



The City of Aspen

2015 Government Operations GHG Inventory

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Introduction: In March 2005, the City of Aspen (COA) adopted a plan to address climate change by reducing greenhouse gas (GHG) emissions at both the ‘government operations’ and ‘community-wide’ scales. ‘Government operations’ GHG emissions refer to those that are produced as a direct result of conducting City business. ‘Community’ scale emissions are those that result from all sources and activities within the community (private, public, nonprofit sector and citizens). An underlying component of the City’s [Climate Action Plan](#) is to reduce GHG emissions 30% below 2004 levels by 2020 and 80% below those levels by 2050 - at both the government operations and community-wide scales. Progress in achieving the GHG reduction goals is tracked via GHG inventories. Since 2004, government operations inventories have been compiled annually, while community-wide inventories are compiled every 3 years. This document is the *City of Aspen’s 2014/15 Government Operations GHG Inventory*.



Image 1. Aspen's City Hall is one of 20+ facilities used for government operations. Electricity for building energy use is the largest source of the COA's GHGs

Background and 2014/15 GHG Target: The submittal of Aspen’s government operations inventories have always coincided with the ‘Goals and Outcomes’ (G&O) year, which runs November of the previous year through October of the current. Accordingly, this inventory quantifies emissions that occurred between August 1, 2014 and July 31, 2015 and compares them against the same time period from past years. Setting the inventory period earlier than the G&O reporting deadline is necessary to have a full, comparable, data set compiled by the time the report is due. The G&O mandated GHG reduction target (Citywide-G&O measure 8.b) for 2014/15 is 29% below the 2004/05 baseline. Given that government operations emissions were reduced 42% below the baseline, the City met and exceeded this year’s GHG reduction goal (Fig. 1).

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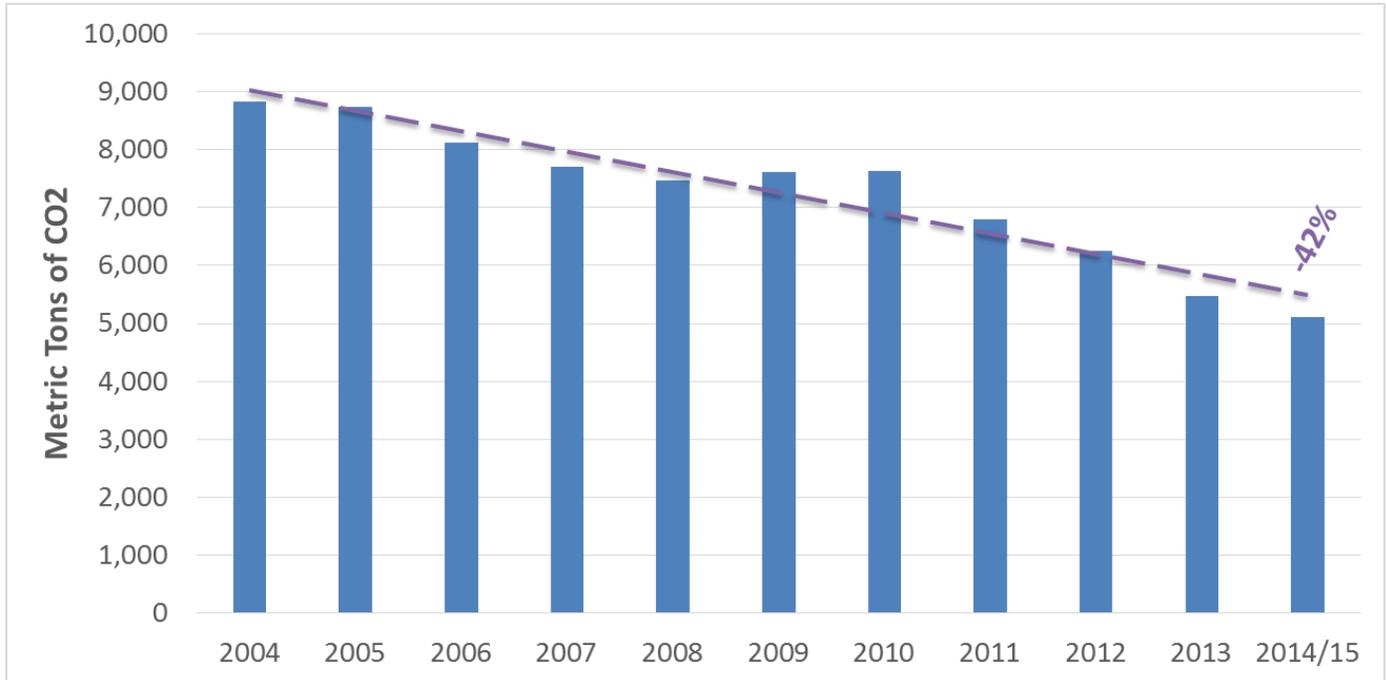


Figure 1. COA GHG Emissions and Reduction Trend, 2004 -2015. Government operations GHGs have been reduced 42% since 2004.

