Eagle County Energy Inventory

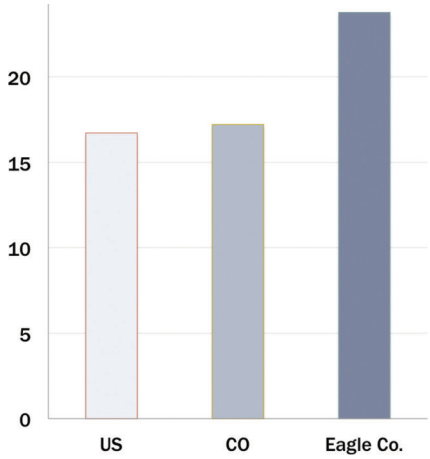
2014 data on energy use, costs and GHG emissions

KEY FINDINGS

- Greenhouse gas emissions from energy use in Eagle County in 2014 totaled 1.4 million metric tons of carbon dioxide equivalent (CO2e).
- The single largest source of emissions, at 39 percent, is from the generation of electricity used to power residential and commercial buildings and facilities.
- Greenhouse gas emissions on a per capita basis are higher in Eagle County than in Colorado or the U.S. As a resort community, Eagle County has more second homes, hotels and energy intensive recreation facilities.
- Consistent with national findings, Eagle County transportation emissions come primarily from passenger vehicles.
- The Eagle County community spent $243 million in 2014 on energy, for electric and natural gas bills and for diesel and gasoline transportation fuels.
- If the community as a whole became 10 percent more energy efficient, $24 million could stay in the community each year to strengthen the local economy.

Section 1: Overview of Emissions, Energy Costs and Energy Use

Total 2014 carbon dioxide equivalent (CO_2e) emissions:
1,387,080 metric tons

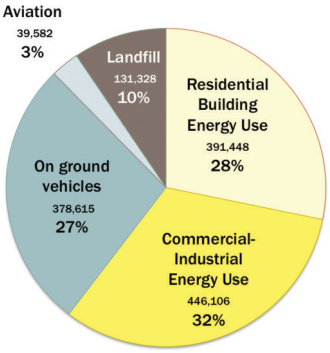


1. Emissions per Capita, 2014
Metric tons of CO_2

Greenhouse gas emissions divided on a per capita basis are 28 percent higher in Eagle County than in Colorado. Contributing factors are transportation, second homes and lodging.

See appendix for details about household energy use and the impact of second homes on energy use.

2. Emissions by Sector, 2014
Metric tons of CO_2e



3. Emissions by Source, 2014
Metric tons of CO_2e

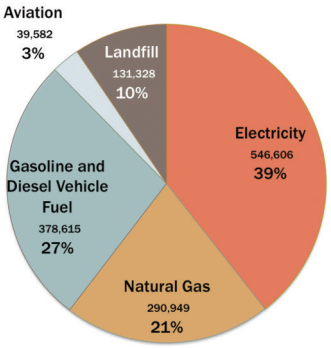


Chart 2 illustrates the sources of emissions by use, while Chart 3 illustrates emissions by fuel source. The residential and the commercial/industrial sectors contribute the largest percentage of total emissions in the county. By fuel, electricity use contributes the largest share of emissions, followed by gasoline and diesel fuels for transportation.

4. Energy Costs by Source
Total energy costs: **$243.5 million**

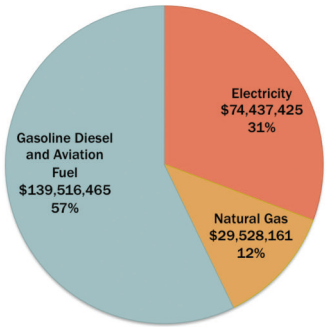


Chart 4 shows that more than half of energy costs are for transportation fuels (based on 2014 average price of $2.92/gallon). Natural gas prices in Colorado rank 47th in the U.S., thus the small wedge for natural gas costs.

5. Energy Use by Source, 2014
Total energy use: 18.8 trillion BTUs

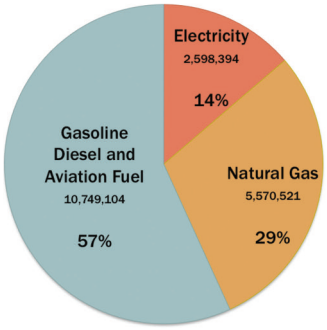
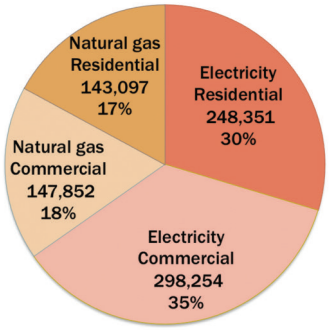


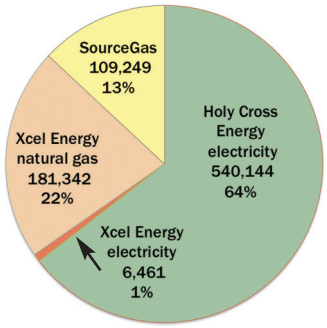
Chart 5 converted gallons of transportation fuel, kilowatt hours of electricity and therms of natural gas into a common, industry standard energy unit, the British thermal unit (BTU). See Appendix for the definition of BTU.

