CITY OF BOULDER'S 2017 GREENHOUSE GAS EMISSIONS INVENTORY SUMMARY REPORT

NOVEMBER 2018

lotus
engineering & sustainability

CONTENTS

FIGURES

TABLES

I. COMMUNITY GOALS AND CLIMATE COMMITMENTS

The City of Boulder and its residents have long understood the importance of local climate action. In 2002, the Boulder City Council passed Resolution 906, committing the community to reducing greenhouse gas (GHG) emissions to the target established by the Kyoto Protocol, a 1997 international agreement to combat global climate change. Boulder then launched a series of climate-change initiatives to support this goal. For example, Boulder's residents and businesses were among the first in the country to support and participate in programs like the Climate Action Plan Tax (CAP Tax) and a host of other energy efficiency and conservation programs. Some of these successful programs and policies (i.e. EnergySmart, SmartRegs and the Building Performance Ordinance), are being replicated in other cities while others, like a local carbon offset fund and electric utility municipalization, are still taking shape.

In 2015, the City of Boulder committed to the Global Covenant of Mayors for Climate and Energy (Covenant) (formerly the Compact of Mayors), a worldwide effort to highlight the leadership of cities in addressing climate change and demonstrate the collective impact of city efforts. One of the requirements of the Covenant is the completion of a GHG inventory that complies with the *Global Protocol for Community-Scale GHG Emissions* (GPC). Boulder's 2017 GHG inventory is GPC-compliant and fulfills the inventory requirement Boulder has committed to under the Covenant.

In 2016 the Boulder City Council adopted the Climate Commitment goals, which included a community goal to reduce emissions by 80 percent based on 2005 levels by 2050[1]. Related to this goal, Boulder also committed to providing 100 percent of the community's electricity needs with renewable energy by 2030 and reduce emissions by 15 percent by 2020 and by 50 percent by 2030 based on 2005 levels.

The City of Boulder contracted with Lotus Engineering and Sustainability, LLC (Lotus) to complete a community 2017 GHG inventory. This report describes the results of the 2017 inventory and compares results against the city's 2005 baseline year and against the subsequent 2012, 2015, and 2016 inventories. The inventory will determine if Boulder is on track to achieve its climate goals. Further, by completing a GPC-compliant inventory, Boulder can report emissions to the Carbon Disclosure Project (CDP)[2], which will demonstrate Boulder's climate change commitments to a global audience. Tracking annual GHG emissions will also allow the city to provide regular updates to the community, and measure progress towards goals, via the citywide dashboard, Boulder Measures[3].

[1] For more information see https://bouldercolorado.gov/climate

[2] As of January 2019, CDP and the carbon*n* Climate Registry (cCR) will merge and entities will report to one organization, presumably CDP.

[3] For more information see https://bouldercolorado.gov/boulder-measures

II. KEY FINDINGS FROM 2017 INVENTORY

The 2017 City of Boulder GHG inventory reports a GPC BASIC emission value of 1,547,393 MT CO_2e[4]. Emissions for all sectors are shown in Figure 1. It should be noted that "other transportation" includes emissions from railway and Boulder Municipal Airport (BMA), "commercial and industrial buildings" includes fugitive emissions from natural gas, and "waste" includes emissions from solid waste treatment and wastewater treatment.

Figure 1. 2017 Emissions by Sector

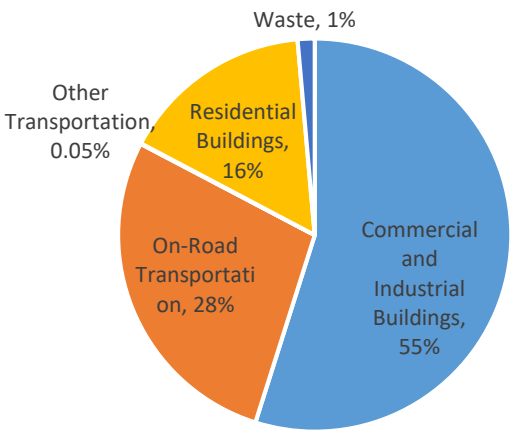
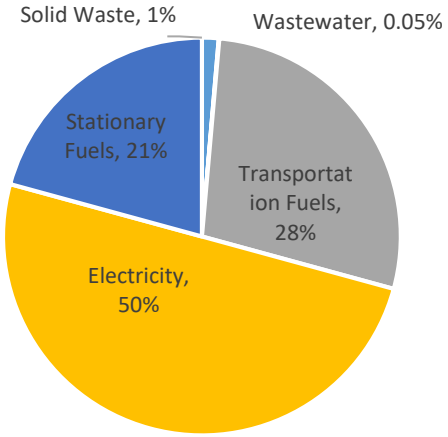


Figure 2. 2017 Emissions by Source



Buildings and vehicles account for nearly 99 percent of Boulder's total emissions. As has been the case historically, commercial and industrial (C&I) building energy use contributed the most to Boulder's total emissions in 2017. C&I building energy use comprised 55 percent of the overall. On-road transportation (which includes gasoline, diesel-powered, and electric vehicles and public transit), and energy use in residential buildings follow closely behind at 28 percent and 16 percent of overall emissions, respectively.

