

PALMDALE GENERAL PLAN UPDATE

Greenhouse Gas Inventory

SPRING 2020 | FINAL REPORT

Envision
PALMDALE 2045
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Chapter 15: Greenhouse Gas Inventory

This memorandum provides an overview of the community-wide sector greenhouse gas (GHG) emissions that were emitted in 2005 (baseline emissions) and 2017 within the City of Palmdale. The five emissions sectors that are included in this report are energy, transportation, off-road transportation, solid waste, and water. This report presents a summary of the 2005 GHG emissions and details the 2017 data year community GHG inventory completed in 2019. It also provides an emissions forecast to 2050.

Key Findings

- Community-wide, the City of Palmdale emitted 1,005,891 metric tons of carbon dioxide equivalent (MTCO₂e) in 2017, up 9% from the 2005 greenhouse gas emissions estimate of 919,905 MTCO₂e.
- Greenhouse gas emissions from the transportation sector accounted for 59% of all community emissions (587,160 MTCO₂e).
- Purchased energy, including electricity and natural gas, accounted for 35% of the greenhouse emissions for the entire community.
- Despite an increase in overall emissions, annual per capita emissions were 6.37 MTCO₂e in 2017, down from 6.81 MTCO₂e in 2005 (a 6% decline).

Community GHG Inventory Overview

2005 Community GHG Inventory

The community of Palmdale’s total 2005 baseline GHG emissions were estimated to be 919,905 MTCO₂e. The inventory included energy (residential and nonresidential), transportation, off-road transportation,¹ and solid waste. Of the five sectors, transportation accounted for the largest amount of GHG emissions with estimated emissions of 379,810 MTCO₂e or 41% of total emissions. The second largest sector was nonresidential energy use with estimated emissions of 220,080 MTCO₂e or 24% of total emissions. The remaining 35% of emissions were made up by the residential energy, solid waste, water, and off-road transportation sectors.²

Table 15.1 Palmdale Total Annual Community GHG Emissions (2005)

Community Sector	Subsector	Subsector MTCO ₂ e	Sector MTCO ₂ e	Percent of Total
Transportation	On-Road Transportation	379,810	379,810	41%
Nonresidential Energy	Electricity	142,570	220,080	24%
	Natural Gas	77,510		
Residential Energy	Electricity	98,080	212,700	23%
	Natural Gas	114,620		
Water	Water Use	46,475	46,475	5%
Solid Waste	Landfilled Waste	44,050	44,050	5%
Off-Road	Lawn and Garden Equipment	40	16,790	2%
	Construction Equipment	16,750		
Total			919,905	100%

Source: Palmdale Energy Action Plan (2011).

The GHG emissions in Table 15.1 vary from the 2005 GHG inventory included in the City’s Energy Action Plan because this inventory uses updated emissions factors so although subsector activity data has remained the same, the GHG intensity has changed to reflect current best practices and the best available data. This variation is most prominent in the electricity subsector. The energy coefficient used to prepare the 2005 inventory was 0.00043658, while this updated inventory used 0.00304 for 2005. Similarly, for solid waste, the energy coefficient in 2005 was 0.1824, which has been updated to 0.293.

¹ The off-road transportation sector includes construction and landscaping emissions.

² The 2005 Community GHG Inventory was developed as part of the Palmdale Energy Action Plan (2011). Water use data for the two largest water suppliers in the city were added during this 2017 inventory process. All other sector emissions (except transportation) were updated as part of the 2017 inventory to reflect the best available emissions data.

Furthermore, the total emissions in 2005 and the proportion of each sector are different than in the Energy Action Plan because the 2017 update adds the water sector to the inventory. The 2005 inventory was also modified to include this sector.

