

**2023**

# Climate Action Plan

ANNUAL REPORT



# Table of Contents

|                                                                     |    |
|---------------------------------------------------------------------|----|
| Letter from the Chief Sustainability Officer                        | 3  |
| Introduction                                                        | 4  |
| Key Highlights                                                      | 5  |
| <b>STRATEGY 1:</b> Decarbonization of the Built Environment         | 7  |
| <b>STRATEGY 2:</b> Access to Clean and Renewable Energy             | 8  |
| <b>STRATEGY 3:</b> Mobility and Land Use                            | 10 |
| <b>STRATEGY 4:</b> Circular Economy and Clean Communities           | 14 |
| <b>STRATEGY 5:</b> Resilient Infrastructures and Healthy Ecosystems | 15 |
| Conclusion                                                          | 18 |
| Community Partners                                                  | 19 |



# Letter from the Chief Sustainability Officer

It is with great enthusiasm that I introduce the 2023 Climate Action Plan (CAP) Annual Report. This year marks the first full year of implementing our updated 2022 Climate Action Plan, a strategic framework designed to guide us toward achieving net-zero greenhouse gas (GHG) emissions by 2035. The ambitious goals set forth in our updated CAP underscore our unwavering commitment to creating a sustainable, equitable and resilient future for our city.

Reflecting on the past year, I am proud to highlight our collective efforts and accomplishments. The City of San Diego has seen conservative reductions in GHG emissions in the 2022 calendar year, as detailed in Appendix A of this report. While the reductions represent important progress, they also serve as a reminder of the significant work that lies ahead. Our updated CAP is designed to tackle these challenges head-on, with robust strategies and innovative solutions aimed at accelerating our transition to a low-carbon future.

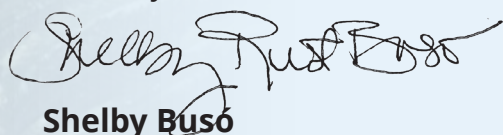
I am particularly excited about the cross-departmental collaborations and the partnerships with external stakeholders that have been instrumental in our success. The Annual Departmental Work Plans are key tools that ensure transparency, accountability and resource alignment across all City departments. This year, we have also launched the CAP Dashboard ([climatedashboard.sandiego.gov](https://climatedashboard.sandiego.gov)). The dashboard will serve as a central platform for data collection and distribution, enabling stakeholders to monitor key metrics and track progress on individual CAP actions sourced from the Annual Department Work Plans.

Despite the challenges posed by the rapid pace of climate change, we remain optimistic and resolute. The strategies detailed in this report, from enhancing biking infrastructure to deploying public electric vehicle (EV) charging stations, demonstrate our holistic approach to creating a more sustainable and equitable San Diego. Our efforts to secure substantial grant funding have further bolstered our capacity to implement critical climate action and sustainability initiatives.

As we look to the future, we are committed to continuous improvement and innovation. Our goal is not just to meet our targets but to exceed them, ensuring that San Diego serves as a model for other cities worldwide. We have a moral imperative to approach our climate work through an equity lens, striving for a just transition that benefits all residents.

Thank you for your continued support and engagement. Together, we will make San Diego a healthier, more sustainable, and more prosperous place for all.

Sincerely,



**Shelby Busó**

Chief Sustainability Officer





# Introduction

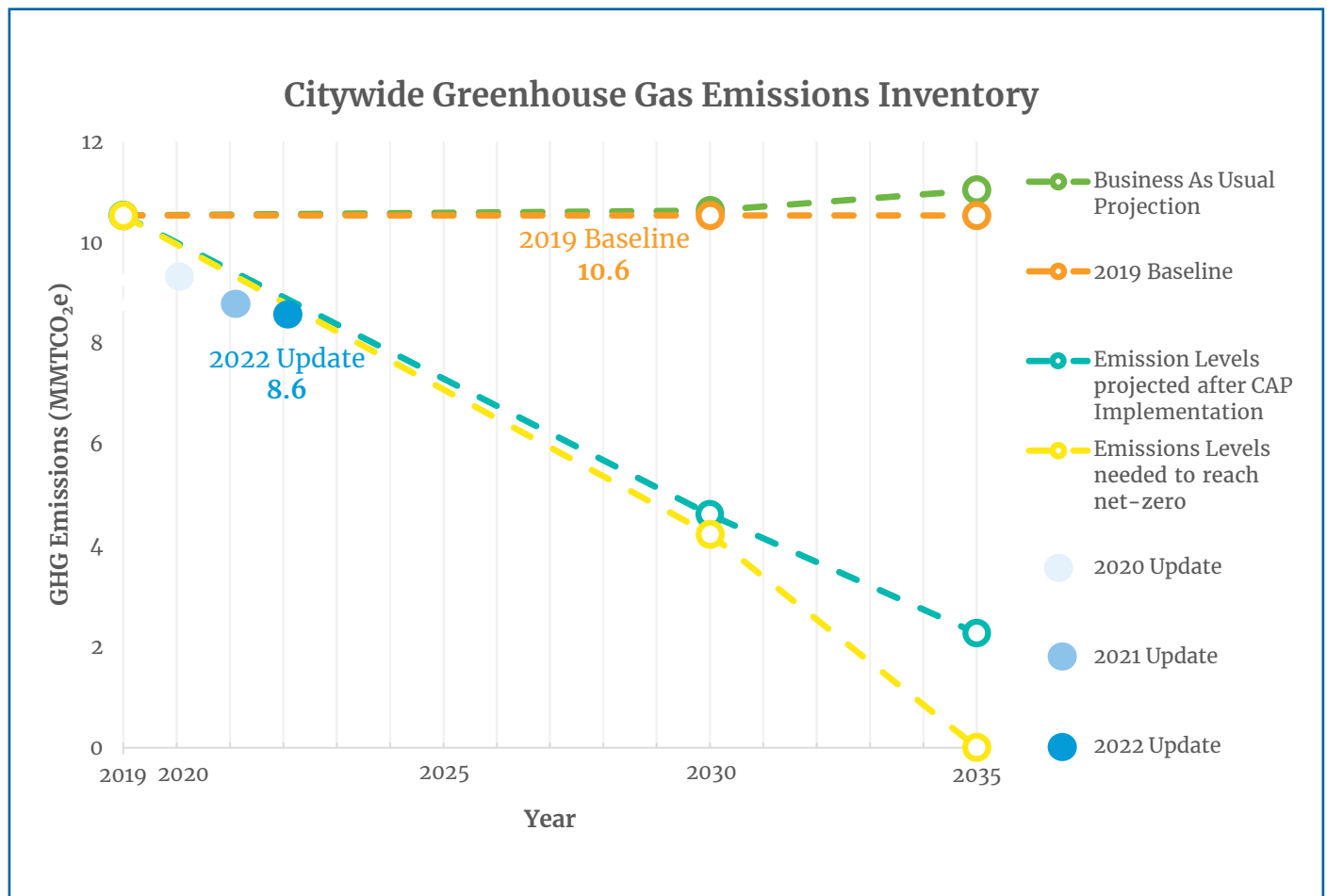
In 2022, the City of San Diego committed to an ambitious goal: **achieving net-zero greenhouse gas (GHG) emissions by 2035**. This report marks the first annual assessment of the City's progress since the adoption of its updated 2022 Climate Action Plan (CAP) and summarizes City action from Fall 2022 through the end of December 2023. It serves as an overview of the City's efforts to combat climate change and transition to a sustainable future. Appendix A contains a detailed GHG inventory for the 2022 calendar year (January–December 2022), providing a gauge for evaluating emissions reduction strategies. To follow the most recent CAP progress, please visit the City's dashboard ([climatedashboard.sandiego.gov](https://climatedashboard.sandiego.gov)).





# Key Highlights:

**San Diego's total GHG emissions in 2022 were approximately 8.6 million metric tons of carbon dioxide equivalent (MMT CO<sub>2</sub>e).** This represents a 2% decrease from 2021 and a 19% decrease from the 2019 baseline. The decrease was primarily due to an increase in renewable energy in the city's electricity supply, improvements in on-road vehicle efficiency, and the adoption of electric and hybrid vehicles. See Appendix A for detailed information about the GHG inventory.





