The City of SAN DIEGO

Climate Action Plan
2020 Annual Report Appendix

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Introduction

This appendix to the 2020 Annual Report of the City of San Diego's Climate Action Plan (CAP) provides additional information and data in the following four sections:

A. Overview of 2019 Greenhouse Gas (GHG) Emissions;
B. 2019 Climate Action Plan Strategy Updates;
C. Methodology Differences and Data Refinement; and
D. Analysis on Jobs.

The 2019 total GHG emissions in the City of San Diego (the City) were estimated to be 9.6 million metric tons of carbon dioxide equivalent (MMT CO_2e) approximately 1% lower than the previous 2018 GHG emissions estimate (9.7 MMT CO_2e).

As detailed in the CAP, this Appendix relates to the second phase (January 1, 2018 - December 31, 2020) of CAP implementation, in which the City focuses on the mid-term actions as identified in the CAP, continued monitoring of the implementation of the CAP strategies as well as the impact of federal and California state policies and mandates to determine whether the City is on track to achieve its emission reduction targets.[1]

In preparation for the 2020 Annual Report and the 2019 GHG emissions inventory, revisions and refinements were made to the 2017 and 2018 citywide GHG emissions, as well as to CAP strategies performance metrics presented in the previous 2019 CAP annual report. These revisions reflect updated data supplied by agencies not managed by the City, and ensures consistency with the 2019 GHG emissions estimates.[2] Revising previous inventories and metrics is consistent with the California Air Resources Board (CARB)'s California statewide inventory method updates to incorporate new methods or reflect updated data, and is based on the Intergovernmental Panel on Climate Change (IPCC) recommendations to maintain a consistent time-series when developing GHG inventories.[3] The updates to 2017 and 2018 citywide emissions are related to revisions in the transportation and waste emissions categories. These revisions are discussed briefly in section C (*Methodology Differences and Data Refinement*) of this Appendix, as well as in Section 5 of the *City of San Diego 2017–2019 Greenhouse Gas Emissions Inventory* supplemental document. The updates to the CAP strategies performance metrics are described in section B (*2019 Climate Action Plan Strategy Updates*) of this Appendix.

The five CAP strategies are: (1) energy and water efficient buildings; (2) clean and renewable energy; (3) bicycle, walking, transit, and land use; (4) zero waste; and (5) climate resilience. Under each strategy, the current state in 2019 is presented first followed by updates of each action. Comparisons of the current status in 2019 and the baseline estimates in 2010 are provided where possible.

[1] City of San Diego: Climate Action Plan, adopted December 2015. Chapter 3 – Implementation and Monitoring.

[2] City of San Diego: Climate Action Plan 2019 Annual Report and Appendix, accessed November 2, 2020.

[3] California Air Resources Board (CARB): California Greenhouse Gas Emissions for 2000 to 2018. Trends of Emissions and Other Indicators, p. 21 Additional Information (2020), accessed November 2, 2020.

Overview of 2019 Greenhouse Gas (GHG) Emissions

GHG EMISSIONS INVENTORY

The emissions source categories included in this update have remained consistent with the previous CAP Annual Reports: on-road transportation, electricity, natural gas, water, and, wastewater and solid waste. As in the previous years, these reflect the five categories of emissions that are recommended in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (U.S. Community Protocol) to be routinely included in a citywide inventory.[4] GHG emissions from sources such as air travel, shipping, off-road vehicle and equipment or other high global warming potential gases in use in the City are not included.

The 2019 and revised 2017 and 2018 GHG emissions inventory results are shown in Table 1. The methods, data availability and sources used to calculate GHG emissions have been updated since the development of the 2010 baseline emissions in the CAP. A brief discussion of the differences in methods and data sources is provided in Section C (*Methodology Differences and Data Refinement*) of this Appendix.

TABLE 1 CITY OF SAN DIEGO GREENHOUSE GAS EMISSIONS

Emissions Category	2010 Emissions* (Reported in the CAP, MT CO_2e)	2016 Emissions (reported in 2019 annual report, (MT CO_2e)	2017 Emissions Revised* (MT CO_2e)	2018 Emissions Revised* (MT CO_2e)	2019 Emissions (MT CO_2e)	2018 Revised – 2019 % Changes	2010 – 2019 % Changes
On-Road Transportation	7,086,297	5,542,000	5,368,000	5,328,000	5,296,000	-0.6%	-25%
Electricity	3,138,613	2,219,000	2,183,000	2,157,000	2,069,000	-4.1%	-34%
Natural Gas	2,098,983	2,058,000	2,095,000	1,841,000	1,911,000	3.8%	-9%
Wastewater & Solid Waste	383,172	276,000	299,000	309,000	303,000	-1.9%	-21%
Water	277,927	73,000	67,000	79,000	67,000	-15%	-76%
Total	12,984,993	10,169,000	10,012,000	9,715,000	9,646,000	-0.7%	-26%

*2010 emissions are not rounded and the methods, data availability, and sources used to calculate GHG emissions have been updated since the development of 2010 emissions inventory **Revised values reflect updated data and information. 2016 emissions reported in 2019 annual report were not revised.
GHG emissions for each category and the totals are rounded to the nearest thousands. Sums may not add up to totals due to rounding.
MT CO_2e = metric tons of carbon dioxide equivalent.
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The 2017 revised, 2018 revised emissions and 2019 emissions shown in Table 1 are calculated based on the same methods and data sources, and can be compared directly. The 2019 total GHG emissions are estimated at 9.6 million metric tons CO_2e (MMT CO_2e), approximately 1% lower than 2018 revised total GHG emissions. The electricity, natural gas end-use, and water related emissions show the largest changes from 2018 compared with the other emission categories.

[4] ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012).

Emissions from electricity decreased by approximately 4% from 2018 to 2019; however, emissions from natural gas end-use increased by about 4% from 2018 to 2019. As a result, the emissions from building energy use (electricity + natural gas) in 2018 and 2019 are approximately the same. Emissions from water reduced significantly from 2018 to 2019, by 15%, due to more local surface water supply that lowered the energy and GHG emissions associated with importing water. The emissions from water in 2019 are similar to those in 2017.

LOW CARBON ECONOMY

The GHG intensity is the level of GHGs per unit of economic activity denominated as the Gross Domestic Product (GDP). The GDP is normally a national unit of economic activity, but can also be applied at the state, regional or city level. National GDP is measured as household expenditures on goods and services plus business investment, government expenditures and net exports. State GDP is measured by income (labor and capital minus business taxes) earned and costs of production in that state. The US Bureau of Economic Affairs has developed GDPs for regions such as San Diego County based on local personal income and industry. IMPLAN, an economic impact model, has been used to develop city-level GDPs.[5]

GHG intensity indicates how dependent economic activity is on GHG producing activities. Economic productivity is said to be more efficient if GHG intensity decreases, as economic growth then consumes less carbon-based fuels. This occurs when GHG emissions remain constant or decrease over time while the GDP increases. As mentioned above, the GHG emissions for the City of San Diego excludes specific emission sources such as emissions from air travel, shipping, off-road vehicles and equipment, or high global warming potential gases in use in the city. Therefore, a limitation of applying this method to community-wide GHG emissions is that not all economic sectors and GHG-emitting categories are included in the inventory, and the GHG intensity is lower than it actually is. However, since the categories inventoried each year are the same, GHG intensities can be compared for the City across the years.

The City of San Diego's GHG intensity was 69 MT CO_2e /$ million in 2018 and 66 MT CO_2e /$ million in 2019.

[5] Kelly Cunningham (San Diego Institute for Economic Research through 2018) developed and provided the estimate based on the IMPLAN model for the City of San Diego using the city's zip code information and the current data available from the U.S. Department of Commerce's Bureau of Economic Analysis (of September 2019). The 2018 GDP data are estimates and subject to revision with new data and information available from the U.S. Department of Commerce.

TABLE 2 2018 AND 2019 GHG INTENSITY (MT CO_2E/$ MILLION GDP)				
Year	**2018 (reported in 2019 Annual Report)**	**2018 Revised***	**2019**	**2018 Revised – 2019 % Changes**
Total Emissions (Million MT CO_2e)	9.8	9.7	9.6	-0.7%
GDP ($ billion)	140	140	146	4%
GHG Intensity (MT CO_2e/$million GDP)	70	69	66	-5%

*Revised values reflect updated information.

GDP = city-adjusted gross domestic product, MT CO_2e = metric tons of carbon dioxide equivalent

Sources: GDP estimated by Kelly Cunningham, San Diego Institute for Economic Research, based on Bureau of Economic Analysis, 2019. 2018 and 2019 GDP data are estimates developed in 2019.

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PER CAPITA GHG EMISSIONS

The 2018 and 2019 per capita GHG emissions in the City of San Diego are given in Table 3. This is based only on the five emission categories analyzed. The 2019 per capital GHG emissions are estimated at 6.8 MT CO_2e per capita, approximately 1% lower than the 2018 per capita GHG emissions.

TABLE 3 2018 AND 2019 PER CAPITA GHG EMISSIONS (MT CO_2E PER CAPITA)					
Year	**2010 Baseline* (reported in the CAP)**	**2018 (reported in 2019 Annual Report)**	**2018 Revised****	**2019**	**2018 Revised – 2019 % Changes**
Total emissions (Million MT CO_2e)	13.0	9.8	9.7	9.6	-0.7%
Total Population	1,301,617	1,419,845	1,414,372	1,420,571	0.4%
Per capita GHG emissions (MT CO_2e per capita)	10.0	6.9	6.9	6.8	-1.1%

*The methods, data availability, and sources used to calculate GHG emissions have been updated since the development of 2010 emissions inventory **Revised values reflect updated information from sources.

MT CO_2e = metric tons of carbon dioxide equivalent

Per capita emissions based on five emission categories only and cannot be compared with California statewide per capita emissions or per capita emissions targets.

2018 revised and 2019 population are based on SANDAG's Demographic & Socio-Economic Estimates (August 19, 2020 version).

