2014 COMMUNITY GREENHOUSE GAS EMISSIONS INVENTORY

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SUMMARY

As part of Chula Vista's climate action program and its commitment to reduce greenhouse gas (GHG) or "carbon" emissions, the Economic Development Department's Conservation Section performs emission inventories to identify GHG sources and to help guide policy decisions. The 2014 GHG Emissions Inventory is the City's latest evaluation of its progress in reaching its emissions reduction goal and builds upon past inventory efforts. The inventory's community component uses ICLEI's U.S. Community Protocol to ensure the City's GHG inventories comply with industry best practices. In an effort to ensure compliance with the protocol, community GHG emissions for the transportation sector were recalculated for 2005 and 2012 based on new guidance on how to best utilize VMT data.

The 2014 inventory indicates that Chula Vista's annual citywide GHG levels are 1,249,503 metric tons of carbon dioxide equivalent (MT CO_2e). Compared to 2005, Chula Vista's citywide GHG emissions have decreased by 5% and per capita emissions are approximately 21% below 2005 levels and 18% below 2012 levels. Looking at the activity data behind the emissions, there were mixed results with a decrease of 30% in the residential sector but a 16% increase in the combined commercial and industrial energy consumption. But largely due to a cleaner electrical grid, both sectors saw GHG emission reductions. Community transportation activity has also decreased since 2012, with vehicle miles traveled (VMT) about 9% lower than in 2012 but still 11% higher than 2005, but largely due to cleaner transportation fuels GHG emissions are only 3% higher. In order to reach the current community emissions reduction goal of 15% below 2005 emission levels, the City will have to reduce its GHG emissions by more than 131,120 MT CO_2e or about 10%.

METHODOLOGY

Chula Vista has been a regional and national leader in climate action policies and programs designed to reduce GHG, or "carbon" emissions. The City has participated in the United Nations Framework Convention on Climate Change, ICLEI Cities for Climate Protection Campaign, the Conference of Mayor's Climate Protection Agreement and the America's Pledge "We Are Still In." Through this involvement, the City has committed itself to reducing its greenhouse gas emissions.

The City's 2014 GHG Emissions Inventory was compiled and calculated using the U.S. Community Protocol (Version 1.0), which was created by ICLEI and supported by California regulatory agencies to provide methodologies for local governments to better estimate their

annual greenhouse gas emissions from community sources. In the protocol, the emissions from five main parameters – building energy consumption, transportation, water (embedded energy), wastewater, and solid waste – are evaluated. These parameters are based solely on "end use activities" and their emissions are expressed as CO_2 equivalent (or CO_2e), which allows greenhouse gases of different strengths to be added together.

SECTOR	DATA PROVIDER	ACTIVITY DATA	EMISSION FACTOR
Energy	SDG&E	- Metered electricity & natural gas use - Due to privacy concerns industrial and commercial sectors needed to be combined - For 2014 data SDG&E used a new data collection methodology than previous years	- 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 CO_2 emission factor provides a CO_2e output that includes CH_4 & N_2O - Default natural gas emission coefficients
Transportation	SANDAG	- Annual VMT data was derived from average weekday VMT values for Chula Vista. Trips that either started or ended in Chula Vista but ended or started in another jurisdiction were discounted by 50% while through trips were not included - 2012 and 2014 VMT calculations were preformed by different SANDAG models and may effect the VMT results	- Default fuel (CO2/CH4/N2O / gallon) emission coefficients - CalTrans EmFac emission coefficients (CO2e / mile) (community analysis only)
Solid Waste	CalRecycle	- Solid waste disposal data for Chula Vista residents and businesses at all California landfills	- Default fugitive methane (CH_4) emission estimates (based on EPA WARM Model)
Wastewater	City Staff	- Wastewater totals sent to Wastewater Treatment Plants (WWTP) provided by City staff	- EPIC emission factor based on Pt. Loma WWTP
Water (embeded energy)	Otay & Sweetwater Authority water districts	- Amount of water used by all community	- California Energy Commission report detailing embedded kWh per gallon of water - Modified SDG&E emission factor (same as used in energy sector)

