

MEMORANDUM

DATE January 29, 2021

TO Patrick M. Tallarico, Manager, City of Palm Springs Office of Sustainability

FROM Tammy L. Seale, Principal, PlaceWorks
Eli Krispi, Senior Associate, PlaceWorks

SUBJECT City of Palm Springs 2010 Greenhouse Gas Inventory Update

Introduction

PlaceWorks is working with the City of Palm Springs (City) to update greenhouse gas (GHG) inventories and forecasts, in support of the City's ongoing General Plan update. This work includes an update to the community-wide and City operations 2010 inventories, preparation of a 2018 community-wide inventory, and preparation of a forecast for 2020. For the first stage of this work, PlaceWorks revised Palm Springs' existing GHG inventories for the calendar year 2010. This update applies to the community-wide GHG inventory (identifying emissions from the activities of community members, including residents, businesses, and visitors) and the City operations GHG inventory (identifying emissions from the City's government operations). This memo summarizes the results of the updated 2010 GHG inventories and the specific revisions that the PlaceWorks team made to the existing GHG inventories. PlaceWorks updated the 2010 GHG inventories in September 2020 and revised the updates again in January 2021 following receipt of more accurate data for the transportation sector.

Methodological Changes

PlaceWorks updated the GHG inventories, originally prepared in 2012, in accordance with the most recent applicable guidance documents, known as protocols. These protocols are recommended for local GHG inventories by the California Governor's Office of Planning and Research. They provide direction for standardized calculation methods, as well as recommended sources (known as sectors) of GHG emissions to include, allowing for greater accuracy and easier comparison between GHG inventories. The updated community-wide GHG inventory uses the United States Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (U.S. Community Protocol), which was first developed in 2012 and updated in 2019. The updated City operations GHG inventory relies on the Local Government Operations Protocol (LGOP), which was first developed in 2008 and was updated in 2010. Updates to both GHG inventories include recommendations from other relevant guidance documents where needed.

One major edit to the 2010 GHG inventories was to revise the global warming potentials (GWPs) used in all inventories to account for the relative difference in potencies of different GHGs. These numbers have changed as the science of GHGs have advanced. Palm Springs' existing inventories used GWPs from the Intergovernmental Panel on Climate Change's (IPCC) Second Assessment Report, released in 1995.

PlaceWorks updated these values to use the GWPs from the most recent IPCC report, the Fifth Assessment Report,¹ released in 2013. **Table 1** shows the differences in GWPs by gas.

Table 1: Change in Global Warming Protocols (GWPs) by Greenhouse Gas

GAS	SECOND ASSESSMENT REPORT GWP	FIFTH ASSESSMENT REPORT GWP
Carbon dioxide (CO ₂)	1	1
Methane (CH ₄)	21	28
Nitrous oxide (N ₂ O)	310	265

In addition to these universal edits to both inventories, PlaceWorks has made the following changes:

Changes to both GHG inventories

- Updated the Southern California Edison (SCE) emission factor (the figure that indicates the amount of GHGs produced per unit of electricity used) to more accurately reflect SCE’s mix of power sources in 2010.
- Updated the emission factor for on-road vehicles in the community-wide GHG inventory to be based on the specific mix of vehicle types present in Riverside County in 2010.
- Revised the calculation methods for fugitive emissions associated with wastewater processing, in accordance with the most recent available guidance.
- Consolidated some subsectors of GHG emissions to provide more streamlined data (see **Attachment 1** for a list of changes).

Changes to the community-wide GHG inventory

- Revised the estimate of vehicle miles traveled (VMT) to more accurately reflect commute and other travel patterns within Palm Springs and between Palm Springs and other communities consistent with best practice for community-wide inventories.
- Revised the GHG emissions for off-road equipment in the community-wide GHG inventory to reflect Palm Springs’ share of these emissions more accurately as a proportion of county-wide emissions.
- Removed GHG emissions associated with ozone-depleting substance substitutes from the community-wide GHG inventory. These sources of GHG emissions are not required under current protocol guidance, and accurate data sources for ozone-depleting substance substitutes are not available.
- Added carbon sequestration from natural lands and street trees, as recommended by the most recent version of the US Community Protocol.

¹ IPCC, 2013: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. 659–740.
https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf.