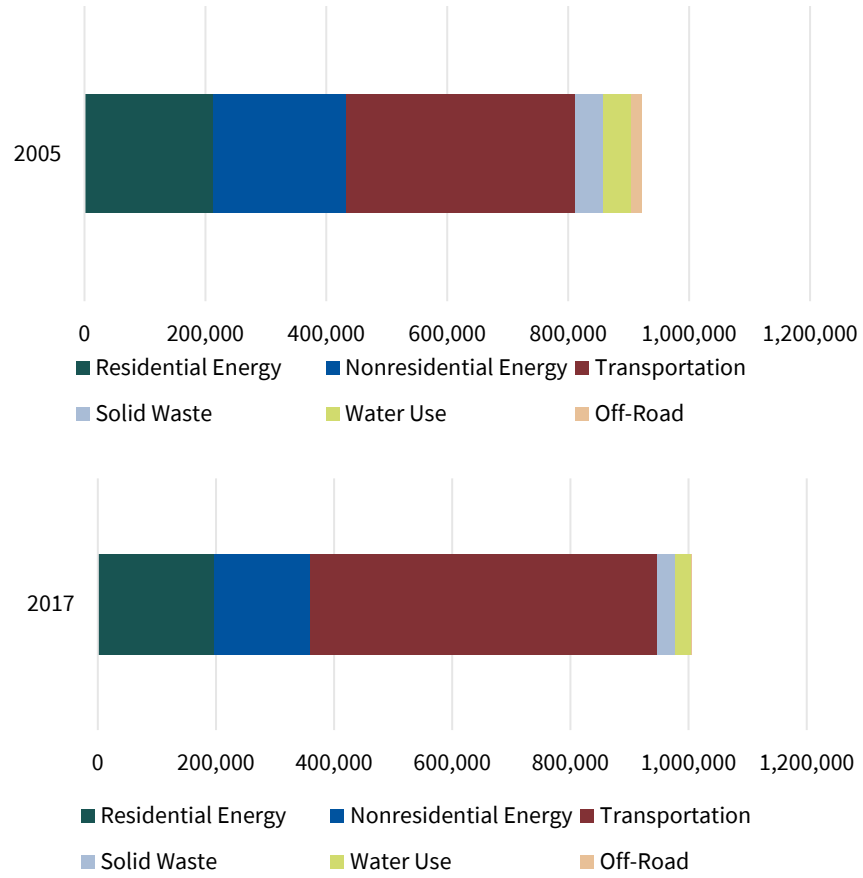
2017 Community GHG Inventory

This report summarizes a community-wide inventory of GHG emissions using data from the 2017 calendar year. 2017 is the most recent year for which complete data is available. Table 15.2 provides the 2017 GHG emissions inventory results. In 2017, Palmdale’s estimated total GHG emissions were 1,005,891 MTCO₂e, an increase of 85,266 MTCO₂e. This inventory is an estimate based on the best available data. As in 2005, transportation was the largest contributor to total GHG emissions with an estimated 587,160 MTCO₂e or 59% of the City’s total 2017 emissions. Residential energy was the second largest sector with estimated emissions of 195,480 or 20% of emissions. The remaining 21% of emissions include nonresidential energy, solid waste, water, and off-road transportation. Figure 15.1 depicts the proportion of emissions by sector for baseline year 2005 and 2017.

Table 15.2 Palmdale Total Annual Community GHG Emissions (2017)

Community Sector	Subsector	Subsector MTCO ₂ e	Sector MTCO ₂ e	Percent of Total
Transportation	On-Road Transportation	587,160	587,160	59%
Nonresidential Energy	Electricity	119,700	162,010	15%
	Natural Gas	42,310		
Residential Energy	Electricity	90,470	197,650	20%
	Natural Gas	107,080		
Water	Water Use	27,900	27,900	3%
Solid Waste	Landfilled Waste	30,490	30,490	3%
Off-Road	Lawn and Garden Equipment	1	681	0%
	Construction Equipment	680		
Total			1,005,891	100%

Figure 15.1 Palmdale Total Annual Community GHG Emissions in 2005 and 2017



Progress Toward Palmdale EAP Target

Palmdale's 2011 Energy Action Plan (EAP) set a target for reducing GHG emissions 15% below 2005 baseline levels by 2020. Table 15.3 provides a comparison of baseline year 2005 to 2017 to show the City's progress toward its goal. Over the 12-year period, total emissions were estimated to have increased by 8%. However, emissions did decrease in every sector except for transportation.

- Residential and nonresidential energy emissions combined decreased by approximately 39%, which reflects a significant change in the carbon intensity of grid consumed electricity, an increase in rooftop renewable energy systems, and investment in energy efficiency.
- Solid waste emissions decreased by approximately 32% due to a decrease in the amount of solid waste generated by Palmdale residents and businesses.
- Water use emissions dropped drastically by approximately 40% due to increased water conservation required during the 2012-2017 drought.

Furthermore, per capita emissions decreased by 6% and per service area emissions decreased by 9.5% over the same period. The service area population includes the populations that live and/or work in the City. It is the sum of population and jobs. These numbers show that population, job growth, and a strong regional economy are the primary drivers of emissions increases. Per service area emissions are nearly on pace to achieve a 15% reduction by 2020.

Table 15.3 Palmdale Total Annual Community GHG Emissions in 2005 and 2017 (in MTCO₂e)

Community Sector	2005	2017	2005 Per Capita	2005 Per Service Area	2017 Per Capita	2017 Per Service Area	Total Percent Change
Transportation	379,810	587,160	2.81	2.48	3.72	3.01	-8%
Nonresidential Energy	220,080	162,010	1.63	1.43	1.03	0.83	-31%
Residential Energy	212,700	197,650	1.57	1.38	1.25	1.01	55%
Water	46,475	27,900	0.34	0.30	0.18	0.14	-32%
Solid Waste	44,770	30,490	0.33	0.29	0.19	0.16	-40%
Off-Road	16,790	681	0.12	.011	0.004	0.003	-96%
Total	920,625	1,005,891	6.81	6.00	6.37	5.16	8%

Progress to State GHG Reduction Targets

Consistent with Assembly Bill (AB) 32, the City’s target is to achieve a 15% reduction below baseline emissions by 2020. As noted in Table 15.4, a 15% reduction in baseline emissions is 782,531 MTCO₂e. The 2017 total emissions estimate of 1,005,891 MTCO₂e shows that despite mitigation strategies, emissions have risen in Palmdale by 8% since 2005. To be sure, Palmdale has made progress toward the State goals on a per capita and per service area basis. Emissions per service area have decreased by 14% putting it on pace to meet the State’s targets.