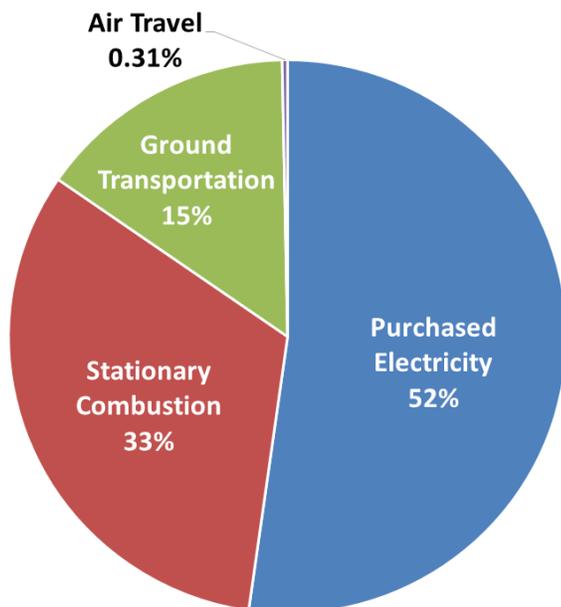


Figure 2. Sources of COA GHG Emissions, 2014/15

GHG Sources: GHG emissions resulting from the COA’s government operations are attributable to four primary sources:

1. **Purchased electricity:** from the use of electricity in municipal buildings and facilities. Acquired from both Aspen Electric and Holy Cross Energy, electricity is responsible for 52% of the COA’s net emissions.
2. **Stationary combustion:** from the use of natural gas in City buildings and facilities. The City’s natural gas provider is SourceGas, and this sector is responsible for 33% of the COA’s total 2014/15 GHGs.
3. **Ground transportation:** from the consumption of both gasoline and diesel in COA-owned and operated vehicles and personal vehicles used for City business. This sector

represents 15% of 2014/15 government operations GHGs.

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- Air travel:** from the consumption of jet fuel used for employee travel on commercial flights for official City business. Air travel comprises less than 1% of the total.

2014/15 Aggregate GHG Emissions: Aggregate (total) GHG emissions represent the entire City GHG picture by summing the emissions from each of the four tracked sectors. Compared with the 2004 base-year, total 2014/15 GHG emissions from government operations were reduced by 42% (Figures 1 and 3). This aggregate decrease is the sum total of changes in the tracked sectors, each of which has either increased or decreased at a different rate. For example, GHG emissions from purchased electricity decreased by 50% since 2004: the steepest sector-specific rate of CO₂ reductions since the base year. Over the same time period, emissions from stationary combustion decreased by 41% and air travel GHGs declined by 4%. Conversely, emissions related to ground transportation have increased by 9% since 2004.