Changes to the City operations GHG inventory

- Removed GHG emissions associated with solid waste hauling from the City operations GHG inventory. These sources of GHG emissions are not required under current protocol guidance.
- Updated the emissions factor for solid waste to reflect current recommended methods.
- Updated the calculation process for fertilizer application to be consistent with current recommended methods.
- Removed GHG emissions from septic tanks, as these are not part of City facilities.

Community-Wide GHG Inventory

Table 2 shows the results of the updated community-wide GHG inventory, organized by sector and subsector. Table 3 shows a comparison of the original and updated community-wide GHG inventory.

Table 2: Updated Community-Wide 2010 GHG Inventory

SECTOR	SUBSECTOR	GHG EMISSIONS (MTCO ₂ E)
Residential buildings	Residential electricity	75,270
	Residential natural gas	73,420
	Residential propane	430
Commercial buildings *	Commercial electricity	82,110
	Commercial natural gas	46,560
Transportation	On-road vehicles	254,860
Off-road equipment	Off-road vehicles and equipment	240
Solid waste	Community-generated waste	16,840
	Former Palm Springs landfill	1,350
Water and wastewater	Water supply electricity	8,190
	Wastewater treatment electricity	1,140
	Wastewater treatment process emissions	24,110
Land use and sequestration	Fertilizer application	20
	Natural land sequestration	-840
	Street tree sequestration	-500
Total		583,200

* This sector includes GHG emissions from municipal buildings and facilities, except for those concerned with water and wastewater activities. Those GHG emissions are now part of the “water and wastewater” sector.

Note: All values are rounded to the nearest 10.

Table 3: Original and Updated Community-Wide 2010 GHG Inventory

SECTOR	ORIGINAL GHG EMISSIONS (MTCO ₂ E)	UPDATED GHG EMISSIONS (MTCO ₂ E)	PERCENT CHANGE
Residential buildings	156,000	149,120	-4%
Commercial buildings	135,900	128,670	-5%
Transportation	87,240	254,860	192%
Off-road equipment	250	240	-4%
Solid waste	10,920	18,190	67%
Water and wastewater	24,040	33,440	39%
Land use and sequestration	380	-1,320	-447%
Ozone-depleting substances	16,860	- *	-
Total	431,590	583,200	35%

* This source of GHG emissions is not included in the updated 2010 community-wide GHG inventory.

Note: All values are rounded to the nearest 10.

Overall, 2010 community-wide GHG emissions totaled 583,200 MTCO₂e under the updated GHG inventory, a difference of approximately 35 percent compared to the results of the original inventory. While the GHG emission level changed to some degree for all sectors due to these adjustments, some sectors saw more substantial changes:

- Transportation GHG emissions increased 192 percent from the GHG inventory adjustment. This is primarily the result of changes in how transportation emissions are estimated. The original GHG inventory followed the “geographic boundary method,” which counts all mileage occurring within Palm Springs’ city limits but excludes all miles occurring outside of the community, regardless of where the trip began or ended. The updated GHG inventory follows an “origin-destination method,” capturing all miles from trips beginning and ending in Palm Springs, including a portion of miles from trips between Palm Springs and other communities, and excluding miles from trips that pass through the community but do not stop. The origin-destination method is consistent with recommended best practices for GHG inventories and land use and transportation planning. Mileage was estimated using the Riverside County Transportation Analysis Model (RIVCOM), released in 2020. Additionally, the original GHG inventory used miles-per-gallon averages to determine overall fuel use and GHG emissions, while the updated inventory uses factors for fuel use and GHG emissions that reflect the vehicle model types and years present in the Coachella Valley area. These revisions ensure the GHG inventory more accurately reflects the travel patterns and resulting GHG emissions associated with Palm Springs residents, visitors, and businesses. While this approach is more accurate, it did result in transportation-related GHG emissions being higher than the original inventory indicated.
- Solid waste GHG emissions rose 67 percent from the GHG inventory adjustment. This is partially because solid waste GHG emissions are methane (CH₄), and as mentioned above, the updated GHG inventory uses more recent GWPs that reflect a higher relative potency of methane. It is also the result of using an updated calculation method that better reflects the full amount of GHG emissions generated by solid waste.

- Water and wastewater GHG emissions increased 39 percent from the GHG inventory adjustment. This is a result of using updated methods to calculate wastewater treatment process GHG emissions and the use of updated GWPs.
- Land use and sequestration GHG emissions fell 447 percent from the GHG inventory adjustment. This is due to a revised method for calculating GHG emissions from fertilizer, which resulted in fewer GHG emissions from fertilizer than in the original GHG inventory. The updated GHG inventory also added negative GHG emissions from natural lands and street trees sequestration, which were not in the original GHG inventory and helped to reduce GHG emissions in this category.

