



DATE: January 13, 2020
TO: Council Sustainability Committee
FROM: Director of Public Works
SUBJECT: Review and Comment on the CY 2017 Greenhouse Gas Emissions Inventory Report

RECOMMENDATION

That the Council Sustainability Committee reviews and comments on the CY 2017 Greenhouse Gas Emissions Inventory report.

SUMMARY

The General Plan includes greenhouse gas (GHG) emission reduction targets for the Hayward community. To track progress, staff completes a full community GHG inventory every five years. Due to an opportunity with East Bay Energy Watch (EBEW) and StopWaste, staff completed an interim inventory for 2017 and re-calculated the inventories for 2005, 2010, and 2015 using the same methodology. This report provides the results of calendar year 2017 inventory and compares it to the previous three inventories. The table below summarizes the emissions totals for the five sectors - energy, transportation, BART, off-road, and waste. Emissions are displayed in metric tons of carbon dioxide equivalent¹ (MTC02e).

Table 1: GHG Emissions by Sector (MTC02e)

	2005	2010	2015	2017	% Change *
Energy	375,885	356,830	318,657	261,228	-30.5%
Transportation	636,581	580,238	571,556	553,298	-13.1%
BART	3,440	3,425	4,276	3,994	16.1%
Off-Road	24,345	37,265	68,251	67,348	176.6%
Waste	42,641	37,357	35,649	38,712	-9.2%
Total	1,082,892	1,015,115	998,387	924,581	-14.6%
Hayward Population	140,530	143,921	154,321	161,455	
Total Emissions/ Capita	5.2	4.8	4.4	3.9	-23.1%

¹ Carbon dioxide is not the only gas that contributes to climate change. Each greenhouse gas causes varying amounts of warming. For example, one ton of methane (CH4) causes the same amount of warming as 23 tons of CO2 (1 ton of CH4 = 23 tons CO2e). To simplify reporting, it is standard practice to report carbon equivalent emissions (CO2e) as opposed to the actual emissions of each gas. *Percent change is compared to the baseline year of 2005

In 2017, the Hayward community achieved a 14.6% reduction in GHG emissions compared to 2005. Total *per capita* emissions were 23.1% lower in 2017 given Hayward's increasing population.

BACKGROUND

The last report on GHG emissions was presented to the Council Sustainability Committee in September 2017. The 2017 report and previous reports are available on the City's [Climate Action Plan](#) page.² The City of Hayward's General Plan Policy NR-2.4 sets the following GHG emissions reduction targets.

NR-2.4: Community Greenhouse Gas Reduction

The City shall...reduce community-based GHG emissions by 20 percent below 2005 baseline levels by 2020 and strive to reduce community emissions by 61.7 percent and 82.5 percent by 2040 and 2050, respectively.

To track compliance with these targets, the City conducts community GHG emissions inventories every five years, starting with 2005 as the baseline year. The previous three inventories were completed with assistance from ICLEI–Local Governments for Sustainability, StopWaste, and the Statewide Energy Efficiency Collaborative's (SEEC). For the 2017 inventory, Alameda County and Contra Costa County jurisdictions hired a consultant through EBEW and StopWaste. All four inventories use the Global Protocol for Community-Scale (GPC) methodology to calculate GHG emissions. The GPC methodology is a global reporting standard created by ICLEI, the World Resources Institute, and C40 Cities Climate Leadership Group. The Global Covenant of Mayors for Climate and Energy, which the Hayward City Council voted to join on March 7, 2017, has adopted the GPC as its standard reporting format.