Since adoption of Palmdale’s EAP in 2011, the State adopted a 2030 target through Senate Bill (SB) 32. If the City adopts a 2030 goal consistent with State target setting, 40% below 2005 baseline levels, the target for Palmdale would be 552,375 MTCO₂e, a 55.6% decrease from 2017 levels. Given Palmdale’s current rate of growth, a target consistent with SB 32 would be extremely ambitious since community emissions are trending upward.

Table 15.4 Progress to AB32 and SB 32 Targets

Year	Total Emissions (MTCO ₂ e)	Emissions Per Capita (MTCO ₂ e)	Emissions Per Service Area (MTCO ₂ e)
2005	920,625	6.81	6.00
2017	1,005,891	6.37	5.16
2020 Target (15% below baseline)	782,531	5.79	5.1
2030 Target (40% below baseline)	552,375	4.09	3.6

Community Energy

This section presents GHG emissions for the energy sector, specifically emissions generated from residential and nonresidential energy use that occurred within City limits. This section provides electricity and natural gas activity data and emissions estimates for the baseline year 2005 and 2017.

Electricity

Southern California Edison (SCE) provides electric service to the community and offers community electricity data to local agencies. The electricity data (presented in kWh) in Table 15.5 is separated between residential and nonresidential uses, which is the most detailed level available to prevent data from being removed for privacy purposes. Additional data is from the UCLA Energy Atlas. Residential data includes single family homes and multi-family dwellings, while nonresidential data includes commercial and industrial uses. From 2005 to 2017 residential electricity usage increased by about 12% and nonresidential electricity usage increased by 2%. Between 2005 and 2017 total electricity use increased by 6%. The 6% increase in electricity use may be the result of population growth and a growing economy with more local jobs.

Table 15.5 Total Annual Community Electricity Usage (2005-2017)

Year	Residential (kWh)	Nonresidential (kWh)	Total (kWh)
2005	322,994,683	469,497,353	792,492,036
2006	373,000,000	-	-
2007	375,000,000	-	-
2008	379,000,000	-	-
2009	373,000,000	-	-
2010	336,754,205	463,804,416	800,558,621
2011	341,763,477	459,963,498	801,726,975
2012	364,904,075	475,709,943	840,614,018
2013	356,504,108	471,894,068	828,398,176
2014	347,158,162	473,651,660	820,809,822
2015	344,331,371	464,511,613	808,842,984
2016	353,688,681	447,438,763	801,127,444
2017	362,005,731	478,961,036	840,966,767

Note: Non-residential data for years 2006-2009 is not available.³

³ In California, individual energy (electricity and natural gas) account information is protected as private information. For specific purposes, certain groups may access detailed information. For example, academic researchers can access disaggregated data to conduct analyses as long as protected information remains confidential. To ensure the confidentiality of each individual customer's consumption information, CCSC masks data that does not meet minimum aggregation

To calculate GHG emissions, an emissions factor is applied to the activity data. SCE staff provided CO₂ emissions factors via the Green Community Portal. In addition to carbon dioxide (CO₂), small amounts of methane (CH₄) and nitrous oxide (N₂O) are released in the electricity generation process. CH₄ and N₂O emissions factors are provided by the ICLEI Local Government Operations Protocol (LGOP). Variability of the emissions factors occur primarily due to fluctuations in SCE’s energy portfolio each year.

CO₂ is the most commonly referenced GHG, however, numerous gasses have greenhouse characteristics. CH₄ and N₂O are commonly accounted for in GHG inventories. These gasses have a greater global warming potential; CH₄ traps approximately 28 times as much heat as CO₂ over a 100-year period and N₂O traps approximately 265 times as much heat. To account for these differences, a factor is applied to the gasses emissions to calculate a CO₂ equivalence.

Table 15.6 provides the emission factors and GHG emissions from electricity use in the city by residential and nonresidential subsectors from 2005-2017. Emissions factor data is missing for years 2008-2010 so no emissions estimate is presented. Over this period, electricity related GHG emissions decreased by 13%.

Table 15.6 Total Annual Community GHG Emissions from Electricity Use (2005-2017)

