City of Walnut Creek

GHG Inventory and CAP Update

2013 Inventory and Forecast Report

Prepared for:

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EXECUTIVE SUMMARY

The City of Walnut Creek adopted a Climate Action Plan (CAP) in 2012. The CAP serves as the City's strategy to reduce greenhouse gas (GHG) emissions and achieve a community-wide GHG reduction target. To quantify progress to this target, the CAP includes a GHG inventory of community emissions for the calendar year 2005. The CAP requires the City to update this inventory at least every five years, with the first update occurring in 2015. As part of the 2015 update, the City prepared a new GHG inventory of community-wide emissions for the calendar year 2013. Along with this new inventory, the City has developed adjusted GHG forecasts for 2020 and 2030 for consistency with newer demographic projections, regional guidance, and current best practices that have emerged since CAP adoption, including the US Community Protocol. For accurate comparison to the 2005 baseline inventory, this report presents slight modifications to the adopted 2005 baseline to account for new protocols.

Walnut Creek's inventoried emissions in 2013 totaled approximately 710,782 metric tons of carbon dioxide equivalent ($MTCO_2e$), an increase of approximately 10% from 2005 levels due primarily to a large rise in vehicle miles traveled. The emissions for all sectors in 2013 are shown in **Table ES-1.**

Table ES-1: WALNUT CREEK 2013 GHG EMISSIONS ($MTCO_2E$)

Sector	2013 $MTCO_2e$	Percentage of Total
Residential built environment	109,870	15%
Nonresidential built environment	101,180	14%
Transportation	435,012	61%
Off-road equipment	47,320	7%
Solid Waste	11,207	2%
Water	5,255	1%
Wastewater	938	0%
Total	**710,782**	**100%**

This revised forecast in this update includes the most recent scientific understanding of GHGs, changes to Walnut Creek's demographic projections, and reductions achieved by existing policies and practices at the state and local levels. A summary of forecast revisions is presented in **Table ES-2**. Revisions include a recalculation of the 2020 target, accounting for newer global warming potentials.

Table ES-2: WALNUT CREEK FORECASTED EMISSIONS ($MTCO_2E$)

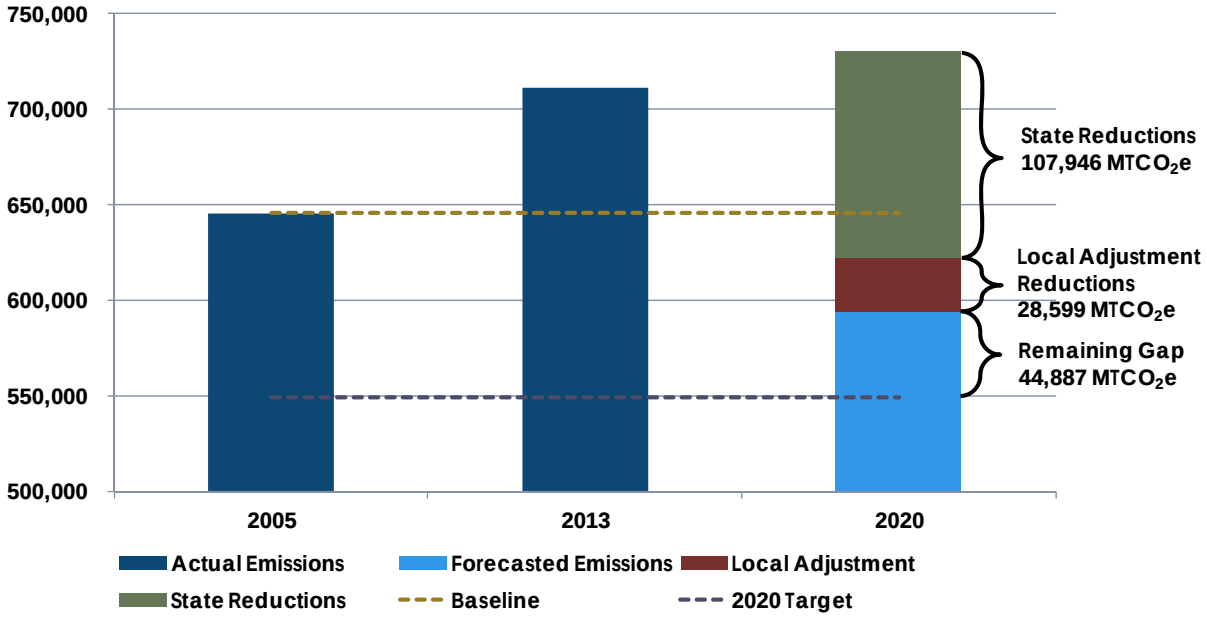
Forecast Adjustments	2020	2030
Baseline	**645,597**	**645,597**
Adopted Forecast	779,117	829,535
Forecast with Updated Scientific Understanding (Global Warming Potential)	730,189	793,052
Net Forecast with Demographic Changes	701,590	755,238
Net Forecast with State Actions	**593,644**	**606,125**
Change from Baseline	**-51,953 (-8%)**	**-39,472 (-6%)**
Emissions Reduction Target	**548,757 (-15%)**	**NA***
Emissions Reduction Needed to Achieve Target	**44,887**	**-**

** NA = Not applicable. The CAP presents a trajectory for 2030 based on statewide 2050 goals. 2030 targets are addressed in greater detail below.*

As indicated in **Table ES-2** above, the adopted CAP includes a GHG reduction target of 15% below 2005 emission levels by 2020. The 2013 inventory demonstrates a 10% increase in community emissions from the 2005 baseline. This rise in GHG emissions is largely due to a spike in 2013 transportation emissions from vehicle miles traveled (VMT) and emissions from off-road equipment used for construction activities. Yet available information indicates that there are annual fluctuations in emissions from these sectors, not a sustained increase in emissions over time. Due to annual volatility in these sectors, evidence does not indicate that increases in emissions from construction and transportation will continue in a sustained manner. For example, waste saw consistent decreases in disposal rates each year between 2005 and 2013, with each year accounting for a relatively equal portion of the total 35% decrease in the monitoring period. Yet VMT, however, experienced almost no change between 2005 and 2012, with annual changes ranging between -2% and 1%, with a single 10% increase in 2013. Freeway traffic comprises approximately 55% of VMT, while traffic on local roads accounts for the remaining 45%. Future inventories and monitoring will track these sectors over time to confirm if these increases continue. Significant progress toward emissions decreases in other sectors, such as electricity use and solid waste disposal, leaves confidence that the forecast is still accurate and 2020 targets can be reached.

The 2013 emissions are shown in relation to forecasts and targets in **Figure ES-1** below. Accounting for credits from decreased demographic projections and increased statewide influence on emissions reductions, Walnut Creek has a remaining 44,887 $MTCO_2e$ to reduce by 2020 to meet the CAP target.

Figure ES-1. Walnut Creek GHG Emissions Forecast and 2013 Inventory ($MTCO_2e$)



I. INTRODUCTION

This report presents a community-wide greenhouse gas (GHG) emissions inventory for the City of Walnut Creek in the calendar year of 2013. A 2005 community GHG inventory informed the development of the City's Climate Action Plan (CAP), adopted in 2012. The CAP establishes the City's strategy to reduce GHG emissions and achieve an overall 15% reduction below the baseline 2005 inventory by 2020. Preparation of the 2013 community-wide inventory and a review of the GHG emissions forecast allow the City to analyze progress toward the CAP target. Preparation of this 2013 inventory also implements an action of the CAP that calls for the City to revisit a GHG inventory and the CAP by 2015 to confirm progress. Creating a recent inventory of GHG emissions will provide a snapshot of emissions in Walnut Creek and capture the outcomes of programs and progress to date. The intent of this report is to inform potential updates to the CAP, as needed, to achieve the 2020 targets of the CAP and consider long-term targets beyond 2020. The findings presented in this report provide information to elected officials, City staff, and the public to understand the community's achievements since adoption of the CAP and information to guide efforts moving forward.

The community-wide 2013 inventory provides a detailed, updated progress report building from the City's recent CAP monitoring efforts. This comprehensive assessment of emissions is presented with adjustments to the long-term GHG emissions forecasts. The forecasts in the CAP show anticipated GHG emissions in 2020 and 2030. Together, the 2013 inventory and revisions to the forecast depict anticipated GHG emissions levels and identify the City's expected progress toward the CAP reduction target.

To describe the current status of GHG emissions and future trajectory to the reduction target, the following sections of this report present the following:

- Current regulatory context, which influences the reduction given for statewide actions to address climate change (**Section II**)

- The results of community-wide 2013 activity-data and emissions inventory, and how the findings compare to those in the 2005 inventory that shaped the CAP (**Section III**)

- An updated forecast, including a series of adjustments that were made to the original, "business as usual" projections (**Section IV**). Complete analysis of adjustments is included to demonstrate the reasoning for changes to the original projections (**Appendix C**)

- A report of existing CAP implementation outcomes and progress to the target **(Section V)**

II. SETTING

A. REGULATORY CONTEXT, PROTOCOLS, AND INVENTORY METHODS

The 2013 community-wide inventory presents the GHG emissions created by activity within the community of Walnut Creek. While the original CAP also included analysis of emissions from government operations, this inventory focuses exclusively on GHGs created from activity within the community. This inventory allows the City to measure its progress to these community-wide goals.

The original CAP also included an inventory and forecast for municipal GHG emissions, including those from City-owned buildings or vehicles. However, the City has achieved tremendous progress towards implementing these programs. The City has committed funding or initiated implementation of over 75% of municipal measures. Based on annual monitoring reports, reductions from government operations are on track to meet the municipal targets established in the CAP, achieving nearly half of the 2020 reduction target with actions to date. Due to this confidence in the achievement of municipal targets, the 2013 inventory and forecast adjustments focus specifically on community-wide emissions.

Protocols and methods for the 2013 inventory are in accordance with the 2012 *US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (US Community Protocol). The California Governor's Office of Planning and Research recommends use of the US Community Protocol for the GHG inventories of jurisdictions in California. The US Community Protocol is a guidance document and not regulatory, but it provides the first universal and standardized methods for the measurement of community-wide GHG emissions in the United States.

Consistent with the US Community Protocol, this inventory includes emissions from the following community-wide activities, or sectors, within Walnut Creek:

- **Residential energy**: electricity and natural gas used in residential buildings

- **Nonresidential energy**: electricity and natural gas used in nonresidential facilities

- **Transportation**: on-road vehicle trips within Walnut Creek

- **Off-road equipment**: the use of equipment and vehicles not used for on-road transportation

- **Solid waste**: materials deposited in landfills

- **Water and wastewater**: energy used to treat and pump water used and wastewater created, along with emissions from wastewater processing

- **BART**: trips on the Bay Area Rapid Transit system originating or ending in Walnut Creek.