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As mentioned above, the GHG emissions categories included and the methods to calculate GHG emissions for the City of San Diego are based on the U.S. Community Protocol. The U.S. Communities Protocol requires five basic emissions-generating activities to be included in a Protocol-compliant community-scale GHG inventory. These categories are generally recognized as being under the collective control and

management of the community whereas other emissions-generating activities such as from air travel, shipping, off-road vehicles and equipment, or high global warming potential gases are not considered as such. Therefore, allocating emissions from such categories to cities is either not possible due to lack of data or lack of proxy data, is challenging, or is better handled at a higher level of aggregation. In contrast, the California statewide GHG emissions inventory includes all economic sectors of the state. Therefore, the estimated City per capita emissions cannot be compared directly with the California statewide per capita emissions or per capita emissions targets calculated using the CARB statewide inventory or statewide emissions targets, which include all economic sectors and additional emissions categories.

Figure 1 below shows the growth in City of San Diego (estimated GDP and population) alongside GHG emissions since 2015, when the CAP annual reporting process started. From 2015 to 2019, the GHG intensity of City of San Diego's economy decreased by 29%, while the estimated GDP increased by 22%. From 2015 to 2019, the per capita GHG emissions dropped by 13%, while the population increased by 3%.

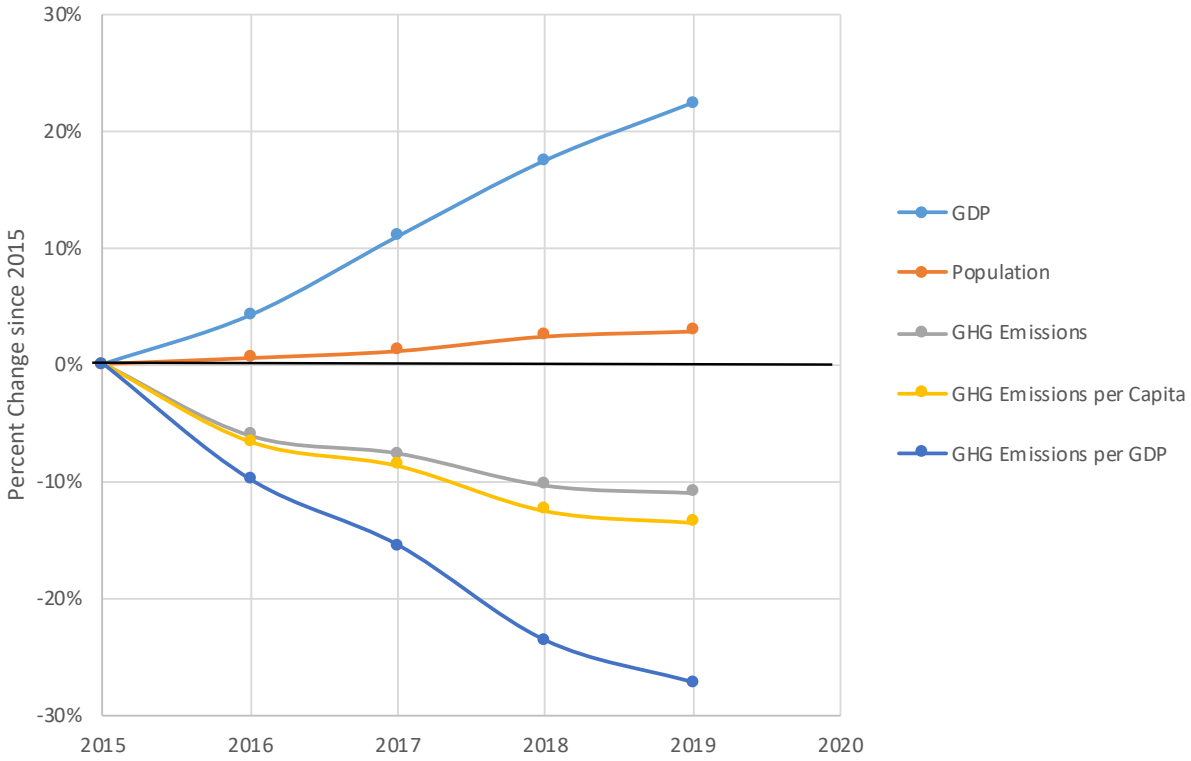


FIGURE 1 CHANGES IN SAN DIEGO GDP, POPULATION, AND GHG EMISSIONS SINCE 2015

2019 Climate Action Plan Strategy Updates

STRATEGY 1: ENERGY AND WATER EFFICIENT BUILDINGS

Energy (fossil-fuel based electricity and natural gas consumption) and water-related emissions account for 42% of 2019 Citywide GHG emissions (Table 1). The Energy and Water Efficient Buildings strategy has targets to reduce citywide per capita water use, energy use in residential buildings, and energy use in municipal operations. Water treatment and distribution to residents and businesses in the City require energy; therefore, reducing water use will also have an impact on the associated energy use.

Baseline and Current State of Energy and Water Use in the City of San Diego

The 2018 and 2019 grid supplied electricity is provided in Table 4. For electricity users with on-site electric generation, only the net electricity from the grid has been included.

TABLE 4 GRID-SUPPLIED ELECTRICITY USE IN CITY OF SAN DIEGO

Year	2010 (reported in CAP)	2018 (reported in 2019 Annual Report)	2018 Revised*	2019	2010-2019 % Change	2018 Revised – 2019 % Change
Electricity (MWh)	8,572,155	7,626,727	7,624,972	7,312,722	-15%	-4%
Emissions from Electricity (MT CO_2e)	3,138,613	2,161,000	2,157,000	2,069,000	-46%	-4%

* Revised values reflect updated information from data sources.

MWh = megawatt hour, MT CO_2e = metric tons of carbon dioxide equivalent

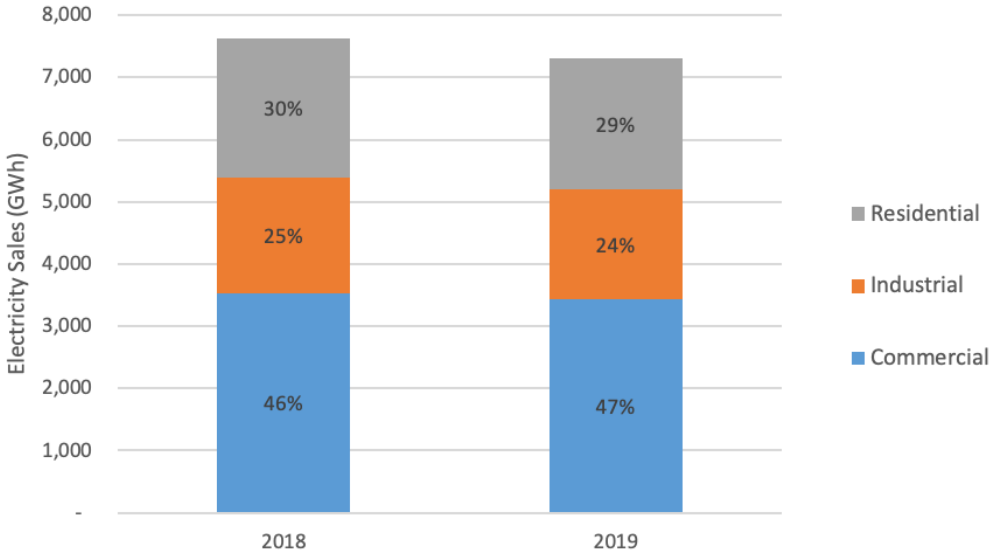
The MWhs do not include transmission and distribution losses, or self-serve behind-the-meter electricity generation (i.e., rooftop PV systems). The electricity sales data do not include the electricity sales to San Diego County Regional Airport Authority, San Diego Unified Port District and military.

GHG emissions are rounded to the nearest thousands. The emissions from electricity were calculated based on City of San Diego's grid supply and power mix specifically, which may differ from other jurisdictions in San Diego region. The GHG emissions include emissions from transmission and distribution losses.

SDG&E 2020, Energy Policy Initiatives Center 2020

A comparison of the grid-supplied electricity use by customer class in 2018 and 2019 is shown in Figure 2.

FIGURE 2 GRID-SUPPLIED ELECTRICITY USE BY CUSTOMER CLASS IN CITY OF SAN DIEGO



SDG&E's electricity sales in City of San Diego. Sales do not include transmission and distrubution losses, and exclude sales to San Diego County Regional Airport Authority, San Diego Unified Port District, and the military.
Percentages may not sum up to totals due to rounding.
SDG&E 2020

In 2019, 37% of natural gas use was from the residential class, 30% from the commercial class and the rest from the industrial class (including electric generation using natural gas). Table 5 provides natural gas end use in 2018 and 2019.

TABLE 5 TOTAL NATURAL GAS DELIVERED BY SDG&E IN CITY OF SAN DIEGO

Year	2018 (reported in 2019 Annual Report)	2018 Revised*	2019	2018 Revised – 2019 % Changes
Natural Gas Use (million therms)	338	338	351	4%

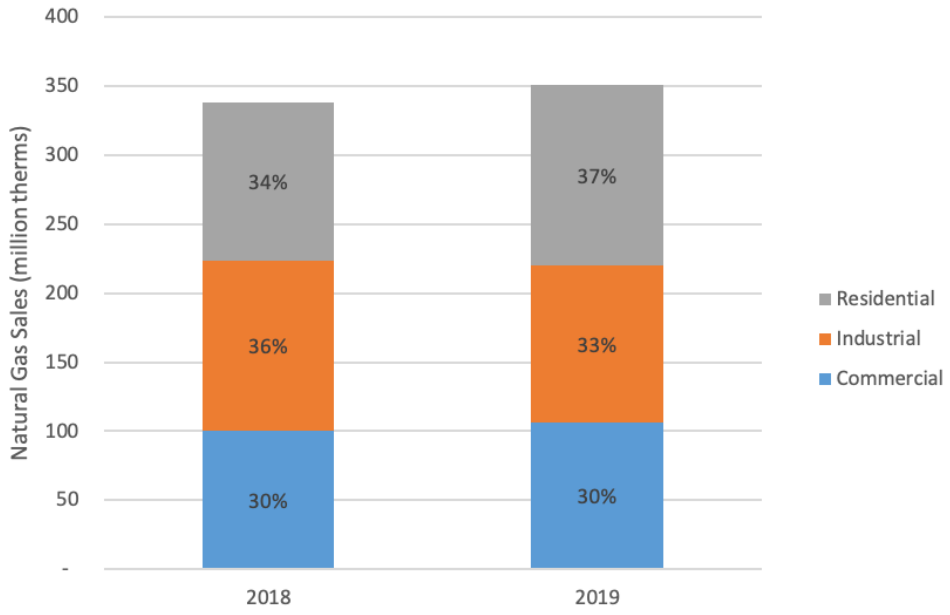
* Revised values reflect updated information from sources.