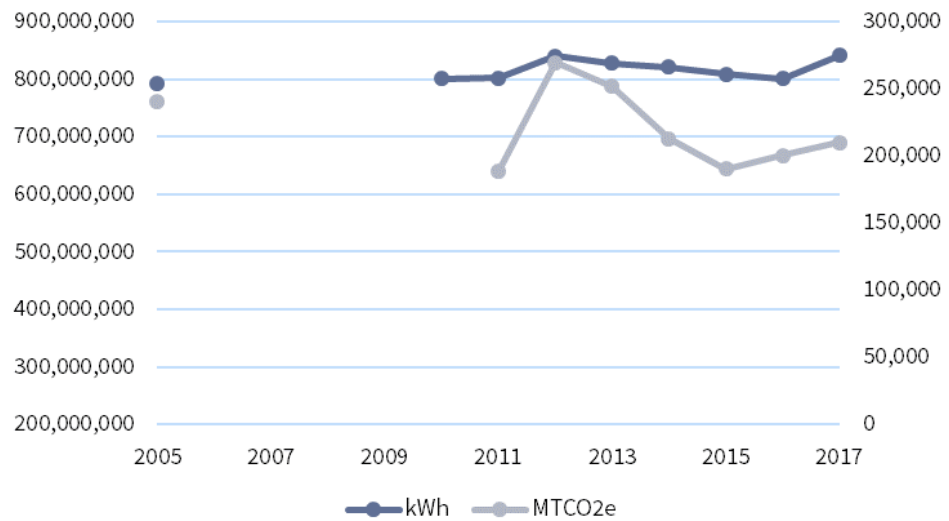
Year	Emissions Factor	Residential (MTCO ₂ e)	Nonresidential (MTCO ₂ e)	Total (MTCO ₂ e)
2005	0.000304	98,080	142,570	240,650
2006	0.000292	109,050	-	-
2007	0.000288	107,900	-	-
2008	-	-	-	-
2009	-	-	-	-
2010	-	-	-	-
2011	0.000236	80,520	108,360	188,880
2012	0.000321	117,080	152,640	269,720
2013	0.000304	108,380	143,450	251,830
2014	0.000259	90,070	122,890	212,960
2015	0.000235	81,060	109,350	190,410
2016	0.000242	88,400	111,830	200,230
2017	0.000250	90,470	119,700	210,170

Note: Data from 2006-2010 is not available. Data from 2005 has been updated with the current SCE emissions coefficient for 2005.

thresholds. For more information about these privacy regulations, please visit the CPUC's decision (D.14-05-016).

Figure 15.2 illustrates GHG and kWh activity data trends between 2005 and 2017. It is important to note that while energy use has been increasing, GHG emissions have been more variable due to changes in SCE’s power portfolio and the related carbon intensity of its electricity supply.

Figure 15.2 Total Annual Community Electricity Use and GHG Emissions (2005-2017)



Natural Gas

Southern California Gas Company (SoCalGas) provides natural gas utility services to Palmdale. Table 15.7 provides the natural gas activity data in therms from 2005-2017 separated by residential and nonresidential uses. Nonresidential use combines commercial and industrial use. Additional data was provided by the UCLA Energy Atlas. The natural gas data in Table 15.7 shows a residential decrease of 6%, a nonresidential decrease of 45%, and a combined decrease of 22% for the sector.

Gaps in nonresidential natural gas activity data make it more difficult to see the year over year changes in natural gas use and emissions. The overall trend is that nonresidential natural gas usage decreased until 2013 and began climbing from 2014-2017. The overall reduction in natural gas use between 2005 and 2017 mirrors the contracting economy during the Great Recession, which resulted in significantly decreased housing construction, military spending, and fewer local manufacturing jobs.

However, another possible reason for the observed drastic change is that since the nonresidential sector in Palmdale is dominated by a few large users of natural gas, the 2014-2017 data may have been “masked” due to aggregation laws. This explanation would suggest that only partial data was provided for 2014-2017 in order to protect user privacy, which results in an incomplete picture of community natural gas use and associated emissions.

Table 15.7 Total Annual Community Natural Gas Use (2005-2017)

Year	Residential (Therms)	Nonresidential (Therms)	Total (Therms)
2005	21,534,879	14,562,270	36,097,149
2006	22,300,000	-	-
2007	22,300,000	-	-
2008	-	-	-
2009	22,200,000	3,061,000	25,261,000
2010	23,600,000	-	-
2011	24,600,000	-	-
2012	23,100,000	-	-
2013	22,000,000	-	-
2014	18,434,830	4,684,696	23,119,526
2015	19,120,338	5,692,788	24,813,126
2016	20,118,641	7,439,520	27,558,161
2017	20,137,146	7,949,963	28,087,109

Note: 2005 data is from the City's 2011 EAP. The rest of the data was provided by SoCalGas. Data from 2006-2008 and 2010-2013 is not available.

As with electricity, GHG emissions are estimated from activity data by applying an emission coefficient. Unlike electricity, the inventory does not assume changes in the carbon intensity of natural gas in any given year, as the carbon intensity of the combustion of natural gas does not vary annually. Table 15.8 provides the GHG emissions estimates for natural gas consumption in the city from 2005 to 2017. These estimates are using the most current emissions coefficient for natural gas. Similar to the activity data, residential and nonresidential emissions decreased with a total decrease in natural gas-related emissions of 22%.