This inventory does not account for some sectors recommended in the US Community Protocol because those activities do not occur in the community to any substantial degree (e.g. agricultural operations). However, the update still follows the vetted protocols and methods for inventories for cities under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Sectors analyzed are consistent with BAAQMD inventory guidance, as well as the methods used by surrounding jurisdictions. Additionally, this inventory includes an additional sector (wastewater), which was not included in the baseline 2005 inventory but is stated in the CAP to be included in future year inventories to comply with BAAQMD guidance.

State, regional, and local laws, as well as agencies tasked with local regulatory oversight, have influenced common methods and impetuses for the completion of GHG inventories in California. Below is a brief description of the laws and policies relevant to Walnut Creek's climate action planning efforts. This regulatory setting is dynamic and may be modified by laws and policies that are currently in development.

1. State

California law first addressed climate change in 1988, when Assembly Bill (AB) 4420 directed the state to prepare a GHG inventory and study the impacts of climate change. Since then, California has adopted several laws to assess climate change, analyze and reduce GHG emissions and their effects, and prepare for the impacts of climate change. Many of these laws and associated regulations affect local governments, although only some create specific requirements for individual communities. Walnut Creek's efforts to reduce emissions are supported by actions at the state level, some of which provide reductions through no effort of the community. State regulations provide important guidance for GHG inventories, by providing guidance on baseline years, relevant horizon years, and evaluation of forecasts to set appropriate emissions reduction targets.

Executive Order S-03-05

In 2005, then-Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05, declaring that California is vulnerable to the impacts of climate change through reductions in the Sierra Nevada snowpack (a major source of water for the state), reduced air quality, and rising sea levels. EO S-3-05 also sets the following GHG reduction goals for the state:

- Reduce emissions to 2000 levels by 2010
- Reduce emissions to 1990 levels by 2020
- Reduce emissions 80% below 1990 levels by 2050

The California Global Warming Solutions Act of 2006 (AB 32)

The California Global Warming Solutions Act of 2006, also known as AB 32, codifies the goals set in EO S-3-05 and sets a target for the state to reduce its total GHG emissions to 1990 levels by 2020 through a series of market-based and regulatory mechanisms. These mechanisms are discussed in the AB 32 Scoping Plan, developed by the California Air Resources Board (CARB). The actions established in the Scoping Plan are analyzed in Walnut Creek's GHG inventories and provide additional credits for emissions reductions to help the City meet its targets. Actions in the Scoping Plan include producing 33% of the state's electricity from renewable sources by 2020,

implementing clean car standards, and developing a cap-and-trade program for major stationary sources of GHGs. The Scoping Plan identifies local governments as strategic partners to achieve the statewide reduction goal and establishes a GHG emissions reduction of 15% below existing levels (generally interpreted as emission levels between 2005 and 2008) as being comparable to a return to 1990 levels, which helped inform Walnut Creek's reduction target.

2. Regional

Air districts in California have direct and indirect regulatory authority over sources of air pollution and GHGs within their territories, and can provide guidance on how to apply laws related to air pollution and GHGs. The BAAQMD is the air district with jurisdiction over Walnut Creek. Prior to the development of the US Community Protocol, the BAAQMD issued a GHG Plan Level Quantification Guidance document in April 2010 to assist local governments with developing GHG inventories and CAPs. This guidance document included recommendations on the types of sectors to include and methods for forecasting; it is specifically intended to be used by communities in the Bay Area to be compliant with regional air quality standards. The Community Protocol addresses many, although not all, of the items discussed in the BAAQMD guidance document. The original GHG inventory is consistent with the BAAQMD GHG Plan Level Quantification Guidance document; this inventory also maintains consistency with the guidance document.

3. Local

The CAP establishes Walnut Creek's commitment to regularly monitor emissions and progress to CAP reduction targets. In addition to this monitoring, the CAP recommends that a new inventory be completed every five years, with the first update by 2015. In early 2014, the City presented a report of estimated annual emissions for 2005–2013. This 2013 inventory report provides a more in-depth analysis of methods and gives the City a more accurate look at where Walnut Creek is in its efforts to reduce emissions.

Additionally, completing recommendations set forth in the CAP, including continued inventorying, supports streamlining the environmental review process under the California Environmental Quality Act (CEQA). Walnut Creek's CAP was developed to serve as a "qualified" reduction strategy, based on guidance from the BAAQMD. A qualified CAP allows projects consistent with CAP reduction strategies to streamline the environmental review of GHG emissions. Streamlined review ensures that GHG emissions impacts alone would not be sufficient to trigger the need for a full environmental impact report, pursuant to CEQA.

B. KEY TERMS

This 2013 inventory report uses several key terms to provide further detail about the 2013 inventory, including the following:

- **Activity:** Any action that directly or indirectly results in GHG emissions. Examples include electricity use, vehicle use, and solid waste disposal. Activity data is a discrete measure of how much of an activity occurred in Walnut Creek in a certain year (e.g., how much electricity was used in 2005). The measurement unit of activity data varies depending on the activity.

- **Baseline Year:** The year against which future changes are measured. Many communities in California use a baseline year of 2005–2008 for consistency with AB 32; the Walnut Creek CAP and inventory use a baseline year of 2005.

- **Carbon dioxide equivalent (CO_2e):** A unit of measurement commonly used to measure GHGs, which accounts for the varying potency of different GHGs. GHGs in this inventory are measured in metric tons of carbon dioxide equivalent ($MTCO_2e$).

- **Emission factor:** A number that describes the amount of GHGs released per unit of a certain activity (e.g., GHGs per unit of natural gas used). Factors are provided by utility companies, state agencies, and guidance documents.

- **Greenhouse gas (GHG):** A gas capable of trapping heat radiated out by the earth and reflecting it back rather than allowing it to escape, much like the glass walls and ceiling of a greenhouse. Consistent with the US Community Protocol and the Local Government Operations Protocol (LGOP), the six GHGs assessed in the inventory are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). GHGs are often measured in units of carbon dioxide equivalent (CO_2e).

- **Global warming potential (GWP):** A comparison of the amount of heat energy trapped in the atmosphere by one type of GHG to another, relative to the amount of heat trapped by CO_2. For example, methane traps approximately 28 times as much heat in the atmosphere as CO_2, and so methane has a GWP of 28 while CO_2 has a GWP of 1.

- **Sector:** A category of activities responsible for GHG emissions, such as transportation, water use, or energy use. Sectors may comprise multiple GHG sources and activities.

These terms are consistent with the protocols and guidance outlined in the Regulatory Setting.

III. WALNUT CREEK GHG INVENTORY SUMMARY

A. 2013 INVENTORY RESULTS

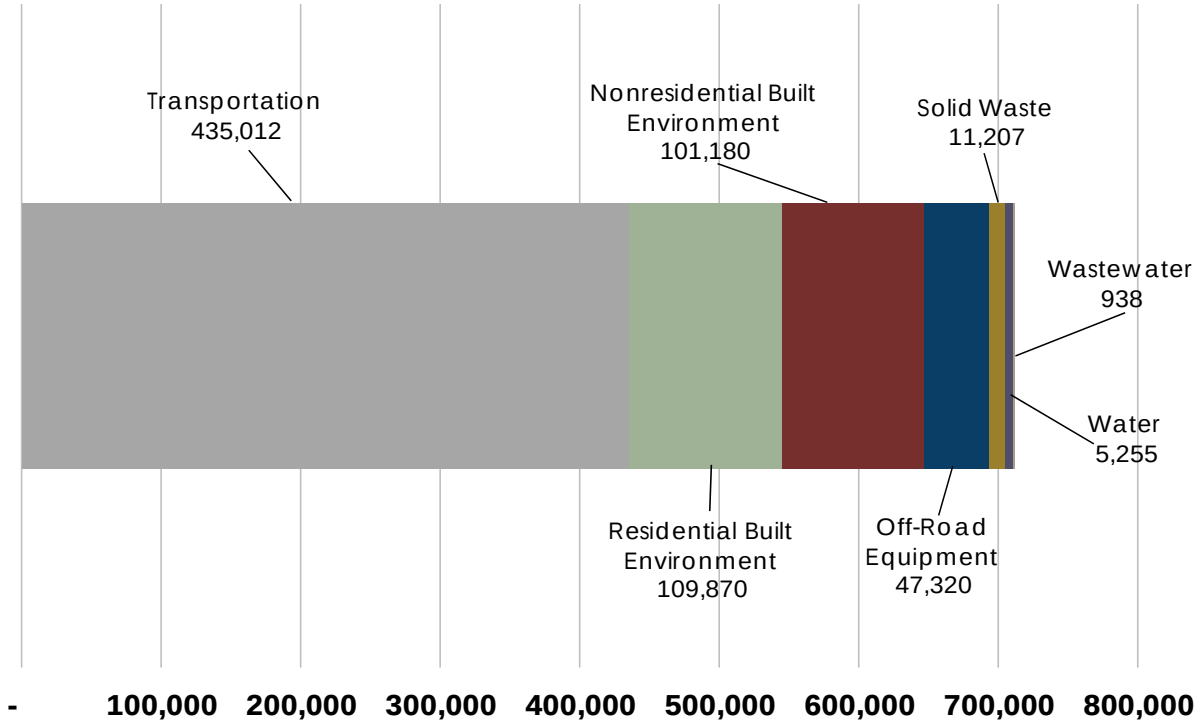
In 2013, Walnut Creek's emissions reached 710,782 $MTCO_2e$. On-road transportation accounted for over half of all 2013 emissions with 432,630 $MTCO_2e$ (60.87%). The residential built environment is the second largest sector, with 15.46% of total emissions (5.57% from electricity use and 9.89% from natural gas use). Nonresidential built environment is a close third, with 14.24% of all emissions (7.80% from electricity use and 6.44% from natural gas use). Off-road equipment emissions from construction produced 6.42% of 2013 emissions (**Table 1**). For information about methods and data used to inventory 2013 emissions, please see **Appendix B**.

Table 1: 2013 WALNUT CREEK GHG EMISSIONS ($MTCO_2E$)

Sector	Subsector	$MTCO_2e$	Percentage of Total
Residential built environment	Electricity	39,560	5.57%
	Natural Gas	70,310	9.89%
Nonresidential built environment	Electricity	55,410	7.80%
	Natural Gas	45,770	6.44%
Transportation	On-road transportation (Local Roads)	194,103	27.31%
	On-road transportation (Highways)	238,527	33.56%
	BART	2,382	0.34%
Off-road equipment	Construction	45,620	6.42%
	Lawn & Garden	1,700	0.24%
Solid Waste	Disposed Waste	11,207	1.58%
Water	Energy Use	5,255	0.74%
Wastewater	Energy Use	530	0.07%
	Direct Emissions	408	0.06%
Total		**710,782**	**100%**

To maintain consistency with baseline inventory, these figures are not rounded. In future reports, rounding is recommended.

