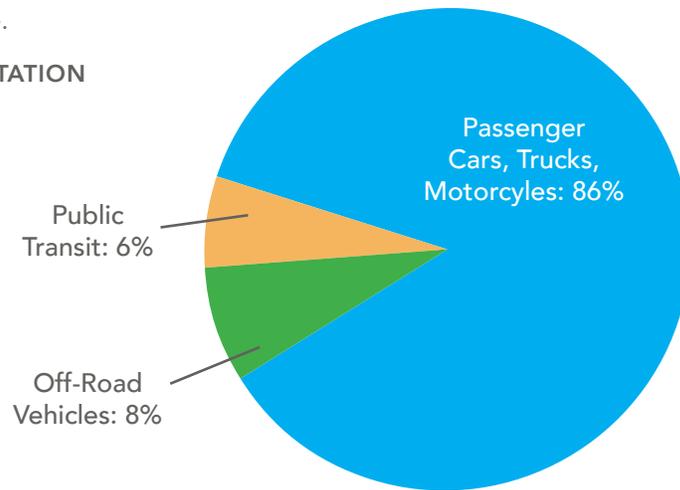
- In 2014, the amount of energy used in households was proportionally similar to the amount of energy used in commercial buildings. There were a relatively greater number of residential utility accounts as compared to commercial, suggesting that addressing energy efficiency in businesses represents a great emissions reduction potential.
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TRANSPORTATION SECTOR

SIXTEEN PERCENT OF OVERALL EMISSIONS WERE GENERATED BY THE FUEL USED TO POWER CARS, TRUCKS, MOTORCYCLES, AND PUBLIC TRANSIT.

- The fuel used for cars, trucks, and motorcycles was responsible for the vast majority of Transportation sector emissions (86%).
- Nearly all fuel used by passenger vehicles is fossil fuel-based (either gasoline or diesel). The share of electric vehicles (EVs) on the road increased between 2009 and 2014, but still represents less than 1% of all traffic.
- Public transportation has a relatively small impact on overall emissions. As buses have the ability to carry more passengers, they can be a more effective use of fuel per person per mile.
- Both the Roaring Fork Transit Authority (RFTA) and the Snowmass Shuttle strive to use efficient vehicles and fuels. All RFTA buses serving Snowmass Village use a biodiesel blend.
- A more robust travel demand model or traffic study would allow for a more granular analysis of emissions. The inventory team determined the best available method for calculating emissions was using local traffic counts, but this approach may not fully capture all fuel use.

FIGURE 5. SUMMARY OF TRANSPORTATION SECTOR EMISSIONS



AIRPORT SECTOR

NINE PERCENT OF OVERALL EMISSIONS WERE GENERATED BY THE FUEL LOADED ONTO AIRPLANES, BY THE FUEL USED IN GROUND SUPPORT EQUIPMENT, AND BY THE ELECTRICITY CONSUMED AT THE ASPEN/PITKIN COUNTY AIRPORT (ASE).

- The burning of fuel loaded onto aircrafts represented that vast majority (nearly 90%) of emissions at ASE.
- Limited opportunities exist for Snowmass Village to influence emissions from this sector, as the amount of emissions from fuel is dependent on variables controlled by airport tenants and airlines, including the type of aircraft, the cities served, and the amount of fuel loaded onto aircrafts.

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

- Local strategies to address emissions could include incorporating energy efficiency into the existing and the proposed terminal, targeting transportation to and from the airport, and adopting policy at council level encouraging airport to explore alternative fuels such as biofuels.
- Following the 2009 inventory methodology, this analysis attributed 20% of airport activity to Snowmass Village. This activity includes aircraft fuel, ground support equipment fuel, and electricity to power the terminal.

FIGURE 6. AIRCRAFT LANDING AT ASPEN/PITKIN COUNTY AIRPORT



SOLID WASTE SECTOR

THREE PERCENT OF OVERALL EMISSIONS WERE GENERATED BY THE DECOMPOSITION OF TRASH AT THE PITKIN COUNTY LANDFILL, AND FROM THE EQUIPMENT USED ONSITE.

- Waste sector emissions are primarily dependent on the characterization of the waste stream (the percentage of organics, recyclables, and other materials) and the volume of waste generated.
- Organic materials emit methane, a potent GHG, when decomposing in the landfill. When buried in a compost pile the organic materials generate fewer GHGs. In Snowmass Village, almost 30% of the waste stream is composed of organic materials.⁴
- Between 2009 and 2014, the Waste sector emissions declined 10% as the amount of organic materials (food scraps, yard waste, etc) in trash decreased.
- Building debris generated from new construction and from demolition projects (referred to as construction and demolition waste or “C&D”) represented a significant portion of Waste sector GHG emissions in 2014.

HOW DOES SNOWMASS VILLAGE COMPARE?

In 2014 the Snowmass Village community generated an estimated 140,099 metric tons of carbon dioxide equivalent (MTCO₂e). This roughly equates to 49 MTCO₂e per person.

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

Per capita, Snowmass Village has significantly higher emissions than that of Colorado, and of a neighboring mountain resort community, Eagle County.⁵ Mountain resort communities tend to have higher per capita emission values due to the second homes, hotels, air traffic, and recreation facilities. It is worth noting that although tourists contribute to the community's overall emissions, the per capita rate is based on the permanent population of 2,852 people.⁶

BE PART OF THE SOLUTION

The Town of Snowmass Village has committed to generating less than 123,000 MTCO₂e by 2020 while providing the same or better quality of life to its residents. Success requires a mix of solutions and broader community participation in climate efforts.

THE TOWN OF SNOWMASS VILLAGE CAN HELP REDUCE GHG EMISSIONS BY:

- Developing strategies to fund and address the emission reduction actions outlined in the *2015 Resiliency and Sustainability Plan Update*. Collaborate with the community, Environmental Advisory Board, utility providers, CORE, and other regional partners to develop strategies.
- Initiating a public awareness campaign to spur broader community participation in climate efforts.
- Commissioning modeling and forecasting studies to better understand the reduction potential for Snowmass Village, and the actions needed to meet the 2020 reduction goal.

EVERY PERSON CAN HELP REDUCE GHG EMISSIONS BY USING LESS ENERGY, DRIVING FEWER MILES, AND REDUCING THE AMOUNT OF WASTE SENT TO THE LANDFILL.

USE LESS ENERGY

- Boost energy efficiency in homes and businesses
- Conserve energy through behavioral and cultural changes
- Continue to adopt the latest building codes so buildings are built right from the start
- Generate more energy from renewable sources

DRIVE FEWER MILES & USE CLEANER VEHICLES

- Encourage biking, walking, public transit and carpooling
- Replace vehicles with lower-carbon options

PRODUCE LESS WASTE

- Encourage composting to reduce the amount of food waste in trash
- Improve recycling rate for household goods
- Salvage and reuse construction and demolition (C&D) waste

⁵ CLEER. "Eagle County Energy Inventory: 2014 data on energy use, costs and GHG emissions."

⁶ US Census Bureau. "2015 Population Estimates."

2014 SNOWMASS VILLAGE GREENHOUSE GAS EMISSIONS INVENTORY

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