As shown in Figure 2, the leading source of emissions in Boulder's 2017 inventory was electricity at 50 percent[5]. Following electricity, fossil fuels used for transportation and stationary fuels (natural gas and diesel) used in buildings comprised 28 percent and 21 percent of total emissions, respectively. The 2017 emissions category and source results are consistent with previous inventories.

[4] GPC BASIC emission sources do not include optional Scope 3 emissions from DIA.

[5] It should be noted that electricity includes electricity consumed by electric vehicles and buildings.

III. COMPARISON BETWEEN INVENTORIES

Despite economic and population growth, total community emissions have decreased by 16 percent (see Table 1). Notable decreases in emissions as compared to the baseline are seen from residential electricity, C&I electricity, vehicle travel, landfilling, and wastewater treatment processes. An increase in C&I fuel combustion and air travel emissions have occurred since 2005.

Table 1. Emissions by Sector Over Time (MT CO_2e)

Sector	2005 (Baseline)	2012	2015	2016	2017	% Change Between Baseline and 2017
Residential Electric	201,710	174,506	164,759	145,565	141,210	-30%
Residential Natural Gas	109,717	99,457	109,554	105,685	104,369	-5%
C&I Electric[6]	812,849	790,966	748,651	657,351	632,470	-22%
C&I Natural Gas	164,371	196,634	198,786	204,493	206,699	26%
Fugitive Emissions[7]	-	9,237	9,619	10,012	10,086	N/A
Total Buildings	***1,288,647***	***1,270,800***	***1,231,369***	***1,123,106***	***1,094,833***	-15%
Vehicle Travel	501,358	423,892	446,797	448,994	430,168	-14%
Railways	-	-	-	40	40	N/A
Air Travel (BMA)	572	626	653	630	701	23%
Total Transportation	***501,930***	***424,517***	***447,450***	***449,663***	***430,909***	-14%
Landfill	53,840	14,920	19,932	22,838	18,663	-65%
Composting	-	1,257	2,129	2,446	2,267	N/A
Wastewater Treatment	1,800	697	671	809	722	-60%
Total Waste	***55,640***	***16,874***	***22,732***	***26,092***	***21,651***	-61%
Total BASIC	***1,846,217***	***1,712,191***	***1,701,550***	***1,598,862***	***1,547,393***	-16%

The increase in natural gas emissions despite reduced consumption shown below in Energy Trends is partially explained by the different natural gas emission factors used between 2005 and 2017. The increase in air travel emissions is attributable to a significant increase in air travel at Boulder Municipal Airport (BMA). These increases, as well as a detailed comparison of normalized emission data (e.g. emissions per capita) and activity data (e.g. energy consumption, vehicle miles traveled, etc.), are further discussed in Section V. Factors Influencing Emissions.

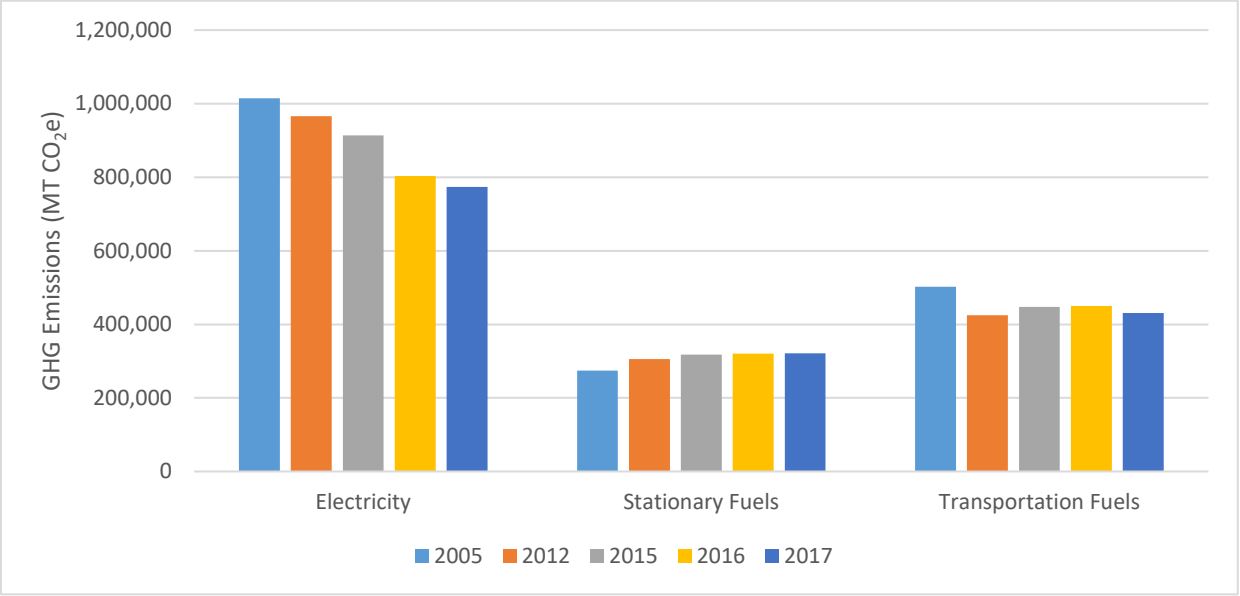
Figure 3 shows trends by source. Most sources have consistently declined each year, with the exception of stationary fuel.[8]

[6] C&I stands for Commercial and Industrial.