Figure 1: 2013 WALNUT CREEK GHG EMISSIONS ($MTCO_2E$)



B. 2005 AND 2013 INVENTORY COMPARISON

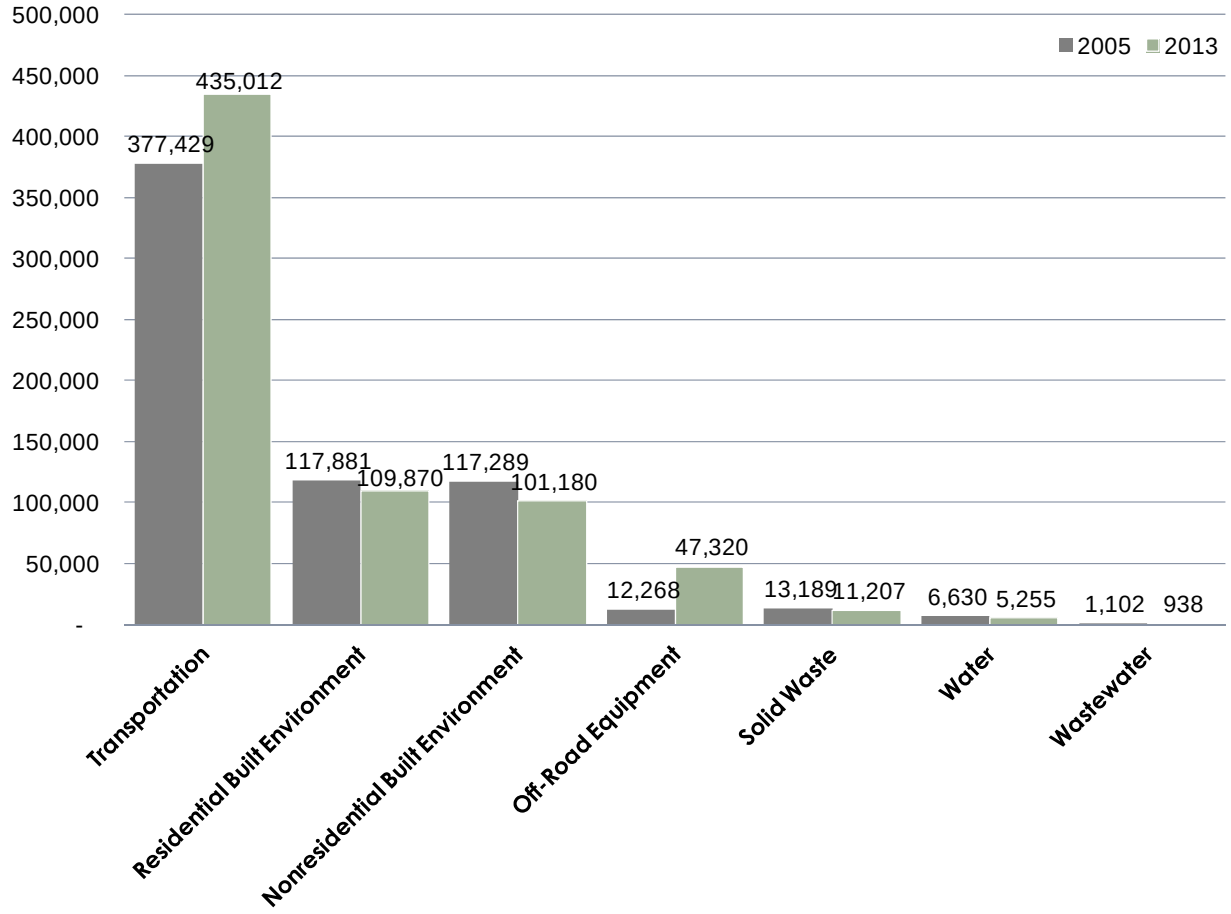
2005 baseline emissions totaled 645,597 $MTCO_2e$ after minor adjustments (detailed in **Appendix B**). **Table 2** and **Figure 2** provide a sector comparison of the 2005 inventory (after adjustments) to the 2013 inventory. Many sectors, such as residential energy use, nonresidential electricity, solid waste, water, and wastewater saw emissions decrease between 2005 and 2013. In some instances these decreases in emissions were significant (as high as a 29% decrease), while others were more minor. These reductions are linked to a decrease in activity, lower emissions factors, or both. For example, emissions from residential electricity use declined by 16%, both because electricity production is becoming cleaner and because residences are using less energy.

Other sectors saw increases in emissions between inventories. The two sectors with the largest emissions increases were on-road transportation and off-road equipment. Emissions from on-road vehicles rose from 375,047 $MTCO_2e$ in 2005 to 432,630 $MTCO_2e$ in 2013, due to an unprecedented increase in 2013 vehicle miles traveled (VMT) and causing an increase in the transportation sector. Construction emissions also rose significantly, from 10,595 $MTCO_2e$ in 2005 to 45,620 $MTCO_2e$ in 2013, causing a large rise in the off-road equipment sector. These increases were substantial enough to bring 2013 emissions above 2005 level by 10%. Yet available information indicates that there are annual fluctuations in emissions from these sectors and not a sustained increase in emissions over time. Due to annual volatility in these sectors, evidence does not indicate that increases in emissions from construction and transportation will continue in a sustained manner. Consequently there remains confidence in the forecast as an accurate representation of expected emissions declines in Walnut Creek (**Section IV**).

Table 2: WALNUT CREEK EMISSIONS, 2005 AND 2013

Sector	2005 $MTCO_2e$	2005 Percentage	2013 $MTCO_2e$	2013 Percentage	Percent Change
Residential built environment	117,881	18%	109,870	15%	-7%
Nonresidential built environment	117,289	18%	101,180	14%	-14%
Transportation	377,237	58%	435,012	61%	15%
Off-road equipment	12,268	2%	47,320	7%	286%
Solid waste	13,189	2%	11,207	2%	-15%
Water	6,630	1%	5,255	1%	-21%
Wastewater	1,102	0%	938	0%	-15%
Total	**645,597**	**100%**	**710,782**	**100%**	**10%**

Figure 2: WALNUT CREEK EMISSIONS BY SECTOR, 2005 AND 2013 ($MTCO_2E$)



IV. FORECAST

The CAP presents a GHG emissions forecast for Walnut Creek in 2020 and 2030, based on available guidance and best practices at the time. The 2005 baseline inventory serves as the foundation for these forecasts, using indicators to project "business-as-usual" (BAU) conditions for GHG emissions. The BAU forecast assumes behaviors and technologies do not become more efficient from the baseline year, but population, jobs, and other metrics continue to grow as projected. While the methods through which emission growth is projected remain fundamentally the same, some of the information used to prepare the forecasts have changed since the 2005 inventory. The following sections account for priority updates to the data used in the original forecast, to ensure accuracy in tracking Walnut Creek's progress to its targets. **Appendix C** includes further discussion of forecast alterations.

A. FORECAST INDICATORS

The forecast projects emissions for two years, 2020 and 2030, from a baseline year of 2005. This helps to maintain consistency with AB 32 as well as state and regional CEQA guidelines. It also allows for a comparison with the original forecast included in the adopted CAP. Future year estimates are created using forecast indicators to predict the growth of emissions based on demographic data. The Association of Bay Area Governments (ABAG) predicts changes in

population, households, and jobs over time, and these projections are used as indicators of the growth in emissions in different sectors. This inventory uses ABAG's most recent growth forecast, from its document "Projections 2013" to project job growth, consistent with the City's internal expectations. However, Walnut Creek has found that the ABAG projections for population and housing to be slightly more aggressive than the Planning Division's estimates. To retain consistency with other City documents, the forecast relies on household and population estimates from the City. **Table 3** contains the indicators used in each sector and subsector, the value of these indicators, and their source (on-road transportation was not forecasted using an indicator). More discussion on the data used to create these forecasts is in **Appendix C**, under Population Adjustment.

Table 3: FORECAST INDICATORS

Indicator	Sectors and Subsectors	2005 Value	2020 Value	2030 Value	Percent Change 2005–2030	Source
Households	Residential built environment, off-road equipment	31,050	33,000	35,700	14.98%	City of Walnut Creek Planning Division
Jobs	Nonresidential built environment	54,830	49,860	52,990	-3.36%	ABAG, 2013
Service Population	Solid waste, water, wastewater, BART	121,030	118,008	124,623	2.97%	City of Walnut Creek Planning Division, ABAG, 2013

B. FORECAST SUMMARY

New information and best practices have evolved since adoption of the CAP in 2012. Adjustments to the CAP forecasts allow for improved accuracy and consistency with regional guidance and new protocols. Forecast adjustments account for current scientific understanding of the potency of different GHG emissions, the most recent statewide regulations that will further decrease emissions in Walnut Creek and elsewhere, and revised growth expectations. The CAP and GHG emissions forecasts assumed patterns of demographic growth that were deemed accurate at the time, but growth slowed as a result of the recession. Demographic forecasts issued after the recession show a slower rate of growth than the prerecession projections used in the CAP. Because of this, the CAP's assumptions in the adopted BAU forecast are now more aggressive than adopted regional forecasts, as reflected in **Table ES-2** and **Table 4**.

- **Original Inventory (Adopted BAU Forecast):** This assumes no federal, state, regional, or local efforts to reduce GHG emissions (a "worst case" scenario).
- **Global Warming Potential (GWP) Adjustment:** A consortium of the world's top climate scientists, the Intergovernmental Panel on Climate Change (IPCC) has revised GWP values based on recent studies, replacing the GWPs used in the adopted CAP. The 2013 inventory applied these updated GWPs to the adopted 2005 inventory. This adjustment reduced expected BAU emissions by 48,928 $MTCO_2e$ in 2020 and 36,484 $MTCO_2e$ in 2030.
- **Local Adjustment:** The current demographic forecasts for Walnut Creek are lower than those used in the adopted CAP, which were developed prior to the economic downturn. This lower rate of growth results in fewer emissions for future years. Additionally, Walnut Creek has seen a long-term decrease in the amount of waste generated per

person, even as economic activity improves and the population continues to rise. This suggests that it is inaccurate to base future emissions for solid waste on 2005 activities, as this would be inconsistent with observed trends. These reductions cannot be directly attributed to specific programs, so the BAU forecast was revised to account for these trends. The demographic changes and changes in observed waste behavior created a forecast revision known as the "Local Adjustment." The local adjustment reduced expected emissions by 28,599 $MTCO_2e$ in 2020 and 37,814 $MTCO_2e$ in 2030.