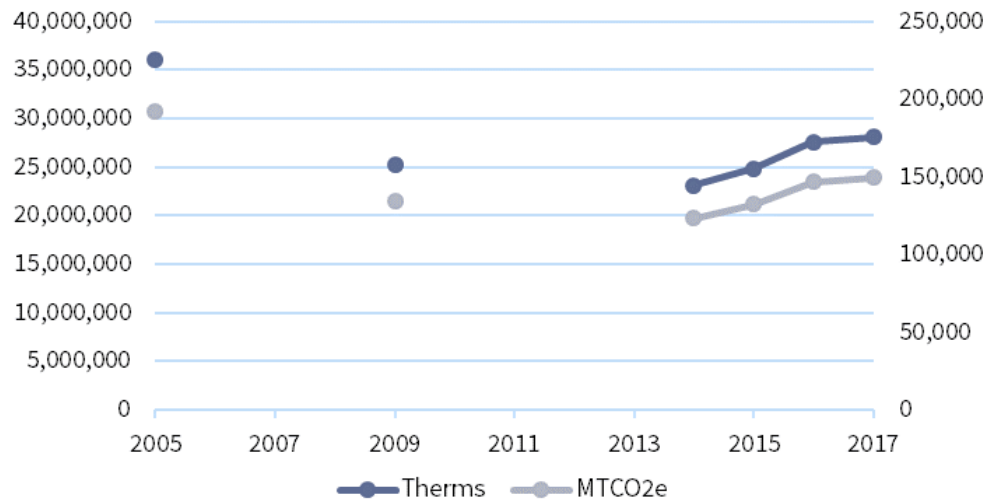
Table 15.8 Total Annual Community GHG Emission from Natural Gas (2005-2017)

Year	Residential (MTCO ₂ e)	Nonresidential (MTCO ₂ e)	Total (MTCO ₂ e)
2005	114,620	77,510	192,130
2006	118,700	-	-
2007	118,700	-	-
2008	-	-	-
2009	118,160	16,290	134,450
2010	125,610	-	-
2011	130,940	-	-
2012	122,950	-	-
2013	117,100	-	-
2014	98,120	24,930	123,050
2015	101,770	30,300	132,070
2016	107,080	39,600	146,680
2017	107,180	42,310	149,490

Note: Data from 2006, 2007, and 2010-2013 is not available.

The GHG emissions in Table 15.8 vary from the 2005 GHG inventory included in the City's Energy Action Plan because this inventory uses updated emissions factors so although subsector activity data has remained the same, the GHG intensity has changed to reflect current best practices and the best available data.

Figure 15.3 Total Annual Community Natural Gas Use and GHG Emissions (2005-2017)



Total Energy GHG Emissions

Table 15.9 shows the total energy related GHG emissions separated by energy type and subsector. Residential energy use subsector emissions decreased by 7% between 2005 and 2017 and nonresidential energy use subsector emissions decreased by 26%. Overall energy GHG emissions decreased by 17% from 2005 to 2017. The reduction in residential energy emissions is the result of a less carbon intensive energy supply in 2017 as compared to 2005 because overall residential energy use increased. As discussed above, nonresidential energy use has decreased most likely due to changing economic conditions as well as a potential difference in data availability between 2005 and 2017.

Table 15.9 Total Annual Community GHG Emissions from Energy Use in 2005 and 2017

Subsector	Activity Data		Unit	Emission Factors (MTCO ₂ e/unit)		GHG Emissions		
	2005	2017		2005	2017	2005	2017	% Change
Residential electricity	322,994,683	353,688,681	kWh	0.000304	0.000250	98,080	90,470	-8%
Residential natural gas	21,534,879	20,118,641	Therms	0.005323	0.005323	114,620	107,180	-6%
Residential total						212,700	197,650	-7%
Nonresidential electricity	469,497,353	447,438,763	kWh	0.000304	0.000250	142,570	119,700	-16%
Nonresidential natural gas	14,562,270	7,439,520	Therms	0.005323	0.005323	77,510	42,310	-45%
Nonresidential total						220,080	162,010	-26%
Total Sector						432,780	359,660	-17%

Transportation

This section presents the GHG emissions for the transportation sector, specifically emissions from all on-road trips (including cars, trucks, buses, etc.) that have occurred within City limits. This section provides activity data and emissions estimates for baseline year 2005 and 2017. The City used its own origin-destination transportation model to estimate vehicle miles traveled (VMT) for trips that began and ended in the city, trips that began outside and ended in the city, trips that began in the city and ended outside, and trips that passed through the city without stopping.⁴ Consistent with the GPC accounting method⁵, the 2017 inventory includes 100% of internal trip miles, 50% of the miles for trips that start or end in the city, and none of the miles from pass-through trips.

Vehicle miles traveled estimates for both years were converted to GHG emissions using the 2017 Emissions Factor (EMFAC) model. EMFAC represents the state's current understanding of motor vehicle travel activities and the associated emission levels from on-road vehicles including cars, trucks, and buses in California.

Table 15.10 shows that VMT has increased in Palmdale by 82% from 2005 to 2017 and associated GHG emissions have increased by 55%. 2005 data was taken directly from the City's previous inventory, which used a different methodology to calculate VMT and emissions than this inventory. This updated inventory uses the origin-destination method to estimate 2017 VMT. The smaller increase in GHG emissions is attributed to State and federal regulations. This includes improved fuel efficiency standards, low carbon fuel standards, and an increasingly efficient overall fleet of vehicles (including an increased uptake of electric, hybrid, and high efficiency vehicles) within the city that is resulting in fewer emissions per mile of VMT, despite an increase in miles driven.