[7] Fugitive emissions were not included in the 2005 inventory.

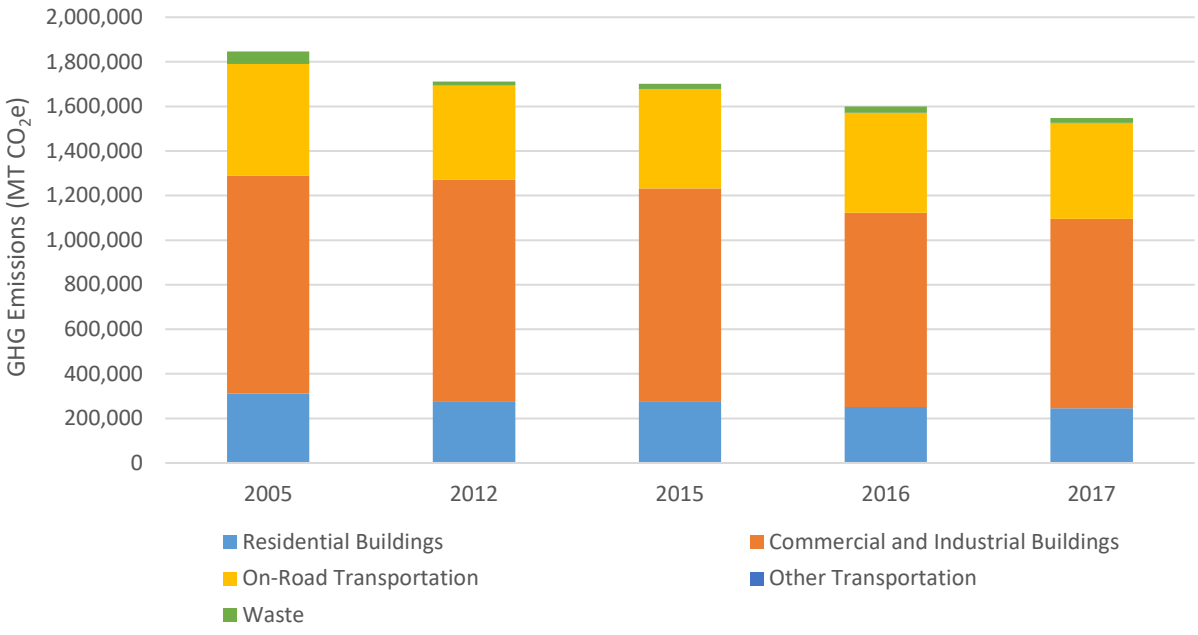
[8] Railway emissions were not accounted for in the 2005,2012, and 2015 inventories.

Figure 3. Primary GHG Emissions Source Trends



The contribution from each emissions category has remained relatively consistent over the years, as shown in Figure 4. Emissions from C&I buildings comprise the majority of total emissions, while on-road transportation emissions are second, and residential building emissions are third.

Figure 4. Emissions Breakout Over Time by End Use



While Boulder has achieved an overall emissions reduction of 16% percent between 2005 and 2017, normalized metrics[9] indicate even greater emission reduction achievements, as shown in Table 2. After normalizing total emissions for various growth factors, significant savings are revealed.

Table 2. Normalized Emissions Metrics

EMISSIONS METRICS	Units	2005 (Baseline)	2017	Change since 2005
Total emissions per capita	$MTCO_2e$/resident	18.7	14.3	-24%
Total emissions per Gross Domestic Product (GDP)	$MTCO_2e$ /$	0.00011	0.00006	-47%
C&I electricity per building floor space (sqft)	kWh/sqft	22.5	22.4	-0.4%
C&I natural gas per building floor space	decatherm/sqft	0.093	0.082	-13%
VMT per capita	VMT/ resident	9,699	8,342	-14%
Landfill tons per capita	tons/resident	0.85	0.83	-3%

To understand how Boulder is performing relative to other communities, Boulder's 2017 per capita emissions were compared to other cities, with the results depicted in Table 3.

Table 3. Per Capita Emissions City Comparison[10]

City	Per capita emissions ($MTCO_2e$)
Boulder, CO (2017)	**14.3**
Colorado (2015)	17
Denver, CO (2016)	15
Bloomington, IN (2016)	16.4
Fort Collins, CO (2016)	13
New York, NY (2015)	6.1
Boulder, CO (2050 Climate Goal)	*3 (Anticipated)*

Per capita emissions trends allow Boulder residents to relate directly to the impact their local activity has on larger global issues like climate change. By educating citizens on GHG emissions inventories and the per capita emissions trends, Boulder can encourage residents to consider their footprint as a global citizen.