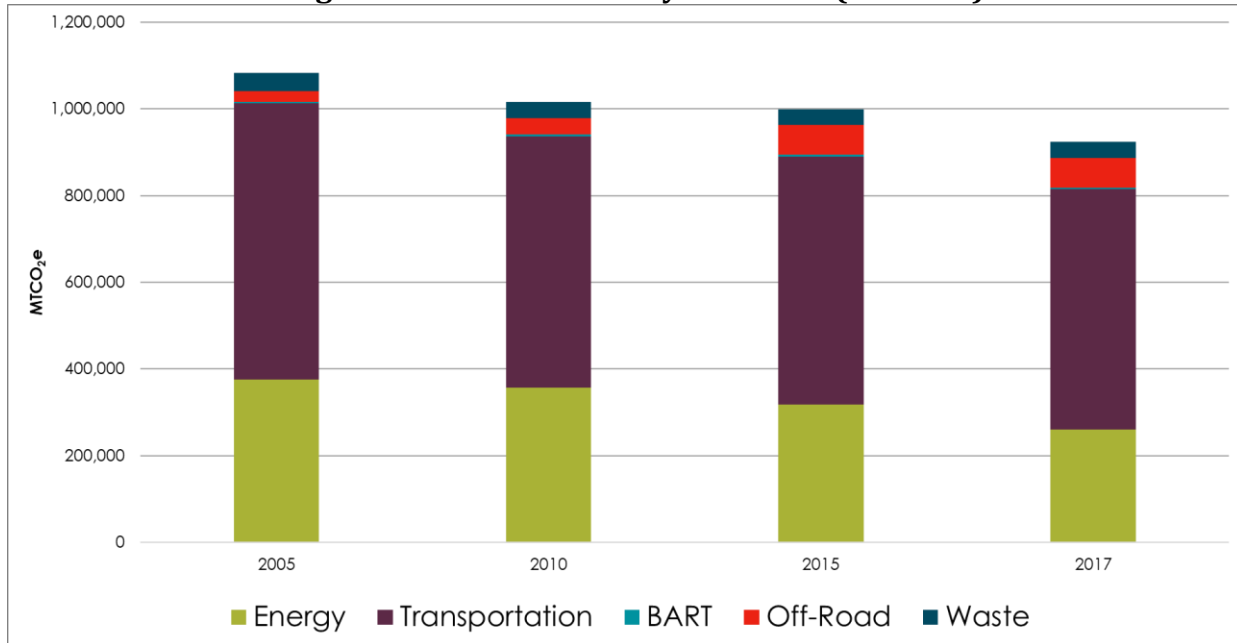
Over the past twelve years, the organizations mentioned above have continuously refined and updated the GPC methodology to estimate emissions more accurately. In response, staff has recalculated emissions for the 2005, 2010, and 2015 in the tool created by EBEW's consultant to make an apples-to-apples comparison. Therefore, the emissions totals reported in this report do not match the numbers from previous reports.

DISCUSSION

Hayward's GHG inventory is comprised of five sectors: energy, transportation, BART, off-road, and solid waste. The chart below shows the subsector breakdown for each year and the percent of each subsector for that year. Transportation, shown in purple, is the largest sector, making up 57-59% of the total. BART accounts for less than 1% of all emissions and off-road vehicles account for 2-7% of emissions. Energy, shown in green, makes up 28-35% of the total and solid waste makes up 3-4%.

² <https://www.hayward-ca.gov/services/city-services/climate-action>

Figure 1: GHG Emissions by Subsector (MT C02e)³



Energy Sector

As shown in Table 2, energy emissions in 2017 were 30.5% below 2005 levels. Emissions from residential electricity, residential gas, and commercial electricity usage all declined in 2017. While electricity emissions have declined, electricity usage has not changed drastically. Residential electricity use has increased by 0.7% and nonresidential electricity use has decreased by 9.3% since 2005, compared to a 56.1% decrease and 60.8% decrease in emissions respectively. The primary reason that electricity emissions have decreased is that Pacific Gas & Electric Company (PG&E) sources have become cleaner as PG&E strives to meet the State’s Renewable Portfolio Standard goal of 33% by 2020 and PG&E’s continued use of large hydro and nuclear energy, which have no GHG emissions.

The reduction in residential natural gas emissions in 2017 is likely related to the milder winters that Hayward has experienced since 2005, which reduced the need for residents to heat their homes. A mild winter equates to fewer Heating Degree Days (HDD). HDD is the unit which measures how many degrees, and for how many days, outside air temperatures were lower than the base temperature of 65 degrees Fahrenheit. As shown in Table 2, residential gas emissions have increased since 2015. This aligns with the increase in HDD since 2014 (see Figure 3).

³ The percentages for each subsector are relative to the total emissions for each year.