Table 15.10 Total Annual Community GHG Emissions from Transportation in 2005 and 2017

2005			2017		
Total VMT	MTCO ₂ e/ VMT	Total Emissions	Total VMT	MTCO ₂ e/ VMT	Total Emissions
740,453,235	0.000513	379,810	1,345,752,570	0.000436	587,160

⁴ VMT data was collected from the 2019 General Plan Transportation Existing Conditions Report created by Parsons.

⁵ The GPC Accounting method or the Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories is the industry best practice emissions accounting framework for reporting city-wide emissions as developed by the World Resources Institute, C40 Cities, and ICLEI.

Water Use

The water sector uses energy to collect, convey, treat, and deliver water to users, and then it uses additional energy to collect, treat, and dispose of the resulting wastewater. This energy use yields both direct and indirect greenhouse gas emissions. Although Palmdale has more than 30 water purveyors, two, Palmdale Water District (PWD) and LA County Waterworks District 40 (LACWD 40), predominantly serve the City and are the only two inventoried.

Water use was not originally included in the 2005 baseline year inventory, so the 2017 inventory process updated it to include for comparison. Table 15.11 provides the total water use and associated GHG emissions for the population of Palmdale. GHG emissions were calculated by combining the amount of water used with emissions factors. Emissions from the water sector decreased by 40% from 2005 to 2017. The 40% decrease in GHG emissions from the water sector may be attributable to more nuanced water supply planning, increases in water efficiency investments, and overall trends toward conservation, especially since the 2012-2017 drought.

Table 15.11 Total Annual Community Water Use and GHG Emissions in 2005 and 2017

2005		2017	
Water Use (million gallons)	Total Emissions (MTCO ₂ e)	Water Use (million gallons)	Total Emissions (MTCO ₂ e)
13,774	46,475	10,047	27,900

Source: 2005 and 2010 UWMP PWD and LACWD 40.

Solid Waste

This section presents GHG emissions for the solid waste sector, specifically emissions from the disposal of solid waste produced within the City limits into a landfill. This section provides solid waste activity data for the baseline year 2005 as well as emissions estimates for years 2005 to 2017. Landfilled waste data was provided by CalRecycle for the City of Palmdale. Figure 15.4 shows the City's solid waste disposal tonnage for 2005 to 2017. The amount of waste generated in Palmdale has decreased by 33% since 2005.

To estimate the solid waste GHG emissions, the carbon dioxide equivalency factor was applied to the disposal ton activity data and then emissions were calculated. As shown in Table 15.12 and Figure 15.5, solid waste disposal emissions decreased by 32% from 2005 to 2017.

Figure 15.4 Total Annual Community Solid Waste Generation (2005-2017)

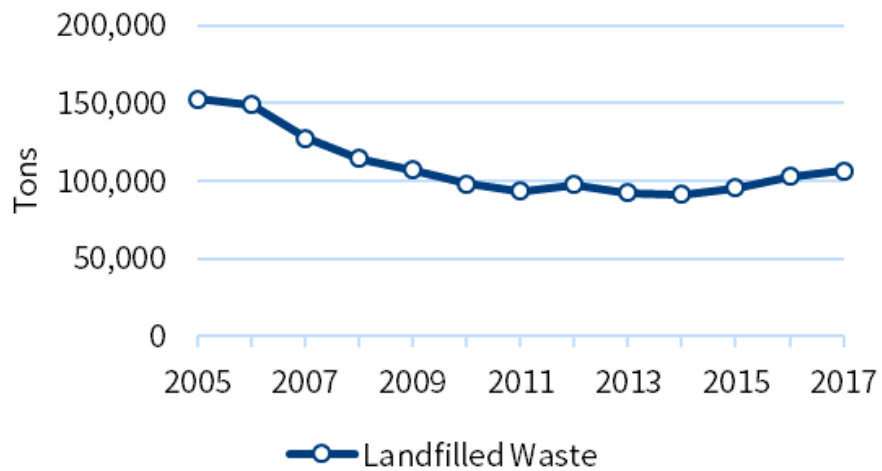
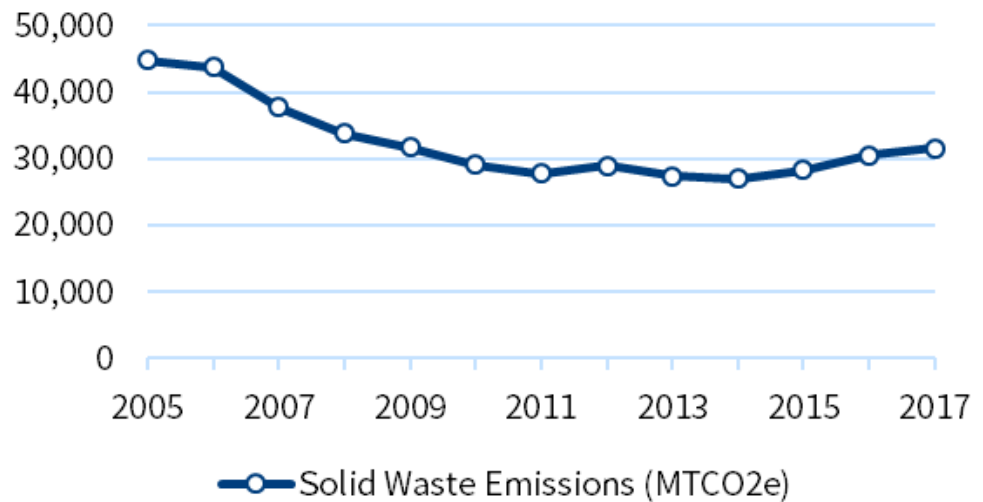