The natural gas sales data do not include the sales to San Diego County Regional Airport Authority, San Diego Unified Port District, and military.

SDG&E 2020, Energy Policy Initiatives Center 2020

A 4% increase in natural gas end-use emissions between 2018 and 2019 is mainly due to an increase in residential end-use. The residential natural gas end-use increased by 14% from 2018 to 2019. The commercial natural gas end-use increased by 6%; and the industrial natural gas end-use decreased by 7%. A comparison of the natural gas end-use by customer class in 2018 and 2019 is shown in Figure 3.

FIGURE 3 NATURAL GAS END-USE BY CUSTOMER CLASS IN CITY OF SAN DIEGO



SDG&E's natural gas sales in City of San Diego, exclude sales to San Diego County Regional Airport Authority, San Diego Unified Port District, and the military.
SDG&E 2020

Table 6 provides the electricity and natural gas end-use in million British thermal units (MMBtu). MMBtu is a common unit of energy used to enable comparison of the energy content of different fuel types. In

this case, electricity in kilowatt-hours (kWh) and natural gas in units of therms are converted to the same MMBTU unit. Natural gas constituted 58% of the total end-use energy in 2019.

TABLE 6 TOTAL ELECTRICITY AND NATURAL GAS DELIVERED BY SDG&E IN CITY OF SAN DIEGO

Year	2018 (reported in 2019 Annual Report)	2018 Revised*	2019	2018 Revised – 2019 % Changes
Electricity (million MMBtu)	26.0	26.0	24.9	-4%
Natural Gas (million MMBtu)	33.8	33.8	35.1	4%
Energy (million MMBtu)	59.8	59.8	60.0	-0.3%

* Revised values reflect updated information from sources.
MMBtu = million British Thermal Units
Conversion factors are 293 kWh/MMBtu and 10 therms/MMBtu.

SDG&E 2020, Energy Policy Initiatives Center 2020

Table 7 provides the electricity and natural gas saved from utility (SDG&E)'s energy efficiency program from 2016 to 2018.

TABLE 7 ENERGY SAVINGS FROM UTILITY ENERGY EFFICIENCY PROGRAM

Year	2016	2017	2018
Electricity Savings (MWh)	8,220	11,900	10,365
Electricity Savings (MMBtu)	280,275	405,724	353,403
Natural Gas Savings (Therms)	1,011,251	382,077	(453,270)
Natural Gas Savings (MMBtu)	101,125	38,208	(45,327)
Net Electricity and Natural Gas Savings (MMBtu)	381,400	443,931	308,076
Net Electricity and Natural Gas Savings as a Percentage of Energy Use (%)	0.6%	0.7%	0.5%

MWh = megawatt hour, MMBtu = million British Thermal Units
KWh and therms are converted to MMBtu using 99,976 btu/therm and 3,412 btu/kWh.

The annual data provide the energy efficiency savings credited for that year. The energy savings are from SDG&E energy efficiency program participants only. These includes all customer classes (agricultural, residential, commercial, and industrial). The savings are estimates comparing the energy use with and without the energy efficiency projects. A negative natural gas value means additional natural gas is used. Net energy savings means the net of electricity and natural gas savings.
SDG&E 2019, Energy Policy Initiatives Center 2019

Action & Progress: Reduce Energy Use in Residential Housing Units

Total residential electricity use includes both electricity provided by SDG&E and electricity generated from behind-the-meter PV systems. Residential PV capacity increased 22% from 239 Megawatts (MW) in 2018 to 291 MW in 2019 while grid-supply decreased by 5% in the same period. Together, grid-supply with behind-the-meter PV decreased about 1% from 2018 to 2019. Residential natural gas increased by 14% from 2018 to 2019. Therefore, combining both electricity and natural gas use, energy use per home in 2019 was approximately 6% higher than in 2018, mainly due to the increase in natural gas end-use (Table 8).

TABLE 8 RESIDENTIAL ENERGY (ELECTRICITY + NATURAL GAS) USE

Year	2010 (reported in CAP)	2018 (reported in 2019 Annual Report)	2018 Revised*	2019	2010-2019 % Change	2018 Revised-2019 % Change
Electricity (MWh, grid-supply)	2,498,471	2,227,628	2,228,521	2,117,782	-15%	-5%
Electricity (MW of PV[1])	15	237	239	291	2052%	22%
Electricity (MWh of PV[2])	26,251	414,869	407,553	494,867	1986%	21%
Total Electricity (sum of utility + estimated PV, MWh)	2,524,722	2,642,497	2,636,073	2,612,649	3%	-1%
Total Electricity (sum of utility + estimated PV, MMBtu)	8,608,065	9,009,621	8,987,720	8,907,854	3%	-1%
Natural Gas (Million Therms)	138	115	115	131	-5%	14%
Natural Gas (MMBtu)	13,781,505	11,476,071	11,474,192	13,058,203	-5%	14%
Total Energy (MMBtu)	22,389,570	20,485,691	20,461,912	21,966,057	-2%	7%
Total # of occupied units[3]	483,092	509,216	501,554	505,736	5%	1%
Energy use per home (MMBtu/home)	46.3	40.2	40.8	43.4	-6%	6%

*Revised values reflect updated information from sources.

MW = megawatt, MWh = megawatt hour, MMBtu = million British Thermal Unit

[1]Behind-the-meter PV capacity is obtained from the California Distributed Generation Statistics database, net energy metering (NEM) interconnection dataset for SDG&E - City of San Diego residential customers (Feb 29, 2020 version). It is based on the date of interconnection application approval.

[2]Capacity is converted to electricity using an average PV system capacity factor of 20% and annual degradation factor of 1%. [3]Occupied housing units are from SANDAG's Demographic & Socio-Economic Estimates (August 19, 2020 version).

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In 2019, approximately 9,000 new residential solar PV systems (99% of the total new systems) were approved for interconnection in the City for an additional 52 MW of new behind-the-meter PV capacity.

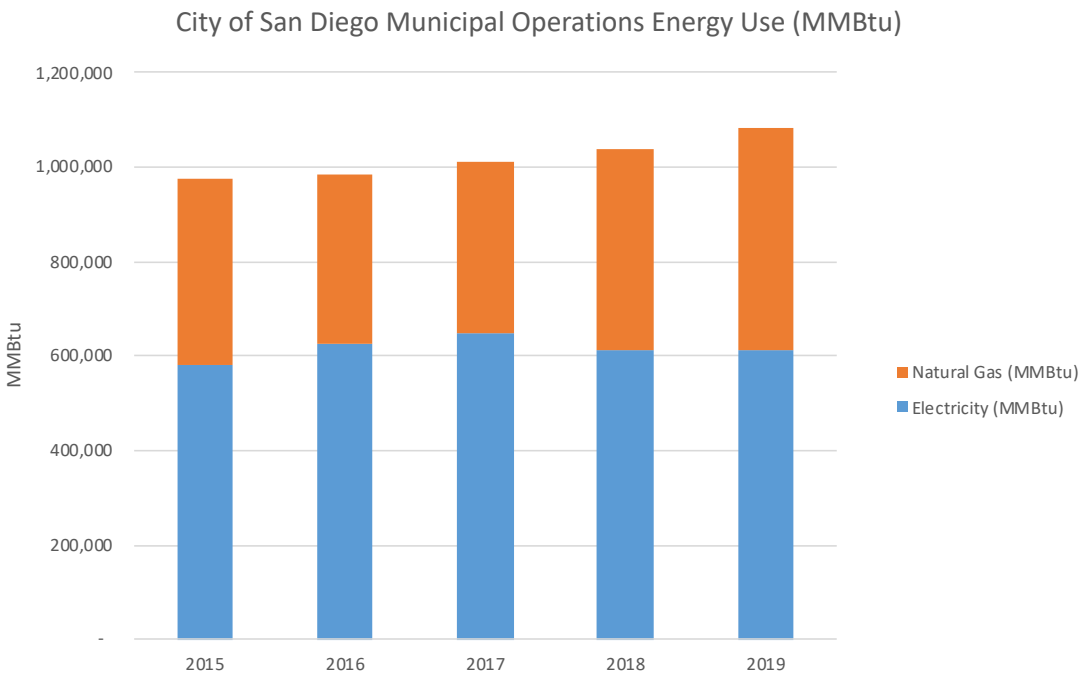
Action & Progress: Reduce Municipal (City Operations) Energy Use

Municipal operations energy use (grid purchases) in 2019 was 5% higher than in 2018 (Table 9).

TABLE 9 ENERGY (ELECTRICITY + NATURAL GAS) USE FOR MUNICIPAL OPERATIONS (SDG&E ONLY)						
Energy Use	**2010 Baseline**	**2018 (reported in 2019 Annual Report)**	**2018 Revised***	**2019**	**2010-2019 % Change**	**2018 Revised-2019 % Change**
Electricity (MWh)	205,787	180,377	179,173	180,200	-12%	1%
Electricity (MMBtu)	701,633	614,997	610,892	614,394	-12%	1%
Natural Gas (Million Therms)	3.4	4.5	4.3	4.7	40%	10%
Natural Gas (MMBtu)	335,723	448,000	426,000	470,000	40%	10%
Total energy (MMBtu)	1,037,357	1,062,997	1,036,892	1,084,394	5%	5%
Grid purchases only, does not include on-site renewable generation. Natural gas consumption includes gas use for space heating/cooling and electric generation. MWh = megawatt hour, MMBtu = million British Thermal Units. KWh and therms are converted to MMBtu using 99,976 btu/therm and 3,412 btu/kWh factors. Sources: City of San Diego Sustainability Department 2020						

The trend in energy use for municipal operations from 2015 to 2019 is given in Figure 4 below.

FIGURE 4 MUNICIPAL ENERGY USE (2015–2019)



Source: City of San Diego Sustainability Department
SDG&E grid purchase only. Does not include on-site renewable geneartion.

