2014 MUNICIPAL GREENHOUSE GAS EMISSIONS INVENTORY

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December 2016

SUMMARY

The City of Chula Vista has committed to reducing greenhouse gas (GHG), or "carbon," emissions from municipal operations, to lead by example, and demonstrate that businesses can reduce emissions while not sacrificing the quality of services they provide. As part of the City's climate action program, the Department of Economic Development's Conservation Section completes carbon emissions inventories to identify GHG sources and to help guide policy decisions. The 2014 Municipal GHG Emissions Inventory utilizes the ICLEI Local Government Operations Protocol and serves as the City's latest assessment of all past inventory efforts and its progress in reaching its municipal emissions reduction goals for City operations.

The 2014 inventory shows that Chula Vista's municipal GHG emissions equal 14,076 metric tons of carbon dioxide equivalents (MT CO_2e). This represents a 16% decrease in total emissions since 2012 (16,821 MT CO_2e) and a 55% decrease when compared to the initial 1990 inventory. GHG emissions from the municipal external lighting have declined every year from the initial report, with a 39% decrease since 2012 due in part to streetlight LED retrofits. The City's vehicle fleet, building energy, and solid waste emissions have similarly lowered, decreasing 15%, 16%, and 14% respectively, from 2012. The emissions associated with the municipal sewage have increased the past two reporting years; however, it is a very small amount (less than 1%) of the City's overall carbon emissions. Lastly, as water usage has increased, emissions from the embedded energy associated with that water have also increased since 2012.

METHODOLOGY

Chula Vista has been at the forefront of climate action policies and programs designed to reduce greenhouse gas (GHG) or "carbon" emissions. As a municipality, the City utilized the industry adopted GHG inventory methodologies and has independently reported its 2008, 2009, 2010, and 2012 municipal emissions to the Climate Registry, North America's leading voluntary greenhouse gas reporting system, with the purpose of archiving the City's actions taken to reduce GHG emissions. Additionally, Chula Vista has participated in the United Nation's Framework Convention on Climate Change, the Conference of Mayor's Climate Protection Agreement, the Department of Energy's Better Buildings program and the steering committee for the California Statewide Energy Efficiency Collaborative (SEEC) ClearPath tool. The City has committed itself to reducing its carbon footprint through these past actions and will continue to do so with future decision making.

PARAMETER	DATA PROVIDER	ACTIVITY DATA	EMISSION FACTOR
Energy	SDG&E	• Metered electricity & natural gas use • Fuel shipment invoices • Energy consumption was categorized by buildings, outdoor lighting, and wastewater	• SDG&E-specific electricity emission coefficients (CO_2). Because the most recent 3rd party verified emission factor is from 2009, calculations were made by EPIC (USD) to estimate the impacts of the increased power from renewable sources • EPIC CO2 emission factor provides a CO2e output that includes CH4 & N2O • Default natural gas emission coefficients
Transportation	Public Works Dept.	• Fuel consumption totals include transit and equipment use	• Default fuel (CO_2/CH_4/N_2O per gallon) emission coefficients
Solid Waste	Republic Services	• Solid waste disposal data includes trash hauled by Republic Services and by City staff	• Default fugitive methane (CH_4) emission estimates (based on ICLEI's ClearPath)
Wastewater	SDG&E	• Energy used to pump wastewater to WWTPs	• Modified SDG&E emission factor (same as used in energy sector)
Water (embeded energy)	Otay & Sweetwater Authority water districts	• Amount of water used by government operations	• California Energy Commission report detailing embedded kWh per gallon of water • Modified SDG&E emission factor (same as used in energy sector)
Other	Recreation Dept.	• pH canisters' shipment invoices	• Default fugitive carbon dioxide (CO_2) emissions coefficients

Table 1: Data sources and emission factors used for community and municipal emissions analyses.