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

To perform emission calculations, the City utilized the ICLEI Clear Path tool provided by the Statewide Energy Efficiency Collaborative (SEEC) and an inventory tool created by University of San Diego Energy Policy Initiatives Center (EPIC). Finally, emissions for 2005 and 2012 were recalculated based on new guidance from SANDAG on how to appropriately account for VMT trips that only have Chula Vista as either the origin or destination but not both. This change increased VMT totals and related emissions. 2005 emissions for the solid waste sector

were also updated based on guidance from ICLEI and updates that were made to the ClearPath software since 2005.

With technical assistance from the EPIC, City staff collected "activity data" from a number of municipal and external data providers including SANDAG, SDG&E, CalRecycle, the Otay and Sweetwater Authority Water Districts, and City Staff (Table 1). In most cases, the data providers were able to offer aggregated data for calendar year 2014. Default emissions coefficients and related assumptions were generally used for transportation and waste analyses. However, staff included utility-specific electricity coefficients for energy sector emission analyses. SDG&E's CO_2 emission factor has not been third-party verified and updated since 2009, yet the utility has significantly increased its percentage of renewable electricity (from 9% to 43%) over the past few years. To help account for this increased renewable energy use, EPIC created a modified CO_2e emission factor that also incorporates CH_4 and N_2O emissions. This emission factor was used in the 2012 and 2014 community inventories. EPIC has also worked with the City of San Diego to calculate GHG emissions factors related to wastewater from Chula Vista residents and business that is sent to San Diego for treatment.

RESULTS

Annual Consumption (Metric Units)

		2005	2012	2014	% Change (2014 vs. 2005)	% Change (2014 vs. 2012)
Population		217,543	249,382	260,765	20%	5%
Housing Units		73,115	79,255	81,267	11%	3%
Land Area (Acres)		33,024	33,024	33,024	0%	0%
Annual Vehicle Miles Traveled (VMT)		1,429,425,787	1,746,331,092	1,585,833,977	11%	-9%
Energy Use (MMBtu)	Residential	3,416,724	3,642,556	2,396,525	-30%	-34%
	Commercial**	2,305,220	2,586,867	3,239,330	16%	11%
	Industrial**	485,504	327,471			
	Total	6,207,448	6,556,894	5,635,855	-9%	-14%
Solid Waste (Tons)		217,459	193,666	257,144	18%	33%
Potable Water (million gallons)		12,666	10,403	8,034	-37%	-23%

Annual Greenhouse Gas (GHG) Emissions (Metric Tons CO2e)

		2005	2012	2014	% Change (2014 vs. 2005)	% Change (2014 vs. 2012)
Per Capita		6.0	5.8	4.8	-21%	-18%
Per Housing Unit		18.0	18.4	15.4	-15%	-16%
Per Acre		39.8	44.1	37.8	-5%	-14%
Transportation ($MTCO_2e$)[1]		717,256	851,386	740,584	3%	-13%
Energy Use ($MTCO_2e$)	Residential	247,559	266,438	221,923	-10%	-17%
	Commercial	182,951	204,818	181,115	-19%	-24%
	Industrial	41,670	34,055			
	Total	472,180	505,311	403,038	-15%	-20%
Solid Waste ($MTCO_2e$)		60,780	50,717	67,245	11%	33%
Potable Water (MTCO2e)		50,062	40,819	30,810	-38%	-25%
Waste Water*** (MTCO2e)		15,457	7,962	7,826	-49%	-2%
Total GHG Emissions ($MTCO_2e$)		1,315,734	1,456,195	1,249,503	-5%	-14%
15% Below 2005 Reduction Goal				1,118,374		
Reductions Needed To Reach Goal				131,129		

* All GHG emissions are reported in CO_2 Equivalent (CO_2e) which allows emissions of different strengths to be added together. For example, one metric ton of methane emissions is equivalent to 21 metric tons of carbon dioxide (or CO2e) in global warming potential.
**Commerical and Industrial energy usage had to be merged in 2014 due to privacy concerns
*** Due to better data avlability methodology for calculating wastewater emission were updated in 2012.