Table 2: Energy Sector GHG Emissions

		2005	2010	2015	2017	% Change*
Residential electricity	GHG Emissions	54,042	51,207	44,819	23,502	-56.5%
	kWh	242,161,904	252,327,941	242,783,315	243,910,202	0.7%
Nonresidential electricity	GHG Emissions	131,848	114,097	97,034	51,616	-60.8%
	kWh	590,811,842	562,228,183	525,628,036	535,682,182	-9.3%
Residential natural gas	GHG Emissions	103,502	103,027	86,736	91,719	-11.4%
	therms	19,489,985	19,400,629	16,332,954	17,271,164	-11.4%
Nonresidential natural gas	GHG Emissions	86,493	88,499	90,066	94,392	9.1%
	therms	16,287,167	16,664,879	16,960,038	17,774,540	9.1%
Total GHG Emissions		375,885	356,830	318,657	261,228	-30.5%

*Percent change is compared to the baseline year of 2005

Figure 2: Energy Sector GHG Emissions (MT CO2e)

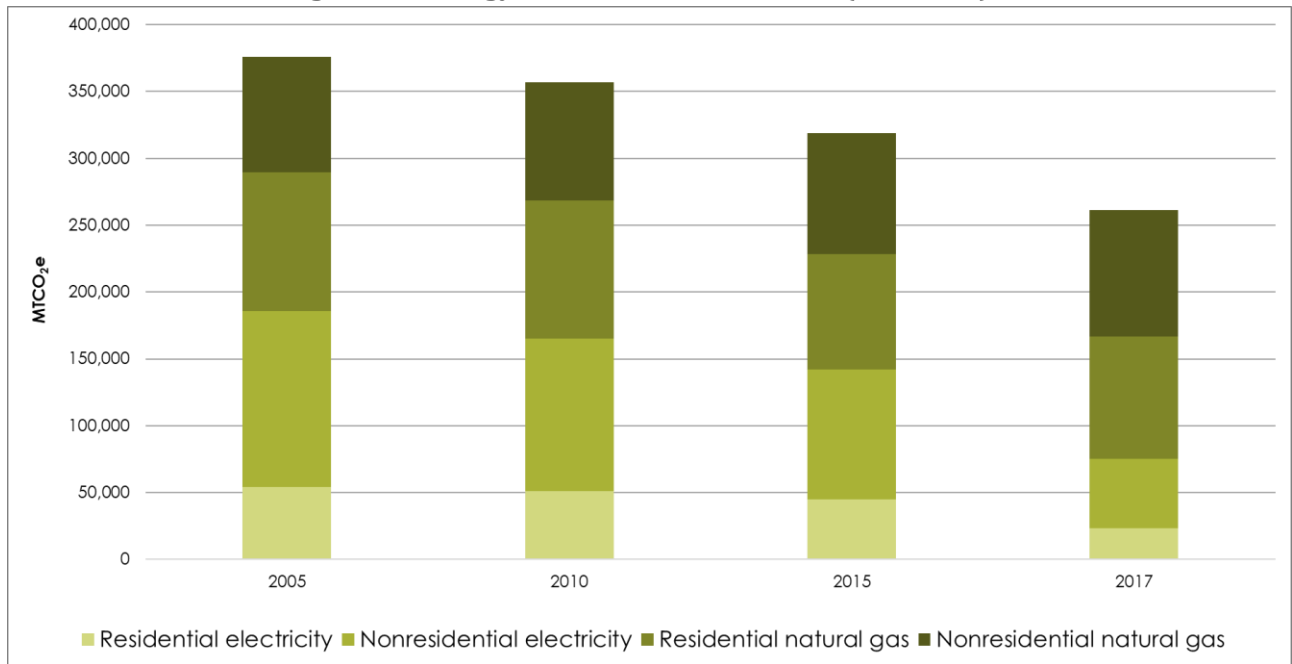
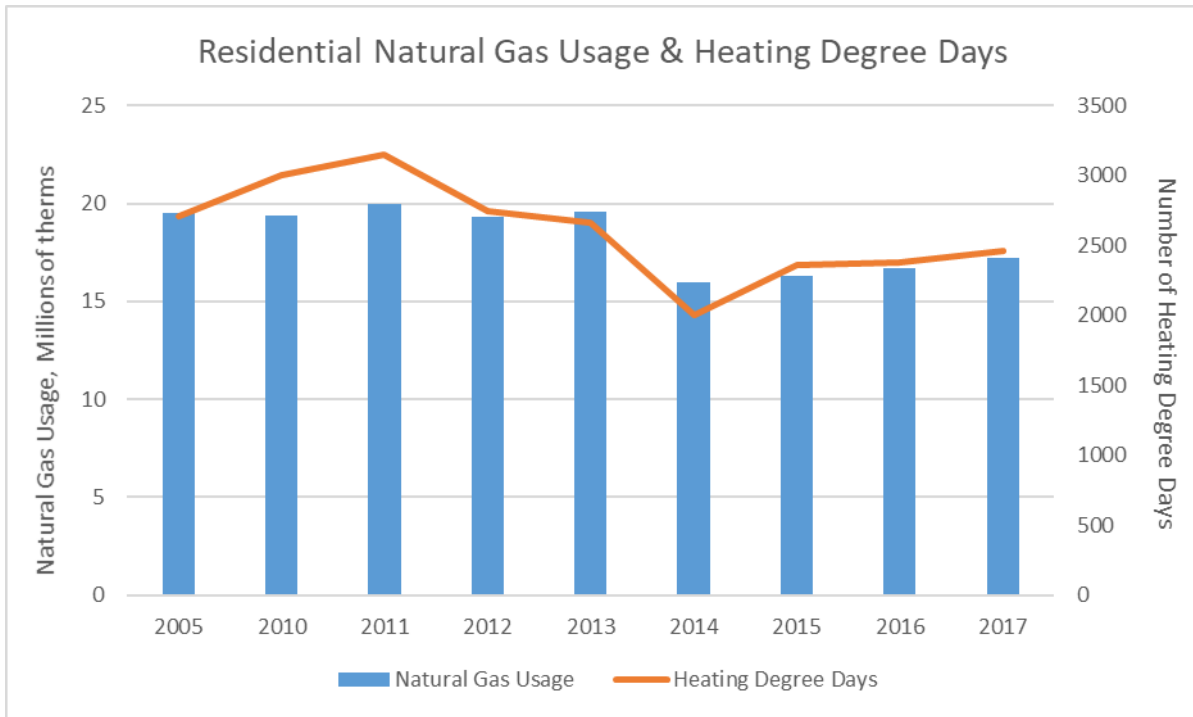