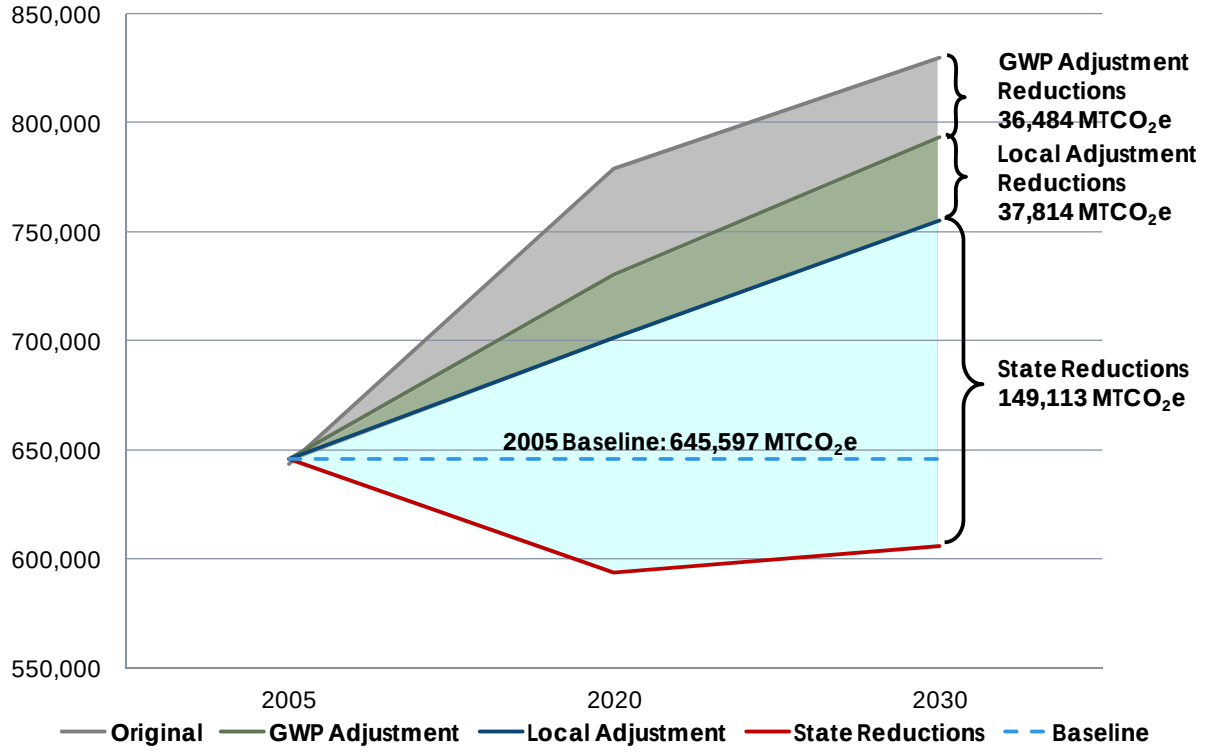
- **State Reductions:** Adjustments from the original inventory reflect the most recent understanding of the effects of statewide programs, such as Title 24 and Pavley Standards. The state reductions decreased expected emissions by 107,946 $MTCO_2e$ in 2020 and 149,113 $MTCO_2e$ in 2030.

The changes between the original forecast and the 2013 inventory forecast created with the current best available data are shown in **Table 4** and **Figure 3** as a series of incremental adjustments. Anticipated increases in state actions last through 2020, but an expected slower rate of post-2020 legislation results in declined rates of anticipated GHG reductions between 2020 and 2030. At the same time, growth in Walnut Creek will likely increase, leading to an overall rise in emissions after 2020. Adjustments to the forecast result in an 8% reduction in GHG emissions below baseline 2005 levels by 2020 and 6% reduction below baseline 2005 levels by 2030. To achieve the full CAP target of a 15% reduction below baseline 2005 levels by 2020, the city would need to reduce emissions an additional 7% below baseline levels. Details about each adjustment are in **Appendix C**.

Table 4: FORECAST ADJUSTMENTS ($MTCO_2E$)

Forecast Adjustments	2020	2030
Baseline	**645,597**	**645,597**
Adopted BAU Forecast	779,117	829,535
GWP Adjustment	-48,928	-36,484
Local Adjustment	-28,599	-37,814
State Reductions	-107,946	-149,113
Total Reductions from Forecast Updates	-185,473	-2223,411
Adjusted Forecast	**593,644**	**606,125**
Percentage Reduction from Baseline	**-8%**	**-6%**

Figure 3: 2030 FORECAST ADJUSTMENTS (MTCO2E)



Note: the original forecast shows the forecast as adopted in the CAP, which assumes higher levels of growth and a worst-case, BAU GHG emissions scenario. Forecast updates reflect more recent information on anticipated growth.

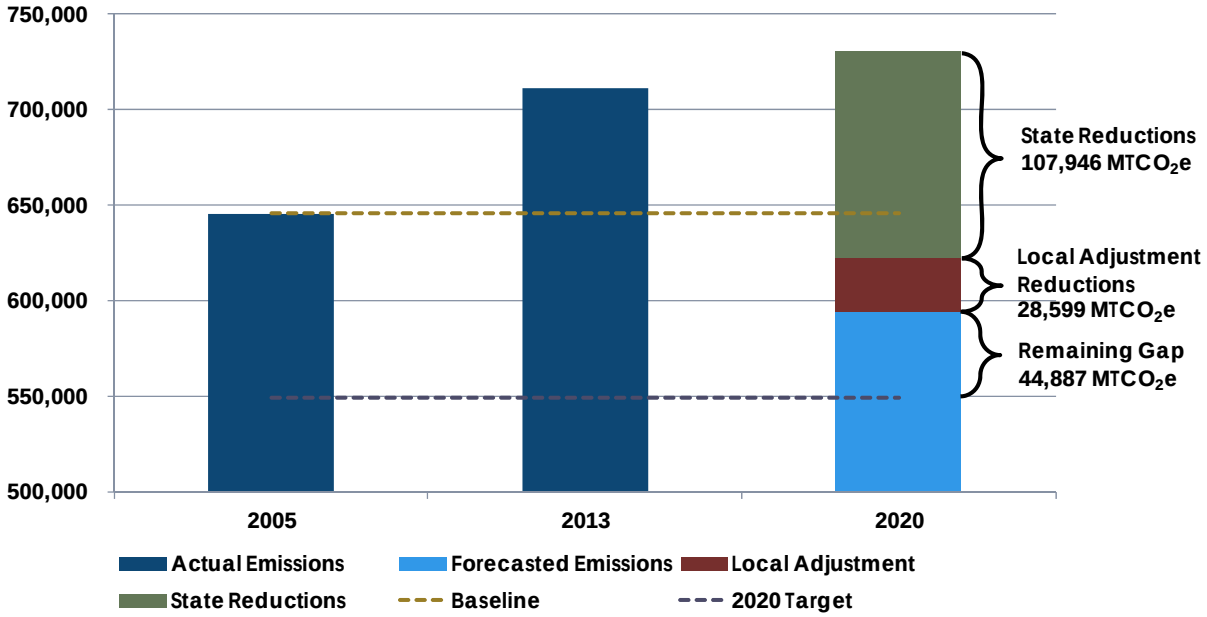
V. PROGRESS TO REDUCTION TARGET

The 2013 inventory serves as a progress check of where Walnut Creek stands in relation to its 15% below baseline reduction target for 2020. The 2013 inventory identifies sustained reductions in certain sectors, such as waste disposal, that will continue to help the City reduce emissions. It also finds short-term increases in the on-road transportation and construction equipment sectors. These increases were not used to alter the forecast, because there is no evidence that they represent a sustained trend at this time. This inventory also does not include credits for local activities since the adoption of the CAP in 2012, but those will be included in future CAP updates with a full evaluation of the impact of these actions. Because the 2013 inventory analyzes emissions only a year after the CAP was adopted, it provides an important look at the City's existing conditions, but is not indicative of a lack of impact of the CAP, because implementation is expected to increase closer to 2020.

Building from the 2020 forecast adjustments shown in **Figure 3**, **Figure 4** demonstrates progress to the City's 2020 target from the GWP-adjusted baseline. In 2020, the local adjustment will reduce 28,599 $MTCO_2e$. State-led reductions will reduce 107,946 $MTCO_2e$ from the local adjustment forecast. This leaves a reduction goal of a further 44,887 $MTCO_2e$, to be reduced by implementing the CAP. **Figure 4** also shows the 2013 inventory relative to the local and state reductions and the remaining gap. Although the emissions found in the 2013 inventory are higher than the 2020 forecast, the unprecedented spike in vehicle and construction emissions are not consistent with sector trends, as trends since 2005 suggest that these spikes in emissions are due to short-term annual volatility rather than longer-term conditions. The great progress made in

decreasing emissions in other sectors demonstrates Walnut Creek's commitment to reaching the 2020 target.

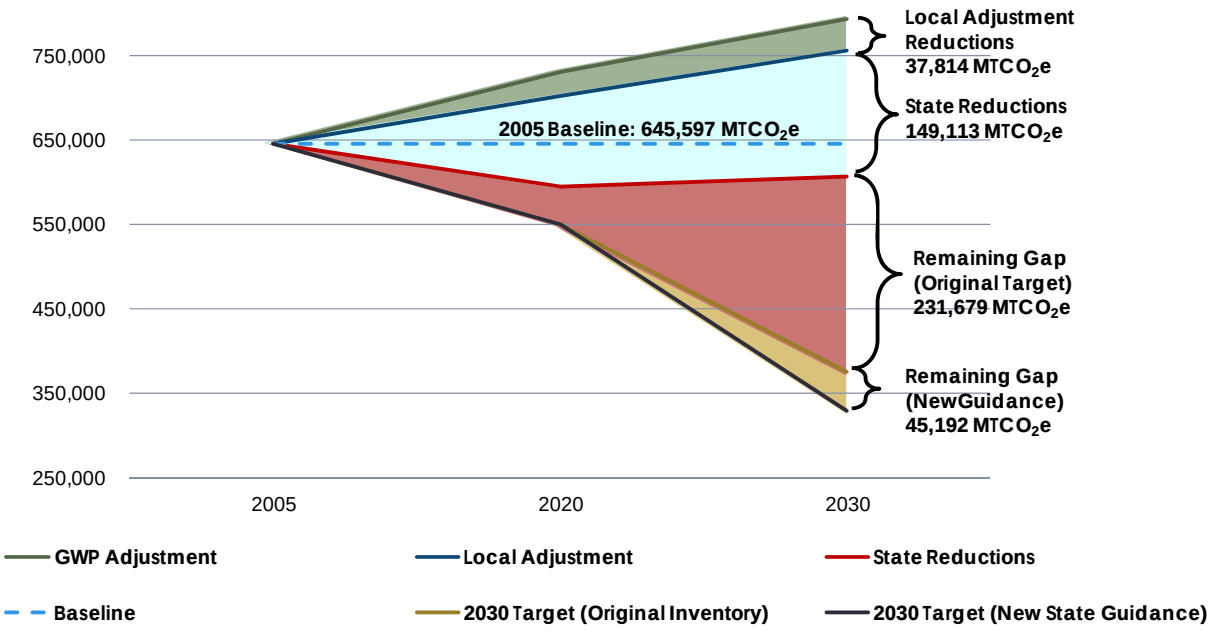
Figure 4: 2013 INVENTORY AND 2020 TARGET ($MTCO_2E$)



Note: the 2020 target is equivalent to the City's adopted target of a 15% reduction below 2005 GHG emissions levels by 2020. The target shown here has been updated to reflect newer GWPs.