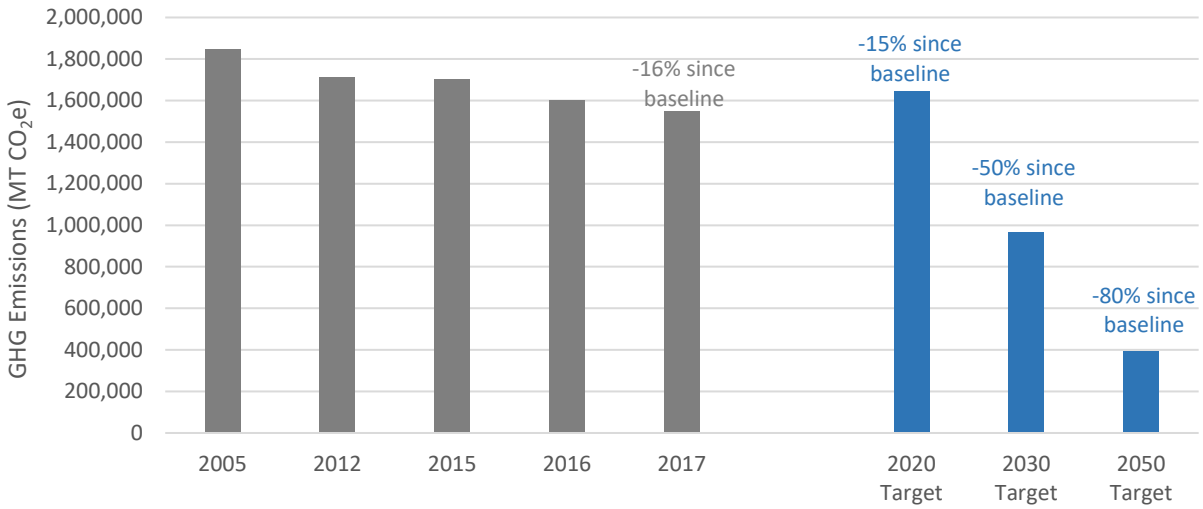
[9] Normalized metrics are intensity ratios that can be used in GHG emissions accounting to scale the net generated emissions by business metrics or other financial or community indicators.

[10] Methodologies for calculating per capita emissions may differ by city.

IV. COMPARISON AGAINST GHG EMISSION REDUCTION TARGETS

Boulder has already achieved its 2020 GHG emissions reduction target. See Figure 5 for a comparison of annual GHG emissions totals against community GHG targets[11].

Figure 5. Overall Community Emissions Trend



V. FACTORS INFLUENCING EMISSIONS

Boulder can influence positive changes in emissions through various programs, policies, and outreach and education efforts. A review of emission changes and the factors that influence those changes inform how well Boulder's climate-change initiatives are working and may inform where the city should focus future efforts. The following is an overview of the drivers that affected the GHG emissions throughout the years.

A. Emission Factor Trends

Colorado's Renewable Energy Standard[12] and the state's Clean Air Clean Jobs Act[13] require Xcel Energy to increase the efficiency of its operations and procure increasing amounts of energy from low- to zero-carbon sources (i.e., renewable energy, recycled energy, etc.). As a result, the mix of energy sources that supply Xcel Energy's electric grid changes every year and the resulting electricity emission factor decreases every year. Based on data from Xcel Energy, electricity emission factors for CO_2 decreased by 28 percent

[11] Target data taken from: https://www-static.bouldercolorado.gov/docs/City_of_Boulder_Climate_Commitment_5.9.2017-1-201705091634.pdf?_ga=2.264106830.313022379.1537465427-1423496703.1536073407

[12] For more information, see: https://www.xcelenergy.com/staticfiles/xe/Corporate/CRR2013/environment/renewable-energy.html.

[13] For more information, see: https://www.xcelenergy.com/environment/system_improvements/colorado_clean_air_clean_jobs.

from 2005 to 2017 and 1 percent from 2016 to 2017.[14] See Table 4. This decrease in emissions factor offsets the increased C&I electricity consumption shown below in subsection called Energy Trends.

Table 4. Changes in Electricity Emission Factors

Energy	Units	2005 (Baseline)	2016	2017	Change since 2005	Change since 2016
Electricity Emissions Factor	MT CO_2e /MWh	0.824	0.599	0.593	-28%	-1%

Emission factors for other emission sources are not expected to change significantly year to year.

B. Community Indicator Trends

Between 2005 and 2017, Boulder experienced growth across all community indicators except for the number of heating degree days (HDD) and cooling degree days (CDD)[15] (see Table 5).