The municipal operations energy use increased by 5% from 2018 to 2019. Although the installation of PV systems and implementation of energy audits, including Net Zero facilities and lighting retrofits, have contributed to a lower than "business-as-usual" consumption, it has been offset by overall growth within the City. Some of this expansion includes initiatives such as the temporary bridge shelter at Golden Hall and growth of airport accounts.[6] Other contributors to the increased consumption in 2019 include an increase of heating degree days, which increased natural gas use and decreased energy generation. Seasonality changes such as an increase in rainy days lead to a higher than usual energy consumption at sewer pump stations as more rain would have seeped into the sewer system and required pumping and treatment.

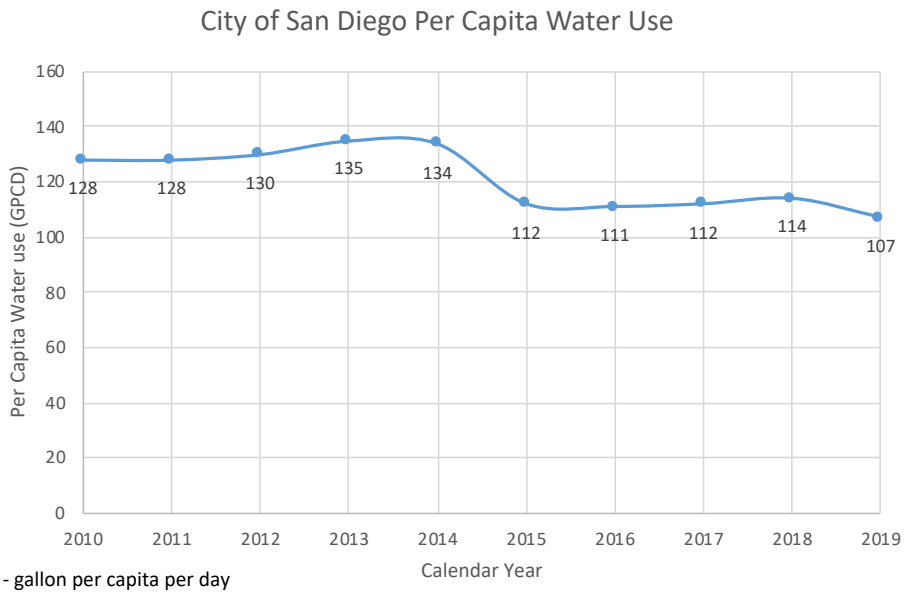
Action & Progress: Reduce Daily per Capita Water Consumption

Per capita water use (gallons per capita per day – GPCD) decreased substantially from 2010 to 2018 beyond what was projected in the CAP for 2020 (Figure 5). Governor Brown issued Executive Order B-29-2015 imposing a 25% statewide potable water reduction in April 2015. This drought emergency declaration was lifted by the Governor in April 2017, while retaining a prohibition on wasteful practice. The per capita water use in the City of San Diego has increased slightly from 2016 to 2018, but dropped to below 2015 level in 2019.

The GPCD calculation method (volume of water entering City of San Diego's distribution system divided by distribution system population) is consistent with the GPCD definition in SB X7-7 (the Water Conservation Act of 2009) and the City of San Diego 2015 Urban Water Management Plan (June 2016 final version). However, to be consistent with the CAP, the GPCD is reported by calendar year in this CAP Annual Report, while the GPCD in the Urban Water Management Plan and SB X7-7 are by fiscal year. Therefore, the GPCD reported here cannot be directly compared with the SB X7-7 GPCD target for 2020.

[6] Not San Diego Regional Airport Authority energy use.

FIGURE 5 PER CAPITA WATER USE (2010–2019)



GPCD - gallon per capita per day
Source: City of San Diego Public Utilities Department

The amount of recycled water and water used for irrigation from 2010 to 2019 are provided in Table 10.

TABLE 10 METERED RECYCLED AND IRRIGATION WATER USE

Year	Recycled Water Sales (million gallons)	Metered Irrigation Water Use (million gallons)
2010	1,350	6,923
2011	1,524	7,193
2012	1,867	7,812
2013	1,691	7,336
2014	2,588	4,977
2015	2,370	4,378
2016	1,637	5,943
2017	1,691	6,302
2018	3,265	7,092
2019	2,606	5,631

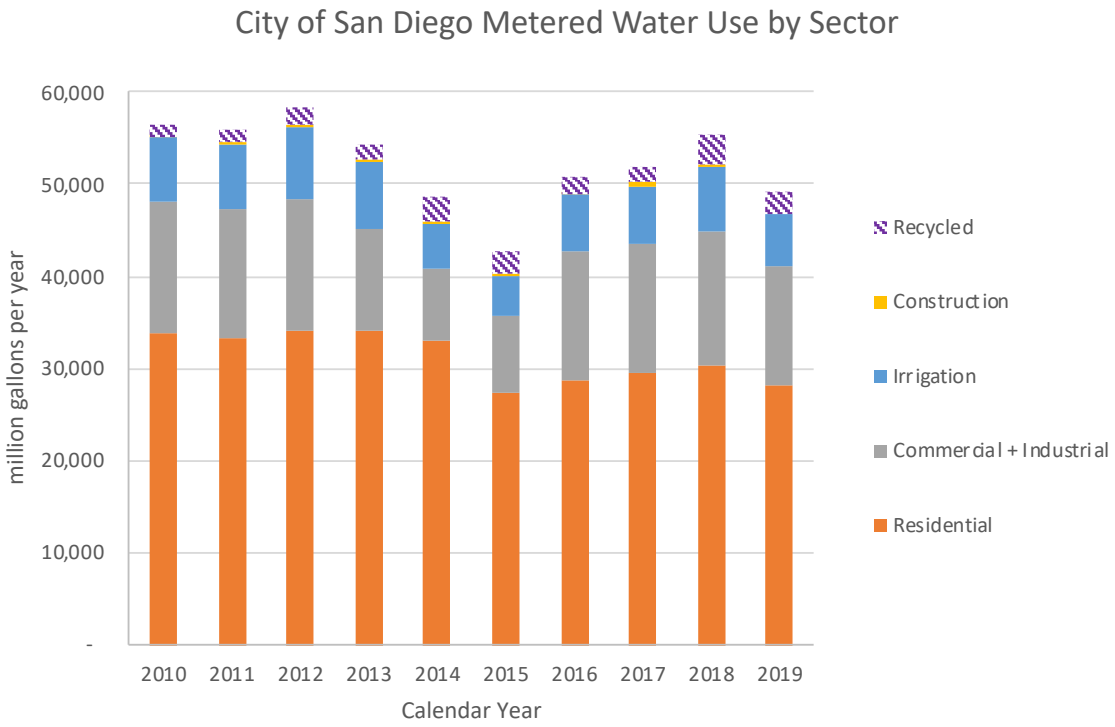
Metered irrigation water, including agricultural and landscape water use.

Sources: City of San Diego Public Utilities Department

The recycled water sales in 2018 increased significantly from 2017, almost double the recycled water sales in 2017, mainly due to the weather, increase in new customers and increase in existing customer usage.

The breakdown of City of San Diego's water sales by sector including recycled water is given in Figure 6.

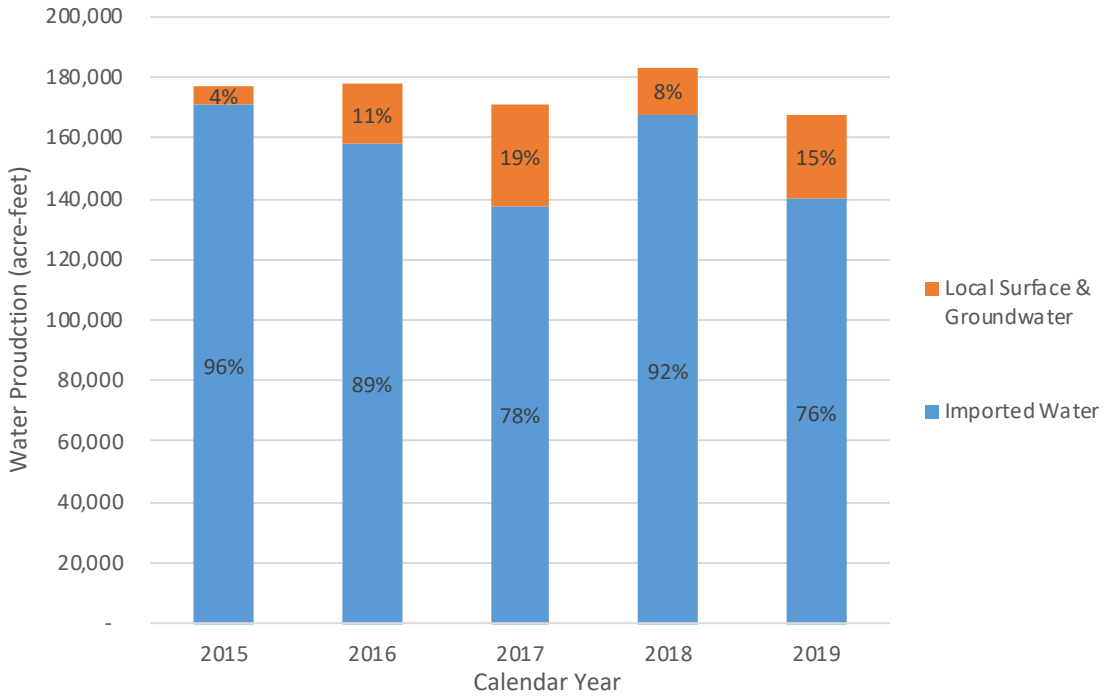
FIGURE 6 WATER SALES BY SECTOR (2010–2019)



Source: City of San Diego Public Utilities Department
Sales within City of San Diego only. Do not include sales to other agencies.

The percentage of local water supply to total water supply increased from 8% in 2018 to 15% in 2019, as shown in Figure 7. This was primarily due to more surface water transfer from Lake Hodges to water treatment plants in 2019. In 2018, less local water was available as a result of lower rain and runoff in the City reservoirs. A higher percentage of local water supply reduced the need to import water from SDCWA in 2019, and reduced the energy and GHG emissions associated with the imported water.