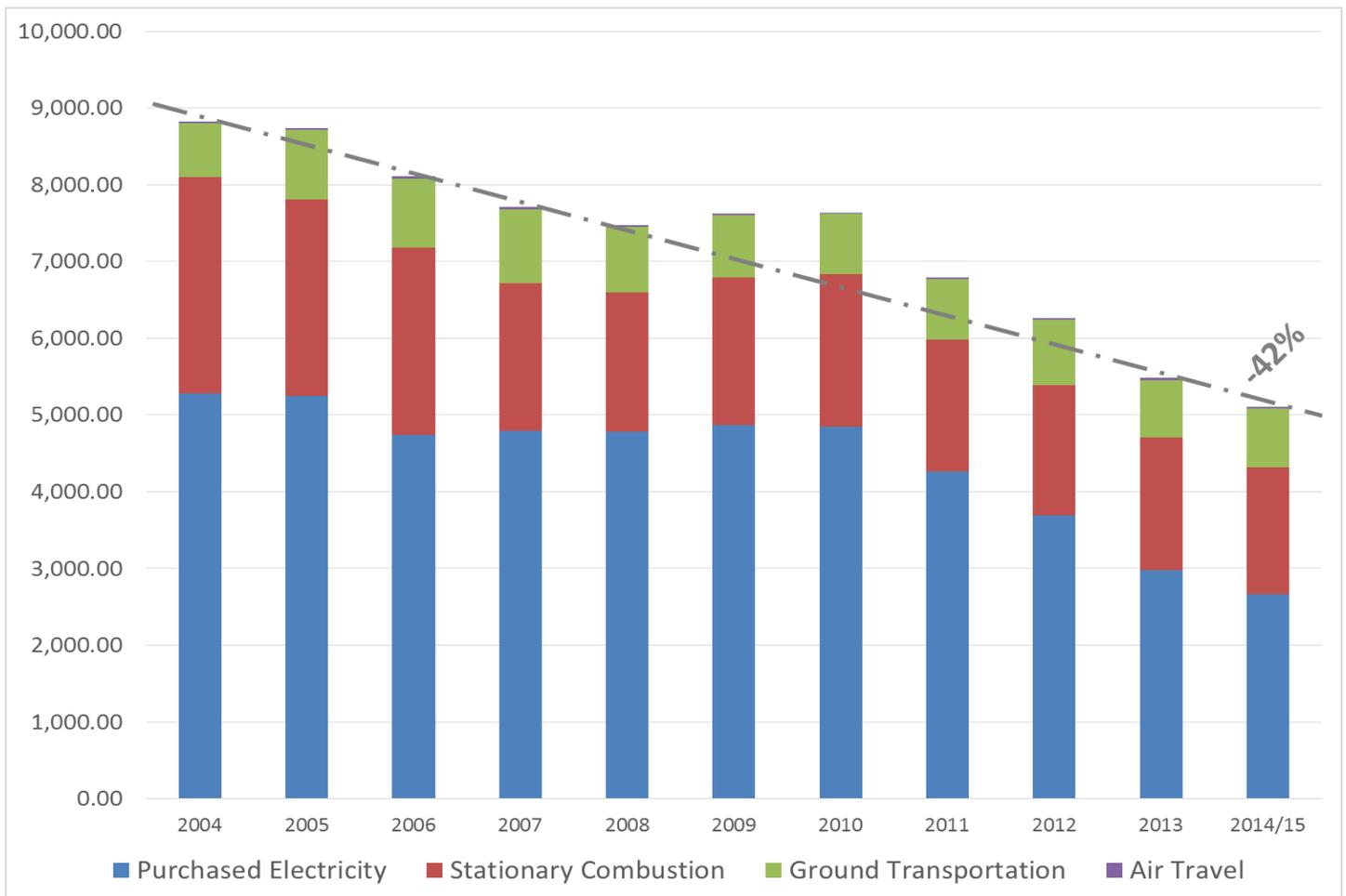


Figure 3. Aggregate CO₂ Emissions from COA Operations, 2004-2014/15. The 42% decrease is a result of the unique contributions from each sector.

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With the exception of the 2009 and 2010 tracking years, aggregate emissions have been reduced each year since tracking began. Figure 3 illustrates emissions totals and trends in net emissions for each year since tracking began. This year, as a whole, the City achieved:

- A 42% reduction from the 2004 baseline;
- A 7% reduction from the 2013 GHG year.

2014/15 Purchased Electricity Consumption and GHG Emissions: The City purchases electricity from Aspen Electric, a municipal electric utility which the COA owns and operates, and Holy Cross Energy (HCE) a cooperative distribution utility. A majority of the COA's buildings and facilities are in the Aspen Electric service area. During the 2014/15 GHG year, the City government's annual aggregate electricity consumption had declined by 31% since 2004 and 15% since 2013/14. Again, this overall change in electricity consumption represents the sum total of changes in the various components that comprise it, namely the two electric utilities. Between 2004 and 2014/15, COA electricity purchases from Aspen Electric declined by 17% while purchases from Holy Cross Energy declined by 46% (Figure 4). Thus, it is clear that proportionally, the bulk of this long term decrease in COA electricity consumption occurred in buildings and facilities on HCE's grid, which reflects a concerted effort to shift COA electricity procurement to Aspen Electric, in part because of the municipal utility's smaller carbon factor, in addition operational ownership.