# Strategies





# **Strategy 1**

## DECARBONIZATION OF THE BUILT ENVIRONMENT

### Decarbonize Existing Buildings

The City of San Diego has been proactive in decarbonizing existing buildings, recognizing them as a significant source of GHG emissions. Collaborating with the White House's Building Performance Standards Coalition, the City initiated discussions and working groups in 2022 to develop draft standards for release in 2024. These standards prioritize equity and aim to streamline the electrification process. To support these efforts, the City conducted an analysis of the existing building stock completed in August 2023, laying the groundwork for a comprehensive decarbonization framework. Additionally, the City is using federal funding from the Department of Energy to establish a community pilot program for neighborhood-level residential electrification in low to moderate-income communities.



### Decarbonize City Facilities

Recognizing the importance of leading by example, the City Council adopted the Zero Emissions Municipal Buildings & Operations Policy (ZEMBOP) to guide the decarbonization of municipal facilities and transition to a zero-emissions fleet by 2035. Electrification assessments were conducted at more than 400 municipal facilities, and the findings are now guiding the next step of ZEMBOP: developing department-specific Fossil Fuel Elimination Plans. These plans are a part of targeted strategies for energy efficiency, renewable energy and microgrid projects, including partnerships with clean energy vendors to implement energy-saving measures across a portfolio of facilities. In 2023, the City also started construction of its first all-electric fire station and all-electric library.



**OCTOBER 2023:** *San Diego came in **first out of the 100 largest U.S. cities** in WalletHub's "Greenest Cities in America" ranking, with scores on Environment, Energy Sources, and Lifestyle & Policy propelling it to the top.*



# **Strategy 2**

## **ACCESS TO CLEAN AND RENEWABLE ENERGY**

### **Citywide Renewable Energy Generation**

San Diego has made significant strides in promoting renewable energy generation through various initiatives and partnerships. Notably, the City coordinated implementation of the first year of the San Diego Solar Equity Program, which provides financial assistance to income-qualifying homeowners for solar panel installations.

The City played a key role in championing San Diego Community Power's 100% renewable "Power 100" rate, which now serves almost all City facilities. Additionally, the City worked closely with San Diego Community Power on their strategic plan for offering local customer energy programs. These programs aim to promote energy efficiency, electrification and distributed energy resources, furthering the City's transition to clean and renewable energy sources.



### **Increase Municipal Zero Emission Vehicles**

San Diego is committed to transitioning to zero-emission vehicles, particularly within our municipal fleet. To accelerate this shift, the City deployed four off-grid EV charging units at two fleet yards, as these mobile chargers required no additional infrastructure and were ready for immediate use. Electrification assessments have been conducted at four fleet yards to support a long-term vehicle replacement and electrification plan. Developing the necessary infrastructure for permanent stations will take time due to



**Solar Mobile Electric Vehicle Chargers:** Purchased four additional standalone electric vehicle chargers using federal grant funding, thereby enhancing accessibility and resilience in charging infrastructure.



the complexity involved, but the City continues to expand its EV fleet in the meantime.

## Increase Electric Vehicle Adoption

The City has taken proactive steps to increase EV adoption among residents and visitors. This includes plans to deploy public EV charging infrastructure on City-owned properties, with an initial focus on public-facing facilities such as recreation centers and libraries. The City also expanded its off-grid modular charging capacity for both fleet and employee vehicles.



### DID YOU KNOW?

## Transitioning to Clean Energy Generation

San Diego Community Power (SDCP), a community choice energy program, buys clean energy from the open market at competitive rates for residents and businesses. In 2022, **299,754 San Diego residential accounts and 50,992 commercial/industrial accounts** switched from San Diego Gas & Electric to SDCP.

By 2023 these numbers **increased to 530,146 residential accounts and 55,038 commercial/industrial accounts.**



Currently, **96.4% of eligible residential customers and 97.2% of eligible commercial/industrial customers** in the city have transitioned to SDCP, significantly reducing emissions from electricity use by providing 50% renewable energy. **The City's next goal is to ensure all customers receive 100% renewable, carbon-free power.**



**SEPTEMBER 2023:** *San Diego's Fleet Operations Division was honored as the fleet with "Best Policies and Procedures" by the National Association of Fleet Administrators for the fifth consecutive year, reflecting reduced emissions and eco-friendly vehicle use.*



# **Strategy 3** **MOBILITY AND LAND USE**

The City of San Diego has undertaken a comprehensive approach to mobility and land use planning, aligning multiple major initiatives to advance the goals of its Climate Action Plan (CAP). These efforts are interconnected, aiming to create a more sustainable and climate-resilient transportation system while promoting equitable access and reducing greenhouse gas emissions.

One key component of this strategy is the enhancement of safe and enjoyable routes for pedestrians and cyclists. The City has embarked on a series of updates and projects aimed at improving biking infrastructure and pedestrian safety, including drafting the City's first ever Mobility Master Plan. These efforts are complemented by the expansion of flexible fleets, such as microtransit services, which provide accessible and affordable transportation options to reduce reliance on private vehicles.

Moreover, the City has committed to the expansion of safe and comfortable bike and pedestrian infrastructure with the adoption of its Complete Streets Policy. In 2022 and 2023, the City completed more than 150 miles of improvements to existing bicycle lanes and constructed more than 175 miles of new lanes. Projects like the Market Street Complete Street and the West Mission Bay Drive bridge replacement prioritize active transportation modes and contribute to safer and more sustainable mobility options.



**SEPTEMBER 2023:** *San Diego was recognized with a **Platinum Diamond** award from SANDAG for promoting sustainable transportation choices to its employees.*



In addition to enhancing active transportation infrastructure, the City is also focused on promoting safe, convenient and enjoyable transit use. Initiatives like providing free transit passes to all City employees, supporting the renewal and expansion of the Youth Opportunity Pass transit program, and establishing new community parking districts aim to reduce traffic congestion and improve air quality.

## Expanding Mobility for All: Flexible Fleets

The City of San Diego is committed to enhancing mobility options for all residents through the implementation of flexible fleets. These innovative, shared, electric on-demand services offer convenient, accessible and affordable transportation solutions. By diversifying transportation choices, flexible fleets aim to reduce reliance on private vehicles, alleviate parking demand and ease traffic congestion.

### HIGHLIGHTED INITIATIVES:

**FRED Service:** Launched in 2016, the FRED electric shuttle service provides a seamless and convenient transportation option in downtown San Diego, contributing to the reduction of driving and parking demand.

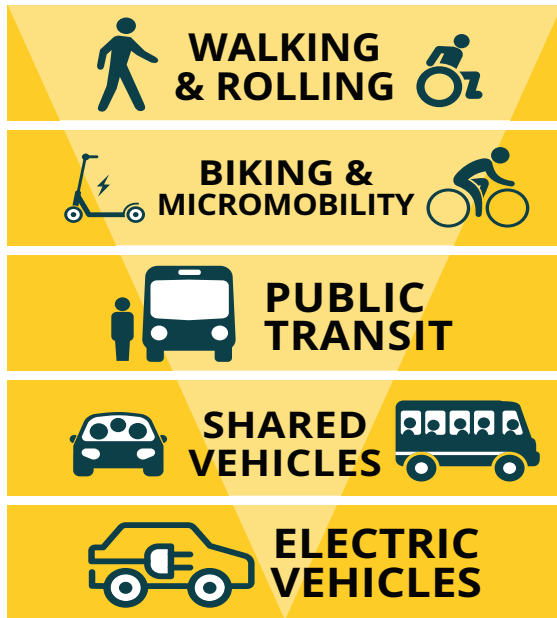
**Beach Bug Pilot:** The introduction of the Beach Bug neighborhood electric vehicle pilot in Pacific Beach in 2023 expanded mobility options while supporting the region's climate goals and providing a direct connection to the Balboa Avenue Transit Station. The pilot, tentatively scheduled to end in October 2024, has provided valuable data on rider usage and needs that will improve the design of future neighborhood services.

**Expansion Efforts:** Building on the success of FRED and the Beach Bug pilot, the North Park and City Heights Community Development Corporations secured funding for a similar on-demand shuttle service in Mid-City. Additionally, planning commenced for the Logan Heights Via Verde service in collaboration with the City in an advisory capacity.