FIGURE 7 WATER MIX (2015–2019)



Water production include water delivered within City of San Diego and sales to other agencies.
Source: City of San Diego Public Utilities Department

STRATEGY 2: CLEAN AND RENEWABLE ENERGY

The City of San Diego has a long-term goal of reaching 100% renewable electricity supply in 2035. Several key categories contribute to the 100% renewable goal including the renewable content in SDG&E's electricity supply, behind-the-meter renewable supply (including rooftop PV) and the renewable content in a Community Choice Aggregation or similar program.

The 2019 SDG&E renewable content was not available as of this appendix's publication, due to the COVID-19 pandemic resulting the delay of annual reports and power content labels submission to California Energy Commission. In 2018, SDG&E achieved 43% renewables in its electricity supply, similar to 2016 and 2017 level, and higher than the state Renewable Portfolio Standard target for 2020. The citywide total behind-the-meter PV systems increased to 405 MW in 2019.[7]

Baseline and Current State of Clean and Renewable Energy in the City of San Diego

SDG&E's renewable electricity supply increased from 11% in 2010 to 43% in 2018 (Table 11).[8]

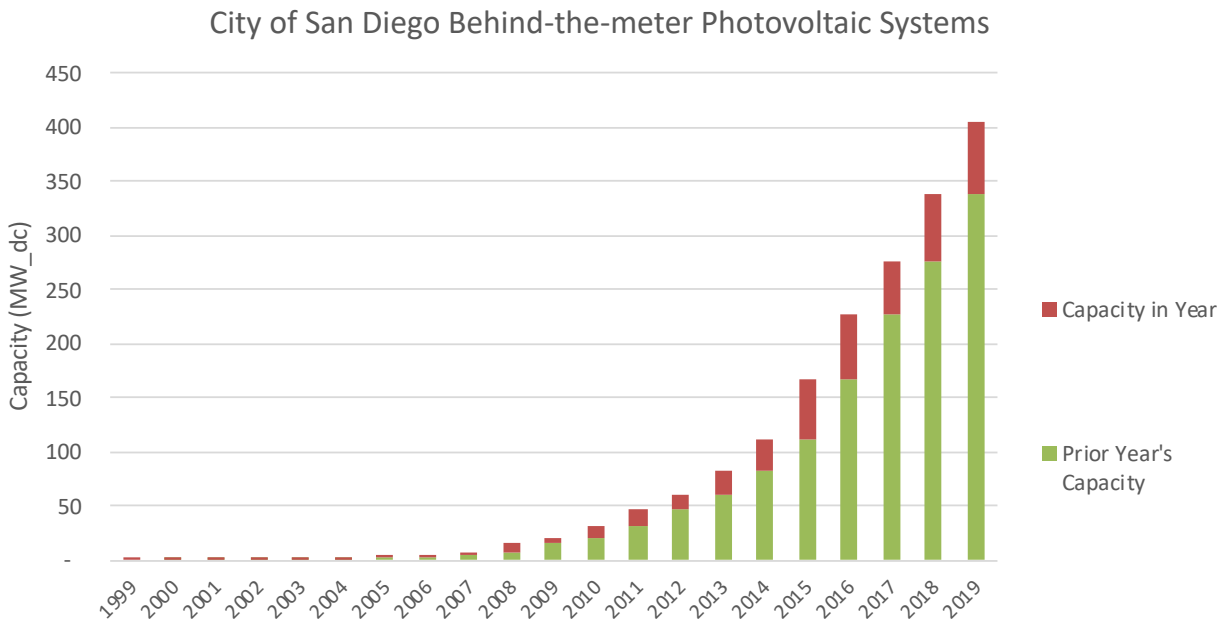
[7] Only accounts for the behind-the-meter PV systems currently interconnected to the grid and net-metered, with historical installation years. NEM Interconnection Data Set (current as of February 29, 2020), accessed on May 8, 2020. Service cities include San Diego, La Jolla and San Ysidro. Based on the date of NEM interconnection applications approved and the Permission to Operate letters issued to the customers. Solar capacities are reported in direct current (DC).

[8] CEC Power Source Disclosure Program under Senate Bill 1305.

TABLE 11 PERCENTAGE OF RENEWABLES IN SDG&E ELECTRICITY SUPPLY	
Year	**Renewables in SDG&E Electricity Supply**
2010	11%
2011	16%
2012	19%
2013	24%
2014	32%
2015	36%
2016	43%
2017	44%
2018	43%
The percent renewable is for the electricity SDG&E supplied to its bundled customers; it does not represent the renewable content of the electricity supplied to SDG&E's Direct Access customers and does not account for behind-the-meter renewable supply. California Energy Commission 2019	

In 2019, approximately 9,000 out of 9,100 new PV systems added (nearly 99% of total installations), in the City were from residential customers. This represented about 78% of the total installed capacity in 2019 (52 MW out of 67 MW). The cumulative net energy metered (NEM) PV capacity from the interconnected systems installed between 1999 and the end of 2019 was 405 MW in the City. Figure 8 shows the new capacity added in a year and prior year's capacity. Assuming that solar PV systems have a capacity factor of 20% and an annual system degradation rate of 1%, the electricity generated from rooftop solar was estimated at 686,000 MWh in 2019, accounting for approximately 8% of the total electricity use.

FIGURE 8 BEHIND-THE-METER PV IN CITY OF SAN DIEGO (1999–2019)



California Distributed Generation Statistics database, net energy metering (NEM) interconnection dataset, Feb 29, 2020 version.
Energy Policy Initiatives Center 2020

The City also has numerous facilities with on-site renewable generation, including: (a) combined heat and power generation using landfill gas or digester gas at Metropolitan Biosolids Center, Point Loma Wastewater Treatment Plant and North City Water Reclamation Plant; (b) hydroelectric generation at Point Loma Wastewater Treatment Plant ocean outfall; and (c) PV systems at water treatment facilities, libraries, recreation centers and fire stations. In total, the City has 6.5 MW behind-the-meter PV systems at municipal facilities. Two of the largest PV systems, at the Alvarado Water Treatment Plant and the Otay Water Treatment Plant, produced a combined 25,000 MWh of electricity on-site in 2019.

Electric Vehicles and Infrastructure in the City of San Diego

The impact of zero-emission vehicles policies and programs in avoiding GHG emissions is calculated as the impact of State polices and actions, not as a result of a particular CAP strategy. However, the impact is reflected at the local level.

The total number of registered EVs citywide, including battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs), at the beginning of 2018 and 2019 are show in Table 12. [9]

[9] California Department of Motor Vehicles: Fuel Type by City as of 1/1/2018, accessed March 18, 2019, and Fuel Type by City as of 1/1/2019, accessed November 17, 2020.

TABLE 12 NUMBER OF REGISTERED ELECTRIC VEHICLES			
Number of Vehicles	As of January 1, 2018	As of January 1, 2019	2018 – 2019 % Change
Number of Battery Electric Vehicles (BEVs)	7,712	8,311	8%
Number of Plug-in Hybrid Electric Vehicles (PHEVs)	4,701	5,194	10%
Total Number of Electric Vehicles (BEVs + PHEVs)	12,413	13,505	9%
Total Number of Registered Vehicles	1,100,805	1,108,667	1%
Percent of Electric Vehicles to All Registered Vehicles	1.1%	1.2%	8%
Department of Motor Vehicles 2019–2020			

At the beginning of 2019, approximately 1% of all registered vehicles in the City were EVs, which is similar to the percentage of San Diego region-wide EVs to all registered vehicles. The percentage does not represent the percentage of new EVs of new vehicles sales. EVs accounted for approximately 5% of new vehicle sales in the state in 2017, and 8% of new vehicle sales in 2018.[10]

The increasing number of EVs leads to increasing demand for EV charging, Table 13 below shows the number of public electric vehicle charging stations (EVCSs) and the number of EVCSs offered through SDG&E's Power Your Drive program at multi-family buildings and workplaces within the City.

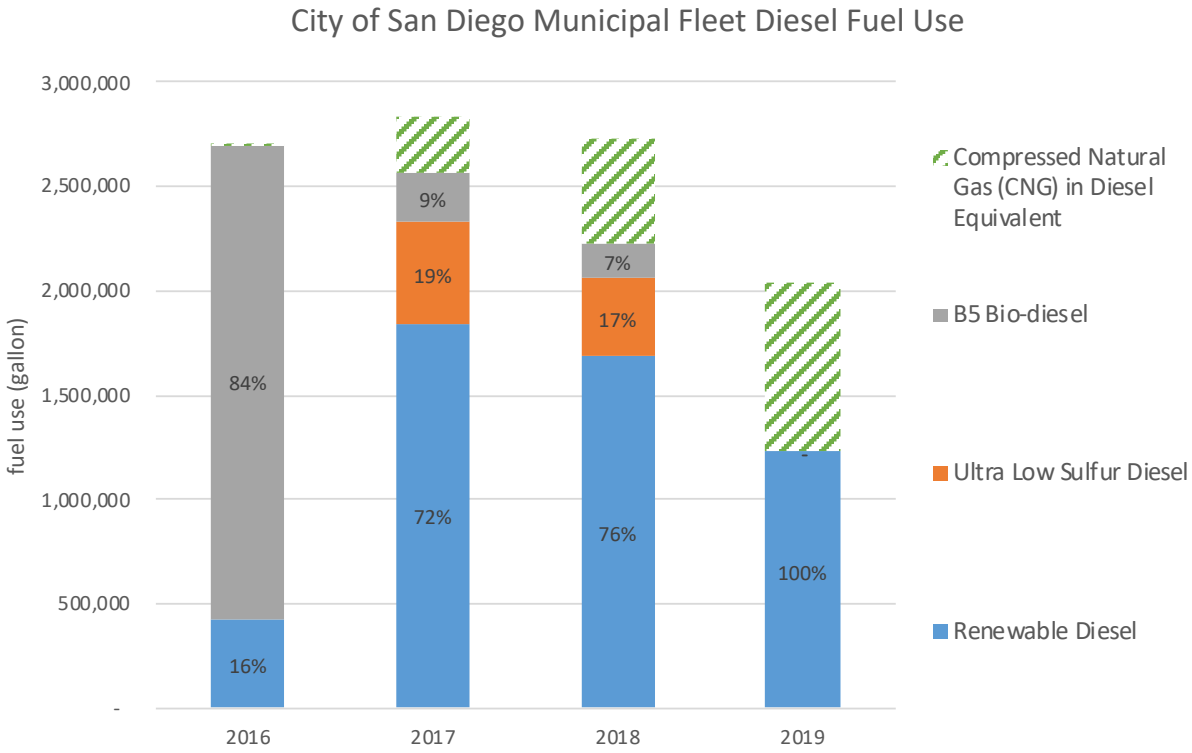
TABLE 13 ESTIMATED NUMBER OF ELECTRIC VEHICLE CHARGING STATIONS	
Number of Charging Sites or Chargers	At the end of 2018/Early 2019
Number of Sites with Public EVCSs	300
Number of Public Level 2 EVCSs at all Sites	1,052
Number of Public DC Fast EVCSs at all Sites	108
Number of SDG&E Power Your Drive EVCSs	1,755
EVCS = electric vehicle charging station Number of EVCSs are the number of nozzles or plugs. One site may have more than one nozzle or plug. EVCSs installed through SDG&E's Power Your Drive program are not considered public chargers as they are installed primarily at workplaces (including municipal facilities) and multi-family buildings (apartments and/or condo buildings). Data do not include other private workplace or in-home (e.g. single-family homes) charging stations. Alternative Fuels Data Center 2019, SDG&E 2019, Energy Policy Initiatives Center 2019	