Table 2: Demographics, activity data and greenhouse gas emissions for 2005, 2012 and 2014

In 2014, community GHG emissions from Chula Vista totaled 1,249,504 MT CO_2e (Table 2, Figure 1). The sector with the greatest amount of emissions (59% of total) was transportation or mobile sources. The residential energy use sector was the second highest source producing a quarter (18%) of total community emissions, followed by the combined commercial and industrial energy use (14%) and solid waste (5%) sectors. Compared to 2005 and 2012, total citywide emissions in 2014 were 5% and 14% lower, respectively (Figure 1). 2014 per capita emissions are approximately 21% below 2005 levels and 18% below 2005 levels. Emissions from all energy sectors have decreased by 15% or 69,142 MT CO_2e in total since 2005, while transportation-based emissions are estimated to have increased 3% or 23,329 MT CO_2e. The solid waste sector had emissions increase 11% since the 2005 baseline and 33% since 2012. Emissions from water (embedded energy) have decreased 38% since 2005 while emissions from wastewater treatment have decreased 2% since 2012.

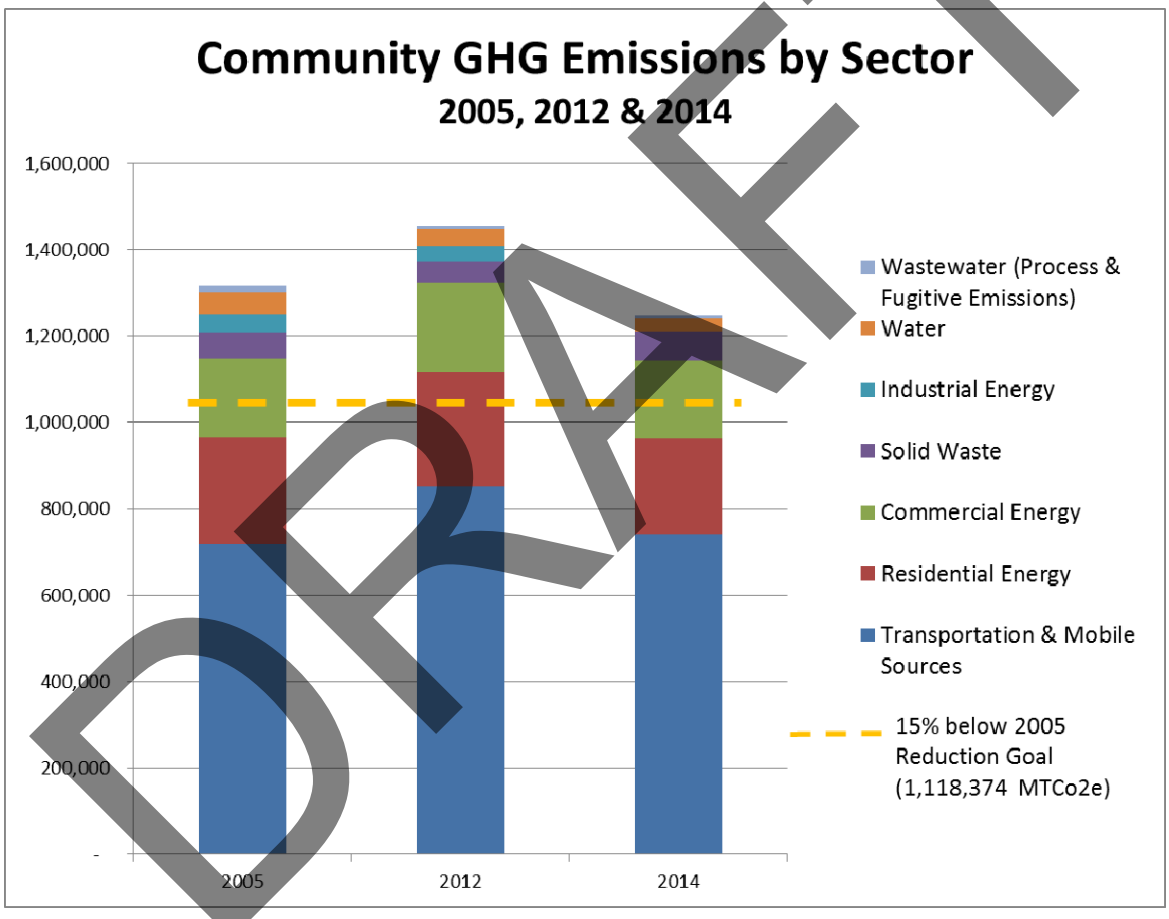

Figure 1: Total GHG emissions from community sources (by sector) in 2005, 2012, and 2014. The yellow dashed line represents the City's carbon reduction goal

DISCUSSION

Community Emissions

As mentioned in the 2012 inventory, due to data availability and updated methodologies, the City has updated its baseline from 1990 to 2005. Unlike previous community inventories, this year saw a total GHG emission reduction of 14% from the most recent inventory (2012) and a 5% reduction from the baseline (2005). These reductions occurred in spite of the City's population growth of 5% since 2012 and 20% since 2005. Factoring that growth into emissions and looking at per capita GHG emissions this illustrates reductions of 18% since 2012 and 21% since 2005. While these reductions are good to see and significant, continued reductions will be needed in multiple inventories in order to reach our short and long-term goals. One factor that affected the 2012 emissions totals included changes in modeling and data collection that are used to estimate activity data. In the transportation sector, SANDAG updated their traffic models between the 2012 and 2014 inventories and this can affect comparisons between those two years. In the energy sector, SDG&E changed how they provided energy usage data to ensure the privacy of their users. The City worked to facilitate data sharing under a Non-Disclosure Agreement but the change may still impact data results. For both sectors, City staff will be carefully monitoring the results of the next inventory (2016) to see if the reduction trends continue.