Figure 3: Residential Natural Gas Usage & Heating Degree Days



Transportation Sector

As shown in Table 3, transportation emissions in 2017 were 13.1% below emissions in 2005. As seen in the table below, the total vehicle miles traveled (VMT) decreased in 2010 and then increased again in 2015 and 2017. This is likely related to the economic recession and recovery.

Overall emissions factors have decreased in all categories over the last twelve years as vehicles have become cleaner. The decrease in emission factor value is why we have seen an overall decrease in emissions of 13.1%, while only seeing a 4.6% decrease in VMT.

Table 3: Transportation Sector GHG Emissions

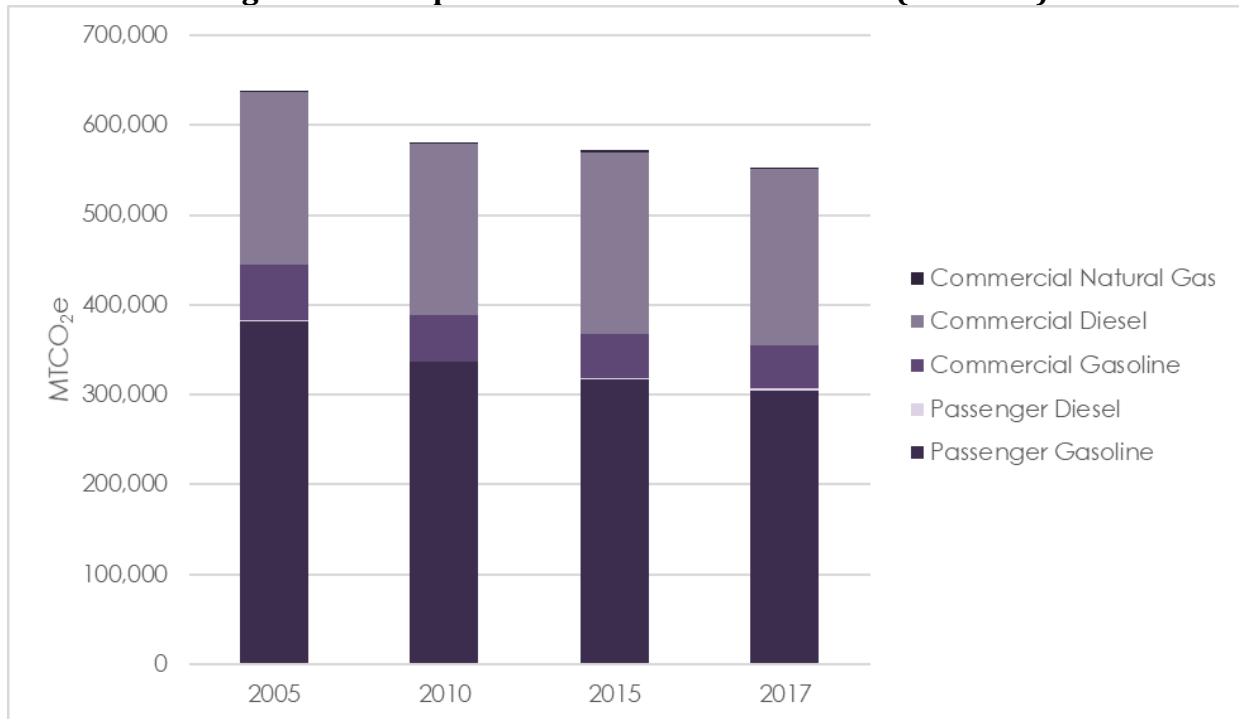
		2005	2010	2015	2017	% Change*
Passenger Gasoline	GHG Emissions	381,808	336,036	316,516	305,005	-20.1%
	VMT	956,623,171	858,832,865	884,055,725	891,575,635	-6.8%
Passenger Diesel	GHG Emissions	849	896	2,418**	2,430	186.2%
	VMT	2,349,479	2,719,823	8,153,097**	8,105,329	244.9%
Passenger Electric	GHG Emissions***	0	0	0	0	
	VMT	195,306	296,949	7,157,788	11,187,141	5,628%
Commercial Gasoline	GHG Emissions	61,642	51,326	48,542	46,969	-23.8%
	VMT	48,729,452	41,099,193	39,351,019	38,745,467	-20.5%
Commercial Diesel	GHG Emissions	191,821	191,556	202,565	196,815	2.6%
	VMT	123,825,051	122,518,404	137,833,264	140,567,582	13.5%
Commercial Electric	GHG Emissions***	0	0	0	0	
	VMT	48,918	0	54,340	49,251	0.7%
Commercial Natural Gas	GHG Emissions	462	424	1,514	2,078	4,267.5%
	VMT	175,959	126,375	434,689	636,407	261.7%
Total GHG Emissions		636,581	580,238	571,556	553,298	-13.1%
Total VMT		1,131,703,112	1,025,296,660	1,069,827,794	1,079,630,420	-4.6%

*Percent change is compared to the baseline year of 2005

**Change between 2010 and 2015 in Passenger Diesel vehicles in most likely due to a reclassification of vehicle types

***GHG Emissions associated with these vehicles are considered zero because the emissions are accounted for in the energy emissions sector

Figure 4: Transportation Sector GHG Emissions (MT CO₂e)



Off-road Vehicles Sector

The off-road vehicles sector is a new sector analyzed in this inventory. As shown in Table 4, the increase in off-road emissions is largely associated with the increase in construction equipment use in Hayward after the recession.

Table 4: Off-road Sector GHG Emissions

	2005	2010	2015	2017	% Change*
Agricultural Equipment	0	0	0	0	
Airport Ground Support Equipment	0	0	0	0	
Construction and Mining Equipment	0	11,478	40,143	37,833	230%**
Dredging	0	0	0	0	
Entertainment Equipment	83	83	83	85	2%
Industrial Equipment	12,564	13,030	14,007	14,350	14%
Lawn and Garden Equipment	2,470	2,460	2,562	2,664	8%
Light Commercial Equipment	4,958	5,009	5,046	5,141	4%
Logging Equipment	0	0	0	0	
Military Tactical Support Equipment	0	0	0	0	
Oil Drilling	0	0	0	0	
Pleasure Craft	1,531	1,751	2,036	2,218	45%
Recreational Equipment	379	455	544	597	58%
Transport Refrigeration Units	2,359	3,000	3,832	4,461	89%
Total GHG Emissions	24,345	37,265	68,251	67,348	176.64%