Action & Progress: Increase Municipal Zero Emissions Vehicles

As of 2018, the City operations have 4,520 vehicles, including 84 battery eclectic vehicles and 15 plug-in hybrid electric vehicles. City also has 78 regular hybrids and 68 compressed natural gas (CNG) waste trucks. In 2016, the City municipal fleet started the transition to 100% renewable diesel to help meet the CAP goal of reducing municipal fleet GHG emissions. The percentage of renewable diesel in total diesel use increased from 16% in 2016, to 76% in 2018, and 100% in 2019 (Figure 9).

[10] Based on CEC IEPR Lead Commissioner July 22, 2019 Workshop Preliminary Transportation Energy Demand Forecast, Presentation: Light-Duty Vehicle Demand Forecast, accessed July 22, 2019.

FIGURE 9 MUNICIPAL FLEET COMPRESSED NATURAL GAS AND DIESEL FUEL USE BY TYPE (2016–2019)



B5 Bio-diesel also includes off-road equipment fuel use.
Percentages are calculated based on the sum of bio-diesel, ultra low surfur diesel, and renewable diesel, not including compressed natural gas.
Source: City of San Diego Fleet Operations Department

Consistent with the CARB statewide GHG Inventory and the IPCC Guidelines, the CO_2 emissions from biofuel (e.g., ethanol, biodiesel, and renewable diesel) are classified as "biogenic CO_2" and not included in the GHG inventory. Only the CH_4 and N_2O emissions from biofuel are accounted for in the GHG inventory. For regular diesel, all CO_2 CH_4 and N_2O emissions are accounted for in the GHG inventory.

The 2010 to 2019 city fleet gasoline consumption is given in Table 14 City Fleet Gasoline Consumption.

TABLE 14 CITY FLEET GASOLINE CONSUMPTION	
Year	Total Gasoline (gallons)
2010	1,337,869
2011	2,155,962
2012	2,267,693
2013	2,277,559
2014	2,268,104
2015	2,262,114
2016	2,344,552
2017	2,275,635
2018	2,199,146
2019	2,047,504
Source: City of San Diego Fleet Operations Department	

Action & Progress: Convert Municipal Waste Collection Trucks to Low-Emissions Fuel

In 2019, the City had 68 compressed natural gas (CNG) waste collection trucks in service versus 41 in 2019. This represents more than half of the waste collection truck fleet, ahead of the scheduled implementation of the measure (100% conversion by 2035). CNG is a low emission fuel compared with diesel. CNG has displaced diesel fuel use as shown in Figure 9. The GHG emissions avoided from this conversion were calculated based on the difference between GHG emissions from CNG and GHG emissions if the fuel use were Ultra-Low-Sulfur (ULS) diesel.

STRATEGY 3: BICYCLING, WALKING, TRANSIT AND LAND USE

In 2019, transportation accounted for 55% of all GHG emissions within the City of San Diego. This strategy aims at reducing commuter vehicle driving by increasing the use of mass transit, bicycling and walking in the city's Transit Priority Areas (TPA). TPAs are defined as the areas within half a mile of existing or planned major transit stops.

State of and current state of transportation in the City of San Diego

The 2019 vehicle miles travelled (VMT) and on-road transportation emissions in the City of San Diego are shown in Table 15. The data sources and method to calculate on-road transportation emissions are provided in a supplement to this Appendix titled *City of San Diego 2017-2019 Greenhouse Gas Emissions Inventory.*

TABLE 15 2019 VEHICLE MILES TRAVELLED (VMT)	
Total VMT (million miles/year)	13,489
San Diego Regional Average Vehicle Emission Rate (g CO_2e/mile)	393
GHG Emissions (MT CO_2e)	5,296,000
The 2019 VMT are estimates based on 2016 City of San Diego VMT estimates from SANDAG's Activity Based Mode l (ABM2) and adjusted by the 2016-2019 San Diego regional VMT annual rates of growth as shown in the California Department of Transportation (CalTrans) Highway Performance Monitoring System public road data. Sources: SANDAG 2019, CalTrans 2019, CARB 2018, Energy Policy Initiatives Center 2020	

Action & Progress: Walking, Biking, Transit and Vehicle Commute Distance

Since the adoption of the CAP in 2015 the availability and type of data for tracking progress on mode shares and commute trip length have evolved. Baseline mode shares were determined through multiple sources of data as listed below in Table 16. To provide a more consistent evaluation of progress and ensure the utilization of the best available data, the City of San Diego worked with a transportation consulting firm, Fehr & Peers, to present updated mode share results comprised of the most up-to-date techniques and information at the time. This information was originally reported in the 2018 CAP Appendix. There have been no significant changes to the modeling inputs since last year's report as SANDAG is currently in the process of updating the 2021 Regional Transportation Plan.

SANDAG, the regional transportation agency, is currently the best source for transportation data in the region. SANDAG has transitioned from an enhanced four-step transportation model to an activity-based model (ABM). ABMs allow for a more nuanced analysis of complex policies and projects and strive to be as behaviorally realistic as possible by simulating individual and household transportation decisions that compose their daily travel itinerary. The ABM is based on empirical data collected by SANDAG, California Department of Transportation (Caltrans), and the federal government.

The results presented below in Table 16 utilize the SANDAG Series 13 ABM, which is different from the ABM used to develop the VMT data used for the GHG inventory (Series 14 ABM version 14.0.1). SANDAG no longer maintains or allows modification to prior data series (e.g. Series 12) or the previously used four-step transportation model. The following model years and scenarios were used:

- Series 13 Base Year (2012) Model Run: The base year model run represents the land use and transportation network for year 2012. The full model output was provided by SANDAG and post processed to obtain 2012 mode share and commute trip length information. No land use or transportation network adjustments were made to the base year model run.

- Series 13 2035 with community plan updates (CPU) Model Run: The 2035 model run was developed before several community plan updates (CPUs) were completed. The unadjusted 2035 model run from SANDAG does not include land use from the recently approved CPUs. The 2035 model was adjusted to reflect the CPU land use for Uptown, North Park, Golden Hill, Navajo, San Ysidro, Southeastern, and Encanto. The full model output was post processed by Fehr & Peers to obtain forecasts for 2035 mode share and commute trip length information.

TABLE 16 SUMMARY OF 2010 (CAP BASELINE YEAR) MODSHARE ESTIMATES AND VEHICLE COMUTE DISTANCE

Mode	Baseline Mode Share (%) 2010	Baseline Source Data
Transit	4%	American Community Survey Briefs 2008 and 2009 (Table 2), for San Diego-Carlsbad-San Marcos area
Walking	3.5%	City of San Diego Pedestrian Master Plan of 2006, Appendix D
Bicycling	2%	City of San Diego Bicycle Master Plan, Table 5.12
Vehicle Commute Distance	25 miles per day (Regional)	SANDAG, 2010

TABLE 17 SUMMARY OF BASELINE MODESHARES AND VEHICLE COMMUTE DISTANCE

Mode	2012 Base Year Mode Share (%)	Modeled Mode Share (%) 2017[11]	2035 with CPUs Mode Share (%)	Modeled Source Data
Transit	5.9%	7.6%	12.7%	SANDAG series 13 regional travel demand model base year (2012) run and SANDAG Series 13 regional travel demand model run 2035 with community plan updates.
Walking	2.7%	3.0%	4.0%	
Bicycling	1.6%	1.8%	2.3%	
Drive	89.8%	87.6%	81.0%	
Drive Alone	80.4%	78.1%	71.3%	
Regional Vehicle Commute Distance (miles)	20.11	19.95	19.41	
City Vehicle Commute Distance (miles)	17.05	16.97	16.71	
Source: Fehr & Peers, 2018				

[11] The 2017 modeshare values were calculated using a straight-line interpolation between the 2012 SANDAG series 13 base year and the 2035 SANDAG series 13 with CPUs mode share values.

This analysis does not account for citywide regulations, programs and policies that would be implemented throughout the life of the community plans, such as additional bicycle and pedestrian improvements whenever street resurfacing occurs, as feasible; highest priority bicycle and pedestrian improvements that align with "Vision Zero"; regional improvements that promote alternative modes of transportation, such as mobility hubs; innovative mobility options (e.g., dockless vehicles, micro transit, etc.), bicycle and car sharing programs; the CAP consistency checklist for new development; and, improvements to enhance transit accessibility. the mode share information provided in this annual report reflect the land use contribution to shift the citywide mode share in continued progress to achieve the CAP goals.

As transportation modeling efforts continue to improve, the information presented in this and future CAP annual reports will reflect results based on the best available data.

In terms of pedestrian infrastructure improvement in 2019, the City constructed 8,500 linear feet of new sidewalk, approximately 14 city blocks (one city block is about 600 ft.).

The bicycle facility improvements are shown in Table 18 Bicycle Facilities Improvements since 2013.