Table 5. Changes in Community Indicators

Community Indicators	2005 (Baseline)	2016	2017	Change since 2005
City of Boulder Population	98,526	108,707	108,507	10%
Number of Housing Units	41,482	46,094	46,189	11%
Taxes (dollars)	$111,701,000	$199,666,000	$204,517,000	83%
Nominal GDP (million dollars)[16]	$16,120	$23,946	$25,274	57%
Number of Service Area Jobs	96,755	104,263	104,263	8%
C&I Building Floor Space (sqft)	42,091402	46,249,891	47,282696	12%
C&I Floor Space Excluding CU Boulder (sqft)	33,442,674	33,902,647	34,840,636	4%
Heating Degree Days	5,227	4,965	4,824	-8%
Cooling Degree Days	745	765	681	-9%

Over the last 12 years, GHG emissions have decreased by 16 percent, while the city has seen an increase in all community indicators[17]. See Figure 6.

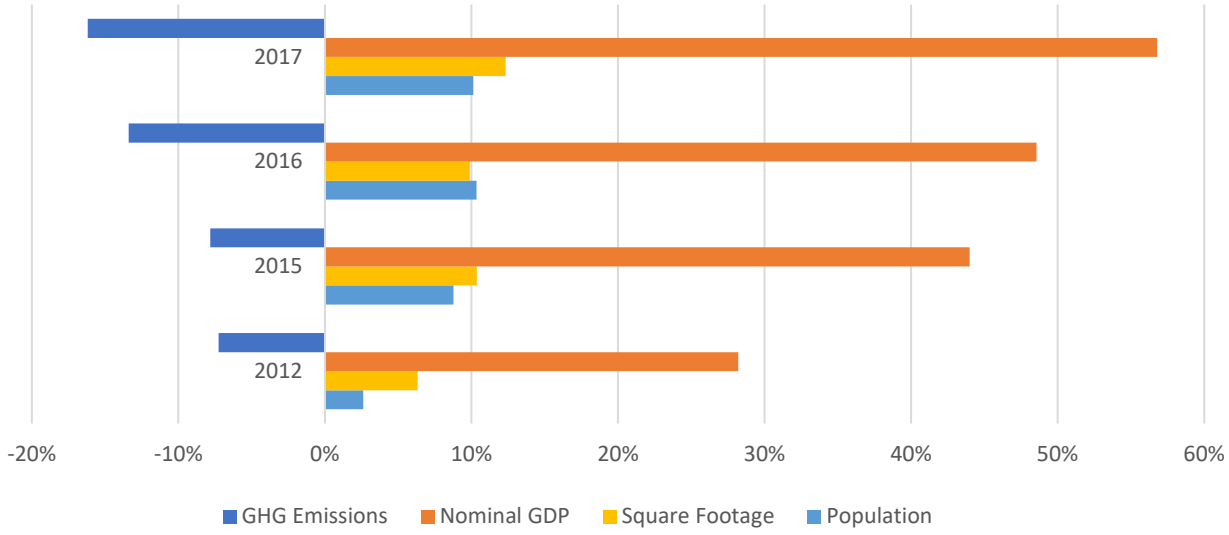
[14] Xcel Energy does not report emission factors for methane and nitrous oxide. These values are sourced from U.S. Environmental Protection Agency's (EPA) eGRID and are not expected to change annually.

[15] A heating degree day (HDD) and cooling degree day (CDD) are roughly proportional to the energy used for heating and cooling a building. They are calculated by taking the difference between the average daily temperature and the balance point temperature. The balance point temperature is the average daily outside temperature at which a building maintains a comfortable indoor temperature without heating or cooling. When the average daily temperature is above the balance point temperature, the result is cooling degree days (i.e., a building must be cooled to maintain the balance point temperature). When the average daily temperature is below the balance point temperature the result is heating degree days (i.e., the building must be heated to maintain the balance point temperature). HDD and CDD were taken from: http://www.weatherdatadepot.com/ using at 65-degree Fahrenheit balance point.

[16] The nominal GDP value reported in this report does not include inflation.

[17] Taxes reported represent sales and use, and property tax.

Figure 6: Changes in Community Indicators as Compared to 2017 Values



Although growth can benefit the community financially, it makes the task of achieving significant reductions in energy use and GHG emissions more challenging. Fortunately, Boulder is reducing overall GHG emissions even as the community continues to grow, and in some cases, normalized metrics present drastic reductions.

C. Energy Trends

As shown in Table 6, between 2005 and 2017, total electricity usage increased while total natural gas usage decreased.

Table 6. Changes in Energy Activity Data

Energy Metrics	Units	2005 (Baseline)	2016	2017	Change since 2005
Residential Electricity	kWh	244,648,421	240,958,410	236,472,936	-3%
Residential Natural Gas	dTh	2,078,322	1,987,056	1,962,311	-6%
C&I Electricity	kWh	946,243,999	1,088,136,214	1,059,167,074	12%
C&I Natural Gas	dTh	3,952,523	3,783,550	3,851,326	-2%
Total Electricity Usage	***kWh***	***1,190,892,420***	***1,329,094,624***	***1,295,640,010***	***9%***
Total Natural Gas Usage	***dTh***	***6,030,845***	***5,770,607***	***5,813,638***	***-3%***

1. Electricity Usage

Total community electricity usage increased by almost 9 percent since the baseline year of 2005 (see Table 6). However, when normalizing consumption for growth factors, residential electricity usage decreased since the baseline year (see Table 7). In comparison, C&I electricity increased per employee but decreased per GDP.