The original CAP estimated a reduction of 42% below baseline by 2030, although this was not adopted as a target. Recent statewide guidance from EO B-30-15 identifies a statewide target of 40% below 1990 levels by 2030, although this goal has not yet been formally established by legislative or regulatory action (legislation currently in development would codify this target). The target in EO B-30-15 is equivalent to 49% below 2005 levels by 2030 for Walnut Creek. In the absence of any formal target adopted by state or regional agencies, Walnut Creek may choose in future CAP updates which forecast is the most appropriate for the City while still complying with statewide targets. A comparison of the CAP's 2030 target levels to the new 2030 target identified in EO B-30-15 is shown in **Figure 5**. To achieve the new 2030 target established by EO B-30-15, the community would need to further reduce an additional 45,192 $MTCO_2e$ beyond the CAP's 2030 target levels.

Figure 5: 2030 FORECAST ($MTCO_2E$)



Note: this table shows 2030 state targets as estimated in the CAP, in comparison to new 2030 state guidance.

VI. APPENDICES

A. DATA SOURCES

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California Air Resource Board. 2010. LGOP (Local Government Operations Protocol). http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm

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California Department of Transportation. 2013. Highway Performance Monitoring System. http://www.dot.ca.gov/hq/tsip/hpms/datalibrary.php

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East Bay Municipal Utilities District. 2013. Walnut Creek Use by Zipcode.

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B. METHOD DISCUSSION

This section will provide a more detailed discussion of the methods used to obtain activity data and to calculate emissions for each sector. Additionally, changes from 2005 to the 2013 inventory provide context of progress to emissions reductions as well as areas that may require more focus on reductions to reach 2020 and 2030 targets. This section first presents overall activity data and emission factors, followed by sector-by-sector methods for calculating emissions.

1. Activity Data

Measuring community-wide activity data is essential for creating best estimates of GHG emissions. Different responsible agencies, including state and local departments, measure these activities annually; this data is known as activity data. 2005 and 2013 activity data is shown in **Table A-1**.

Table A-1: WALNUT CREEK ACTIVITY DATA, 2005 AND 2013

Sector	Subsector	2005 Inventory Activity Data	2013 Inventory Activity Data	Unit of Measurement	Activity Data Source
Residential built environment	Electricity	213,598,642	202,598,034	kWh	PG&E
	Natural Gas	13,109,879	13,209,381	Therms	PG&E
Nonresidential built environment	Electricity	352,915,877	283,774,195	kWh	PG&E
	Natural Gas	7,182,540	8,599,739	Therms	PG&E
Transportation	On-road Vehicle Miles	847,089,857	896,467,044	Vehicle Miles Traveled	CalTrans Highway Performance Monitoring System
	BART	36,413,208	39,525,589	BART miles	BART Ridership Report
Off-road equipment	Construction	10,595	45,620	$MTCO_2e$	US HUD State of the Cities Data Systems and CARB OFFROAD Modeling Application
	Lawn & Garden	1,673	1,700	$MTCO_2e$	CARB OFFROAD Modeling Application
Solid Waste	Disposed Waste	94,066	62,336	Tons	City of Walnut Creek
Water	Energy Use	30,346,050	26,913,582	kWh	Contra Costa Water District & East Bay Municipal Utilities District
Wastewater	Energy Use	3,434,418	2,715,512	kWh	Contra Costa Water District & East Bay Municipal Utilities District
	Direct Emissions	431	408	$MTCO_2e$	Contra Costa Water District & East Bay Municipal Utilities District

2. Emission Factors

The inventory uses established methods to translate local activities into associated GHG outputs. Activity data in the inventory comes from private utility companies such as Pacific Gas and Electric (PG&E), local government service providers and districts such as the City of Walnut Creek and Contra Costa Water District, or state agencies such as CARB and the California Department of Transportation (CalTrans). The Local Government Operations Protocol (LGOP),

which was developed by CARB and multiple climate science groups, also provides a set of common standards and calculation tools for reporting GHG emissions that guided methods used in this inventory. Different activities generate GHG emissions at different rates, as reflected in emission factors for different activities. Multiplying activity data by established emission factors determines total GHG emissions for each sector. An emission factor is a number that describes how many GHGs each unit of activity, such as a kilowatt hour or vehicle mile traveled, produces. **Table A-2** provides the emission factors for the 2005 and 2013 inventories (note that sectors and subsectors without emission factors are not included).

Table A-2: WALNUT CREEK EMISSION FACTORS, 2005 AND 2013

Sector	Subsector	2005 Inventory Emission Factor	2013 Inventory Emission Factor	Emission Factor Source
Residential built environment	Electricity	0.000224 $MTCO_2e$/kWh	0.000195 $MTCO_2e$/kWh	LGOP and PG&E
	Natural Gas	0.005323 $MTCO_2e$/therm	0.005323 $MTCO_2e$/therm	LGOP
Nonresidential built environment	Electricity	0.000224 $MTCO_2e$/kWh	0.000195 $MTCO_2e$/kWh	LGOP and PG&E
	Natural Gas	0.005323 $MTCO_2e$/therm	0.005323 $MTCO_2e$/therm	LGOP
Transportation	On-road transportation	0.000445 $MTCO_2e$/VMT	0.000483 $MTCO_2e$/VMT	CARB
	BART	0.000060 $MTCO_2e$/mile	0.000060 $MTCO_2e$/mile	BART GHG Inventory
Solid Waste	Disposed Waste	0.105160 $MTCO_2e$/ton	0.180963 $MTCO_2e$/ton	CARB Landfill Tool
	Alternative Daily Cover	NA	0.151631 $MTCO_2e$/ton	CARB Landfill Tool
Water	Energy Use	0.000224 $MTCO_2e$/kWh	0.000195 $MTCO_2e$/kWh	LGOP, PG&E, and California Energy Commission
Wastewater	Energy Use	0.000224 $MTCO_2e$/kWh	0.000195 $MTCO_2e$/kWh	LGOP, PG&E, and California Energy Commission

1. Built Environment (residential and nonresidential energy use)

The built environment accounted for over 36% of total emissions in 2005 and over 29% of total emissions in 2013, making it the second largest source of emissions in both inventories, behind transportation. PG&E is the provider of both natural gas and electricity to all customers in Walnut Creek. In 2005, PG&E reported that residential buildings used 213,598,642 kilowatt hours (kWh) of electricity and 13,109,879 therms of natural gas. In 2013, PG&E reported that residential users had reduced electricity use by 5%, to 202,598,034 kWh. Residential natural gas use in 2013 rose 1% from 2005 data, to 13,209,381 therms. Nonresidential users, which include offices, shops, restaurants, and other commercial energy users in Walnut Creek, consumed 352,915,877 kWh and 7,182,540 therms in 2005, according to PG&E. Electricity data reported by PG&E does not report electricity produced by on-site renewable energy systems, such as rooftop solar.

However, on-site renewable energy systems generally offset electricity purchases from utility companies, thereby resulting in lower overall energy usage reported by the utility. As a result, PG&E data indirectly reflects any changes in electricity purchasing behaviors, although PG&E data does not directly report total communitywide energy production by on-site systems. [1] There are no industrial facilities that use significant quantities of fuel or otherwise produce a large amount of emissions, known as stationary source emissions, in Walnut Creek.[2] In 2013, electricity use among nonresidential customers had decreased 20%, to 283,774,195 kWh, while nonresidential natural gas use had increased 20%, to 8,599,739 therms.[3] **Table A-3** shows all changes in activity data between 2005 and 2013.

Table A-3: BUILT ENVIRONMENT ACTIVITY DATA, 2005–2013

Sector	2005 Activity Data	2013 Activity Data	Unit of Measurement	Percent Change (2005-2013)
Residential Electricity	213,598,642	202,598,034	kWh	-5%
Residential Natural Gas	13,109,879	13,209,381	Therms	1%
Nonresidential Electricity	352,915,877	283,774,195	kWh	-20%
Nonresidential Natural Gas	7,182,540	8,599,739	Therms	20%

Emission factors for electricity change year to year based on the sources of the electricity sold by PG&E. As the utility purchases more power from renewable sources to comply with the goals set forth in the Renewables Portfolio Standard (RPS), PG&E's emission factor for electricity has generally decreased since 2005, from 0.000224 $MTCO_2e$/kWh to 0.000195 $MTCO_2e$/kWh (**Table A-2**). These emissions factors are released with the activity data for Walnut Creek's electricity use, as well as in annual reports to demonstrate progress to RPS targets. Because natural gas retains the same content year after year, the emissions factor stays the same, at 0.00532 $MTCO_2e$/therm. Changes in Walnut Creek's built environment emissions between 2005 and 2013 are shown in **Table A-4**.

Table A-4: BUILT ENVIRONMENT GHG EMISSIONS, 2005–2013 ($MTCO_2E$)

Sector	2005 Emissions	2013 Emissions	Percent Change (2005–2013)
Residential Electricity	47,120	39,560	-16%

[1] Walnut Creek's credit from on-site renewable energy systems will be fully accounted for in the updated CAP.

[2] The lack of stationary source emissions in Walnut Creek is verified by the California Mandatory GHG Report 2013 Emissions Data (http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm) and the 2007 Source Inventory of Bay Area Greenhouse Gas Emissions prepared by BAAQMD (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Emission%20Inventory/regionalinventory2007_2_10.ashx)

[3] While there were some gradual increases in nonresidential natural gas use from 2005 to 2013, a substantial proportion of this 20% increase occurred as a result of a spike in nonresidential natural gas use in 2011

Residential Natural Gas	70,761	70,310	-1%
Nonresidential Electricity	78,554	55,410	-29%
Nonresidential Natural Gas	38,735	45,770	18%

2. On-Road Transportation

This sector captures trips on roads and highways in Walnut Creek, regardless of origin or destination. Emissions are generated from car trips in Walnut Creek's boundaries, with trips as measured as vehicle miles traveled or VMT. Unlike origin-destination models, this "community boundary" approach focuses on trips that occur within the boundaries of Walnut Creek. While origin-destination models assign trips to the City that start or end in the community, accounting for total trip length, the US Community Protocol identifies the "community boundary" method as an acceptable alternate approach (see Method TR.1.b). At this time, publicly accessible origin-destination VMT is unavailable for jurisdictions in Contra Costa County. The community boundary approach is also more consistent with the approach of the baseline 2005 inventory, allowing for comparability to the baseline year.