Section 2: Utility Energy

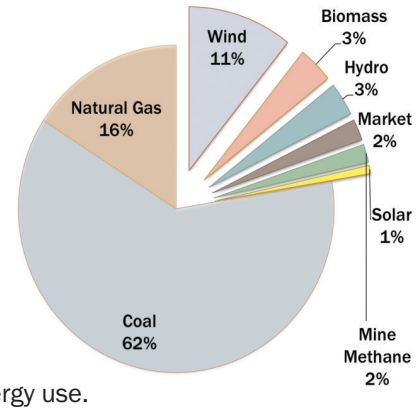
6. Emissions by Sector
Metric tons of CO_2e



7. Emissions by Utility
Metric tons of CO_2e



8. Holy Cross Energy Electricity Sources



CO2 emissions/year: 831,384 metric tons

Average CO2 intensity: 1.57 lb. per kWh

Renewable energy: 20.3%

Member-owned renewable systems: 517
Capacity: 3,492 kW

Meters in Eagle County:
29,335 residential
6,304 commercial

Electricity is the dominant source of emissions from building energy use.

Section 3: Emissions from Buildings, Facilities and Industry

9. Emissions by Community by Residential and Commercial Sector, 2014
Metric tons of CO_2e

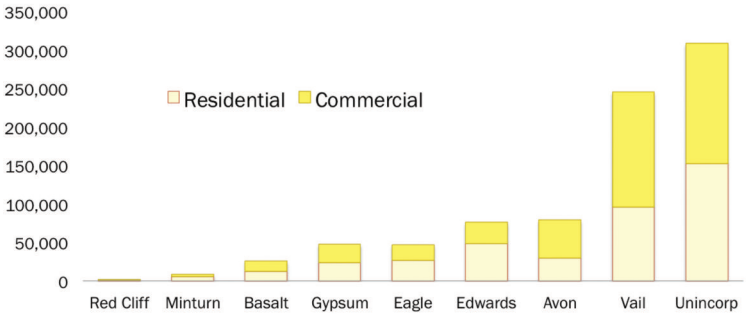


Chart 9 shows total emissions in each community from building, facility and industrial energy use in the residential and commercial sectors.

Notes for Charts 9 and 10:

Edwards: Data for Edwards, an unincorporated community, includes the entire 81632 zip code.

Unincorp: Abbreviation for "unincorporated" includes meters in unincorporated Eagle County other than the Edwards 81632 zip code. Unincorporated Eagle County has more population and housing units than any of the county's individual municipalities.

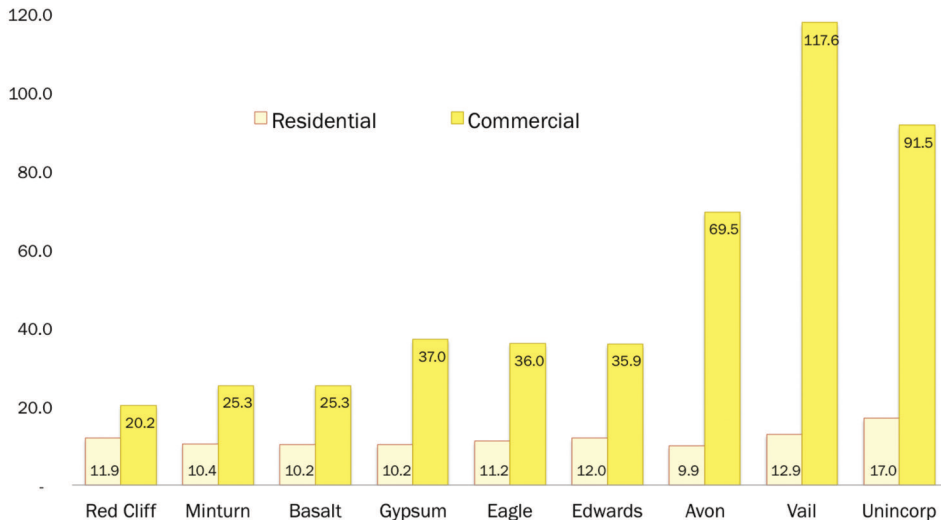
Commercial: A utility designation for a meter on properties such as hotels, multi-family complexes with one meter, recreational facilities (lifts and snow-making equipment), governments, schools, retail, industrial and manufacturing facilities.