Table 7. Normalized Electricity Data

Electricity Metrics	Units	2005 (Baseline)	2016	2017	Change since 2005
Residential electricity per housing unit	kWh/HU	5,898	5,228	5,120	-13%
Residential electricity per person	kWh/person	2,483	2,217	2,179	-12%
C&I electricity per employee	kWh/FTE	9,780	10,436	10,159	4%
C&I electricity per building floor space (sqft)	kWh/sqft	22.5	23.5	22.4	-0.4%
C&I electricity per GDP	kWh/$	0.059	0.045	0.042	-29%

The decrease in normalized residential electricity shows that Boulder residents are using less electricity to perform the same tasks, even while total electricity consumption remains relatively flat due to population increases. The reduction in normalized residential electricity usage is largely attributed to growing end-user awareness as well as demand side management programs from the city, the county and the energy utility, including Boulder's EnergySmart Program, SmartRegs, and solar incentive programs.

Increases in overall C&I electricity are a function of economic growth. Growth in some of the normalized C&I electricity metrics (per employee) is due to the addition of high energy density buildings such as marijuana grow facilities and data centers, as well as increased plug loads and space density. For example, the marijuana industry represents approximately 2% of total city electricity consumption and 2.3% of the C&I sector electricity consumption. The high energy density buildings consume significant amounts of energy within small footprints, and with few employees, so they can skew the typical normalized metrics for the C&I sector. Because of this, the most accurate metric for the C&I sector is electricity use per GDP, which has decreased significantly since 2005.

2. Natural Gas Usage

Natural gas consumption decreased by 3 percent overall in the community since the baseline (see Table 6). When normalizing natural gas consumption, Table 8 shows normalized natural gas usage has decreased since the baseline year for both sectors.

Table 8. Normalized Natural Gas Data

Natural Gas Metrics	Units	2005 (Baseline)	2016	2017	Change since 2005
Residential natural gas per housing unit	dTh/HU	50.10	43.11	42.48	-15%
Residential natural gas per person	dTh/ person	21.09	18.28	18.08	-14%
C&I natural gas per employee	dTh/FTE	40.57	36.29	36.94	-9%
C&I natural gas per floor space	dTh/sqft	0.093	0.082	0.082	-13%
C&I natural gas per GDP	dTh/$	0.00024	0.00016	0.00015	-37%

Since HDD decreased between 2005 and 2017 by nearly 8 percent (see Table 9), it would be expected that residential natural gas use would decrease as shown in Table 8. Natural gas consumption per housing unit, normalized for HDD, is nearly 14 percent lower than 2005 natural gas consumption per household.

Table 9. Comparison of Natural Gas Use to HDD

Weather Normalized Metrics	Units	2005 (Baseline)	2016	2017	Change since 2005
Heating Degree Days	HDD	5,227	4,965	4,824	-8%
Residential natural gas per housing unit	dTh/HU/HDD	0.00959	0.0087	0.0083	-14%
Residential natural gas per person	dTh/person/HDD	0.00404	0.0037	0.0035	-13%

The data suggests that the residential sector saw a decrease in natural gas consumption commensurate with the weather. Efforts underway to address both residential and C&I natural gas use are identified in Section VI. Action Plan.

D. Transportation Trends

As shown in Table 10, overall emissions from the transportation sector decreased by 14 percent between 2005 and 2017. Vehicle travel emissions decreased by over 14 percent from the baseline year, while air travel emissions from BMA increased by 23 percent. Though activity data is limited for 2005, Table 10 shows vehicle miles traveled (VMT) decreased by just over 5 percent between 2005 and 2017 and 0.4% since 2016[18]. Likewise, transportation emissions per resident and per job have decreased since the baseline year.

Table 10. Changes in Transportation Activity Data

Transportation Metrics	Units	2005 (Baseline)	2016	2017	Change since 2005
On-road transportation	VMT x 1,000	955,570	908,850	905,200	-5%
Vehicle travel	MT CO_2e	501,358	448,994	430,168	-14%
Railways	MT CO_2e	-	40	40	-
BMA travel	MT CO_2e	572	630	701	23%
Total Transportation	***MT CO_2e***	***501,930***	***449,663***	***430.909***	***-14%***
Emissions per resident	MT CO_2e/resident	5.09	4.14	3.97	-22%
Emissions per job	MT CO_2e/ job	5.19	4.31	4.13	-20%
VMT per resident	VMT/ resident	9,699	8,361	8,342	-14%
VMT per job	VMT/job	9,876	8,717	8,682	-12%

1. On-Road Vehicle Travel and BMA Airline Travel

Reductions in VMT and vehicle emissions between 2005 and 2017 were expected due to Boulder's transportation efforts including GO Boulder, expansion and continued improvement of bike lanes, support, and incentives for electric vehicles, and transition of city fleet to cleaner fuels. Efforts underway to continue to reduce emissions from the transportation section are identified in Section VI. Action Plan.