While it is difficult to reduce transportation-related emissions due to long-standing land use form and commuting patterns, there are local, state, and federal programs that are beginning to actively target this sector by reducing the carbon-intensity of vehicle fuels, improving fuel efficiency, and promoting alternative transportation options. The City itself continues to integrate "smart growth" design principles into its development review and approval process and to facilitate the installation of alternative fuel infrastructure throughout the community, including public electric vehicle chargers at 7 City facilities, which can further help address these emissions.

When looking at the second largest sector, building energy use, Chula Vista has numerous programs and policies to expand energy efficiency and renewable energy opportunities. These include the Property Assessed Clean Energy (or PACE) programs which started in late 2014 but have since been used to finance almost 50 million dollars in energy efficiency, renewable energy, or water efficiency in Chula Vista. City staff also continued to promote energy conservation through the Local Government Partnership with SDG&E. Under this partnership, the Free Resource & Energy Business Evaluation (FREBE) program has successfully helped over 1,000 local businesses and 135 Home Upgrade Carbon Downgrade program participants identify energy-saving improvements at their buildings and homes.

NEXT STEPS

With the adoption of the City's most recent Climate Action Plan in late 2017, City staff are working to implement the 11 GHG reduction strategies. Some of the implementation actions being taken are the adoption of increased efficiency levels for commercial outdoor lighting, working to adopt an ordinance that would require solar PV on new construction, installing more than 120 electric vehicle chargers for City employees and fleets and adopting the City's Water Stewardship plan. Staff are also working with SANDAG and EPIC to create a Regional GHG Framework that will guide future GHG inventories and help ensure consistency across the

region. Additionally, in an effort to increase inventory consistency and decrease the amount of required staff time, EPIC will be undertaking efforts to conduct GHG inventories for a number of jurisdictions, including Chula Vista, starting with the 2016 inventory. This effort will help ensure a more timely and rigorous inventory while minimizing the staff time required.