Table 15.12 Total Annual Community Solid Waste Tons and GHG Emissions (2005-2017)

Year	MTCO ₂ e Conversion Factor	Total Waste (Disposal Ton)	Total (MTCO ₂ e)
2005	0.293	150,251	44,770
2006	0.293	149,115	43,720
2007	0.296	127,413	37,740
2008	0.296	114,104	33,800
2009	0.296	107,203	31,760
2010	0.296	98,071	29,060
2011	0.296	93,621	27,730
2012	0.296	97,801	28,970
2013	0.296	92,344	27,350
2014	0.296	91,091	27,000
2015	0.296	95,569	28,330
2016	0.296	102,935	30,490
2017	0.296	106,650	31,600

Figure 15.5 Total Annual Community Solid Waste GHG Emissions



Off-Road

This section presents the GHG emissions for off-road activity, specifically emissions from construction and lawn and garden equipment use within the City.

Off-road emissions data for Los Angeles County was gathered from the CARB OFFROAD2007 modeling tool. Since the CARB tool models emissions for the entire county, city specific emissions data was proportioned using demographic housing data. Data from the tool was compiled and summed according to emissions type and is presented in Table 15.13. Emissions were then converted into carbon dioxide equivalent. Off-road emissions reductions reflect the significant decline in the proportion of housing units being created in Palmdale as a fraction of the County whole. According to the California Department of Finance, in 2005, 6% of housing units completed countywide were being constructed in Palmdale. However, in 2017 that proportion had decreased to 0.2%.

Table 15.13 Los Angeles County Off-Road Emissions Factors

	2005		2017	
	Construction	Lawn & Garden	Construction	Lawn & Garden
t CO ₂ /day	811.3063	7.7950	933.2459	0.5054
t CH ₄ /day	0.1030	0.0150	0.0604	0.0000
t N ₂ O/day	0.0007	0.0061	0.0000	0.0000
t CO ₂ e/day	814.3716	9.8242	934.9388	0.5060
t CO ₂ e/year	297,245.6189	3,585.8429	341,252.6662	184.6760
MTCO ₂ e/year	269,659.4565	3,253.0553	309,582.3879	167.5370

Source: CARB OFFROAD2007 modeling tool (Los Angeles County)

To estimate emissions within the city, an adjustment factor was applied to the final MTCO₂e estimates in Table 15.14. The adjustment factor used for construction equipment was 6.21% in 2005 and 0.22% in 2017. The adjustment factor used for lawn and garden equipment in 2005 was 1.23% and 1.33% in 2017.

From 2005 to 2017, the City of Palmdale experienced a 96% reduction in emissions from construction equipment and lawn and garden equipment. This significant decrease in emissions is likely due to decrease in construction activity and may be partially attributable to the electrification of equipment. Table 15.14 shows the total GHG estimates from off-road sources.

Table 15.14 Total Annual Off-Road GHG Emissions in 2005 and 2017

	2005	2017
Construction Equipment	16,750	680
Lawn and Garden Equipment	40	1
Total	16,790	681

Source: CARB OFFROAD2007 modeling tool (Los Angeles County)

Forecast

The Business as Usual (BAU) GHG emissions forecast estimates how Palmdale's emissions would change over time if no action were taken to reduce emissions by the State, utilities, or at the local level. The BAU projections also assume that population, housing, employment, and transportation activity will grow over time, consistent with the Southern California Association of Governments (SCAG) projections. These activities produce GHG emissions.

The demographic projections used in the forecast are those provided by SCAG. These projections assume that the anticipated development is fully implemented by 2050. Table 15.15 shows the assumed demographic changes.

Table 15.15 Palmdale Demographic Projections (2020-2050)

Demographic Indicator	2005	2017	2020	2030	2040	2045	2050
Population	135,179	157,887	166,500	184,000	201,500	210,250	219,000
Housing Units	41,626	47,012	51,456	57,779	64,103	67,265	70,427
Jobs	18,246	37,206	32,200	36,250	40,300	42,325	44,350
Service Population	153,425	195,093	198,800	220,250	241,800	252,575	263,350

* Note: Service population is the sum of population and jobs within the City.

This forecast holds emissions from construction equipment constant at 2016 levels. This approach helps eliminate uncertainty in future emissions, since the specific timing of construction activities depends on several difficult-to-predict factors, including local and larger-scale economic conditions. Keeping construction emissions constant is consistent with the expectation that Palmdale will continue to grow at a steady and managed rate.