Airline emissions from BMA have increased due to an increase in airline travel.

[18] Reference the spreadsheet "Inventory Comparisons_Boulder_092118" for 2017 comparisons against 2016.

2. *Scope 3 Airline Emissions*

Emissions for Denver International Airport (DIA) are categorized as "Scope 3". Scope 3 emissions are optionally reported under GPC and are not included in the city inventory boundary or goals. These emissions are being tracked as an information-only item.

Scope 3 Airline Emission Metrics	Units	2005 (Baseline)	2016	2017	Change since 2005
Gallons of fuel consumed[19]	gallons	-	17,067,396	18,080,235	-
Emissions generated	MT CO_2e	87,570	163,609	173,324	98%

Emission factors used to convert gallons of fuel consumed to GHG emissions are constant. Therefore, the increase in emissions is solely due to increased airline activity at DIA.

E. Waste Trends

As shown in Table 11, overall emissions from total waste decreased by over 61 percent between 2005 and 2017 despite the addition of composted waste emissions.

Table 11. Changes in Waste Activity Data

Waste Metrics	Units	2005 (Baseline)	2016	2017	Change since 2005
Landfilled waste	Tons	83,983	109,561	89,529	7%
Wastewater (Nitrogen effluent discharge)	kg/day	2,569	628	484	-81%
Landfilled waste	MT CO_2e	53,840	22,838	18,663	-65%
Composted waste	MT CO_2e	-	2,446	2,267	-
Wastewater	MT CO_2e	1,800	809	722	-60%
Total Waste	***MT CO_2e***	***55,640***	***26,092***	***21,651***	***-61%***
Landfill tons per GDP	Tons/$	0.000005	0.000005	0.000004	-32%
Landfill tons per resident	Tons/resident	0.85	1.01	0.83	-3%
Total waste emissions per resident	MTCO_2e/resident	0.56	0.24	0.20	-65%
Total waste emissions per job	MT CO_2e/job	0.575	0.25	0.21	-64%

1. *Landfilled and Composted Waste*

The city has seen a 7% increase in landfilled waste tonnage, likely due to a growing population and a growing economy. The city has also improved waste-data tracking software, which now reports waste and compost figures more accurately than in previous years. Finally, construction cycles and natural disasters, such as the 2013 flood, contribute to an increase in wasted materials that is not consistent or predictable with typical waste streams. However, the Zero Waste Ordinance has had an evident impact in landfill tonnage reduction since implementation began in 2016, with an 18% reduction from 2016 to 2017.

[19] Gallons of fuel consumed by DIA operations was not available for 2005.

Recycling, while not incorporated into the overall emissions inventory, has increased 6% since 2016, avoiding over 95,000 MT CO2e.

Despite the increase in landfill tonnage, we see a large reduction in emissions. This discrepancy is partly due to changes in the methodology and emission factors for waste between 2005 and 2017. Additionally, composting waste is now an option for residents and businesses in Boulder, and the compost operations continue to grow annually[20].

The city has implemented several sustainability initiatives to help guide the community towards zero waste and therefore reduce landfill emissions, as identified in Section VI. Action Plan.

2. Wastewater Treatment

Table 11 also shows a significant decrease (60 percent) of emissions from the city's wastewater treatment plant (WWTP) between 2005 and 2017. The emissions associated with the effluent discharge of the WWTP are impacted by the amount of nitrogen discharged by the community and by the performance of the treatment processes associated with nitrogen removal. Prior to 2006, around 1,000 MT CO_2e per year were associated with effluent nitrogen discharge. The $45M Liquid Stream Upgrades Project that occurred between 2005 and 2008 incorporated an activated sludge biological nutrient removal (BNR) system capable of roughly 50 percent nitrogen removal. This upgrade was motivated by new discharge permit limits for ammonia and nitrate. In addition, the $5M Nitrogen Upgrades Project that began in 2015 is evident in 2017 effluent nitrogen performance.

VI. ACTION PLAN

The city's action plan to address emissions includes a set of aggressive, city-funded programs and services largely funded by the CAP Tax. The programs and services outlined in Table 12 are designed to reduce local GHG emissions and mitigate climate change.

Table 12. Current Action Areas (2017- 2018)

Buildings
• **Building Performance Program:** Continue implementation and building owner support for energy reporting and energy efficiency requirements on C&I buildings (larger than 20,000 sf). • **SmartRegs:** Implementation of strategies to achieve 100 percent compliance with the city's rental housing efficiency requirements by 2019. • **Natural Gas Replacement:** Continue to work with city consortium to develop a national strategy and technical assistance platform to accelerate the retirement of natural gas appliances. Grow the Comfort 365 program providing support to homeowners adopting heat pumps as natural gas replacement alternatives. • **Voluntary Energy Efficiency:** Continue to support Boulder County's Partners for a Clean Environment (PACE) advising services and program implementation, including EnergySmart.

