CITY OF HAYWARD

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Cover Memo

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DATE: July 11, 2016

TO: Council Sustainability Committee

FROM: Director of Utilities and Environmental Services

SUBJECT
Community Greenhouse Gas Inventory Update: Building Energy Usage and Emissions Data, 2005 - 2015

RECOMMENDATION
That the Committee reviews and comments on this report.

BACKGROUND

Greenhouse gas (GHG) inventories are prepared to assess progress toward the emissions reduction goals of Hayward's Climate Action Plan. As a member of the International Council for Local Environmental Initiatives (ICLEI)-Local Governments for Sustainability (a global network of cities and regions), the City of Hayward follows ICLEI's protocol for developing GHG inventories. ICLEI recommends updating GHG inventories at least every five years. Completed and planned inventories to date include:

- **2005 Baseline:** Cataloged municipal and community (city-wide) emissions and established a baseline to compare to future inventories. Sectors covered: building energy consumption, transportation, and landfilled waste.
- **2010 Inventory:** Municipal and community emissions with a 2005 / 2010 comparison. Sectors covered: building energy, transportation, landfilled waste, Water Pollution Control Facility, and water/ wastewater.
- **2015 Inventory:** To be completed once transportation data becomes available (expected by early 2017).

Partial inventory data on energy consumption and emissions are periodically presented to give a snapshot of progress toward energy goals. Staff last presented data on municipal and community energy usage to the Committee in October 2013. The 2013 report as well as GHG reports from 2012 and 2011 are available at
<http://www.hayward-ca.gov/your-environment/green-government/greenhouse-gas-reduction>. This report includes a brief review of the 2005 and 2010 inventory totals and provides an update on community electricity and natural gas usage and related emissions for 2010 - 2015, compared to the 2005 baseline.

General Plan policies and programs related to reducing GHG emissions and building energy consumption include:

Policy NR-2.4 Community Greenhouse Gas Reduction - The City shall work with the community to reduce community-based GHG emissions by 20% below 2005 baseline levels by 2020, and strive to reduce community emissions by 61.7% and 82.5% by 2040 and 2050, respectively.

Program NR 7. Energy Reduction Initiative and Annual Report - The City shall develop and implement a public information and education campaign to encourage every household and every business to reduce their energy consumption by 10% by 2020. The City shall evaluate and report to the City Council annually on the community's progress in achieving the 10% goal, and recommend additional efforts as necessary to ensure the goal is met.

DISCUSSION

About the Data - Staff is using ClearPath, an industry-standard platform developed by the Statewide Energy Efficiency Collaborative (SEEC), to facilitate better record keeping and analysis in GHG accounting. The 2005 and 2010 full inventories and energy data for 2010 through 2015 were uploaded onto ClearPath. ClearPath calculates emissions based on raw data, and due to the availability of new best practices and formulas, there are some differences between ClearPath-calculated emission totals and totals presented in previous inventory reports using different software.

Raw energy data comes from PG&E's most recent report for Hayward. PG&E aggregates energy data for "Residential" and "Non-Residential" sectors. "Non-Residential" includes commercial, industrial, institutional, and municipal buildings and is referred to as "Commercial / Industrial" in this report. PG&E provided multiple sources of community electricity and natural gas data for Hayward for 2015. Staff found that the totals among the electric energy sources differ by 0.424% and notified PG&E. While this discrepancy does not have a material effect on the City's analysis, PG&E analysts are investigating the discrepancy. Staff used the source thought to be the most accurate in the analysis below and will update the figures if needed once PG&E resolves this issue. *The data below should be considered "preliminary" until this issue is resolved.*

The data reflected in the attached charts is unadjusted for population increases. This is because the City of Hayward's emissions reduction goals are based on emission totals, not per capita figures. Therefore, population increase could be a causal factor in any increases in electricity or natural gas usage reflected in the attached charts. Per capita data is presented in the narrative.

2005 and 2010 GHG Inventory Comparison - City-wide emission totals for building energy, on-road transportation, and landfilled waste in 2005 were estimated at 1,149,100 metric tons of carbon dioxide equivalent (MT CO2e) and 1,037,066 MT CO2e for 2010. As reflected in Chart 1 in Attachment I, in 2010 Hayward's community emissions decreased by 10% compared to 2005, which is on track to meeting City Council's goal of reducing emissions by 20% below 2005 levels by 2020. (This is a larger decrease compared to the original 2005 / 2010 inventory completed in January 2013, which estimated an 8% reduction in community emissions.)