Businesses and governments often hold many utility accounts for the multiple properties they own or lease. In this chart, each utility account is counted separately, regardless of ownership.

10. Emissions by Community by Residential and Commercial Utility Account, 2014
Metric tons of CO_2e

Chart 10 shows emissions by community based on the number of residential (light yellow) and commercial (dark yellow) electric utility accounts in each community and in unincorporated areas (far right bar).

While commercial energy use per account is higher than residential, it's important to note that there are about five times as many residential accounts as commercial accounts across Eagle County. However, total energy use between the two sectors is close, 53 percent for commercial and 47 percent for residential (see Chart 6).



Section 4: Transportation Energy Emissions and Use

11. Eagle County Transportation Emissions, 2014

Metric tons of CO_2e

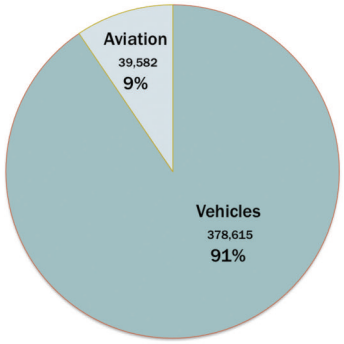


Chart 11. To calculate motor vehicle energy use, the research team determined that the best available method was to use Colorado Department of Transportation traffic statistics for Eagle County.

CDOT data does not include county roads or city streets. Because of this missing information, this inventory's estimate is inherently conservative and is very likely an underestimate of total transportation energy use.

Because of the economic importance of I-70 to the region for destination traffic, the high percentage of local traffic on I-70, and the built-in underestimation due to missing city street traffic, the research team chose to include 100 percent of I-70 traffic to represent the county's total vehicle miles traveled.

12. Eagle County Energy Use by Vehicle Class, 2014

Thousands of Gallons

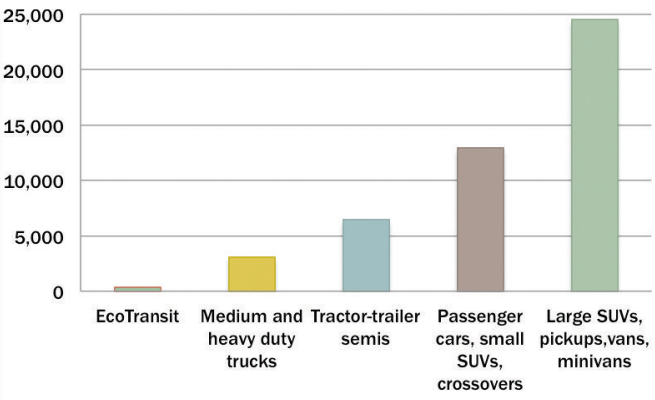


Chart 12. The majority of gasoline and diesel fuel use is for vehicles that carry passengers. The two bars on the right represent small and large passenger vehicles. Combined, they account for 79 percent of gasoline and diesel gallons used in Eagle County. Medium and heavy-duty trucks and semis use 21 percent of gasoline and diesel gallons.

13. U.S. Transportation Sector Emissions by Source

Metric tons of CO_2e

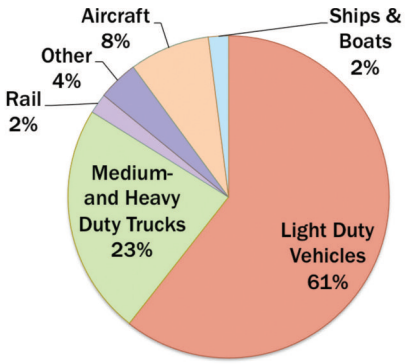


Chart 13. Within the U.S. transportation sector, light-duty vehicles (including passenger cars and light-duty trucks) were by far the largest category, responsible for 61 percent of emissions. Medium- and heavy-duty trucks made up the second largest category, with 23 percent of emissions. Between 1990 and 2013, emissions nationwide in the transportation sector increased more in absolute terms than any other sector (i.e. electricity generation, industry, agriculture, residential, or commercial).

Section 5: Recommendations

Energy Efficiency: Energy efficiency programs need to address electricity consumptions in residential, commercial and industrial sectors across the county. The greatest potential for emissions reduction is in commercial sector energy use.