CalTrans is the state agency responsible for measuring on-road transportation in communities throughout California. The Highway Performance Monitoring System (HPMS) measures annual VMT at city- and countywide levels. The report is broken into urban, rural, and highway miles traveled. For cities, only local roads data is reported. However, Walnut Creek has multiple state highways passing through the city. Some of the miles traveled on those highways must be attributed to traffic generated by Walnut Creek homes and business. To do this, the share of VMT on Walnut Creek local roads compared to all local roads in Contra Costa County was calculated, showing that the city represents 11% of this VMT.[4] Then, this share of VMT (11%) is applied to Contra Costa County highway miles. In 2005, on-road transportation activity in Walnut Creek totaled 847,089,857 VMT. In 2013, this activity rose to 896,467,044 VMT, an increase of 6% from 2005 levels, as shown in **Table A-5**.

Table A-5: ON-ROAD TRANSPORTATION ACTIVITY DATA, 2005–2013

Sector	2005 Activity Data	2013 Activity Data	Unit of Measurement	Percent Change (2005–2013)
On-Road Transportation (Local Roads)	374,395,650.00	402,207,700	VMT	7%
On-Road Transportation (Highways)	472,694,206.96	494,259,344	VMT	5%
On-Road Transportation (Total)	847,089,857	896,467,044	VMT	6%

[4] This method does not take into account where the traffic is coming from or where it is going to (known as an origin-destination calculation), as CalTrans does not report data in this fashion. Instead, this method assumes that Walnut Creek generates the same proportion of Contra Costa County's highway traffic as local traffic. The US Community Protocol identifies this method as an appropriate alternative when origin-destination data is not available.

GHG emissions from transportation are based on countywide data from the EMFAC database maintained by CARB.[5] Although VMT increased by 6% from 2005 to 2013, total on-road transportation emissions increased 15%, from 375,047 $MTCO_2e$ in 2005 to 432,630 $MTCO_2e$ in 2013, as indicated in **Table A-6**. An increase in medium-duty vehicles between 2005 and 2013, as well as incremental increase in other heavier duty vehicles, is partly responsible for why on-road transportation emissions increased at a larger rater than VMT activity.

Table A-6: ON-ROAD TRANSPORTATION GHG EMISSIONS, 2005–2013 ($MTCO_2E$)

Sector	2005 Emissions	2013 Emissions	Percent Change (2005–2013)
On-Road Transportation (Local Roads)	201,730	194,103	-4%
On-Road Transportation (Highways)	173,317	238,527	38%
On-Road Transportation (Total)	375,047	432,630	15%

3. Off-Road Equipment

The off-road equipment sector consists of equipment and vehicles that consume gasoline or diesel fuel but are not intended for on-road transportation. The activities included in this sector range from the use of small landscaping equipment (e.g., leaf blowers) to large construction equipment. In Walnut Creek, this sector includes two subsectors:

- Construction: equipment and vehicles used for construction, such as tractors, cranes, and excavators
- Lawn and garden: equipment used for landscaping purposes, including lawnmowers, chainsaws, and tillers

GHG emissions are calculated using CARB's publicly available OFFROAD modeling software rather than activity data. OFFROAD provides emissions estimates for different equipment types at the countywide level based on equipment and vehicle registration numbers. Emissions for construction equipment were allocated based on the percentage of new houses in Contra Costa County constructed in Walnut Creek during each inventory year, using US Department of Housing and Urban Development (HUD) data. While this calculation includes the emissions from all construction activities, Walnut Creek's share of these emissions is based on Walnut Creek's share of all new single family and multifamily residential constructions in Contra Costa County, consistent with the methods employed by jurisdictions across the Bay Area seeking consistency with BAAQMD guidance. Due to limits in data availability, Walnut Creek's share of new nonresidential permitting does not affect how these emissions are allocated. Lawn and garden emissions were calculated using the percentage of Contra Costa County households located in Walnut Creek, using ABAG estimates. Changes in emissions by subsector for off-road activity are shown in **Table A-7**.

[5] CARB data does not specifically identify VMT from electric vehicles (EVs). However, the CARB data does reflect changes in vehicle fuel efficiency, including reduction in fuel use as a result of increased EV usage. Therefore, EVs are accounted for in the GHG emissions data from the EMFAC database.

Table A-7: OFF-ROAD EQUIPMENT ACTIVITY DATA AND GHG EMISSIONS, 2005–2013 ($MTCO_2E$)

Sector	2005 Activity Data	2013 Activity Data	Percent Change (2005–2013)
Construction	10,595	45,620	331%
Lawn & Garden	1,673	1,700	2%

4. Solid Waste Generation

Solid waste generation in Walnut Creek saw a sustained decrease in tons disposed from 2005 to 2013, as shown in **Table A-8**, despite an increase in population. This data was provided by the City, and represents information from Walnut Creek's waste providers, including RecycleSmart, Republic Services, Valley Waste Management, and Pacific Rim. Of this waste, 52,785 tons were municipal solid waste, 8,464 tons were Alternative Daily Cover (ADC)[6], and 1,087 tons were direct waste to energy, where EBMUD transferred commercial food waste into energy.

Table A-8: SOLID WASTE ACTIVITY DATA, 2005–2013

Sector	2005 Activity Data	2013 Activity Data	Unit of Measurement	Percent Change (2005–2013)
Solid Waste	94,066	62,336	Disposed Tons	-34%

Emissions from solid waste were calculated using the publicly available CARB landfill emissions tool Version 1.3. The tool takes into account the composition of the waste using statewide waste characterization estimates and the climate where the landfill is located (which affects decomposition rates) and calculates the total GHG emissions produced by decomposition of the material. A refined understanding of waste emissions found a higher emission factor for solid waste than was used in the original inventory, meaning that the change in emissions between 2005 and 2013 represented a 15% decrease, as shown in **Table A-9,** instead of the 34% decrease found in activity data.

Table A-9: SOLID WASTE GHG EMISSIONS, 2005–2013 ($MTCO_2E$)

Sector	2005 Emissions	2013 Emissions	Percent Change (2005–2013)
Solid Waste	13,189	11,207	-15%

5. BART

BART use in Walnut Creek has risen slightly since the original 2005 inventory. The transit agency releases monthly ridership reports showing how many annual miles are attributed to each station. The Walnut Creek station's ridership report for 2013 was analyzed for the month of April to

[6] Alternative Daily Cover is material placed on an active area of a landfill to reduce odors, blowing litter, animal activity, or other undesirable conditions. California has specific requirements for what kinds of material can be used as ADC and how it should be counted (http://www.calrecycle.ca.gov/lgcentral/basics/adcbasic.htm).

maintain consistency with the original inventory. Walnut Creek is responsible for half of all miles attributed to the BART station. In 2005, 36,413,208 BART miles were traveled from the Walnut Creek station, and in 2013 there was a 9% increase in miles traveled, to 39,525,589 miles, shown in **Table A-10**. The emission factor for these miles relies on a report by BART that has not been updated since the original inventory, so the emissions have grown at the same rate as the activity data, as shown in **Table A-11**. This historical factor is verified by BAAQMD and remains the most accurate available emissions factor due to BART's unique power purchasing contracts.

Table A-10: BART ACTIVITY DATA, 2005–2013

Sector	2005 Activity Data	2013 Activity Data	Unit of Measurement	Percent Change (2005–2013)
BART	36,413,208	39,525,589	BART Miles	9%

Table A-11: BART GHG EMISSIONS, 2005–2013 ($MTCO_2E$)

Sector	2005 Emissions	2013 Emissions	Percent Change (2005–2013)
BART	2,190	2,382	9%

6. Water and Wastewater

The City of Walnut Creek has two water providers—Contra Costa Water District (CCWD) and the East Bay Municipal Utility District (EBMUD). In 2013, 3,854 million gallons (MG) were provided to Walnut Creek from EBMUD and 1,938 MG were provided by CCWD. These numbers are best estimates calculated using data sorted by zip code, which may overestimate the water use in Walnut Creek. Note that these consumption figures are best available estimates for purposes of the inventory, providing a closer representation of local use than regional water reports. However, this data is not intended for use outside of this inventory, nor is it intended to serve as a baseline for progress towards per capita consumption targets or mandatory water reductions regulated by the State Water Board. This understanding of MG provided allows for analysis of the energy in kWh required to treat and transfer water for consumption in Walnut Creek. To compare this consumption to the 2005 inventory, the analysis used the same water-energy relationship assumptions. This understanding, based on reports from the National Resource Defense Council and California Energy Commission, assumes that 61% of water is used indoors and 39% is used outdoors; 5,411 kWh are used for each MG used indoors, while 3,500 kWh are used for each MG used outdoors. This allows for the calculation of total energy use for water use by applying the proportion of indoor and outdoor use to the kWh each requires, using the water supply data provided by EBMUD and CCWD shown in **Table A-12**. Then, emissions are calculated using the same emission factor from PG&E and applied to the kWh used to move and process water for Walnut Creek as shown in **Table A-13**. Between 2005 and 2013, electricity use for water decreased 11%, from 30,346,050 kWh in 2005 to 26,913,582 kWh in 2013. Because the emission factor for electricity also dropped between 2005 and 2013 (**Table A-2**), total emissions from water use dropped 21%, from 6,630 $MTCO_2e$ to 5,255 $MTCO_2e$.

Wastewater was calculated in this inventory for both 2005 and 2013. There are two different subsectors related to wastewater emissions: energy use and direct emissions. Energy use refers to the electricity required to move and process wastewater from the city, and the resulting GHG emissions from generating this electricity. Direct emissions are methane and nitrous oxide

released into the atmosphere as a result of the wastewater treatment process due to the decomposition of organic matter, which is measured using US Community Protocol guidance on process emissions from wastewater treatment plants. Energy use from wastewater decreased 21% between 2005 and 2013, from 3,434,418 kWh in 2005 to 2,699,652 kWh in 2013. Because the emission factor for electricity also dropped between 2005 and 2013 (**Table A-2**), emissions from wastewater electricity dropped 21%, from 671 $MTCO_2e$ to 527 $MTCO_2e$. Direct emissions dropped from 431 $MTCO_2e$ in 2005 to 407 $MTCO_2e$ in 2013, a 6% decrease as shown in **Table A-13**.

Table A-12: WATER AND WASTEWATER ACTIVITY DATA, 2005–2013

Sector	2005 Activity Data	2013 Activity Data	Unit of Measurement	Percent Change (2005–2013)
Water (Energy Use)	30,346,050	26,913,582	kWh	-11%
Wastewater (Energy Use)	3,434,418	2,715,512	kWh	-21%
Wastewater (Direct Emissions)	431	408	$MTCO_2e$	-5%

Table A-13: WATER AND WASTEWATER GHG EMISSIONS, 2005–2013 ($MTCO_2E$)

Sector	2005 Emissions	2013 Emissions	Percent Change (2005–2013)
Water (Energy Use)	6,630	5,255	-21%
Wastewater (Energy Use)	671	530	-21%
Wastewater (Direct Emissions)	431	408	-5%

C. FORECAST DISCUSSION

Forecasting emissions depends on a number of different factors, all of which rely on best practices and the most updated scientific understanding, but still rely on assumptions to reach GHG projections for future years. Since the preparation of the 2005 inventory, a few key pieces used to create forecasts for 2020 and 2030 have been updated. In order to create practical goals and a comprehensive understanding of progress to targets, the updated forecast reflects these changes.