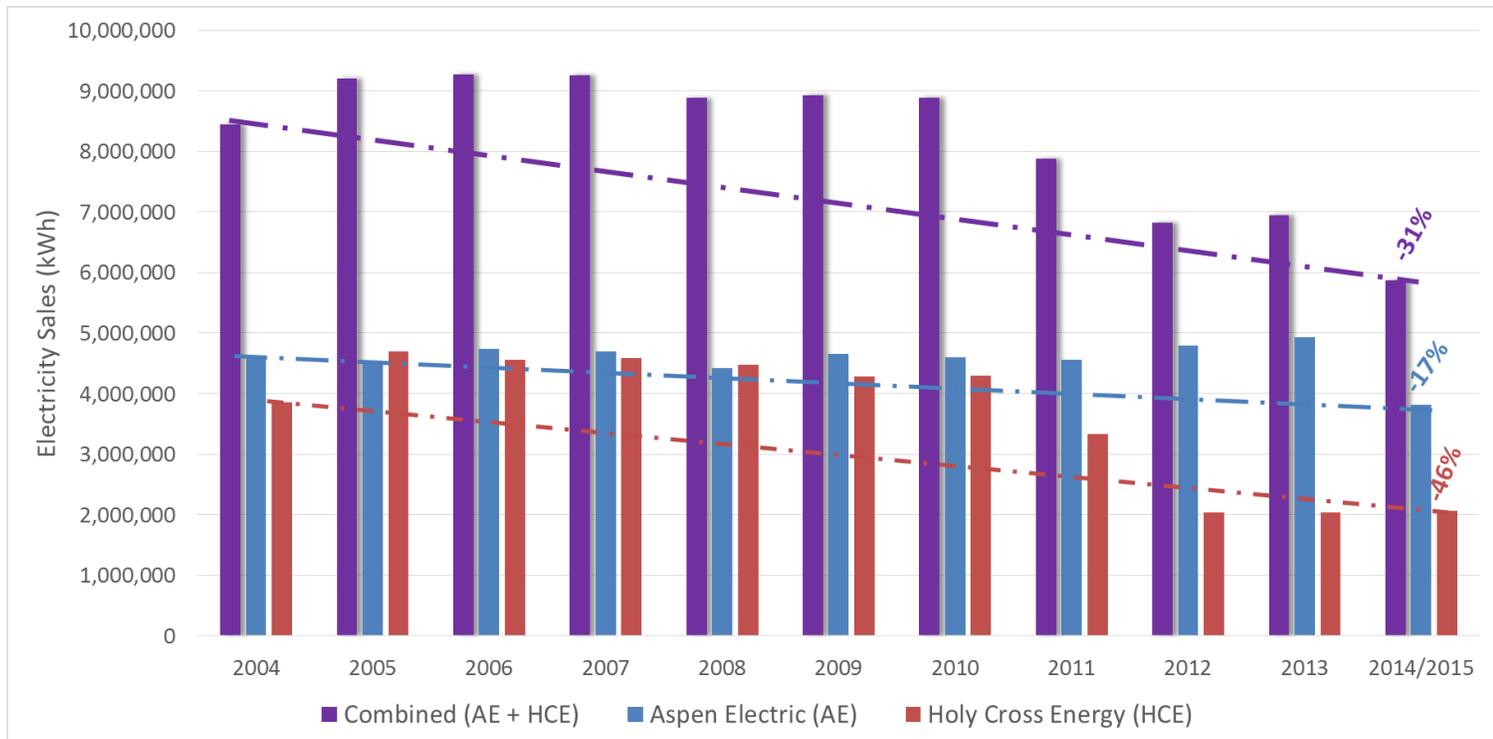


Figure 4. COA Electricity Consumption trends, 2004-2015.

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Correspondingly, CO₂ emissions associated with the City’s electricity consumption have declined substantially, due both to changes in each utility’s move to a higher percentage of renewable energy in their generation portfolios, combined with an overall drop in actual consumption. In 2004, Aspen Electric was about 35% renewable and Holy Cross Energy was approximately 6% renewable. Those numbers climbed to 74% and 20%, respectively, by 2014. In mid-2015, Aspen Electric became powered by 100% renewable electricity. Figures 4 and 5 compare electricity consumption and emissions from purchased electricity, respectively, from 2004 through the present and reveal that:

- Total Electricity consumption has decreased 31% since 2004; and
- Aggregate CO₂ emissions attributable to purchased electricity have dropped 50% since the base year. This overall result is due to a 53% decrease in HCE-related emissions and a 45% decrease in AE-related emissions (Figure 5).