## City Mobility Loading Prioritization



Furthermore, the City's climate-focused land use initiatives, such as Blueprint SD, aim to create connected multimodal networks that prioritize sustainable modes of transportation. These efforts are complemented by policy updates like Sustainable Development Areas and Housing Action Package 2.0, which encourage the development of homes connected to convenient and affordable transportation options. To help developers build projects that meet the City's CAP goals, the City released the Mobility Evaluation Tool to give developers a simple way to design projects that comply with the Complete Communities: Mobility Choices regulations and implement measures to reduce vehicle miles traveled (VMT).

The City also leads by example by encouraging municipal employees to commute to work using best practice Transportation Demand Management (TDM) strategies and maintains a strong working relationship with the regional Sustainable Transportation Services program at SANDAG, and has been recognized with a Platinum Diamond award for its efforts.

Overall, the integration of these various plans and initiatives demonstrates the City's commitment to creating a more sustainable, equitable and climate-resilient transportation system that aligns with the goals of its Climate Action Plan. By prioritizing active transportation, promoting public transit use and implementing climate-focused land use policies, the City of San Diego is working toward a greener and more sustainable future for its residents and communities.



## Biking Infrastructure Expansion

The City of San Diego is committed to enhancing biking infrastructure to promote sustainable transportation options. The Complete Streets Policy (Council Policy 900-23) plays a key role in this effort by requiring new mobility projects to include multimodal infrastructure (such as sidewalks or bike lanes) whenever possible. Additionally, it mandates that repair or reconstruction projects also consider these features. This opportunistic approach allows for a faster expansion of bike lanes. Between 2022 and 2023, the City improved more than 150 miles of existing bicycle lanes and built more than 175 miles of new ones.

### MARKET STREET COMPLETE STREET

Completed in 2023, this project in the Encanto neighborhood features more than two miles of Class IV protected bike lanes, on-street Class II bike lanes, wider sidewalks and street trees.

### BALBOA PARK PIPELINE REPLACEMENT

Park Boulevard now boasts a dedicated bus lane and buffered bike lane, enhancing safety and accessibility for cyclists.

### WEST MISSION BAY DRIVE BRIDGE REPLACEMENT

Opened in 2023, this project includes Class I protected bike lanes in both directions, contributing to the city's largest bridge replacement effort.

### CONVOY STREET REPAVING

In progress since 2023, the repaving of Convoy Street from State Route 52 to Kearny Mesa Road includes separated bike lanes and sidewalk replacement, prioritizing safety and mobility for all transportation modes.

### UNIVERSITY AVENUE COMPLETE STREET

Awarded in 2022, this project aims to improve biking infrastructure with three new roundabouts, Class II bike lanes, and widened sidewalks along University Avenue between Euclid and Fairmont avenues.







# Strategy 4

## CIRCULAR ECONOMY AND CLEAN COMMUNITIES

### Zero Waste to Landfill

In alignment with its commitment to achieving zero waste to landfill, the City of San Diego has undertaken significant efforts to enhance recycling practices and reduce organic waste disposal, as mandated by the amended Citywide Recycling Ordinance in 2022 to comply with Senate Bill 1383, a state law requiring organic waste recycling. The City's Environmental Services Department accomplished the following in the course of about a year:

- **In order to support the biggest change to trash and recycling in San Diego's history, the City expanded its fleet of trucks, increased staffing, and established new landfill operations.**
- **Waste haulers distributed green and blue bins to approximately 200,000 residents.**
- **Ongoing checks identified missed properties, ensuring broad participation.**
- **A multicultural marketing campaign educated diverse communities about organic waste recycling.**
- **Diverse outreach efforts engaged residents through various channels like mailers, billboards and social media.**

Additionally, the City opened a mattress recycling center at the Miramar Landfill, providing residents with a convenient and sustainable way to dispose of mattresses and reduce landfill waste.



**DECEMBER 2023:** *San Diego was granted A-list status by the Carbon Disclosure Project among 119 cities worldwide, marking its third appearance on the list and its first A rating, joining visionary cities like Barcelona, Toronto and Buenos Aires.*



# **Strategy 5**

## RESILIENT INFRASTRUCTURES AND HEALTHY ECOSYSTEMS

### Tree Canopy

Investing in urban forestry is essential for enhancing resilience, improving air quality, and promoting community well-being. The City has secured funding to support its tree-planting efforts: A \$10 million grant from the federal government for the “Ready, Set, Grow San Diego” program, and \$4.69 million for the “Trees for Communities,” a San Diego County Air Pollution Control District settlement program. Both large-scale planting programs are focused in San Diego’s Communities of Concern, using tools like CalEnviroScreen and the Climate Equity Index to prioritize planting locations. The CAP goal is to plant 40,000 new trees in Communities of Concern by 2030. Ongoing tree operations in 2023 resulted in 1,586 trees planted and 48,754 trees trimmed or otherwise maintained.



**OCTOBER 2023:** *The San Diego chapter of the Association of Environmental Professionals presented **San Diego the Outstanding Innovation in Resilient or Sustainable Planning and Design** award for its CAP Implementation Plan.*



## Advancing Climate Equity

**The Climate Equity Index (CEI)** is a vital tool developed to address disparities in access to opportunities and services within San Diego. Historically, some communities have faced systemic barriers, limiting their access to resources. **To understand these disparities, the City worked with the Equity Stakeholder Working Group to create the CEI.** This tool evaluates social and structural vulnerabilities, environmental pollution, and climate change impacts across different census tracts, and identifies those with **Very Low, Low, and Moderate Access** to Opportunity as Communities of Concern.

**The development of a measureable tool for use across various City departments is a crucial step toward embedding equity into San Diego's operations.** For instance, the Environmental Services Department utilized the CEI during the planning and implementation of last year's green bin rollout, prioritizing neighborhoods with the lowest CEI scores to receive the bins first. Additionally, the Mobility Master Plan (MMP) employs the CEI within its prioritization framework to ensure that mobility projects address the most pressing needs and offer the greatest benefits in a sustainable and equitable manner. **Moreover, the City has amended the Capital Improvement Projects process (Council Policy 800-14) to incorporate sustainability and equity scoring factors, utilizing the CEI to guide the prioritization of Capital Improvement Program Projects.** These efforts illustrate the City's commitment to using the CEI to rectify historic inequities and ensure that all communities benefit from climate action initiatives.



## Funding Climate Action



The City of San Diego has demonstrated notable success in securing grant funding to support its climate action and sustainability initiatives. Through proactive efforts and strategic partnerships, the City has been able to access a diverse range of grants aimed at advancing key priorities outlined in its Climate Action Plan.

One area of success is in the realm of energy efficiency and renewable energy, where the **City secured a federal Energy Efficiency & Conservation Block Grant totaling \$1.18 million.** This grant will be instrumental in establishing a community pilot program for residential electrification in low to moderate-income communities, furthering the City's commitment to equity and environmental sustainability.

The City has also capitalized on opportunities to enhance mobility and transportation infrastructure through grant funding. In addition to **more than \$10 million in funding** earmarked for complete streets projects, traffic calming, disability access and other pedestrian



and bicycle improvements, the City was **awarded \$2.25 million** from the federal government's Safe Streets and Roads for All program. This money will be used to create an Accessible Pedestrian Connections and Safety Plan and to update San Diego's Bicycle Master Plan. Other grants totaling **more than \$300,000** have been secured for pedestrian and bicycle safety programs, contributing to efforts to create safe and enjoyable routes for pedestrians and cyclists across the city.

The green bin rollout for organics recycling and associated educational campaign to bring San Diego into compliance with Senate Bill 1383 was a massive undertaking supported, in part, by a **\$1.85 million grant** from the California Department of Resources Recycling and Recovery (CalRecycle).



Another notable success is in the realm of urban forestry and green infrastructure, where the City was **awarded a \$10 million grant** from the federal government for tree planting initiatives under the "Ready, Set, Grow San Diego" program. This significant funding injection will enable the city to enhance its tree canopy, improve air quality and promote community well-being. Another \$3.1 million, from the California Natural Resources Agency, will go to a stormwater green infrastructure project.