Table A-14: SUMMARY FORECAST ADJUSTMENTS

	Summary	2005 Baseline Emissions ($MTCO_2e$)	2020 Projected Emissions ($MTCO_2e$)	2030 Projected Emissions ($MTCO_2e$)
Original Forecast	This is the forecast as it is in the adopted CAP.	643,488	779,117	829,535
Global Warming Potential (GWP) Adjustment	This reflects changes in scientific understanding about the potential for each pollutant to increase global warming. This forecast is the "business as usual" scenario for all other adjustments.	645,597	730,189	793,052
Local Adjustment	This reflects the most recent regional demographic growth indicators, which were updated in 2013. It also includes changes that reflect significantly decreased waste disposal rates.	645,597	701,590	755,238
State Reductions	This reflects actions taken by state agencies that reduce GHG emissions at the citywide level without any action by local government.	645,597	593,644	606,125
Total Reductions	**Difference between the original forecast and updated forecast with state reductions.**	**2,109**	185,473	223,411

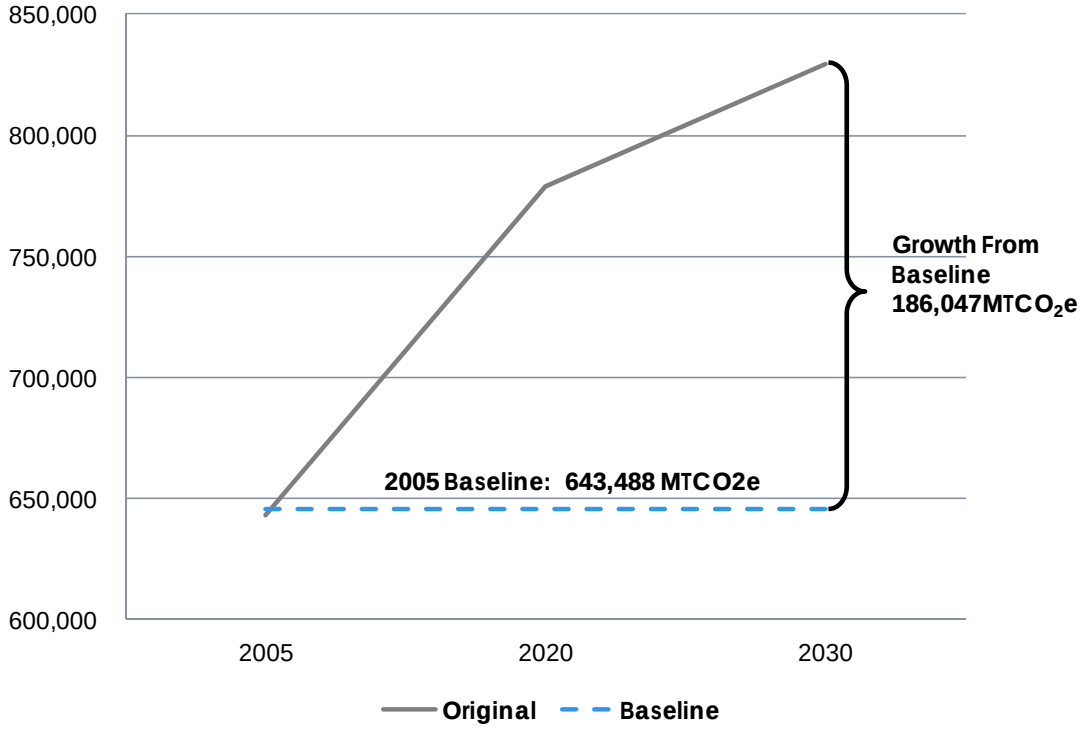
1. Original Forecast

This forecast was adopted with the CAP in 2012, and reflects a "worst-case scenario" for emissions increases, assuming there are no federal, state, or local actions made to reduce GHG emissions and that individual community members do not modify their behaviors. In this scenario, 2005 per capita activity data would continue to grow with the population, increasing GHG emissions through 2020 and 2030, shown in **Table A-15** and **Figure A-1**.

Table A-15: WALNUT CREEK GHG EMISSIONS FORECAST, ORIGINAL INVENTORY ($MTCO_2E$)

2005	2020	2030
643,488	779,117	829,535

Figure A-1: WALNUT CREEK GHG EMISSIONS FORECAST, ORIGINAL INVENTORY ($MTCO_2E$)



2. Global Warming Potential Adjustment

In 2013, after Walnut Creek's original CAP had been adopted, the IPCC released its 5th Assessment Report, which provides a consensus from the world's top officials on the most recent climate science. Part of this report included an update of global warming potential (GWP). Each pollutant has a GWP, which allows emissions to be assessed with an understanding of how big of an impact each unit of various GHGs has on the greenhouse effect relative to carbon dioxide (for example, one metric ton of methane has 28 times the impact on climate change as a metric ton of carbon dioxide, so one metric ton of methane is equal to 28 $MTCO_2e$). The GWP adjustment maintains all of the same assumptions about the growth of activity data through 2030 as the adopted forecast, but reflects the emissions with 5th Assessment Report GWPs, rather than the 2nd Assessment Report GWPs used before. Adjusting these figures changes the original forecast slightly, but provides the most appropriate representation of the scientific basis of climate change. All of the other adjustments in the adjusted forecast are based on this revised baseline. The updated GWPs are included in **Table A-16**.

Additionally, this adjustment includes the addition of the wastewater sector, which was not included in the 2005 CAP but was said to be included in future inventories to maintain consistency with BAAQMD recommendations. This added 1,102 $MTCO_2e$ to the original 2005 inventory, to allow for consistent and direct comparison with the 2013 inventory. Changes to the inventory and forecast as a result of the updated GWPs and the inclusion of wastewater are shown in **Table A-17** and **Figure A-2**.

Table A-16: GLOBAL WARMING POTENTIALS, 2ND ASSESSMENT REPORT TO 5TH ASSESSMENT REPORT

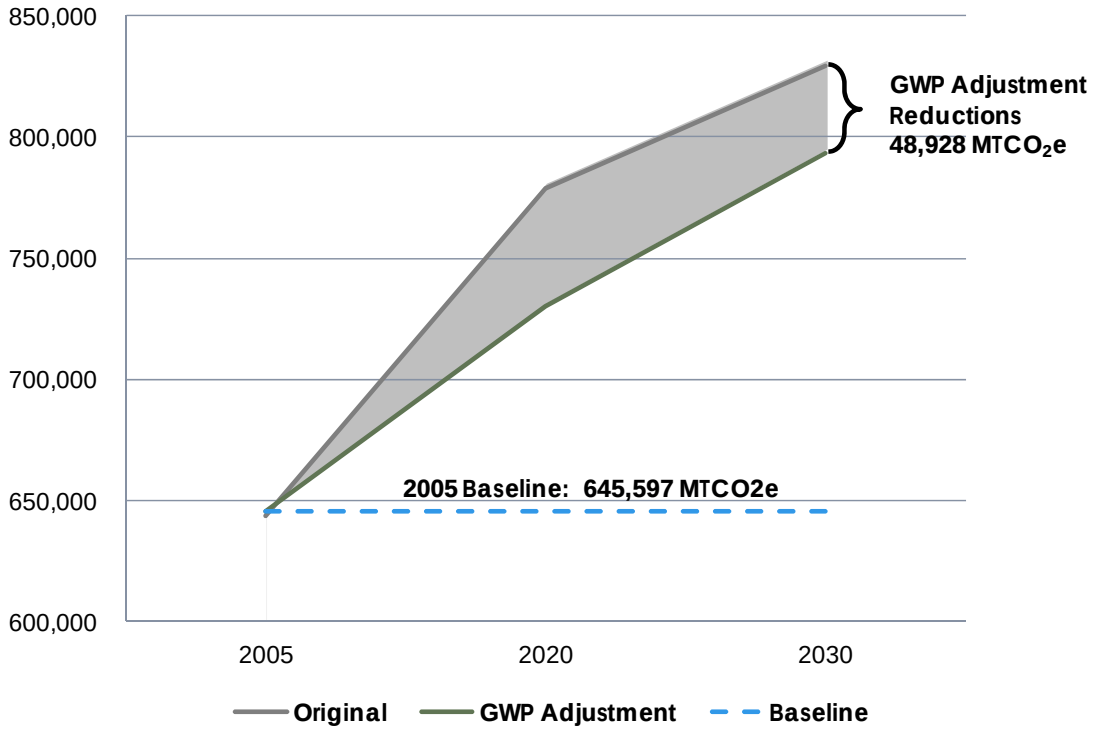
Pollutant	IPCC 2nd Assessment Report	IPCC 5th Assessment Report

Carbon Dioxide (CO_2)	1	1
Methane (CH_4)	21	28
Nitrous Oxide (N_2O)	310	265

Table A-17: WALNUT CREEK GHG EMISSIONS FORECAST, ORIGINAL INVENTORY TO GWP ADJUSTMENT ($MTCO_2E$)

Inventory	2005	2020	2030
Original Forecast	643,488	779,117	829,535
Global Warming Potential (GWP) Adjustment	645,597	730,189	793,052
Change	2,109	-48,928	-36,484

Figure A-2: WALNUT CREEK GHG EMISSIONS FORECAST, ORIGINAL INVENTORY TO GWP ADJUSTMENT ($MTCO_2E$)



3. Local Adjustment

The 2009 ABAG projections used to forecast demographic growth in the original CAP assumed ambitious growth rates for population, households, and jobs in Walnut Creek. However, the economic downturn and other factors have influenced these projections, and the most recent ABAG report, released in 2013, reflects these more conservative, slower growth estimates. Additionally, the City's internal projections anticipate slower population and household growth

than those prepared by ABAG. Projections of activity data for future years (e.g., how many kWh will be used in 2020) depend on demographic forecasts and growth rates. The 2009 ABAG projections, which projected a higher growth scenario, were released on the cusp of the economic downturn. The 2013 ABAG jobs projections and the City's population and household estimates are more conservative and take into account demographic trends observed since the economic downturn. The differences from the original projections are shown in **Table A-18**. Because of this decrease in expected population, households, and jobs, the activity data in the 2013 inventory and forecast adjustment reflected a similar decrease in activity, which often reflects a reduction in emissions. This reduces the total expected emissions from Walnut Creek through 2030, and is reflected in **Table A-19**.