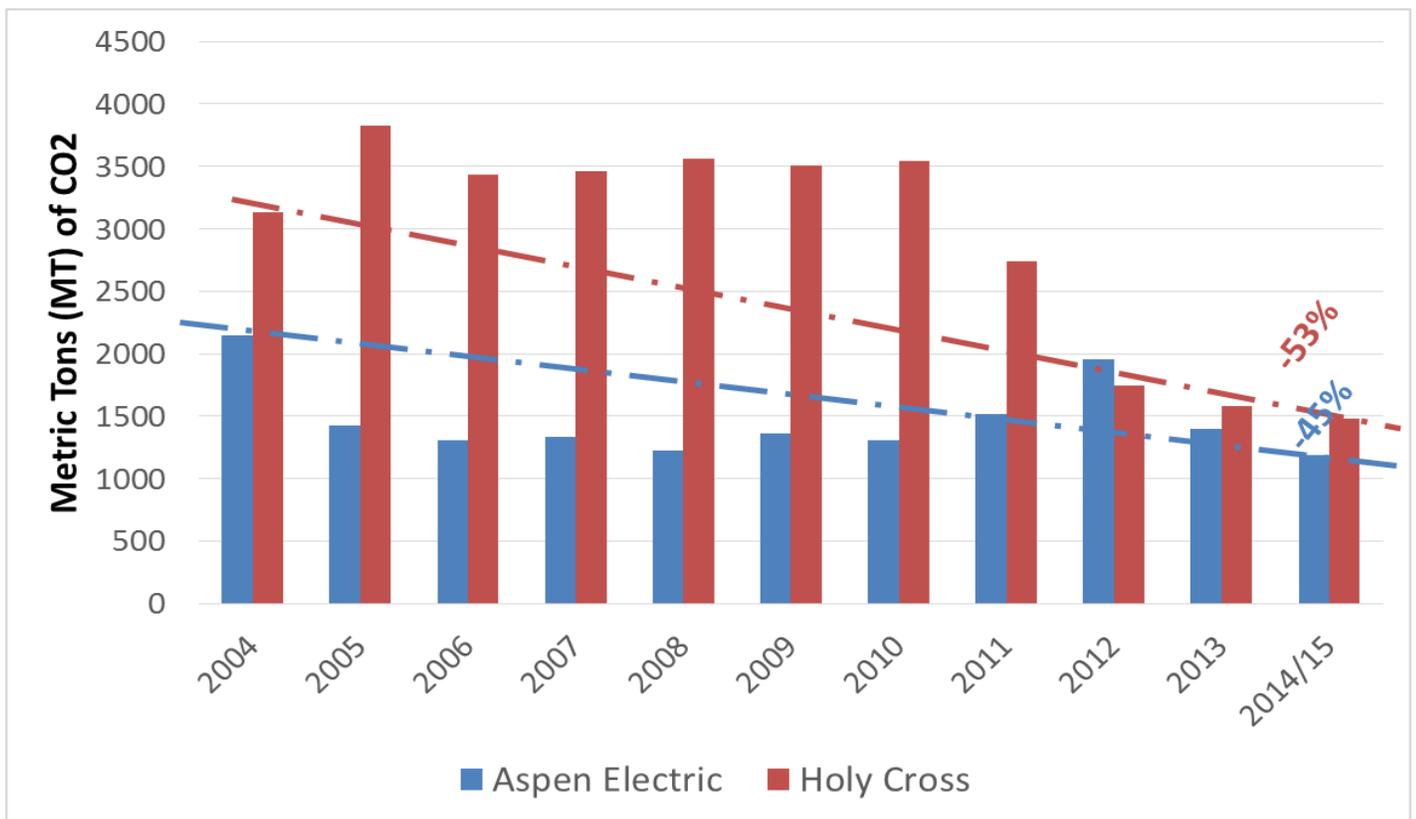


Figure 5. CO₂ Emissions Trends from Purchased Electricity, 2004 - 2014/15.

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2014/15 Stationary Combustion Volume and GHG Emissions: The COA purchases natural gas from SourceGas, a Golden, Colorado based investor owned utility, for stationary combustion in various municipal buildings and facilities. Unlike electricity which is generated off-site and delivered through distribution lines, natural gas is delivered in pipelines and combusted on-site in boilers. Given that the emissions factor for natural gas has remained relatively consistent over all inventory years, changes in emissions correspond directly to changes in consumption, which are typically associated with energy efficiency and conservation measures. Figure 6 shows that the COA's CO₂ emissions attributable to stationary combustion decreased by 41% since the base year and 4% since 2013/14.

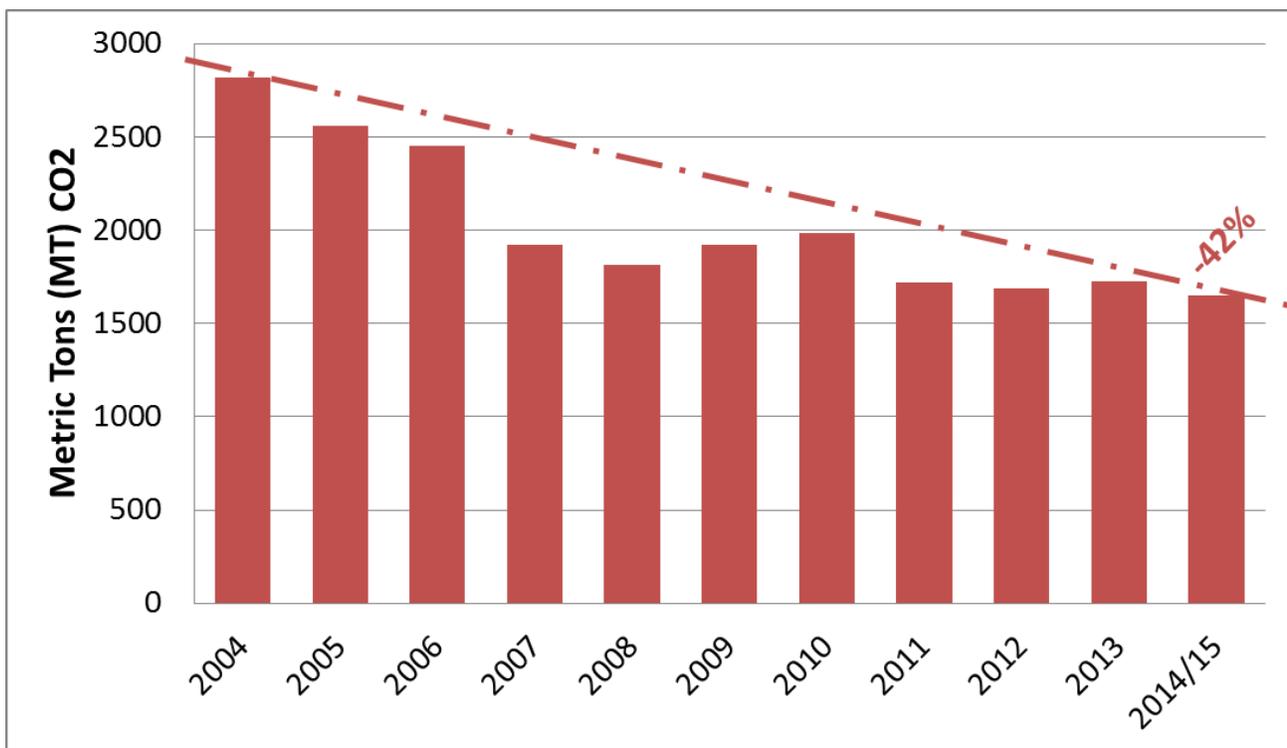


Figure 6. Trend in Emissions from Stationary Combustion, 2004-2014/15.