City Operations GHG Inventory

Table 4 shows the results of the updated City operations GHG inventory, organized by sector and subsector. **Table 5** shows a comparison of the original and City operations GHG inventory.

Table 4: Updated City Operations 2010 GHG Inventory

SECTOR	SUBSECTOR	GHG EMISSIONS (MTCO ₂ E)
Buildings and facilities	Building electricity use	2,910
	Building natural gas use	980
	Cogeneration	4,170
	Water and wastewater electricity use	930
Outdoor lighting	Traffic signals	110
	Streetlights	240
	Outdoor lighting	60
Vehicle and equipment fleet	Vehicle fleet	1,040
	Off-road equipment	170
Employee commute	Employee commute	780
Solid waste disposal	Government-generated solid waste	380
	Former Palm Springs landfill	1,350
Fertilizer application	Public lands fertilizer	10
Refrigerants	Refrigerant use	310
Wastewater treatment	Wastewater treatment facility	24,090
Total		37,530

Note: All values are rounded to the nearest 10.

Table 5: Original and Updated City Operations 2010 GHG Inventory

SECTOR	ORIGINAL GHG EMISSIONS (MTCO ₂ E)	UPDATED GHG EMISSIONS (MTCO ₂ E)	PERCENT CHANGE
Buildings and facilities	9,340	8,990	-4%
Outdoor lighting	440	410	-7%
Vehicle and equipment fleet	1,290	1,210	-6%
Employee commute	1,020	780	-24%
Solid waste disposal	1,480	1,730	17%
Fertilizer application	160	10	-94%
Refrigerants	110	310	182%
Wastewater treatment	13,940	24,090	73%
Waste hauling fleet	1,470	- *	-
Total	29,230	37,530	28%

* This source of GHG emissions is not included in the updated 2010 community-wide GHG inventory.

Note: All values are rounded to the nearest 10.

Overall, the City operations GHG emissions increased to 37,530 MTCO₂e, an increase of 28 percent, because of the GHG inventory update. This is primarily due to increased GHG emissions from the wastewater treatment facility, which make up more than half of the City operations GHG emissions. GHG emissions changed for all sectors, although some experienced more significant changes.

- GHG emissions from employee commute declined 24 percent from the adjustment. The updated inventory relies on the vehicle model types and years present in the Coachella Valley area to calculate GHG emissions. Given the mix of vehicle types driven by City employees, the use of this more accurate dataset has caused a decline in GHG emissions in this sector.
- GHG emissions from solid waste disposal rose 17 percent due to updated data about the amount of solid waste generated at County facilities and the increased GWP of methane, as discussed above.
- Land use and sequestration GHG emissions fell 94 percent from the GHG inventory adjustment as a result of a new method for calculating GHG emissions from fertilizer, which caused fewer GHG emissions than in the original GHG inventory.
- Refrigerant GHG emissions increased 182 percent as a result of the GHG inventory adjustment due to the inclusion of refrigerant gases that were left out of the 2010 GHG inventory.
- Wastewater treatment emissions increased 73 percent after the GHG inventory adjustment because of the higher GWP of methane and revised methods to calculate GHG emissions from the wastewater treatment process.

Next Steps

PlaceWorks will work with City staff to review these updated GHG emissions. Additionally, PlaceWorks will prepare a 2018 community-wide GHG inventory to show how Palm Springs' GHG emissions have changed since this 2010 baseline.

Attachment A: Subsector Organization Changes

As mentioned earlier, PlaceWorks has consolidated and reorganized some subsectors of GHG emissions to provide more streamlined results. This reorganization does not affect any calculations, only how the numbers are presented. **Table A-1** shows how subsectors for the community-wide GHG inventory have been reorganized, while **Table A-2** shows the reorganized subsectors for the City operations GHG inventory. Only emission sources included in the original GHG inventories are shown in these tables.