The City's 2014 Municipal GHG Inventory was collected and calculated using the Local Government Operations Protocol (LGOP, Version 1.1) and the SEEC ClearPath tool, which were created by ICLEI with support from California regulatory agencies to provide methodologies for local governments to better estimate their annual greenhouse gas emissions from municipaloperations. These ICLEI protocols evaluate emissions from five primary parameters – building energy consumption, transportation, water (embedded energy), wastewater, and solid waste. These parameters are mainly based on "end use activities" and the emissions are expressed in terms of carbon dioxide equivalents (CO_2e), which allows greenhouse gases of different strengths, or global warming potentials, to be evaluated together. When possible, past emissions for 1990, 2005, and 2012 were recalculated using updated emissions factors or data in order to provide a more accurate comparison to the latest 2014 emission levels. Due to a lack of available data, 1990 and 2005 inventories do not include emissions from the water sector.

City staff collected "activity data" from a number of municipal and external data providers including multiple Chula Vista Departments, SDG&E, Otay and Sweetwater Authority Water Districts, and Republic Services (Table 1). Staff was able to separate potable water emissions from recycled water emissions and utilized energy factors from the California Energy Commission to quantify the different amounts of energy embedded in each. In most cases, the data providers were able to offer aggregated empirical data for calendar year 2014; however, if 2014 data was unavailable for minor sources the most recent data available was used as a proxy. Staff included utility-specific electricity coefficients for CO_2 emissions in the energy analyses and default emissions coefficients and related assumptions were generally used for transportation and waste analyses. SDG&E's emission factor has not been third-party verified and reported since 2009, but the utility has significantly increased its percentage of renewable electricity, to over 33%, over the past few years. To help account for this increased renewable energy supply, EPIC at the University of San Diego created a modified CO_2e emission factor that accounts for CO_2, CH_4, and N_2O, which the City incorporated into its 2014 municipal inventory. Additionally, through working with EPIC we learned that the 2005 SDG&E emission factor, as reported in the LGOP, used statewide defaults, which contributed to an artificially low emission factor. For this reason, the 2006 SDG&E emission factor was used as a proxy emission factor for 2005.

RESULTS

Chula Vista's 2014 municipal GHG emissions were 14,076 MT CO_2e (Table 2). The majority of emissions came from the City's vehicle fleet, accounting for 41% of total emissions. Following the vehicle fleet, the next highest emission sectors were building energy use (26%) and solid-waste related emissions (14%). External energy use (traffic signals and street lights) and the energy associated with potable and recycled water usage each accounted for about 10% of the total emissions each. Emissions from wastewater pumping were minor, making up less than 1%. Compared to 1990 and 2012, total municipal operation emission levels were 55% and 16% lower, respectively (Table 2). The energy use for external lighting continues to be the City's largest decreasing emissions sector, which has decreased by 18,890 MT CO_2e (93%) since 1990 and 39% since 2012. Additionally, only the water (wastewater and potable/recycled water) sectors increased, 14% (3 MT CO_2e) and 10% (117 MT CO_2e) respectively, while all other sectors had lower emission in 2014 compared to 2012. The City reached its original GHG emission reduction goal for municipal operations in 2005 and has now surpassed the primary goal by over 40%.

Table 2: MUNICIPAL ANALYSIS - 1990, 2005, 2012, and 2014

Annual Consumption (Metric Units)

		1990	2005	2012	2014	% Change (2014 vs. 1990)	% Change (2014 vs. 2012)
Employees		866	1,198	863	875	1.0%	1.4%
Vehicle Fleet Fuel Use (Gallons or Equivalent)		478,344	1,102,823	897,603	771,410	61.3%	-14.1%
Energy Use (MMBtu)	Buildings	35,527	70,790	54,765	46,710	31.5%	-14.7%
	External Lights	147,100	27,780	21,764	15,484	-89.5%	-28.9%
	Sewage	7,122	257	215	240	-96.6%	11.6%
	Total	189,749	98,827	76,744	62,434	-67.1%	-18.6%
Solid Waste (Tons)		5,400	6,603	7,942	6,859	27.0%	-13.6%
Potable Water (million gallons)		NA	NA	260	298	NA	14.6%
Recycled Water (million gallons)		NA	NA	342	409	NA	19.6%