In summary, the City of San Diego **has demonstrated a strong track record of securing grant funding to support its climate action goals and sustainability priorities.** These grants have been instrumental in financing pivotal initiatives spanning energy, transportation and green infrastructure sectors, thereby bolstering the city's resilience and sustainability. Looking ahead, the City remains steadfast in its commitment to seek out and secure additional funding streams to further propel the implementation of its Climate Action Plan, ensuring continued progress toward a thriving, sustainable future for all residents.

# Conclusion

The City of San Diego's Greenhouse Gas (GHG) inventory indicates that our emissions reductions are currently in line with the initial projections outlined in the CAP. **This is a positive sign that the City is on the right track toward achieving its near-term climate goals.**

However, to meet its 2035 goal of net-zero carbon emissions, we must accelerate the pace of these reductions in the coming years.

It is important to note that the GHG inventory reflects conditions from two years ago, prior to the implementation of the current CAP. **As this report demonstrates, the City of San Diego has made significant progress in implementing this Climate Action Plan, with initiatives spanning multiple sectors to reduce GHG emissions, promote sustainability and build resilience.** The impact should be reflected in future GHG inventories. Through collaboration with stakeholders and innovative solutions, the City is working toward a more sustainable and equitable future for all residents.



*Follow our progress at:  
[climatedashboard.sandiego.gov](https://climatedashboard.sandiego.gov)*



# Community Partners

***The City thanks the following partners for making this work possible:***

- Building Electrification Institute
- Business for Good San Diego
- Caltrans: California Department of Transportation
- Casa Familiar
- Center for Sustainable Energy
- Circulate San Diego
- City Heights Community Development
- Climate Action Campaign
- Energy Policy Initiatives Center – University of San Diego
- Environmental Health Coalition
- Green Cities California
- The Greenlining Institute
- GRID Alternatives
- Groundwork San Diego-Chollas Creek
- ICLEI – Local Governments for Sustainability
- Institute for Local Government
- New Buildings Institute
- Port of San Diego
- Project New Village
- Rocky Mountain Institute
- SanDiego350
- San Diego Association of Governments (SANDAG)
- San Diego Building Electrification Coalition
- San Diego Community Power
- San Diego County Air Pollution Control District
- San Diego County Bike Coalition
- San Diego Diplomacy Council
- San Diego Foundation
- San Diego Gas & Electric
- San Diego Green Building Council
- San Diego Regional Chamber of Commerce
- San Diego Regional Climate Collaborative – University of San Diego
- San Diego Regional Economic Development Corporation
- San Diego Urban Sustainability Coalition
- University of San Diego
- Urban Sustainability Directors Network
- World Economic Forum







***A sustainable city with opportunity  
and access for people in every  
community.***



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Climate Action Plan  
2023 Annual Report Appendix



## Table of Contents

|                                                                          |           |
|--------------------------------------------------------------------------|-----------|
| <b>INTRODUCTION .....</b>                                                | <b>1</b>  |
| <b>SECTION A: OVERVIEW OF 2019 – 2022 GREENHOUSE GAS EMISSIONS .....</b> | <b>1</b>  |
| GREENHOUSE GAS (GHG) EMISSIONS INVENTORY .....                           | 1         |
| PER CAPITA GREENHOUSE GAS EMISSIONS .....                                | 3         |
| <b>SECTION B: 2022 CLIMATE ACTION PLAN STRATEGY UPDATES .....</b>        | <b>4</b>  |
| STRATEGY 1: DECARBONIZATION OF THE BUILT ENVIRONMENT.....                | 5         |
| STRATEGY 2: ACCESS TO CLEAN AND RENEWABLE ENERGY .....                   | 10        |
| STRATEGY 3: MOBILITY AND LAND USE.....                                   | 15        |
| STRATEGY 4: CIRCULAR ECONOMY AND CLEAN COMMUNITIES .....                 | 20        |
| STRATEGY 5: RESILIENT INFRASTRUCTURE AND HEALTHY ECOSYSTEMS.....         | 22        |
| STRATEGY 6: EMERGING CLIMATE ACTION .....                                | 25        |
| <b>SECTION C: METHODOLOGY DIFFERENCES AND DATA REFINEMENT .....</b>      | <b>26</b> |

## Table of Figures

|                                                                                                    |    |
|----------------------------------------------------------------------------------------------------|----|
| FIGURE 1: CITY OF SAN DIEGO GHG EMISSIONS COMPARISON TO 2019 BASELINE .....                        | 3  |
| FIGURE 2: CHANGES IN SAN DIEGO GDP, POPULATION, AND GHG EMISSIONS SINCE 2019 .....                 | 4  |
| FIGURE 3: GRID-SUPPLIED ELECTRICITY CONSUMPTION CHANGES FROM 2019 BASELINE .....                   | 5  |
| FIGURE 4: GRID-SUPPLIED ELECTRICITY USE BY CUSTOMER CLASS IN CITY OF SAN DIEGO [2019–2022] .....   | 6  |
| FIGURE 5: NATURAL GAS CONSUMPTION CHANGES FROM 2019 BASELINE .....                                 | 6  |
| FIGURE 6: NATURAL GAS USE BY CUSTOMER CLASS IN CITY OF SAN DIEGO [2019–2022] .....                 | 7  |
| FIGURE 7: TOTAL ENERGY USE IN CITY OF SAN DIEGO [2019–2022] .....                                  | 8  |
| FIGURE 8: MUNICIPAL ENERGY USE [2015–2022] .....                                                   | 9  |
| FIGURE 9: ELECTRICITY CONSUMPTION AND EMISSIONS IN THE CITY OF SAN DIEGO [2019–2022] .....         | 10 |
| FIGURE 10: BEHIND-THE-METER PV IN CITY OF SAN DIEGO [1999–2022] .....                              | 11 |
| FIGURE 11: CITYWIDE ENERGY CONSUMPTION FROM SDG&E, SDCP, BEHIND METER PV [2019–2022] .....         | 12 |
| FIGURE 12: VEHICLE TYPES IN MUNICIPAL FLEET [2016–2022] .....                                      | 13 |
| FIGURE 13: MUNICIPAL FLEET COMPRESSED NATURAL GAS AND DIESEL FUEL USE BY TYPE [2016–2022] .....    | 13 |
| FIGURE 14: PERCENT OF HYBRID AND ELECTRIC VEHICLES IN SAN DIEGO COUNTY [2019–2022] .....           | 15 |
| FIGURE 15: CHANGES IN VMT, PER CAPITA VMT, AND ON-ROAD EMISSIONS FROM 2019 BASELINE .....          | 16 |
| FIGURE 16: ON ROAD EMISSIONS VS. VEHICLE MILES TRAVELED IN THE CITY OF SAN DIEGO [2019–2022] ..... | 17 |
| FIGURE 17: REGIONAL TRANSIT BOARDINGS AND PASSENGER MILES [2016–2022] .....                        | 18 |
| FIGURE 18: TONS TO LANDFILL AND LANDFILL DIVERSION RATE IN CITY OF SAN DIEGO [2016–2022] .....     | 21 |
| FIGURE 19: WATER SALES BY SECTOR [2010–2022] .....                                                 | 22 |
| FIGURE 20: ACRE-FEET OF WATER DELIVERED TO CITY OF SAN DIEGO [2015–2022] .....                     | 24 |
| FIGURE 21: PER CAPITA WATER USE [2010–2022] .....                                                  | 25 |