Based on the results of the BAU forecast, emissions are expected to rise from 1,005,891 MTCO₂e in 2017 to 1,341,672 MTCO₂e in 2050. Table 15.16 shows the forecasted BAU emission levels for each sector in future years and Table 15.17 shows the forecasted annual emissions per capita and per service population.

Table 15.16 Forecasted Business as Usual Total Annual Community GHG Emissions in 2020, 2030, 2040, 2045 and 2050 (in MTCO₂e)

Community Sector	2005	2017	2020	2030	2040	2045	2050	Percent Change (2005-2050)
Residential electricity	98,080	90,470	96,751	108,640	120,531	126,476	132,422	35%
Residential natural gas	114,620	107,180	117,207	131,610	146,015	153,217	160,419	40%
Nonresidential electricity	142,570	119,700	96,780	108,953	121,125	127,212	133,300	-7%
Nonresidential natural gas	77,510	42,310	34,270	38,581	42,891	45,045	47,200	-39%
On-Road Transportation	379,810	587,160	598,018	662,876	727,734	760,163	792,592	109%
Water Use	46,475	27,900	28,415	31,497	31,633	33,106	34,579	-26%
Landfilled Waste	44,050	30,490	31,055	34,423	37,792	39,476	41,160	-8%
Total	919,905	1,005,891	1,002,497	1,116,580	1,227,721	1,284,695	1,341,672	46%
Change from 2005	-	9%	9%	21%	33%	40%	46%	-

Table 15.17 Forecasted BAU Annual Community GHG Emissions in 2020, 2030, 2040, 2045 and 2050 Per Capita and Per Service Area (in MTCO₂e)

Demographic Indicator	2005	2017	2020	2030	2040	2045	2050	Percent Change (2005-2050)
Per Capita	6.8	6.4	6.02	6.07	6.09	6.11	6.13	-10%
Per Service Area Population	6.0	5.2	5.04	5.07	5.08	5.09	5.09	-16%

Additionally, the Adjusted Business as Usual (ABAU) forecast is presented to show how Palmdale’s emissions are anticipated to change accounting for the impacts of adopted State policies if no action is taken at the local level. There are three major policies that the State has adopted to reduce GHG emissions at the local level:

1. **Renewables Portfolio Standard (RPS):** This law requires that electrical utilities provide an increased amount of electricity from eligible renewable sources. SB 100 requires that 33% of electricity sold by utilities in 2020 be renewable, 60% be renewable in 2030, and 100% be carbon-free in 2045.
2. **Title 24:** Title 24 is the set of regulations that specifies how new buildings must be constructed, including specifying minimum energy efficiency standards. These standards are updated triennially to be more stringent. California has set a goal for zero-net energy new construction by 2030.
3. **Clean Car Standards:** These standards require that vehicles sold in California meet minimum fuel efficiency requirements, and that fuel sold in the state emits less GHGs during production and use

Based on the results of the ABAU forecast, emissions are expected to fall from 1,005,891 MTCO₂e in 2017 to 741,586 MTCO₂e in 2050. Table 15.18 shows the forecasted ABAU emission levels for each sector in future years and Table 15.19 shows the forecasted annual emissions per capita and per service population. The ABAU forecast illustrates the importance of supporting the State’s climate targets to reduce emissions statewide and kickstart local actions.

By inventorying community-wide greenhouse gas emissions, the City of Palmdale is taking an important step towards understanding its emissions profile. This emissions inventory provides the baseline of information necessary to evaluate greenhouse gas emissions reduction targets, to identify and implement key mitigation measures, and to monitor the effectiveness of the Palmdale’s actions to reduce greenhouse gas emissions.

Table 15.18 Forecasted Adjusted Business as Usual Total Annual Community GHG Emissions in 2020, 2030, 2040, 2045 and 2050 (in MTCO_{2e})

Community Sector	2005	2017	2020	2030	2040	2045	2050	Percent Change (2005-2050)
Residential electricity	98,080	90,470	90,408	12,943	4,809	2,405	0	-100%
Residential natural gas	114,620	107,180	117,207	117,207	131,610	138,812	146,015	27%
Nonresidential electricity	142,570	119,700	85,738	11,040	5,008	2,504	0	-100%
Nonresidential natural gas	77,510	42,310	34,270	34,270	38,581	40,736	42,891	-45%
On-Road Transportation	379,810	587,160	557,439	477,250	475,238	493,380	511,521	35%
Water Use	46,475	27,900	27,527	3,929	1,438	719	0	-100%
Landfilled Waste	44,050	30,490	31,055	34,423	37,792	39,476	41,160	-8%
Total	919,905	1,005,891	943,645	693,727	694,475	718,032	741,586	-19%
Change from 2005	-	9%	3%	-24%	-25%	-22%	-19%	-

Table 15.19 Forecasted ABAU Annual Community GHG Emissions in 2020, 2030, 2040, 2045 and 2050 Per Capita and Per Service Area (in MTCO_{2e})

Demographic Indicator	2005	2017	2020	2030	2040	2045	2050	Percent Change (2005-2050)
Per Capita	6.8	6.4	5.67	3.77	3.45	3.42	3.39	-50%
Per Service Area Population	6.0	5.2	4.75	3.15	2.87	2.84	2.82	-53%