* All GHG emissions are reported in CO_2 Equivalent (CO_2e)

Annual Greenhouse Gas (GHG) Emissions (Metric Tons CO_2e)

		1990	2005	2012	2014	% Change (2014 vs. 1990)	% Change (2014 vs. 2012)
Per Employee		35.9	16.6	19.5	16.1	-55.2%	-17.5%
Vehicle Fleet		4,655	9,282	6,802	5,802	24.6%	-14.7%
Energy Use	Buildings	3,728	5,856	4,321	3,646	-2.2%	-15.6%
	External Lights	20,260	2,896	2,247	1,370	-93.2%	-39.0%
	Sewage	981	19	22	25	-97.5%	13.6%
	Total	24,969	8,771	6,590	5,041	-79.8%	-23.5%
Solid Waste		1,471	1,830	2,296	1,983	34.8%	-13.6%
Potable/Recycled Water (embeded energy)		NA	NA	1,133	1,250	NA	10.3%
Total GHG Emissions		31,095	19,883	16,821	14,076	-54.7%	-16.3%
20% GHG Reduction Goal					24,876		
Reductions Needed To Reach Goal					0	*Goal Obtained	

DISCUSSION

The 2014 inventory results highlight Chula Vista's continued success in reducing GHG emissions associated with its municipal operations. This significant and sustained reduction is largely due to the continued decrease in emissions from external lighting energy, building energy, and fleet sectors, which each saw reductions between 600 and 1,000 MT CO_2e since the last inventory. The external lighting sector saw the largest percent reduction by lowering usage 93% since 1990. Emissions from building energy use were at the lowest they have been since the original inventory in 1990 (2% decrease) and 38% lower than the highest reported levels in 2005 (5,856 MT CO_2e). These trends are due in large part to the lasting energy upgrade and management efforts made throughout the City. Beginning in the mid-1990s, traffic signals were retrofitted with energy-efficient LED technologies, and more recently, most streetlights were converted to LED in 2013. In the building sector, phase II of the solar photovoltaic (PV) systems was accomplished, bringing the total amount of PV installed on City facilities to 1.7 megawatts (MW) at 14 facilities. Combined with the streetlight retrofits, these two projects have saved the City enough energy to offset the annual energy use of more than 500 homes.