Renewable Energy: Partnering with Holy Cross Energy to increase the amount of renewable energy in the utility's power portfolio will decrease emissions from electricity consumption.

Transportation: Programs should focus on reducing passenger vehicle travel and shifting to cleaner-burning alternative fuels. Key components should include increased availability of public transit, growth in public electric vehicle charging stations and use of electric vehicles, and more bicycle travel options within communities.

Policy: Local government partners should work toward similar policies that reduce emissions, such as energy efficiency building codes, land use codes that encourage compact walkable communities and transit-oriented development, and multi-modal transportation planning.

Areas of Further Study

- Travel pattern study to assist with local traffic emissions calculations and planning for mass transit.
- Updated waste composition study at the Eagle County Landfill to ensure more recent data is incorporated into future inventories and to acknowledge improvements at the landfill.
- Energy use study to differentiate between occupied and unoccupied housing.
- Energy use study specifically focused on resort operations.

Appendix

Energy and Emissions by Population and Household

Per capita and per housing unit calculations are one way to compare one community's energy use to others, even when population totals are different. However, these calculations can be difficult to apply in a resort-dominated community such as Eagle County.

Per Capita: A per capita calculation divides energy use or emissions by the permanent population of the community, as shown in Chart 1 (page 1). The Eagle County population used for this calculation was 52,831.

Chart 1 shows a much higher rate of emissions per capita for Eagle than for Colorado or the United States. Eagle County's large resort industry, which includes ski lifts and on-mountain facilities, and a high density of lodging, dining and retail establishments in eastern Eagle County, acts like other large energy-using industries would in skewing the per capita emissions figure.

Per Housing Unit: Per housing unit calculations are another means of comparing one community's energy use to others, specifically in the residential sector. These calculations divide total energy use in the residential sector by the number of households or residential service meters in that community. This calculation excludes emissions from the commercial sector, avoiding the imbalance seen in Chart 1.

However, the per housing unit calculation is also difficult to apply in Eagle County, because a high percentage of residential units are used sporadically or seasonally as second homes and vacation rentals. These second homes and vacation rentals use energy whether they are vacant or occupied, although they would presumably use less energy when vacant.

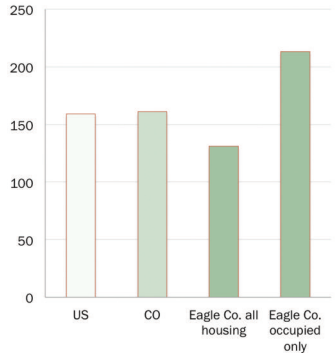
The Colorado State Demographer reports that of Eagle County's 31,675 housing units (this figure does not include commercial lodging properties), 38 percent were considered "vacant" or unoccupied in 2014. Colorado's average vacancy rate in 2014 was 7.6 percent.

Utility companies, however, do not differentiate between permanently occupied homes and sporadically occupied second homes and vacation rentals. So it's impossible, without further study, to calculate energy use by permanently occupied compared to sporadically occupied homes.

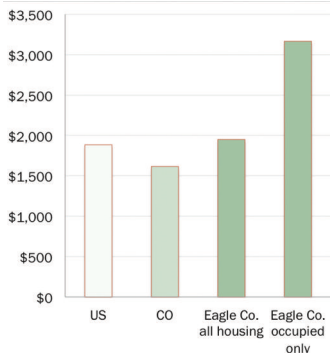
For this inventory, the research team ran the per housing unit calculation both ways, dividing all residential energy use by all housing units (second bar from right in Charts 15-18), and dividing only by permanently occupied units (right bar). Neither bar accurately depicts average household energy use for Eagle County. Dividing by all units yields a low per-unit average, while dividing only by occupied units yields an unfairly high per-unit average. The true number is probably somewhere in between.