*Percent change is compared to the baseline year of 2005

**Percent change is compared to 2010

Solid Waste Sector

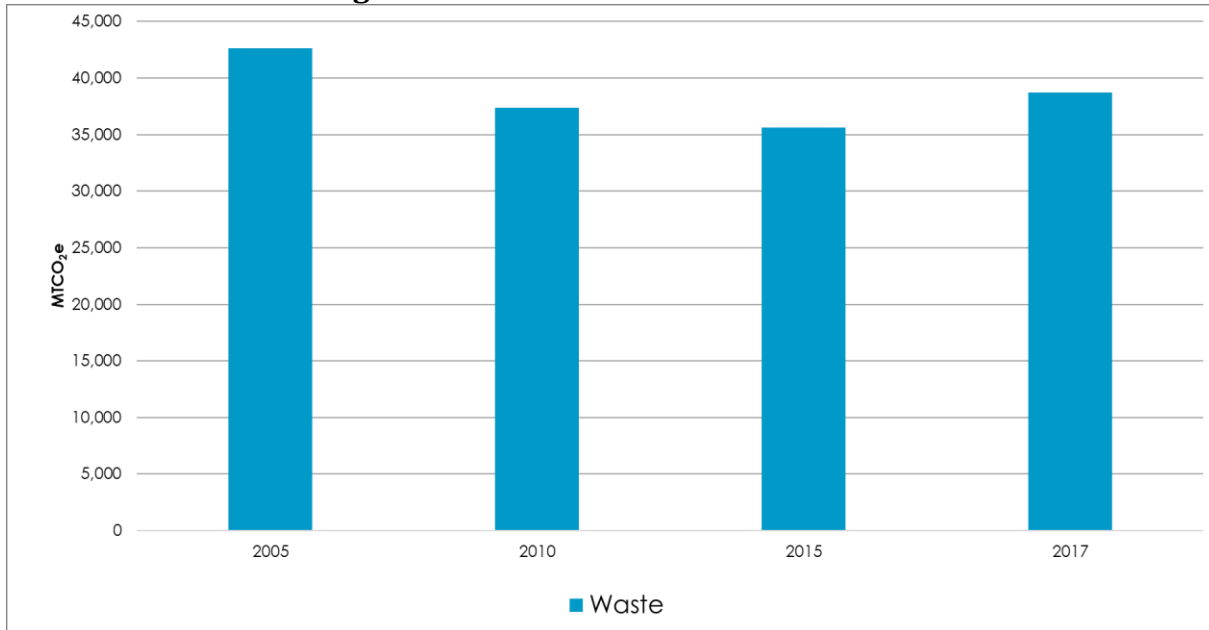
Solid waste emissions in 2017 were 9.2% below 2005 levels. As shown in Table 5, emissions have increased since 2015. This increase is most likely due to an increase in economic activity.

Table 5: Solid Waste Sector GHG Emissions

		2005	2010	2015	2017	% Change*
Waste Sent to Landfill	GHG Emissions	42,641	37,357	35,649	38,712	-9.2%
	Tons of waste	145,659	127,495	127,527	136,517	-6.3%

*Percent change is compared to the baseline year of 2005

Figure 5: Solid Waste Sector GHG Emissions



Progress Towards the 2020 Goal

Hayward is on track to meet its goal of 20% below 2005 levels by 2020. Table 6 shows how the roll out of East Bay Community Energy (EBCE) is predicted to affect the City’s GHG emissions starting in the year 2019. In the scenario predicted in Table 6, staff is assuming that all other emission sources remain flat because staff does not anticipate that there will be significant reductions in these categories by 2020 to make up for Hayward’s growing population and increased commercial activity.

Table 6: GHG Emission Reduction Predictions for 2019

	2005	2010	2015	2017	Change from 2005 - 2017	With EBCE 2019*	Change from 2017 to 2019*
Residential Electricity	54,042	51,207	44,819	23,502	56.5%	5,876	75%
Residential Natural Gas	103,502	103,027	86,736	91,719	11.4%	91,719	0%
Commercial Electricity	131,848	114,097	97,034	51,616	60.9%	10,323	80%
Commercial Natural Gas	86,493	88,499	90,066	94,392	-9.1%	94,392	0%
Transportation	636,581	580,238	571,556	553,298	13.1%	553,298	0%
Public Transit (BART)	3,440	3,425	4,276	3,994	-16.1%	3,994	0%
Off Road Vehicles	24,345	37,265	68,251	67,348	-176.6%	67,348	0%
Solid Waste Disposal	42,641	37,357	35,649	38,712	-9.2%	38,712	0%
Totals	1,082,892	1,015,115	998,387	924,581	14.6%	865,662	20%

*This is based on predicted reductions.