## List of Tables

|                                                                                          |    |
|------------------------------------------------------------------------------------------|----|
| TABLE 1: CITY OF SAN DIEGO GREENHOUSE GAS EMISSIONS .....                                | 2  |
| TABLE 2: 2019-2022 PER CAPITA GHG EMISSIONS .....                                        | 3  |
| TABLE 3: TOTAL GRID-SUPPLIED ELECTRICITY USE IN CITY OF SAN DIEGO .....                  | 5  |
| TABLE 4: TOTAL NATURAL GAS DELIVERED BY SDG&E IN CITY OF SAN DIEGO .....                 | 6  |
| TABLE 5: TOTAL ELECTRICITY AND NATURAL GAS DELIVERED BY SDG&E IN CITY OF SAN DIEGO ..... | 8  |
| TABLE 6: ENERGY USE IN MUNICIPAL BUILDINGS .....                                         | 9  |
| TABLE 7: PERCENTAGE OF RENEWABLES IN GRID ELECTRICITY SUPPLY .....                       | 11 |
| TABLE 8: MUNICIPAL ON-SITE GENERATION [2021–2022] .....                                  | 12 |
| TABLE 9: PERCENT OF ZEVS IN MUNICIPAL VEHICLE FLEET [2016–2022] .....                    | 12 |
| TABLE 10: CITY FLEET GASOLINE CONSUMPTION .....                                          | 14 |
| TABLE 11: NUMBER OF REGISTERED ELECTRIC VEHICLES IN SAN DIEGO COUNTY .....               | 14 |
| TABLE 12: ESTIMATED NUMBER OF ELECTRIC VEHICLE CHARGING STATIONS .....                   | 15 |
| TABLE 13: VEHICLE MILES TRAVELED (VMT) IN CITY OF SAN DIEGO .....                        | 16 |
| TABLE 14: PERCENT OF MODE SHARE FOR EMPLOYEE COMMUTE .....                               | 17 |
| TABLE 15: BICYCLE FACILITIES IMPROVEMENTS SINCE 2013 .....                               | 18 |
| TABLE 16: REGIONAL REMOTE WORK SURVEY .....                                              | 19 |
| TABLE 17: ROUNDABOUTS INSTALLED AND TRAFFIC SIGNALS RETIMED .....                        | 19 |
| TABLE 18: WASTE DIVERSION RATE AND DISPOSED TONNAGE .....                                | 20 |
| TABLE 19: WASTEWATER FLOW AND EMISSIONS [2016-2022] .....                                | 20 |
| TABLE 20: ACRES OF RIPARIAN AND WETLAND RESTORATION IN PROGRESS .....                    | 22 |
| TABLE 21: TREE PLANTING AND MAINTENANCE .....                                            | 23 |
| TABLE 22: METERED RECYCLED AND IRRIGATION WATER USE .....                                | 25 |
| TABLE 23: METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY .....            | 26 |



# Introduction

The City of San Diego (City) adopted an updated Climate Action Plan (CAP) in 2022 with new sets of targets, measures, and actions.<sup>1</sup> This is the first annual report monitoring the 2022 CAP. The City of San Diego's 2023 Climate Action Plan Annual Report (this report) provides additional information and data in the following three sections:

- Section A: Overview of 2019 – 2022 Greenhouse Gas Emissions
- Section B: 2022 Climate Action Plan Strategy Updates
- Section C: Methodology Differences and Data Refinement

Estimated total greenhouse gas (GHG) emissions in the City in 2022 were 8.6 million metric tons of carbon dioxide equivalent (MMT CO<sub>2</sub>e), approximately 19% lower than the 2019 GHG emissions estimate of 10.6 MMT CO<sub>2</sub>e. The five strategies in the 2015 CAP are: (1) decarbonization of the built environment; (2) access to clean and renewable energy; (3) mobility and land use; (4) circular economy and clean communities; (5) resilient infrastructure and healthy ecosystems; and (6) emerging climate actions. Under each strategy, the current state in 2019–2022 is presented first followed by updates of each action. Comparisons of the 2020, 2021, and 2022 status and the baseline estimates from 2019 are provided where possible.

In preparation for this report and the 2019–2022 GHG emissions inventory, revisions and refinements were made to the baseline 2019 GHG emissions estimates from previous Annual Reports and the 2022 CAP to reflect updated data as it became available. This updating approach follows the approach used by the California Air Resources Board (CARB) when updating the California statewide GHG inventory, and is based on the Intergovernmental Panel on Climate Change (IPCC) recommendations to maintain a consistent time-series when developing GHG inventories.<sup>2</sup> Revisions to previous estimates are explained in *Section C: Methodology Differences and Data Refinement* of this report. The updates to the CAP strategies performance metrics are described in *Section B: 2022 Climate Action Plan Strategy Updates*.

## Section A: Overview of 2019 – 2022 Greenhouse Gas Emissions

### GREENHOUSE GAS (GHG) EMISSIONS INVENTORY

The categories of emissions sources included in this update are consistent with the previous 2015 CAP Annual Reports, with the addition of off-road vehicle and equipment from construction. Categories include: on-road transportation, electricity, natural gas, water, wastewater, solid waste, and off-road construction. As in the previous years, these reflect the emission categories that are recommended in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (U.S.

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<sup>1</sup> City of San Diego: 2022 Climate Action Plan.

<sup>2</sup> California Air Resources Board (CARB): California Greenhouse Gas Emissions for 2000 to 2020. Trends of Emissions and Other Indicators, p. 28 Additional Information (2020).

Community Protocol)<sup>3</sup> developed by ICLEI. These emission categories are routinely included in citywide inventories to ensure comparability across jurisdictions. GHG emissions from sources such as air travel, shipping, or other high global warming potential gases used in the City are not included. The 2019–2022 GHG emissions inventory results are shown in Table 1.

| <b>Emissions Category</b>                                                                                                                                                                                                                                                                                                                                             | <b>2019 Emissions [MT CO<sub>2</sub>e] (Reported in 2022 CAP)</b> | <b>2019 Emissions Revised* [MT CO<sub>2</sub>e] (per 2022 Annual Report)</b> | <b>2020 Emissions [MTCO<sub>2</sub>e]</b> | <b>2021 Emissions [MTCO<sub>2</sub>e]</b> | <b>2022 Emissions [MTCO<sub>2</sub>e]</b> | <b>% Change 2021-2022</b> | <b>% Change 2019-2022</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|---------------------------|---------------------------|
| On-Road Transportation                                                                                                                                                                                                                                                                                                                                                | 5,805,000                                                         | 5,854,000                                                                    | 4,650,000                                 | 4,683,000                                 | 4,628,000                                 | -1%                       | -21%                      |
| Electricity                                                                                                                                                                                                                                                                                                                                                           | 2,375,000                                                         | 2,398,000                                                                    | 2,368,000                                 | 1,725,000                                 | 1,661,000                                 | -4%                       | -31%                      |
| Natural Gas                                                                                                                                                                                                                                                                                                                                                           | 1,911,000                                                         | 1,912,000                                                                    | 1,827,000                                 | 1,918,000                                 | 1,837,000                                 | -4%                       | -4%                       |
| Off-Road Transportation (Construction Equipment Only)                                                                                                                                                                                                                                                                                                                 | 70,000                                                            | 69,000                                                                       | 57,000                                    | 57,000                                    | 57,000                                    | 0%                        | -17%                      |
| Wastewater & Solid Waste                                                                                                                                                                                                                                                                                                                                              | 277,000                                                           | 303,000                                                                      | 296,000                                   | 312,000                                   | 295,000                                   | -5%                       | -3%                       |
| Water                                                                                                                                                                                                                                                                                                                                                                 | 68,000                                                            | 61,000                                                                       | 70,000                                    | 70,000                                    | 74,000                                    | 6%                        | 21%                       |
| <b>Total Emissions</b>                                                                                                                                                                                                                                                                                                                                                | <b>10,532,000</b>                                                 | <b>10,597,000</b>                                                            | <b>9,268,000</b>                          | <b>8,765,000</b>                          | <b>8,552,000</b>                          | <b>-2%</b>                | <b>-19%</b>               |
| *This report will reference the 2019 Revised Emissions for the remainder of this report.<br>GHG emissions for each category and the totals are rounded to the nearest thousands. Sums may not add up to totals due to rounding.<br>MT CO <sub>2</sub> e = metric tons of carbon dioxide equivalent.<br>Energy Policy Initiatives Center, University of San Diego 2024 |                                                                   |                                                                              |                                           |                                           |                                           |                           |                           |