Table A-18: 2020 POPULATION PROJECTION COMPARISON, 2009–2013

Indicator	ABAG 2009	ABAG 2013 & City Estimates	Percent Change
Population	72,900	68,148	-7%
Households	34,160	33,000	-3%
Jobs	58,170	49,860	-14%
Service Population	131,070	118,008	-10%

Note: jobs estimates are from ABAG 2013, and all other estimates are from internal City projections. The City's projections do not include anticipated jobs projections.

Table A-19: 2030 POPULATION PROJECTION COMPARISON, 2009–2013

Indicator	ABAG 2009	ABAG 2013 & City Estimates	Percent Change
Population	77,400	71,633	-7%
Households	36,450	35,700	-2%
Jobs	65,880	52,990	-20%
Service Population	143,280	124,623	-13%

Note: jobs estimates are from ABAG 2013, and all other estimates are from internal City projections. The City's projections do not include anticipated jobs projections.

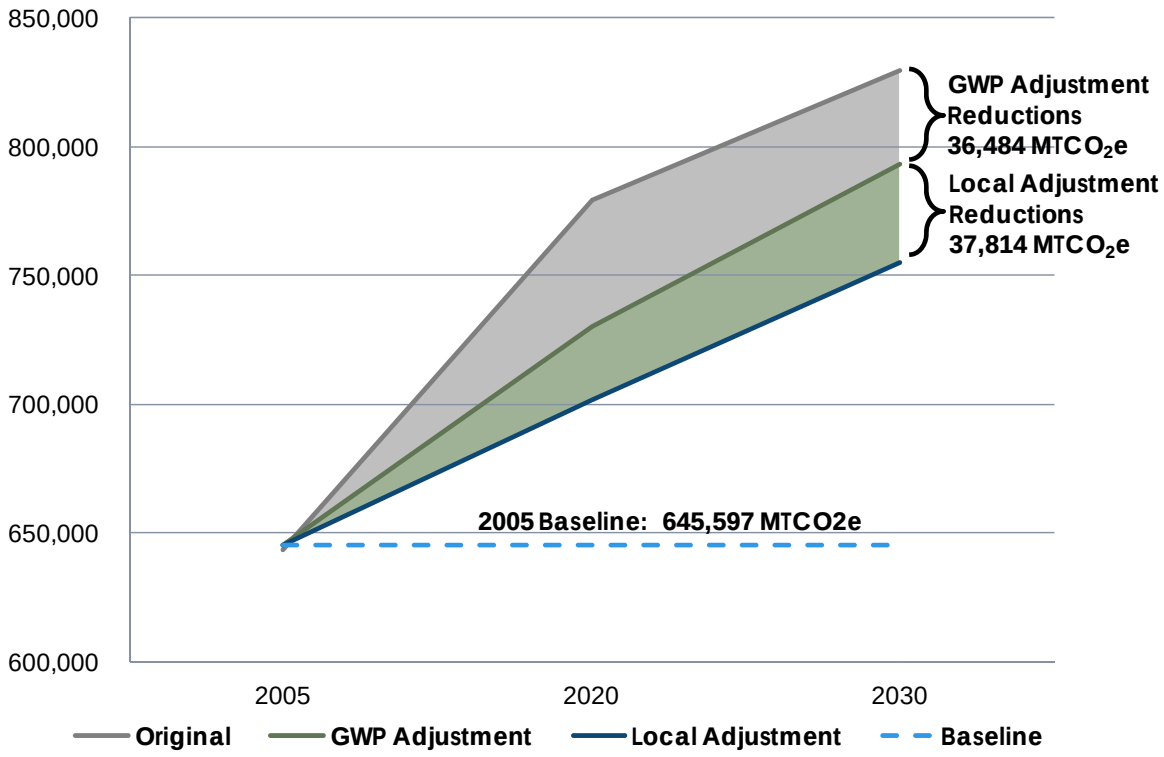
The local adjustment is a means of accounting for changes in per capita activity data between the baseline year and 2013, allowing the community to receive credit for observed GHG reductions even if they cannot be assigned to a particular activity. In Walnut Creek, the tons of waste disposed each year decreased over 30% from 2005 to 2030. Typically, waste disposal would be projected to 2020 and 2030 as a proportion of growth in service population. However, this growth rate would not reflect the significant decrease in tons disposed in recent years, a decrease which continued for a long period of time and does not appear to be the result of shorter-term factors such as economic recessions. Therefore, the waste sector received a "local adjustment," where the 2020 and 2030 activity data estimates are based on the tons disposed of waste in 2013, not the higher figure from 2005. The differences between the original forecast, the GWP adjustment, and the local adjustment are shown in **Table A-20** and **Figure A-3**.

Table A-20: WALNUT CREEK GHG EMISSIONS FORECAST, ORIGINAL INVENTORY TO GWP ADJUSTMENT AND LOCAL ADJUSTMENT ($MTCO_2E$)

Inventory	2005	2020	2030
Original Forecast	643,488	779,117	829,535

Global Warming Potential (GWP) Adjustment	645,597	730,189	793,052
Local Adjustment	645,597	701,590	755,238
Change (Original Forecast to GWP Adjustment)	2,109	-48,928	-36,484
Change (GWP Adjustment to Local Adjustment)	-	28,599	37,814

Figure A-3: WALNUT CREEK GHG EMISSIONS FORECAST, ORIGINAL INVENTORY TO LOCAL ADJUSTMENT ($MTCO_2E$)



4. State Reductions

Actions taken by state agencies can reduce GHG emissions at the local level. Some of these state-level reductions occur without any action by local governments, while other reductions are set in place by state policy that is implemented by local communities. Walnut Creek's existing CAP reflects these reductions from state programs and regulations, but recently available information has resulted in an update to how reductions from these state-level actions are calculated. The difference in reductions from state actions in the original forecast and the adjusted forecast are shown in **Table A-21**, **Table A-22**, and **Table A-23**. The reductions from the GWP, local, and state adjustments are shown in **Figure A-4**.

Table A-21: STATE GHG REDUCTIONS, ORIGINAL FORECAST ($MTCO_2E$)

Program	2020	2030
Pavley & Low Carbon Fuel Standard (LCFS)	78,231	135,470
Renewables Portfolio Standard (RPS)	47,890	124,767
California Building Code (Title 24, CALGreen)	2,670	7,728
California Solar Initiative (CSI)	1,110	832
Total	129,901	268,797

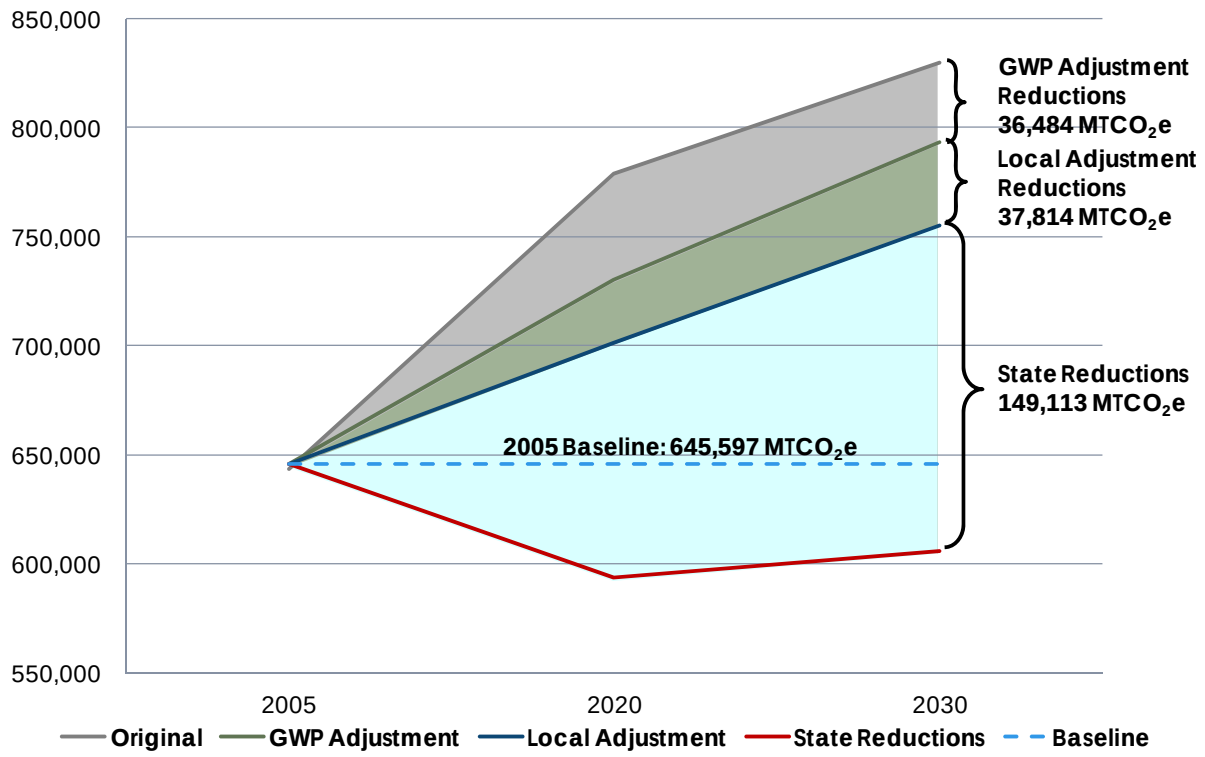
Table A-22: STATE GHG REDUCTIONS, UPDATED FORECAST ($MTCO_2E$)

Program	2020	2030
Pavley & Low Carbon Fuel Standard (LCFS)	78,890	112,620
Renewables Portfolio Standard (RPS)	27,396	29,313
California Building Code (Title 24, CALGreen)	1,660	7,180
California Solar Initiative (CSI)*	-	-
Total	107,946	149,113
* Due to updates in methods that allow for greater accuracy, this update does not include reductions from the CSI program as a state reduction. Reductions from this program will be counted as an existing local accomplishment and will be identified at a later date.		

Table A-23: COMPARISON OF STATE GHG REDUCTIONS IN ORIGINAL AND UPDATED FORECASTS ($MTCO_2E$)

Program	2005	2013	Percent Change
State GHG Reductions, 2020	129,901	107,946	-17%
State GHG Reductions, 2030	268,797	149,113	-45%

Figure A-4: STATE GHG REDUCTIONS ($MTCO_2E$)



Some programs, such as CSI, have expired since the original inventory. The results of this program, namely an increase in the number of rooftop solar panels in Walnut Creek, will be rolled into credits for local reductions in electricity use, so as to avoid double counting. The RPS was also updated since the original inventory and forecast, setting a preliminary 2030 target of 50% renewables. In the 2005 inventory, post-2020 targets for RPS had not been set, so a sustained 33% target was assumed for 2030. State regulations may be subject to change between inventory updates pending new legislation.

D. KEY DATA

This includes copies of PG&E reports, traffic counts, waste volumes, and other data as appropriate.