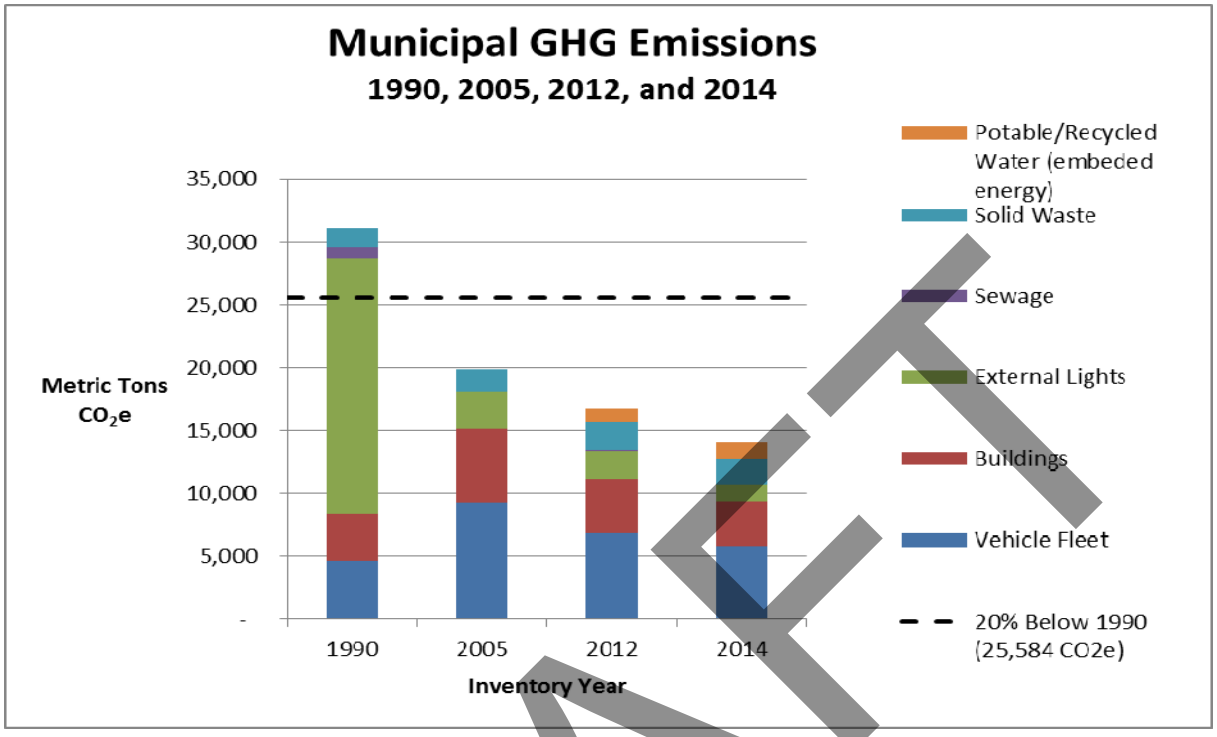

Figure 1: Total GHG emissions from municipal sources (by sector) in 1990, 2005, 2012, and 2014. The dashed line represents the City's carbon reduction goal. Due to a lack of available data, emissions from the water sector are not included in the 1990 and 2005 inventories.

Within the municipal vehicle fleet sector, fuel usage has decreased by 14% (126,193 gallons of gasoline equivalents) since 2012 with emissions decreasing by 15% (1,000 MT CO_2e). As a result of the City's Clean Fleet Policy, which prioritizes alternative fuels and hybrid technologies when selecting new vehicles, 31% of the municipal fleet has been converted to operate on electricity, propane, compressed natural gas, or biodiesel. Lastly, the City leverages its "purchasing power" to promote cleaner fuel sources through its contracted fleets, including the City's trash hauler and transit company which have both completed 100% shifts to alternative fuel sources and street sweepers and tow truck services which are still working on converting to alternative fuels.

NEXT STEPS

Chula Vista's municipal climate actions are guided by the City's Climate Action Plan and Sustainable Operations Plan. The operations plan outlines goals and strategies for seven key sustainability areas with the objective of integrating innovative sustainable practices throughout the City's procedures and facilities. This outline includes actions related to energy, water, and transportation upgrades, such as an indoor LED lighting upgrade at multiple City facilities, replacing turf with drought tolerant landscaping, and working with SDG&E to increase the City's electric vehicle charging infrastructure. To build upon past experiences and ensure that City buildings are operated in a holistic and sustainable way, the City has begun to seek LEED Building Operations and Maintenance certification for one of our existing buildings. By striving for this third party certification, City staff is learning about, and implementing where needed, a

comprehensive set of policies that help reduce emissions and provide numerous co-benefits including improved indoor air quality, promoting healthy commuting options, and ensuring comfortable and productive work spaces.

The City has also initiated a Smart Cities program to look at how it can incorporate new technologies to better track and manage various aspects of City operations including environmental impacts. Some proposed technologies involve smart streetlights that can dim and reduce energy usage when not needed, electronic signage that can provide environmental focused marketing while also generating revenue and building sensors and networks that better allow the City to manage resources including energy, water, and waste. Through implementation of The City Operations Sustainability Plan, the City strives to lead by example, thereby helping to ensure clean air, water, and land for the entire community.