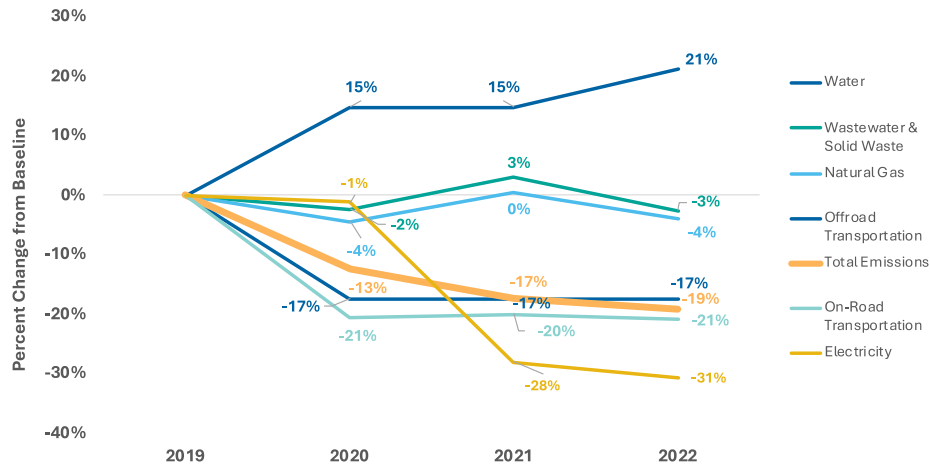
This report will reference the 2019 revised emissions for the remainder of the report, and will refer to them as the ‘2019 emissions.’ More information on the methods, data availability, and sources used to calculate GHG emissions are provided in Section C: Methodology Differences and Data Refinement.

<sup>3</sup> ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012).



Figure 1 shows how emissions in each category have changed relative to 2019.

**FIGURE 1: CITY OF SAN DIEGO GHG EMISSIONS COMPARISON TO 2019 BASELINE**



In 2022, total emissions were 8.6 MMTCO<sub>2</sub>e, a 19% reduction from the 2019 baseline and a 2% decrease from 2021. This decrease was mainly due to an increase of renewable electricity supplied to the City and increased on-road vehicle efficiency and adoption of electric and hybrid vehicles added. Although COVID-19 temporarily reduced on-road transportation emissions by lowering vehicle miles traveled, these miles are now returning to pre-pandemic levels. Despite this, emissions remain lower because the adoption of electric and hybrid vehicles has reduced the carbon intensity of on-road vehicles.

Furthermore, SDG&E has expanded its renewable electricity portfolio, and San Diego Community Power, the city's Community Choice Energy provider, now supplies electricity to commercial, industrial and residential sectors. This shift has decreased the carbon intensity of the city's electricity consumption, further reducing overall emissions.

For more information on sector-specific activities and GHG emissions, refer to Section B: 2022 Climate Action Plan Strategy Updates.

## PER CAPITA GREENHOUSE GAS EMISSIONS

The 2019–2022 per capita GHG emissions in the City of San Diego are given in Table 2. This represents emissions from the six emissions categories analyzed.

**TABLE 2: 2019-2022 PER CAPITA GHG EMISSIONS**

| Year                                                      | 2019 Emissions | 2020 Emissions | 2021 Emissions | 2022 Emissions |
|-----------------------------------------------------------|----------------|----------------|----------------|----------------|
| Total Emissions (MMTCO <sub>2</sub> e)                    | 10.60          | 9.27           | 8.77           | 8.55           |
| Total Population                                          | 1,420,571      | 1,380,448      | 1,371,832      | 1,374,790      |
| Per Capita GHG Emissions (MTCO <sub>2</sub> e per capita) | 7.46           | 6.71           | 6.39           | 6.22           |

2019 population and housing estimates are based on the 2010 census benchmark, and 2020 and 2021 population and housing estimates are based on the 2020 census benchmark.

MT CO<sub>2</sub>e = metric tons of carbon dioxide equivalent

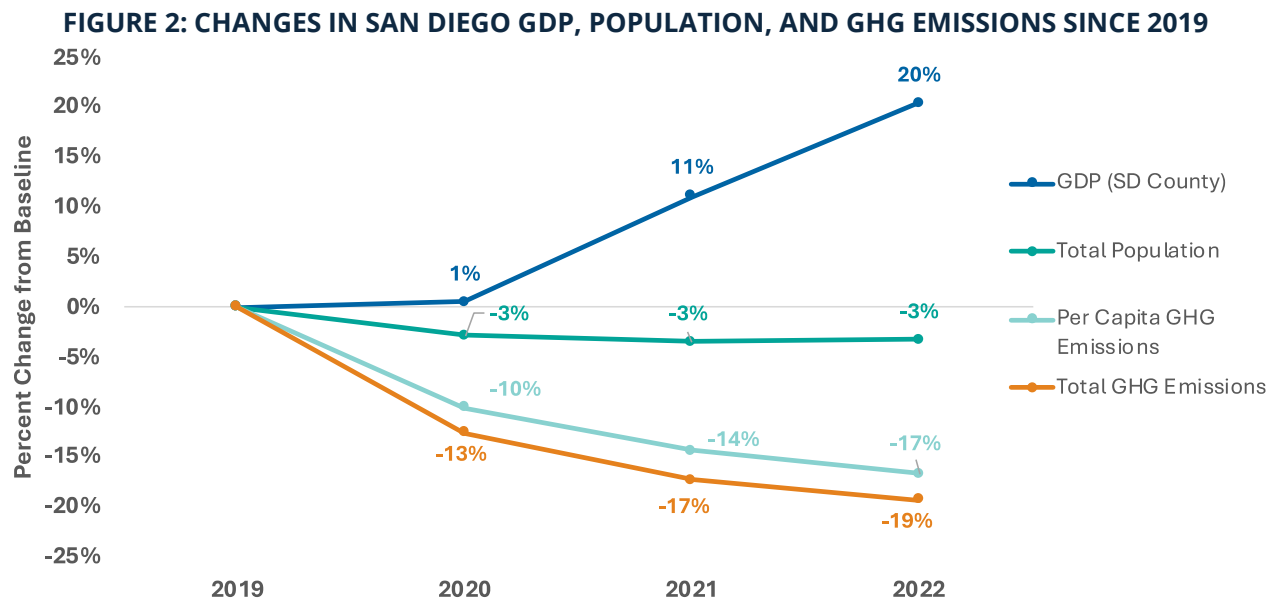
Per capita emissions based on six emission categories only and cannot be compared with California statewide per capita emissions or per capita emissions targets.

2019 population is based on 2010 census benchmark. 2020, 2021 and 2022 population and housing estimates are based on 2020 census benchmark.

Energy Policy Initiatives Center, University of San Diego 2024

As mentioned previously, the GHG emissions categories and inventory methodology for the City of San Diego are based on the U.S. Communities Protocol, which requires five basic emissions-generating activities to be included in a Community 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 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 2 shows countywide GDP growth compared to City of San Diego population and GHG emissions changes since 2019. From 2019 to 2022, the per capita GHG emissions dropped by 17%, while the population remained largely stable.



GDP listed is for San Diego County

CA Dept of Finance, U.S. Bureau of Economic Analysis, Energy Policy Initiatives Center, University of San Diego 2024



# Section B: 2022 Climate Action Plan Strategy Updates

This section summarizes activity related to measures outlined in the 2022 Climate Action Plan. The [City of San Diego's CAP Dashboard](#) has up-to-date information and additional metrics tracking.

## STRATEGY 1: DECARBONIZATION OF THE BUILT ENVIRONMENT

### Baseline & Current State of Building Energy Use in the City of San Diego:

Building energy-related emissions (fossil-fuel based electricity and natural gas consumption) accounted for 41% of total city-wide emissions, though the sector had a 19% reduction from the 2019 baseline (31% reduction in emissions from electricity and 4% from natural gas) and a 4% reduction from 2021.