Per Capita Comparison - Population estimates for 2005 and 2010 are 140,305 and 145,090 respectively. Per capita emissions for energy, on-road transportation, and landfilled waste decreased approximately 12.7% from an estimated eight MT CO2e for 2005 to seven MT CO2e for 2010.

Building Energy Emissions: 2010 - 2015 - This section covers emissions from grid electricity and natural

gas consumption city-wide for residential, commercial, industrial, institutional, and municipal buildings.

The charts in Attachment II reflect emission trends compared to the targets established by City Council to reduce GHG emissions by 82.5% by 2050. In 2015, Hayward's energy emissions were estimated at 365,711 MT CO2e, an 8% decrease compared to the 2005 baseline total of 395,790 MT CO2e (see Chart 2).

Fluctuations in GHG emissions from grid electricity from 2010 - 2015 are largely due to changes in PG&E's emissions factor, which measures the pounds of CO2e emitted per kilowatt-hour (kWh) of electricity. As PG&E's mix of generation sources changes (i.e. solar, natural gas, hydropower), the emissions factor changes accordingly. For example, year to year electricity usage changed very little from 2010 - 2012 - less than 1% - though emissions increased by 11% and decreased by 13% in 2011 and 2012 respectively.

Residential vs. Commercial / Industrial - Chart 3 in Attachment II reflects residential versus commercial / industrial energy emissions by year, including the 2005 baseline year. Charts 4 and 5 in Attachment II show trends in emissions for residential and commercial / industrial buildings respectively compared with reduction goals. From 2005 to 2015, there was a 15% decrease in energy emissions for residential buildings and a 3% decrease for commercial / industrial buildings.

Building Energy Consumption: 2010 - 2015 - This section covers city-wide trends in consumption of grid electricity and natural gas for residential, commercial, industrial, institutional, and municipal buildings. In 2015, community electricity consumption was 964,750,497 kWh and natural gas consumption was 33,259,832 therms.

Total energy consumption - electricity and natural gas, for all sectors - has changed very little since 2005. As Chart 6 in Attachment III reflects, 2015 saw an estimated 1% decrease in overall energy consumption compared to the 2005 baseline. Per capita energy consumption decreased approximately 13% from forty -eight to forty-two million British thermal units (MMBtu) from 2005 to 2015.

Residential Consumption - Although overall energy consumption has not changed much since 2005, residential energy usage in 2015 was 12% below 2005 levels (Chart 7). This exceeds the City's 2020 target of a 10% reduction from 2005 levels.

Charts 8 and 9 in Attachment III are breakouts for natural gas and electricity usage for residential buildings.

Year to year changes in energy usage may be due to conservation and efficiency programs, but changes in weather and economic activity are also important considerations. Chart 10 in Attachment III shows a decrease in natural gas consumption over the years as well as a decrease in heating degree days. ("Heating degree days", or "HDD", are a measure of how much (in degrees), and for how long (in days), outside air temperature was lower than a specific "base temperature" (or "balance point"). They are used for calculations relating to the energy consumption required to heat buildings. Fewer heating degree days could partially explain the drop in natural gas consumption by residents.

As mentioned earlier in this report, changes in grid electricity GHG emissions are largely due to, and affected by, changes in the PG&E emissions factor. Because of this relationship, it is possible that

electricity emissions may not decline steadily year to year or every five years even if grid electricity usage declines.
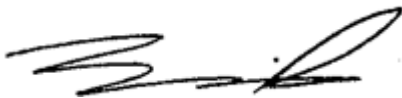
NEXT STEPS

Staff will continue to use ClearPath to:
- **Conduct GHG reduction analysis** of specific Climate Action Plan implementation programs.
    o Estimate reductions achieved by current and ongoing programs.
    o Forecast potential reductions for proposed programs and policies with an eye on the 2040 and 2050 goals.
- **Complete the 2015 GHG inventory**, including the following sectors: building energy, transportation, waste, Water Pollution Control Facility, water/ wastewater.
    o Data collection is complete for building energy and other sectors will be added as source data becomes available (anticipated in early 2017).
    o Once the 2015 inventory is complete, staff will compare all inventories and present analysis to the Committee.

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Recommended by: Alex Ameri, Director of Utilities and Environmental Services

Approved by:

Fran David, City Manager

Attachments:

Attachment I	2005 and 2010 GHG Inventory Comparison Chart
Attachment II	Building Energy Emissions: 2010 - 2015 Charts
Attachment III	Building Energy Consumption: 2010 - 2015 Charts