Energy per Household per Year, 2014

14. Energy Use, in million BTUs

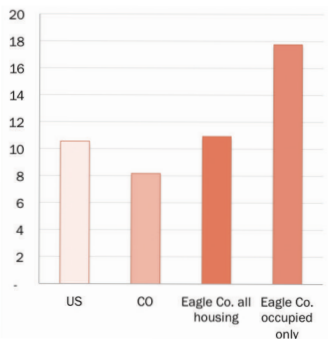


15. Energy Cost

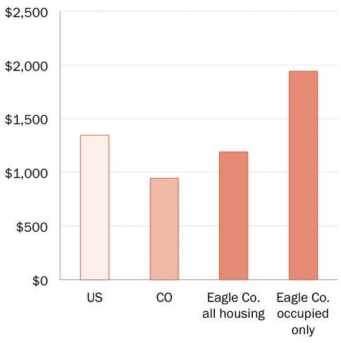


Electricity per Household per Year, 2014

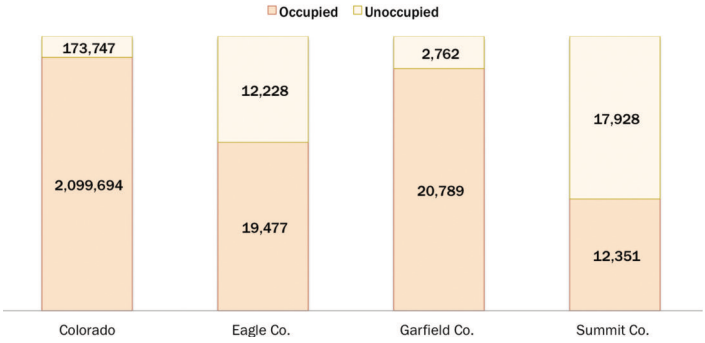
16. Electricity Use, in mWh



17. Electricity Cost



18. Occupied and unoccupied housing units, 2014



Eagle County has a high percentage of unoccupied housing units compared to Colorado overall, or to non-resort counties such as Garfield County. Summit County has an even higher percentage of residential units considered unoccupied.

What is a BTU?

Charts 5 and 15 report total energy use by a common unit, British thermal unit or BTU.

One BTU is the amount of work needed to raise the temperature of 1 pound of water by 1 degree F. For a physical example, burning one 4-inch wooden kitchen match generates 1 BTU.

Sources and Acknowledgements

Data collection and analysis by Erica Sparhawk, CLEER, and Rick Heede, Climate Mitigation Services

Special thanks to the Eagle County Commissioners, Jeanne McQueeney, Jill Ryan and Kathy Chandler-Henry, for their continued work to address climate change, for their understanding of the importance of energy, and for commissioning this emissions inventory for enacting informed climate action policies.

The following individuals provided data, insight, support and expertise for this report:

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Steve DeGrazio, Xcel Energy

Lisa Pfitzinger and Renae Chandler, Black Hills Energy / SourceGas

Amanda Nolan, Eagle County Landfill

Chris Anderson and Jeffrey Brownback, Eagle County Airport

Energy Inventory Protocol

The Eagle County Energy Inventory quantifies total energy use, costs and carbon emissions by sector and by fuel and utility source, using 2014 as the baseline year.

The inventory's purpose is to understand how and where energy is used and emissions are generated. With this information in hand, each energy-using sector can identify opportunities to increase efficiency, reduce emissions and reduce costs.

This inventory complies with the U.S. Community Protocol for Accounting and Reporting of GHG Emissions (USCP). At least five emission-generating activities must be included for an inventory to be USCP compliant. This inventory surveys five activities: residential energy, commercial energy, vehicles, aviation and the landfill.

Sources

Chart 1

U.S. Energy Information Administration: Carbon emissions by state: *www.eia.gov/environment/emissions/state/analysis/*

Colorado State Demographer's Office: Population and Household Estimates for Colorado Counties and Municipalities, 2014: *bit.ly/COCountyMuniHousing2014*

Charts 2 - 7

Eagle County Energy Inventory data gathered from Holy Cross Energy, Xcel Energy, SourceGas, Colorado Department of Transportation, Eagle County Airport

Pitkin, Eagle and Garfield Waste Composition Study, 2009, LBA Associates, funded by U.S. Dept. of Agriculture

Chart 7

In 2016, Black Hills Energy acquired SourceGas.

Chart 8

Holy Cross Energy, 2014 CO2 Emissions Report

Charts 9 - 10

Eagle County Energy Inventory data (usage and customer counts) gathered from Holy Cross Energy, Xcel Energy and SourceGas

Chart 11

Colorado Department of Transportation: Vehicles Miles Traveled Statistics, Data provided by CDOT staff Andrew Hogle and Leo Livecchi.

Chart 12

Vehicle miles traveled (VMT) data was combined with the Aspen VMT Model 2014 prepared by Charlier Associates (2015), the nearest regional data available, to estimate vehicle miles traveled per vehicle type, including cars, pickups, and medium and heavy trucks.

Chart 13

U.S. Office of Transportation and Air Quality: Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions 1990-2013, EPA-420-F-15-032October 2015: *bit.ly/fastfacts15032*

Charts 14 - 18

U.S. Energy Information Administration: U.S. & Colorado energy comparisons: *bit.ly/EIA-US-Colo*

Colorado State Demographer's Office: Population and Household Estimates for Colorado Counties and Municipalities, 2014: *bit.ly/COCountyMuniHousing2014*

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