TABLE 18 BICYCLE FACILITIES IMPROVEMENTS SINCE 2013

Year	2013	2014	2015	2016	2017	2018	2019	Since 2013
New Class I Bike Lane Miles Added	-		-	-	2.1	-	-	2.1
New Class II Bike Lane Miles Added	6.9	10.5	14.6	12.7	7.9	11.5	10.8	74.9
New Class IV Bike Lane Miles Added	-	-	-	-	-	-	2	2
Existing Bike Lane Miles Improved	35.7	51.7	42.2	43.6	21.4	2.3	34.6	231.5
Existing Bike Lane Miles Replaced	1.3	1.6	-	-	-	27.9	-	30.8
Total Added or Improved Miles	43.9	63.8	56.8	56.8	31.4	41.7	47.4	341.8

Source: City of San Diego Transportation & Storm Water Department

Action & Progress: Roundabouts and Traffic Signal Re-timing

The city re-timed 64 traffic signals in 2019 that led to traffic flow improvements and subsequent fuel reductions, as shown in Table 19.

TABLE 19 ROUNDABOUTS INSTALLED AND TRAFFIC SIGNALS RETIMED

Year	2016	2017	2018	2019
Roundabouts Installed	2	0	0	0
Traffic Signals Retimed	60	70	52	64

Source: City of San Diego Transportation & Storm Water Department

STRATEGY 4: ZERO WASTE

In 2019, solid waste and wastewater emissions accounted for about 3% of the total citywide emissions. The City has a Zero Waste strategy with actions to divert waste from landfills and capture and utilize the methane from wastewater treatment.

Action & Progress: Enact Zero Waste and Divert Trash and Capture GHG Emissions from Landfills

The 2015–2019 waste disposed and diversion rates in the City are shown in Table 20. The waste disposal amount in 2019 is 4% lower than the disposal in 2018, and similar to 2017 disposal amount. The 2019 waste diversion rate is not available due to a delay on the new Recycle and Disposal Reporting System per Assembly Bill (AB) 901. The Bill revised reporting requirements of organic, recyclable material, and solid waste, which affects the waste diversion rate calculation.

TABLE 20 WASTE DIVERSION RATE AND DISPOSED TONNAGE

Year	2015	2016	2017	2018	2019
Waste Disposed in Landfills (tons)	1,583,833	1,521,363	1,576,105	1,639,817	1,569,447
Waste Diversion Rate (%)	64%	66%	66%	65%	Not Available*

Tonnages were adjusted or corrected from tonnages reported in the CalRecycle database based on City information

Source: City of San Diego Environmental Service Department

*2019 waste diversion rate is expected to become available from CalRecycle in early 2021

Action & Progress: Capture Methane from Wastewater Treatment

The City of San Diego's Point Loma Wastewater Treatment Plant (Point Loma WWTP) is self-sufficient with on-site renewable electricity production using biogas (captured methane from wastewater treatment) and hydropower. The excess renewable electricity generated at the Point Loma WWTP is exported back to the grid. The digester capture rate at Point Loma WWTP is now 99.9%.

STRATEGY 5: CLIMATE RESILIENCE

The City of San Diego has committed itself to increasing the urban tree canopy from 7% total coverage in 2010 baseline to 15% by 2020 and 35% by 2035. Increasing urban tree canopy contributes to the capture and storage of carbon, as well as other benefits including storm water management, improved air quality, increased property values, etc.

Action & Progress: Increase Urban Tree Canopy Coverage

The updated urban tree canopy coverage in 2015 was 13% in the City of San Diego, based on the Urban Tree Canopy Assessment preliminary results developed by the University of Vermont and the USDA Forest Service, funded by California Department of Forestry and the Fire Protection (CalFire) for the City of San Diego. The City is tracking the number of new trees planted and tree maintenance (trimmed, pruned and or removed) by City departments (Table 21).

TABLE 21 TREE PLANTING AND MAINTENANCE

Tree Planting and Maintenance Year	2019

TABLE 21 TREE PLANTING AND MAINTENANCE	
Trees Planted[1]	1,634
Trees Trimmed[2]	25,256
Trees Removed[1]	1,646
Trees Evaluated[3]	5,163

[1]Planted or removed by the Transportation Street Division and Parks and Recreation Department; [2]Includes shade trees and palms trees; [3]Trees are evaluated for species type, tree condition, diameter, and defects to determine the amount of corrective tree work that may be needed for the health of the tree and/or to address public safety adjacent to the tree.
Data are for fiscal year 2019

Source: City of San Diego Transportation & Storm Water Department

METHODOLOGY DIFFERENCES AND DATA REFINEMENT

The method differences and data refinements between the previous and current GHG inventory calculations are given in Table 22. The differences are primarily from updated and more accurate data sources. "No change" means no method differences or data refinements since the 2019 Annual Report.

TABLE 22 METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY

Category	Category Detail	2018 Inventory (Published in 2019 Annual Report)	2018 Revised Inventory	2019 Inventory
Electricity	Activity (kWh)	Requested data from SDG&E by customer class, service provider, and rate schedule for customers with City of San Diego town code	No change	
	Emission Factor (lbs CO_2e/MWh)	Created a weighted average emission factor based on a) SDG&E kWh procured from each fuel type at each facility/power plant and the emission factor of electricity generation at each facility/power plant (EPA eGRID2016 database specific plant level emission factor) for SDG&E's purchased power.	2018: Created a weighted average emission factor based on a) SDG&E kWh procured from each fuel type at each facility/power plant and the emission factor of electricity generation at each facility/power plant (EPA eGRID2018 database specific plant level emission factor) for SDG&E's purchased power. 2019: The same as 2018, due to a delay in CEC power source disclosure program as a result of the COVID-19 pandemic	
Natural Gas	Activity (Therms)	Requested data from SDG&E by customer class, service provider, and rate schedule for customers with City of San Diego town code	No change	
	Emission Factor (MT CO_2e/Therm)	Natural gas emission factor in California based on California Air Resources Board statewide inventory	No change	

TABLE 22 METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY				
Category	**Category Detail**	**2018 Inventory (Published in 2019 Annual Report)**	**2018 Revised Inventory**	**2019 Inventory**
Transportation	Activity (VMT)	Applied annual average VMT rate of increase from HPMS data to 2016 VMT estimates provided by SANDAG Series 14 Forecast and ABM2	No change	
	Emission Factor (g CO_2e/mile)	San Diego region emission rate per vehicle class from EMFAC2017 with model default assumptions on vehicle mix, travel activities, etc.	No change	
Water	Activity (acre-feet)	Potable and recycled water supplied to City of San Diego (water production) separated into wholesale water (from San Diego County Water Authority) and local water (surface and groundwater) Removed water purchased by Del Mar and CalAm service area as not in the City	No change	
	Emission Factor (energy intensity - kWh/acre-foot)	Local energy intensity based on water treatment plants and lake pump stations electricity consumption, all other water pump stations and facilities electricity consumption Upstream supply energy intensity calculated based on Metropolitan Water District and SDCWA 2015 Urban Water Management Plan; eGRID2016 California average (CAMX)	No change	

TABLE 22 METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY				
Category	**Category Detail**	**2018 Inventory (Published in 2019 Annual Report)**	**2018 Revised Inventory**	**2019 Inventory**
Wastewater	Activity (gallons)	City of San Diego's annual average flow (MGD) entering into Metropolitan Sewerage System (include Point Loma WWTP, South Bay WRP and North City WRP)	No change	
	Emission Factor (MT CO_2/gallon)	Calculated by dividing Point Loma WWTP and North City WRP GHG Emission reported in CARB Mandatory GHG Reporting by 2015 Point Loma WWTP and North City WRP total flow	No change	
Solid Waste	Activity (tons)	Annual waste disposed tonnage provided by City of San Diego Environmental Services Department	No change	
	Emission Factor (MT CH_4/tons)	Emission factor for each waste component from EPA WARM Model Version 14 (2016 version) and waste components from City of San Diego waste characterization study 2012–2013	Emission factor for each waste component from EPA WARM Model Version 15 (2019 version) and waste components from City of San Diego waste characterization study 2012–2013	

Analysis on Jobs

Addressing climate change has created an opportunity for San Diego to support our environment while also boosting our economy. The CAP's five strategies could impact certain industry groupings in San Diego's job market. Each will ideally have a positive impact on the local and regional economy. Jobs in the fields related to the CAP strategies were estimated and industry reports from related fields were also consulted to estimate a baseline from which to measure future progress.

Utilizing data from the Bureau of Labor Statistics (BLS), 74 industries in San Diego County were categorized into the five CAP strategies. These results are presented in Figure 1, showing the total jobs and cumulative growth rates for each group by year.

The BLS estimate of San Diego's jobs in the industry groups related to the CAP grew 20.3 percent from 2010 to 2019, adding 24,156 jobs. Th Energy and Water Efficient Buildings group contributed nearly 71 percent of the cumulative job growth. Between 2018 and 2019, the five CAP-related industry groups added 2,144 jobs, an increase of 1.5 percent. More than four out of five new jobs came from the Energy and Water Efficient Buildings group, which grew by 2.2 percent in 2019. Meanwhile, the Clean and Renewable Energy group shed 273 jobs in 2019, down 1.0 percent. Data sources and raw figures can be found in Appendix A.

According to the Cleantech Industry Cluster Economic Impact Analysis conducted by the San Diego Regional Economic Development Corporation, the San Diego region's Cleantech Industry Cluster added 278 jobs in 2019, an increase of 2.9 percent. Regional employment concentration in the cluster remains more than double the national average. Furthermore, earnings and average wages increased in 2019.[12]

According to a separate report by The Solar Foundation's 2019 National Solar Jobs Census, solar installations employment declined again in 2019 both in California and in San Diego, with 152 jobs being shed in the region.[13] Despite these declines, overall solar job growth continues to rise nationwide and California remains home to the largest number of solar jobs with more than 74,000 jobs.