Table A-1: Community-Wide GHG Inventory Reorganization

ORIGINAL SECTOR	ORIGINAL SUBSECTOR	UPDATED SUBSECTOR	UPDATED SECTOR	
Residential buildings	Electricity	Residential electricity	Residential buildings	
	Natural gas	Residential natural gas		
	Propane	Residential propane		
Commercial buildings	Golf courses and country clubs - electricity	Commercial electricity	Commercial buildings	
	Golf courses and country clubs – natural gas	Commercial natural gas		
	Hotels, motels, and hospitality – electricity	Commercial electricity		
	Hotels, motels, and hospitality – natural gas	Commercial natural gas		
	Casinos and casino hotels – electricity	Commercial electricity		
	Casinos and casino hotels – natural gas	Commercial natural gas		
	Other commercial – electricity	Commercial electricity		
	Other commercial – natural gas	Commercial natural gas		
	Domestic water supply (Coachella Valley Water District) – electricity	Water supply electricity		Water and wastewater
	Wastewater treatment facilities (Desert Water Agency) – electricity	Wastewater treatment electricity		

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ORIGINAL SECTOR	ORIGINAL SUBSECTOR	UPDATED SUBSECTOR	UPDATED SECTOR
	Agricultural/water pumping – electricity	Water supply electricity	
	Private City services – electricity	Commercial electricity	Commercial buildings
	Buildings and other facilities – electricity	Commercial electricity	
	Buildings and other facilities – natural gas	Commercial natural gas	Commercial buildings
Municipal buildings	City services – electricity	Commercial electricity	
	Cogeneration plants – natural gas	Commercial natural gas	
	Wastewater treatment facilities (Palm Springs) – electricity	Wastewater treatment electricity	Water and wastewater
	On-road vehicles	On-road vehicles	Transportation
Transportation	Off-road vehicles	Off-road vehicles and equipment	Off-road equipment
	Community generated waste – paper products	Community-generated waste	
	Community generated waste – food waste	Community-generated waste	
Solid waste	Community generated waste – plant debris	Community-generated waste	Solid waste
	Community generated waste – wood and textile	Community-generated waste	
	Former Palm Springs landfill	Former Palm Springs landfill	
	Wastewater treatment facilities (Palm Springs)	Wastewater treatment process emissions	Water and wastewater
Fugitive emissions	Ozone-depleting substance substitutes	Not included	Not included
	Parks fertilizer application	Fertilizer application	
	Golf course fertilizer application	Fertilizer application	Land use and sequestration

Table A-2: City Operations GHG Inventory Reorganization

ORIGINAL SECTOR	ORIGINAL SUBSECTOR	UPDATED SUBSECTOR	UPDATED SECTOR
Municipal Buildings and Other Facilities	Major facilities electricity use	Building electricity use	Buildings and facilities
	Miscellaneous City-funded accounts	Building electricity use	
	Municipal facilities natural gas use	Building natural gas use	
	Municipal facilities refrigerant use	Refrigerant use	
Airport facilities	Airport facilities	Building electricity use	Buildings and facilities
Streetlights and traffic signals	Traffic signals/controllers	Traffic signals	Outdoor lighting
	Park and public spaces lighting	Outdoor lighting	
	Streetlights	Streetlights	
	Outdoor lighting	Outdoor lighting	
Water delivery	Water delivery	Water and wastewater electricity use	Buildings and facilities
	Wastewater treatment	Water and wastewater electricity use	
Wastewater treatment facilities	Emissions from incomplete combustion of digester gas	Wastewater treatment facilities	Wastewater treatment
	Emissions from wastewater treatment lagoons	Wastewater treatment facilities	
	Emissions from plant without nitrification/denitrification	Wastewater treatment facilities	
	Emissions from septic systems	Not included	
Cogeneration plants	Cogeneration facilities	Cogeneration	Buildings and facilities
Vehicle fleet	Municipal on-road fleet fuel	Vehicle fleet	Vehicle and equipment fleet
	Municipal off-road fleet fuel	Off-road equipment	
	Other municipal fuel	Off-road equipment	

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ORIGINAL SECTOR	ORIGINAL SUBSECTOR	UPDATED SUBSECTOR	UPDATED SECTOR
	Municipal vehicles refrigerant use	Refrigerant use	Refrigerants
Transit fleet	Waste transport fuel consumption	Not included	Not included
Employee commute	Municipal employee commute	Employee commute	Employee commute
Solid waste disposal	Municipal solid waste disposal	Government-generated solid waste	Solid waste disposal
Former Palm Springs landfill	Former Palm Springs landfill	Former Palm Springs landfill	
Fertilizer application	Nitrous oxide from fertilizers on municipal golf course	Public lands fertilizer	Fertilizer application
	Nitrous oxide from fertilizers on parks	Public lands fertilizer	