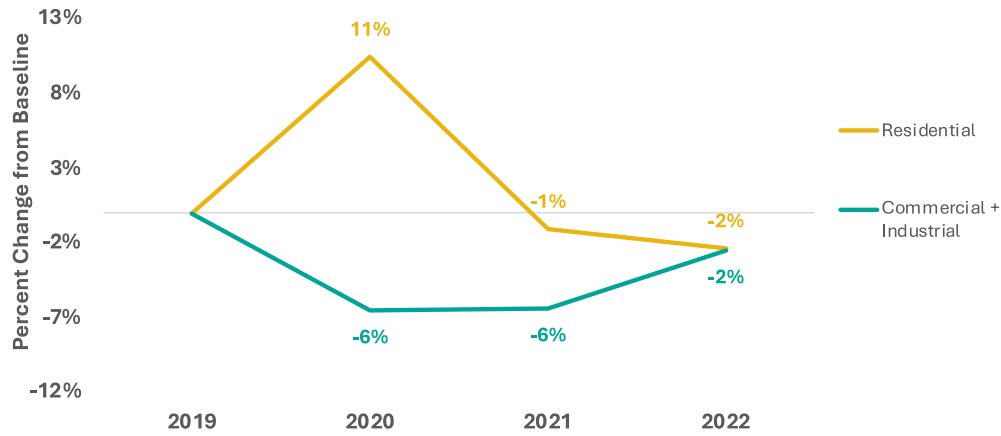
#### Electricity Consumption & Emissions:

The 2019–2022 grid supplied electricity is provided in Table 3. For electricity users with on-site electric generation, only the net electricity from the grid has been included.

| TABLE 3: TOTAL GRID-SUPPLIED ELECTRICITY USE IN CITY OF SAN DIEGO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |           |           |           |                       |                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------------------|-----------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2019      | 2020      | 2021      | 2022      | % Change<br>2021-2022 | % Change<br>2019-2022 |
| Electricity Consumption (MWh)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 7,312,722 | 7,198,617 | 6,957,279 | 7,137,087 | 3%                    | -2%                   |
| Emissions from Electricity (MTCO <sub>2</sub> e)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2,398,000 | 2,368,000 | 1,725,000 | 1,661,000 | -4%                   | -31%                  |
| <p>MWh = megawatt hour, MT CO<sub>2</sub>e = metric tons of carbon dioxide equivalent</p> <p>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. The emissions calculation includes the electricity transmission and distribution losses.</p> <p>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.</p> <p>SDG&amp;E 2022, Energy Policy Initiatives Center, University of San Diego 2024</p> |           |           |           |           |                       |                       |

Electricity use changes compared to a 2019 baseline is shown in Figure 3.

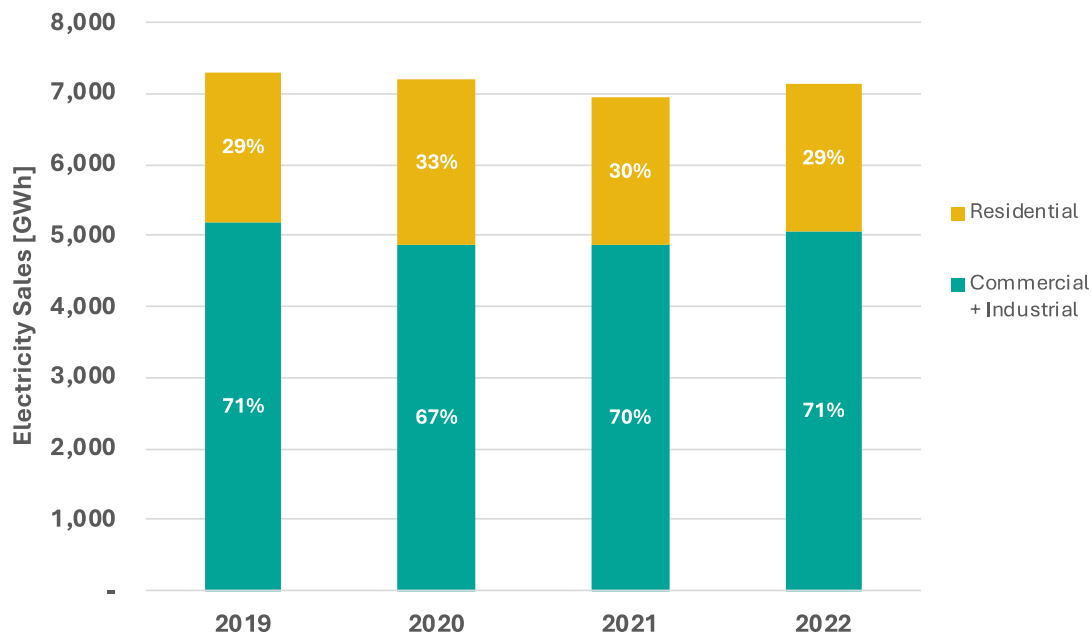
**FIGURE 3: GRID-SUPPLIED ELECTRICITY CONSUMPTION CHANGES FROM 2019 BASELINE**



SDG&E 2019 – 2022, SDCP 2021-2022

A comparison of the grid-supplied electricity use by customer class in 2019–2022 is shown in Figure 4.

**FIGURE 4: GRID-SUPPLIED ELECTRICITY USE BY CUSTOMER CLASS IN CITY OF SAN DIEGO [2019–2022]**



SDG&E's electricity sales in City of San Diego. Sales do not include transmission and distribution 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 2019-2022

#### Natural Gas Consumption & Emissions:

Table 4 provides natural gas end use in 2019–2022. City-wide natural gas end use is 4% lower since both the baseline and 2021, showing a fluctuating energy use.

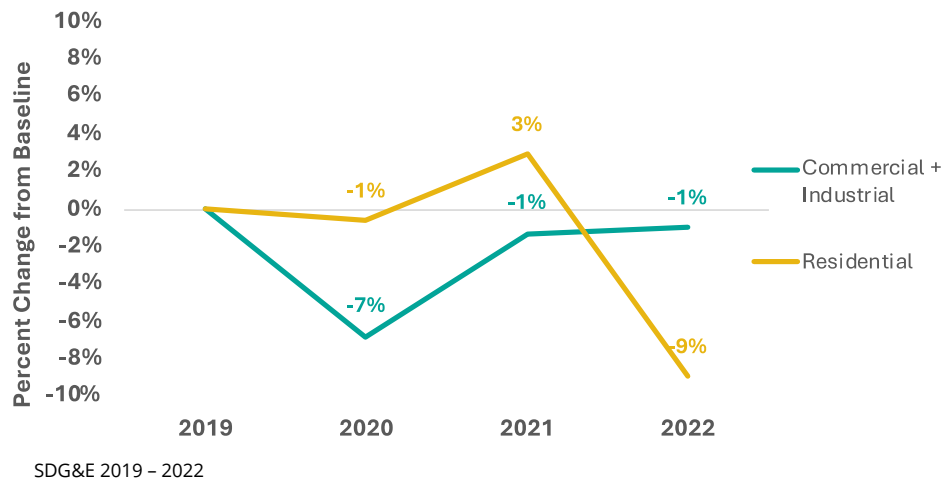


| TABLE 4: TOTAL NATURAL GAS DELIVERED BY SDG&E IN CITY OF SAN DIEGO                                                                                                                                                              |           |           |           |           |                       |                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------------------|-----------------------|
| Year                                                                                                                                                                                                                            | 2019      | 2020      | 2021      | 2022      | % Change<br>2021-2022 | % Change<br>2019-2022 |
| Natural Gas Use<br>(million Therms)                                                                                                                                                                                             | 351       | 335       | 352       | 337       | -4%                   | -4%                   |
| Emissions from<br>Natural Gas (MTCO <sub>2</sub> e)                                                                                                                                                                             | 1,912,000 | 1,827,000 | 1,918,000 | 1,837,000 | -4%                   | -4%                   |
| The natural gas sales data do not include the sales to San Diego County Regional Airport Authority, San Diego Unified Port District and military.<br>SDG&E 2022, Energy Policy Initiatives Center, University of San Diego 2024 |           |           |           |           |                       |                       |