[20] Compost emissions were not calculated in the 2005 inventory.

- **Clean Energy Finance:** Work with Boulder County to expand utilization of the Colorado Commercial Property Assessed Clean Energy (C-PACE) financing program. For more information see: http://copace.com/
- **Electricity Offset for Marijuana Facilities:** Achieve 100 percent compliance with the city's requirement for marijuana facilities to offset their electricity usage with renewable energy**.**
- **Net Zero Energy Codes:** Every three years, update energy codes to ensure the city is on the pathway to the goal of net zero energy codes for all new buildings by 2031.
- **City Facilities:** Continue to retrofit city buildings to reduce emissions, including major redevelopment efforts such as the Alpine-Balsam site, which will demonstrate accelerated energy efficiency and renewable energy adoption.

Electricity Source Change

- **Renewable Grid Electricity**: Either by forming a municipal electric utility, or working with another utility partner, work to ensure that 100 percent of grid electricity that serves in-city customers comes from renewable energy by 2030.
- **Solar/Local Generation Strategy**: Contract technical assistance in the development of a community solar adoption strategy designed to achieve the new renewable energy targets adopted in the Climate Commitment (50 MW by 2020).
- **Energy Resilience:** Complete implementation of the Department of Energy's Energy Resilience grant and implementation of resilient energy systems at three critical community service centers.
- **City Facility Solar Energy Development**: Complete a bulk purchase that will add at least 3 MW of solar capacity to city buildings. Continue evaluation and feasibility assessments of solar energy opportunities on city facilities or sites.
- **Community Solar Adoption:** Work with both public and private sector partners to utilize the Boulder Solar Tool and other individual and group adoption strategies to foster increased adoption of local solar.

Mobility

- **Multi-Modal Transportation Options**: Continue work with Transportation Division/GO Boulder to implement multimodal action items from Boulder's Transportation Master Plan (TMP) to achieve GHG reduction goals as well as broader community sustainability goals.
- **Electric Vehicle (EV) Strategy**: Carry out a strategy to achieve Climate Commitment emission reduction targets related to EVs.
    - **Electric Vehicle Adoption**: Continue to coordinate the multi-departmental working group on EV and alternative fuels strategy development with a community goal of 15% EV adoption by 2035. Continue to pursue funding opportunities for public charging infrastructure, develop low-income access opportunities and pair EV charging with solar strategy.
    - **Electrification of Transit**: Expand cross departmental collaboration and continue working with Via and RTD to explore the adoption of transit fleet vehicle electrification options.
- **Emerging Transportation Technologies**: Work with Transportation Division/GO Boulder to research and evaluate emerging mobility options including expanded ride share systems, connected/automated vehicles and new heavy transport options (e.g. renewable natural gas or diesel fleet vehicles).

- **Employee Commute**: Demonstrate city leadership in continuing to advance additional low emission commute options for city employees (e.g. EV adoption, electric van pool, telework, etc.).

Waste

- **Zero Waste Resolution and Zero Waste Strategic Plan:** Continue implementation strategies to achieve 85 percent waste diversion by the year 2025.
- **Universal Zero Waste Ordinance:** Continue to refine the implementation systems and compliance support for the city's recycling and composting expansion requirements on homeowners, property managers, and businesses.
- **Public Place Recycling and Composting:** Continued transition of city-owned public space waste receptacles to include zero waste services.
- **Food Waste Reduction:** Increase awareness of food waste and encourage edible food recovery programs.

Cross Cutting Initiatives

- **Carbon Tax Research:** Further investigate future carbon taxes that would discourage the use of natural gas and petroleum, as the city transitions to clean renewable electricity.
- **Energy Impact Offset Fund**: Continue work with Boulder County to create a local energy/carbon offset fund initially funded through the required offsets for the marijuana industry for electricity use**.**
- **Program Tracking and Reporting**: Continue city organization and community wide emissions tracking and reporting, as well as program level tracking and reporting. Work to integrate into the city dashboard and centralized data management systems.
- **Climate Action Plan Strategy Development:** Develop the Climate Action Plan to achieve the recently adopted Climate Commitment goals. This plan should include 5 and 10-year action plans under the key areas (electricity source change, high performance buildings, clean mobility, resource use, and ecosystems).
- **Climate Commitment Community Engagement**: Continue community engagement around the development of a coordinated climate action strategy and implementation plan with special focus in 2017 on the business community, the faith community, neighborhoods, and Latino/lower income segments of the community.
- **Boulder Energy Challenge:** Review the impact of the second Boulder Energy Challenge, which provided funding to support the development and commercialization of innovative GHG emission reducing technologies and strategies in Boulder.
- **Research Internal Carbon Valuation:** Conduct best practices research with other cities, public institutions and businesses to identify mechanisms to effectively internalize the cost of carbon in city operations.
- **City Organization Climate Preparation**: Support the implementation of priority actions to make the city organization (facilities, fleet, operations, procurement etc.) more sustainable and better prepared for climate change.