[12] The San Diego Regional Economic Development Corporation's Cleantech Industry Cluster Economic Impact Analysis, November 2020

[13] The Solar Foundation's 2019 National Solar Jobs Census

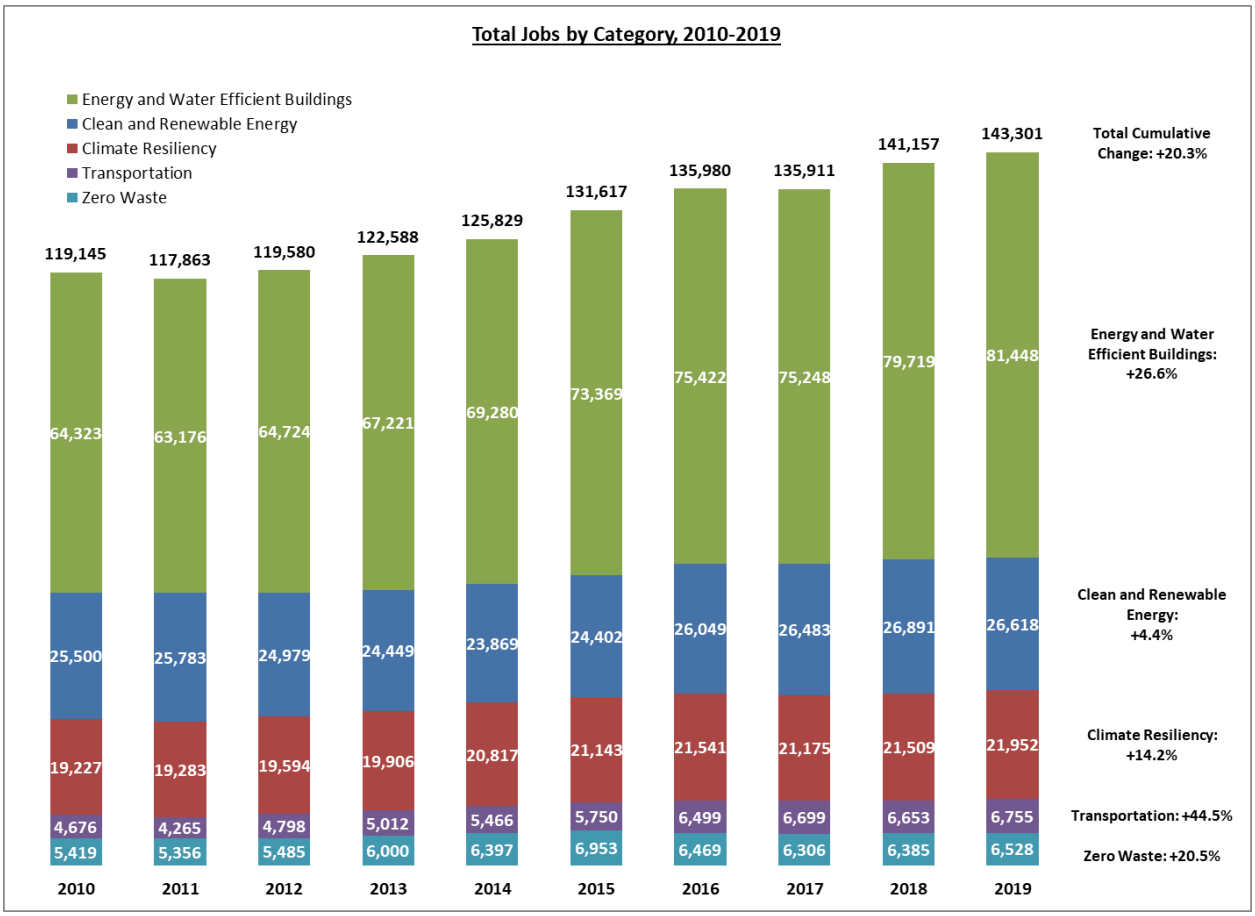


FIGURE 10 ESTIMATED TOTAL SAN DIEGO JOBS BY CAP CATEGORY, 2010–2019

"GREEN" JOBS – APPENDIX A

Economic Modeling Specialists International (Emsi, 2020.4) www.economicmodeling.com

Summary: Emsi identifies 1,000+ industries within the San Diego Region. Seventy-four industries were categorized into five CAP industry groups and grouped within Emsi. From those groups, Emsi output the jobs per occupations in the total of all the industries identified per CAP industry group during 2010-19. These job totals were then used to identify the growth per CAP industry group between 2010 and 2019.

In order to identify a baseline of total jobs within the CAP strategies over the past five years, first the industries that corresponded with each CAP industry group were identified (Table 1). No one industry was categorized into multiple CAP industry groups. Overall, 74 industries were categorized into the five industry groups; 20 industries in Energy and Water Efficient Buildings, 21 industries in Clean and Renewable Energy, eight industries in Climate Resiliency, 13 industries in Transportation and 12 industries in Zero Waste. The occupations within the corresponding CAP industry groups were identified and then the individual jobs within these occupations were totaled for each year between 2010 and 2019.

Industry Data: Emsi industry data have various sources depending on the class of worker. (1) For QCEW Employees, Emsi primarily uses the QCEW (Quarterly Census of Employment and Wages), with supplemental estimates from County Business Patterns. (2) Non-QCEW employees data are based on a number of sources including QCEW, Current Employment Statistics, County Business Patterns, BEA State

and Local Personal Income reports, the National Industry-Occupation Employment Matrix (NIOEM), the American Community Survey, and Railroad Retirement Board statistics. (3) Self-Employed and Extended Proprietor classes of worker data are primarily based on the American Community Survey, Nonemployer Statistics, and BEA State and Local Personal Income Reports. Projections for QCEW and Non-QCEW Employees are informed by NIOEM and long-term industry projections published by individual states.

This report uses state data from the following agencies: California Labor Market Information Department, U.S. Bureau of Labor Statistics. This report uses state data from the following agencies: California Labor Market Information Department.

TABLE 23 INDUSTRIES WITHIN EACH CAP INDUSTRY GROUP

Energy and Water Efficient Buildings	Clean and Renewable Energy	Climate Resiliency	Transportation	Zero Waste
Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	Biomass Electric Power Generation	Environment, Conservation and Wildlife Organizations	All Other Transit and Ground Passenger Transportation	All Other Miscellaneous Waste Management Services
Architectural Services	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	Forest Nurseries and Gathering of Forest Products	Bus and Other Motor Vehicle Transit Systems	Hazardous Waste Collection
Automatic Environmental Control Manufacturing for Residential, Commercial and Appliance Use	Electric Bulk Power Transmission and Control	Landscape Architectural Services	Commuter Rail Systems	Hazardous Waste Treatment and Disposal
Building Inspection Services	Electric Power Distribution	Landscaping Services	Highway, Street and Bridge Construction	Materials Recovery Facilities
Commercial and Institutional Building Construction	Electrical Contractors and Other Wiring Installation Contractors	Sewage Treatment Facilities	Interurban and Rural Bus Transportation	Other Nonhazardous Waste Treatment and Disposal
Engineering Services	Environmental Consulting Services	Soil Preparation, Planting and Cultivating	Mixed Mode Transit Systems	Other Waste Collection
Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing	Geothermal Electric Power Generation	Water and Sewer Line and Related Structures Construction	Other Support Activities for Road Transportation	Recyclable Material Merchant Wholesalers
Industrial Building Construction	Hydroelectric Power Generation	Water Supply and Irrigation Systems	Other Urban Transit Systems	Remediation Services
Industrial Design Services	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals		Rail transportation	Solid Waste Collection

Energy and Water Efficient Buildings	Clean and Renewable Energy	Climate Resiliency	Transportation	Zero Waste
New Housing For-Sale Builders	Mechanical Power Transmission Equipment Manufacturing		School and Employee Bus Transportation	Solid Waste Combustors and Incinerators
New Multifamily Housing Construction (except For-Sale Builders)	Natural Gas Distribution		Support Activities for Rail Transportation	Solid Waste Landfill
New Single-family Housing Construction (except For-Sale Builders)	Nuclear Electric Power Generation		Taxi Service	Used Merchandise Stores
Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	Other Electric Power Generation		Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers	
Plumbing, Heating and Air-Conditioning Contractors	Pipeline Transportation of Natural Gas			
Relay and Industrial Control Manufacturing	Power and Communication Line and Related Structures Construction			
Research and Development in the Physical, Engineering and Life Sciences (except Biotechnology)	Power, Distribution and Specialty Transformer Manufacturing			
Residential Electric Lighting Fixture Manufacturing	Semiconductor and Related Device Manufacturing			
Residential Remodelers	Solar Electric Power Generation			
Steam and Air-Conditioning Supply	Storage Battery Manufacturing			
Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers	Turbine and Turbine Generator Set Units Manufacturing			
	Wind Electric Power Generation			

TABLE 24 NUMBER OF JOBS/INDUSTRY PER CAP INDUSTRY GROUP, 2010–2019

	Clean & Renewable Energy	Climate Resiliency	Energy & Water Efficient Buildings	Transportation	Zero Waste
2010	25,500	19,227	64,323	4,676	5,419
2011	25,783	19,283	63,176	4,265	5,356
2012	24,979	19,594	64,724	4,798	5,485
2013	24,449	19,906	67,221	5,012	6,000
2014	23,869	20,817	69,280	5,466	6,397
2015	24,402	21,143	73,369	5,750	6,953
2016	26,049	21,541	75,422	6,499	6,469
2017	26,483	21,175	75,248	6,699	6,306
2018	26,891	21,509	79,719	6,653	6,385
2019	26,618	21,952	81,448	6,755	6,528

TABLE 25 PERCENT CHANGE IN JOBS, 2010–2019

	Clean & Renewable Energy	Climate Resiliency	Energy & Water Efficient Buildings	Transportation	Zero Waste
2010-11	1.1%	0.3%	-1.8%	-8.8%	-1.2%
2011-12	-3.1%	1.6%	2.5%	12.5%	2.4%
2012-13	-2.1%	1.6%	3.9%	4.5%	9.4%
2013-14	-2.4%	4.6%	3.1%	9.1%	6.6%
2014-15	2.2%	1.6%	5.9%	5.2%	8.7%
2015-16	6.7%	1.9%	2.8%	13.0%	-7.0%
2016-17	1.7%	-1.7%	-0.2%	3.1%	-2.5%
2017-18	1.5%	1.6%	5.9%	-0.7%	1.3%
2018-19	-1.0%	2.1%	2.2%	1.5%	2.2%
2010-19	4.4%	14.2%	26.6%	44.5%	20.5%

Supplemental Documentation

CITY OF SAN DIEGO 2017-2019 GREENHOUSE GAS EMISSIONS INVENTORY