Gasoline, Diesel and Jet Fuel Emissions 2014/15: COA combustion of gasoline and diesel results from 'fleet operations' and 'department travel'. 'Fleet operations' involves all gasoline and diesel consumption associated with the operation of City-owned vehicles and machinery that are fueled at the City-owned pumps. 'Department travel' describes purchases of fuel that were made at public facilities. Typically, this occurs when employees are traveling for work in their personal vehicles, or flying for work purposes. In 2014/15, the consumption of ground transportation fuels and associated GHG emissions increased compared to the base year and the 2013/14 GHG year. Figure 7 shows that aggregate GHG emissions from ground transportation increased by 9% between 2004 and 2014/15 and by 2% over last year. Interestingly, ground transportation emissions have actually exceeded

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2004 levels in a majority of the years tracked, peaking in 2007. While emissions from City-related air travel have declined by 4% since 2004, an individual trend graph is not included given that air travel's scale is de-minimis (less than 5% of the total).

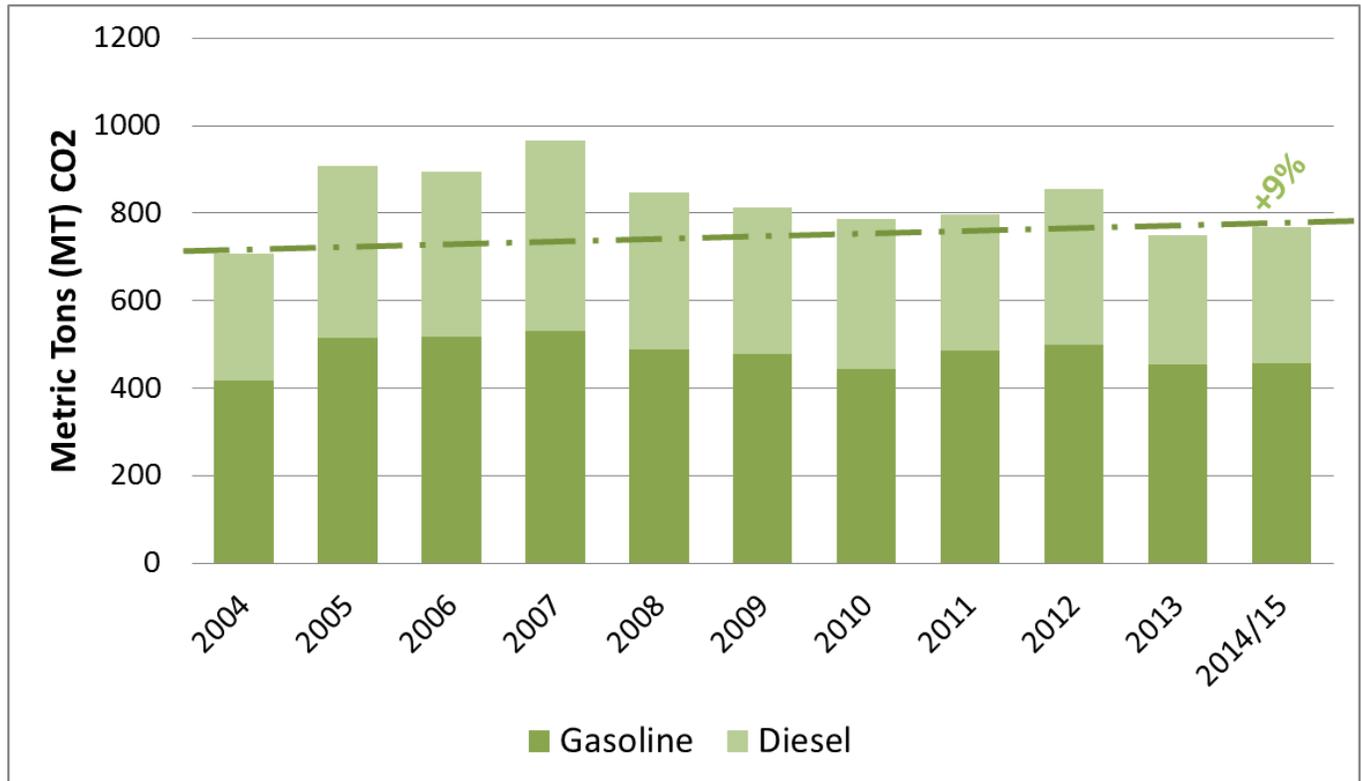


Figure 7. Trend in Combined (both gasoline and diesel) Ground Transportation Emissions, 2004-2014/15