Goals for 2025, 2030, and 2045

The Committee has recommended the following new GHG emission reduction goals for 2025, 2030, and 2045:

- 30% below 2005 levels by 2025
- 50% below 2005 levels by 2030
- Carbon neutral by 2045

The proposed goals were presented to the Planning Commission on December 12, 2019⁴ and will be presented to Council in early 2020. Upon Council adoption of the new goals, the next step will be to develop a roadmap to meet the 2030 goal, which will entail community outreach and identification of actions and policies for implementation over the next decade.

Limitations of this Inventory

The GHG inventory method that Hayward uses, along with most cities worldwide, was originally designed by ICLEI and partners in the early 2000s. The focus then and now is on measuring emissions from the data sources that are most readily available, such as utility data. This approach is practical, but it comes with limitations.

⁴ <https://hayward.legistar.com/LegislationDetail.aspx?ID=4274107&GUID=B4340074-1179-4CEB-B3EA-28B1BD1C6B5C&Options=&Search=>

Missing Emission Sources

The inventories completed omit large sources of emissions over which the City may have some influence. Specifically, the inventory does not include the upstream emissions of the goods consumed in Hayward. For example, emission reductions from green purchasing policies would not be reflected in the current inventory. Also, one of the biggest contributors to GHG emissions worldwide, food, is not reflected in Hayward's inventory.

As mentioned above, the reason upstream emissions are not included is that it is difficult to obtain data on consumer consumption patterns. However, some attempts are being made. In 2016, the Bay Area Air Quality Management District (BAAQMD) launched a project with UC Berkeley to create [consumption-based inventories](#)⁵ for Bay Area cities.⁶ Staff has concerns with the data sources used for this project, but feels that the intent is meaningful.

ECONOMIC IMPACT

There is no economic impact associated with the completed inventory. However, the information acquired from the inventory provides staff with insight on what needs to be done to meet the City's GHG reduction goals. Meeting Hayward's ambitious GHG reduction goals will require significant investment throughout the community and has the potential to create new local jobs, however some necessary improvements are not currently cost-effective.

FISCAL IMPACT

Through the partnership with EBEW, StopWaste, and other Bay Area cities, the 2017 GHG inventory was prepared at no cost to the City.

STRATEGIC INITIATIVES

This agenda item is an informational report, and does not relate to one of the Council's Strategic Initiatives.

SUSTAINABILITY FEATURES

Meeting GHG reduction goals is the primary objective of the City's Climate Action Plan. Meeting the goals will require reducing emissions in every sector and will entail improving energy efficiency in buildings, decarbonizing buildings, increasing the use of renewable energy, and reducing vehicle-related emissions. All these actions will result in cleaner air for Hayward residents and for the region.

NEXT STEPS

⁵ <http://www.baaqmd.gov/about-air-quality/research-and-data/emission-inventory/consumption-based-ghg-emissions-inventory>

⁶ The City's current inventory is a hybrid of consumption and production. For example, energy consumed by residents is consumption-based and energy consumed by industry is production-based. The State of California performs a true production-based inventory, measuring all emissions produced in California from all sectors, including agriculture.

Staff will continue to work with StopWaste and regional agencies to identify potential opportunities to streamline GHG inventories on a county or regional level, with the goal of increasing the frequency of reporting to annually rather than every five years.

Staff will present to Council a revised Strategic Roadmap including a “Combat Climate Change” priority. One of the projects identified under this priority is to adopt a 2030 GHG target and develop a roadmap to meet the 2030 target. The roadmap will likely entail revisions to the City’s Climate Action Plan and General Plan. Staff will continue to work with the Committee to establish a variety of other sustainability-related goals to be presented to Council in 2020.

Prepared by: Nicole Grucky, Sustainability Specialist

Recommended by: Alex Ameri, Director of Public Works

Approved by:

A handwritten signature in black ink, appearing to read 'Kelly McAdoo', written in a cursive style.

Kelly McAdoo, City Manager