Operational Indicators – Actions and Activities during the 2014/15 GHG Year: While quantifying annual GHG emissions and changes between years is relatively straightforward, understanding why changes have occurred tends to be less accessible. Looking at the raw consumption, carbon content and emissions data can provide insights about categorical scale changes (i.e. changes in fuel mix), but falls short of revealing specific activities that occurred and influenced COA's GHG emissions during a specific year. The following section on 'Operational Indicators' discusses specific GHG-related activities that during the 2014/15 year. By maintaining a written record of these activities, current and future planners will be able to better connect the dots between changes in GHG emissions and related operational activities. The following is by no means a comprehensive record of all GHG-related changes and activities that occurred during the 2014/15 GHG year but serves as a partial account of several significant ones.

Electricity Generation: Changes in the types of resources producing the power that the City purchases directly affects GHG emissions. During the 2014/15 year, Aspen Electric, the City's municipal utility made substantial

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strides in reducing the carbon intensity of its electricity per unit of energy produced by becoming powered by 100% renewable resources. Aspen's 2015 generation portfolio was comprised of 53% wind, 46% hydro and 1% landfill gas (LFG).



Image 2. Buildings at the COA Streets department consume energy, and the facility also dispenses a majority of the transportation fuels consumed for COA fleet vehicles like snowplows and utility trucks.

Departmental Goals and Outcomes Activities: Just as changes in generation assets affect CO₂ emissions, so do the numerous behavioral and operational activities occurring throughout the City government's processes on a given year. During the 2014/15 G&O year, each City department made a commitment to either a) reduce energy consumption in their own or related community facilities; b) hold overall energy use levels (buildings and transportation) flat or c) participate in the Civic Space Relocation project as an advocate for a net-zero energy facility. The following activities by Department occurred during the 2014/15 GHG tracking year and contributed to the COA's GHG reduction accomplishment:

- The City Attorney's office decreased energy and department travel over the previous year.
- The Community Development Department compiled research on the feasibility of reducing parking requirements and tying reductions to Transportation Demand Management (TDM) and Multi-Modal Level of Service (MMLOS) measures.

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- The Aspen Pitkin County Housing Authority, which is housed in its own building, upgraded old light bulbs to more efficient ones in their main office.
- While the Information Technology (IT) Department traveled more than it had in previous years, they deployed many new efficiency-related measures including downsizing their space and staff by about 50%, converting 5 physical servers to virtual servers (each of which can save about \$500 in energy annually), eliminating 6 desktop PCs in Recreation with the deployment of “virtual desktops” and the implementation of the new City Data Center (significant energy efficiency gain).
- The Special Events Department deployed several strategies to reduce the GHG impact of the annual Community Picnic by serving locally grown, produced or sourced food.
- Ashley Perl from the Environmental Health and Sustainability Department and Jack Wheeler and Jeff Pendarvis from Asset, Barry Crook from the City Manager’s Office, Don Taylor from Finance and Bill Linn from the Police Department all maintained ongoing involvement in the Civic Space Relocation Project to encourage beyond-code building efficiency in the design process.
- The City Clerk purchased tablets for all board members in order to reduce two tons of paper used annually for board packets. The avoided energy associated with no longer printing these packets could be significant.
- While Kids First traveled more than it had in the previous year, the department plans to mitigate this by replacing lamps throughout the Yellow Brick with LEDs.
- The Golf Department was able to retrofit their ‘cart cabin’ with extra efficient lighting.
- The Recreation Department successfully implemented lighting retrofits and energy overhauls in multiple buildings under their management.
- The Transportation Department researched options for increased bus service to Burlingame and presented an option to City Council for piloting the service increase (which will begin in December, 2015).



Image 3. Bicycles are a popular way for COA employees to commute to work, as well as to run work-related errands that are in close proximity to offices and don't require a vehicle.

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Conclusion: As an organization, the City of Aspen government is making significant progress in reducing the CO₂ emissions associated with its overall operations. It has met and exceeded the 2014/15 reduction target as specified by G&O measure 8.b. This achievement keeps the City on track to keep working towards its 2020 and 2050 GHG reduction goals, though success will require continued vigilance. While the de-carbonization of Aspen Electric’s electricity supply could help the City successfully achieve the 2020 goal (as long as achieved reductions in other sectors are maintained), accomplishing the 2050 goal will require similarly innovative planning and technology in the two other principal emissions sectors; stationary combustion and ground transportation.

Continuing to reduce emissions while the organization grows will be a significant challenge requiring continuous analysis, action and program deployment. As the COA approaches future annual G&O GHG targets and the long-term CO₂ reduction goals, the Canary Initiative will continue to engage and collaborate with City departments to ensure ongoing success.



Image 4. This solar array at the COA Utilities plant offsets purchased electricity demand on the HCE Grid.

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Additional Figures: The figures below provide additional context by presenting GHG data by fuel type or energy vendor (i.e., gasoline and diesel) rather than by sector (ground transportation).

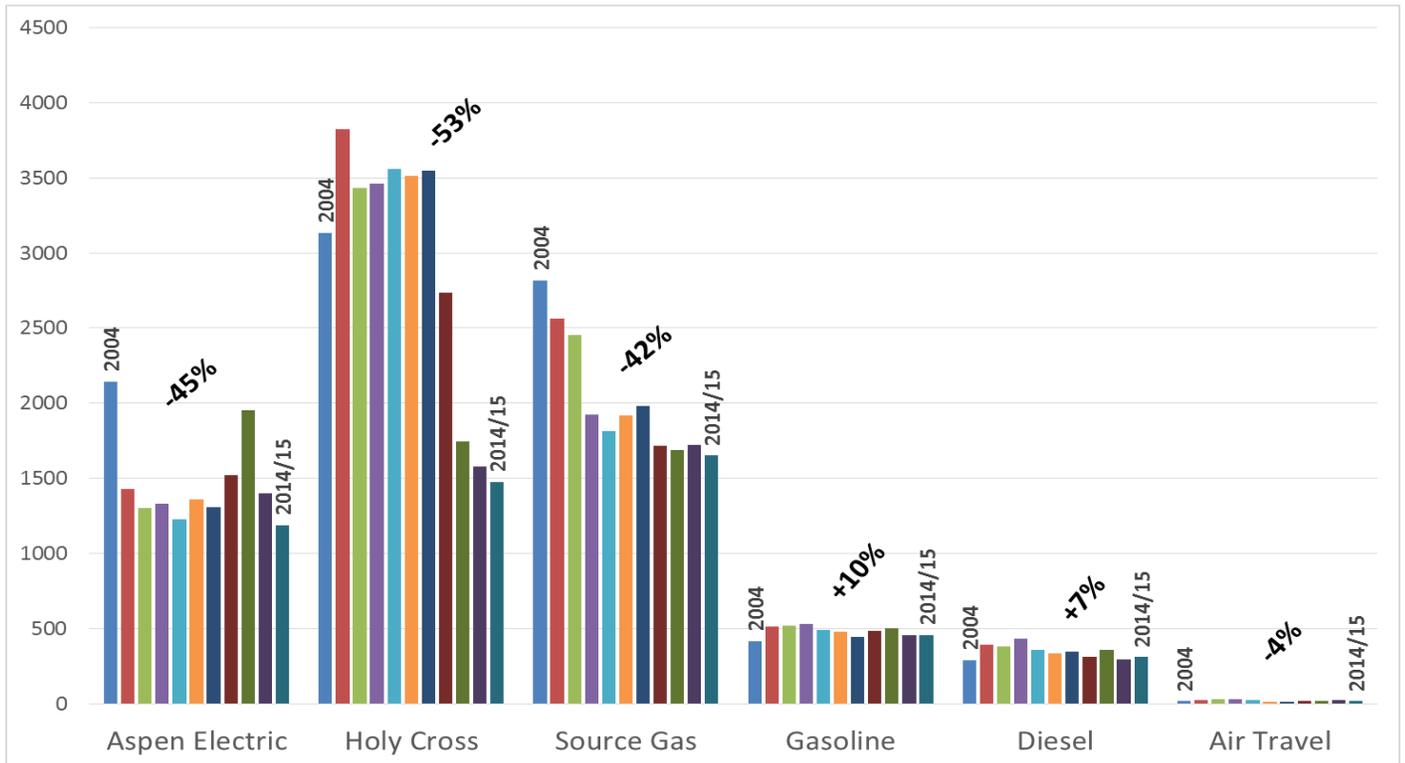


Figure 8. COA's GHG Emissions by Energy Vendor or Fuel Type, and Percent Change, 2004-2014/15.

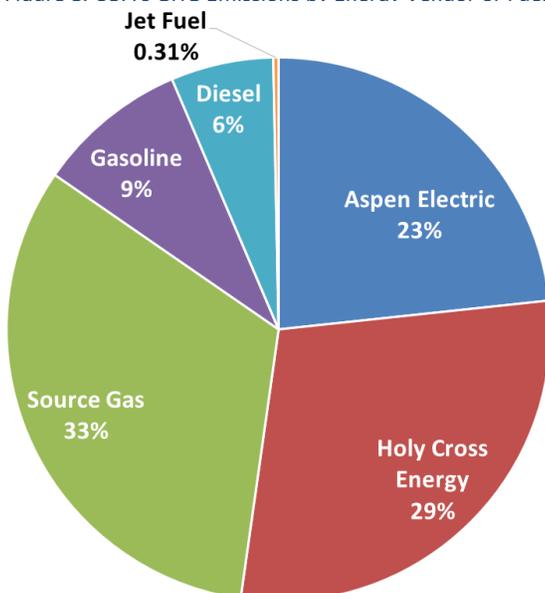


Figure 9. City of Aspen's GHG Emissions by Energy Vendor or Fuel Type, 2014/15.