Natural gas use changes compared to a 2019 baseline is shown in

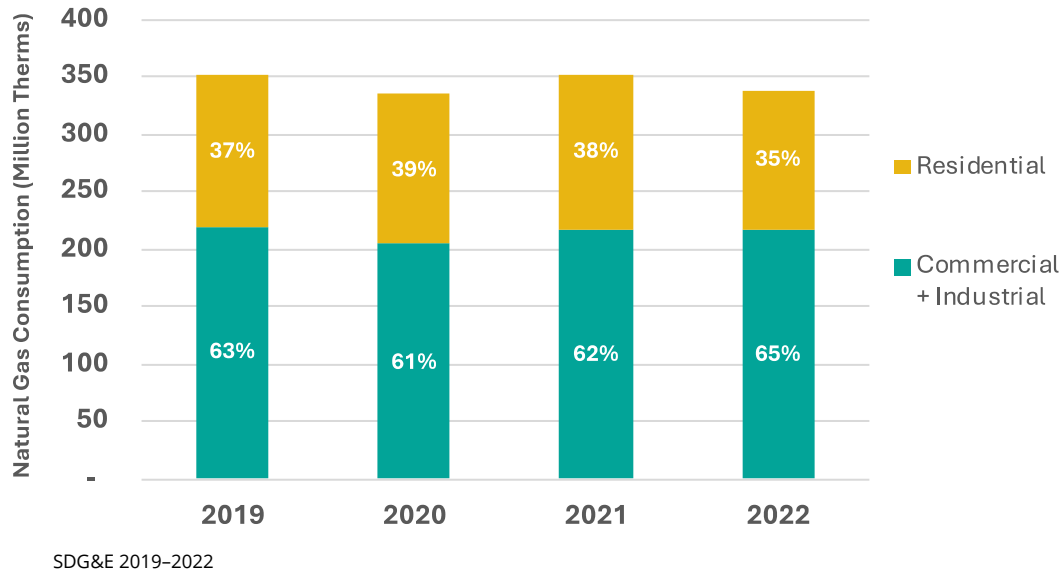
Figure 5.

FIGURE 5: NATURAL GAS CONSUMPTION CHANGES FROM 2019 BASELINE



A comparison of the natural gas use by customer class in 2019–2022 is shown in Figure 6.

FIGURE 6: NATURAL GAS USE BY CUSTOMER CLASS IN CITY OF SAN DIEGO [2019–2022]



## Target Progress: Reduce Natural Gas Use in New & Existing Buildings

### Measure 1.1: Decarbonize Existing Buildings

- 2030 Target: Phase out 45% of natural gas usage from existing buildings
- 2035 Target: Phase out 90% of natural gas usage from existing buildings

### Measure 1.2: Decarbonize New Building Development

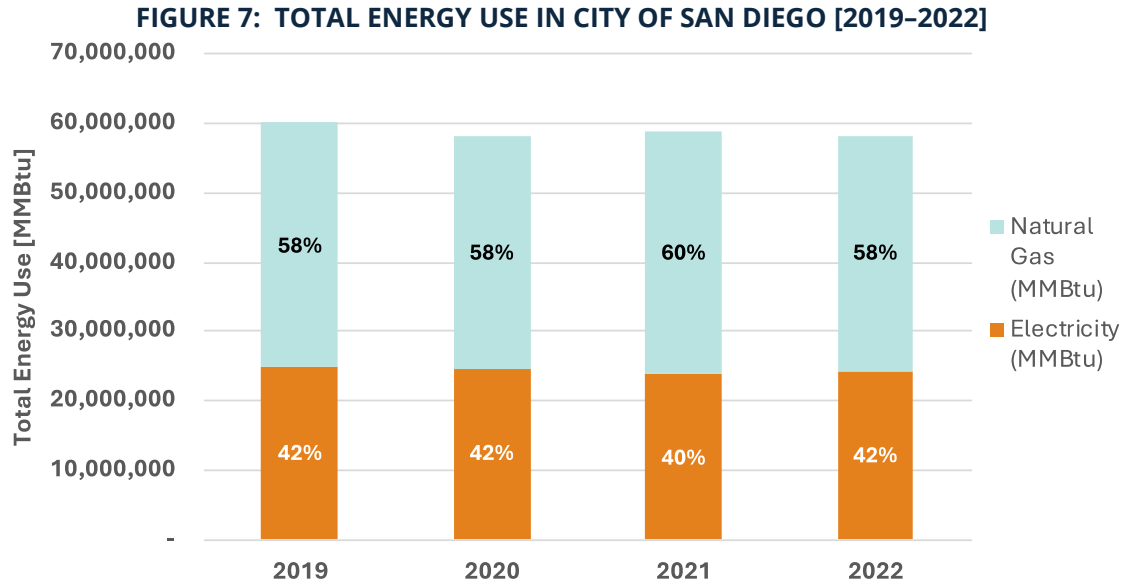
- 2030 Target: All-electric reach code starting 2023 at new residential and commercial development
- 2035 Target: Ongoing implementation of all-electric new residential and commercial development

Table 5 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. Total 2022 citywide energy consumption is 3% lower than 2019 levels.

| TABLE 5: TOTAL ELECTRICITY AND NATURAL GAS DELIVERED BY SDG&E IN CITY OF SAN DIEGO                                                                                                                                                                     |            |            |            |            |                       |                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------------|-----------------------|-----------------------|
| Year                                                                                                                                                                                                                                                   | 2019       | 2020       | 2021       | 2022       | % Change<br>2021-2022 | % Change<br>2019-2022 |
| Electricity (MMBtu)                                                                                                                                                                                                                                    | 24,951,000 | 24,562,000 | 23,738,000 | 24,352,000 | 3%                    | -2%                   |
| Natural Gas (MMBtu)                                                                                                                                                                                                                                    | 35,057,000 | 33,483,000 | 35,159,000 | 33,673,000 | -4%                   | -4%                   |
| Total Energy (MMBtu)                                                                                                                                                                                                                                   | 60,008,000 | 58,045,000 | 58,897,000 | 58,025,000 | -1%                   | -3%                   |
| Emissions from Energy Use (MMTCO <sub>2e</sub> )                                                                                                                                                                                                       | 4.3        | 4.2        | 3.6        | 3.5        | -4%                   | -19%                  |
| MMBtu = million British Thermal Units<br>Conversion factors are 293 kWh/MMBtu and 10 therms/MMBtu<br>MMTCO <sub>2e</sub> = million metric tons carbon dioxide equivalent<br>SDG&E 2022, Energy Policy Initiatives Center, University of San Diego 2024 |            |            |            |            |                       |                       |



A comparison of the total energy use for 2019–2022 is shown in Figure 7.



SDG&E 2019 - 2022, Energy Policy Initiatives Center, University of San Diego 2024

## Target Progress: Decarbonize City Facilities

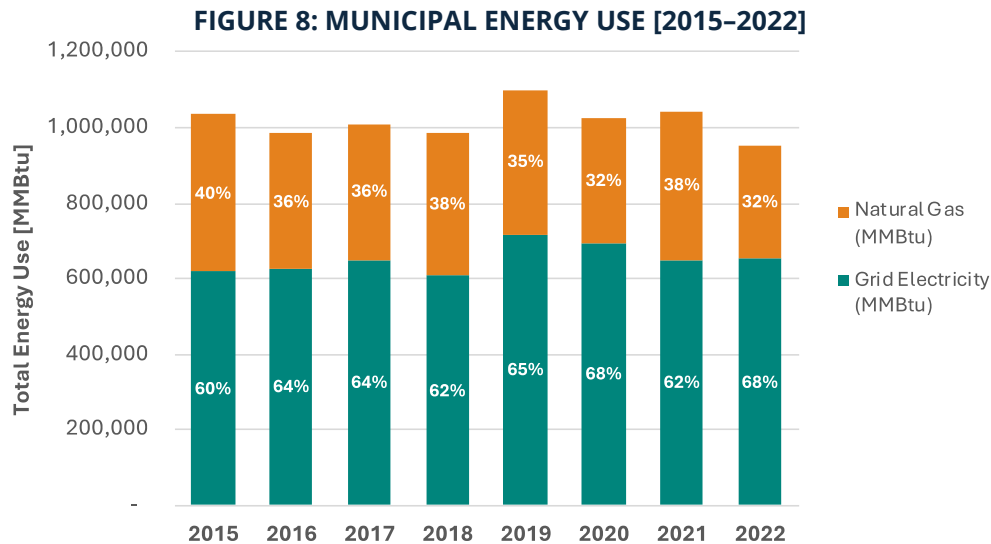
### Measure 1.3: Decarbonize City Facilities

- 2030 Target: Phase out 50% of natural gas usage in municipal facilities
- 2035 Target: Phase out 100% natural gas usage in municipal facilities

Total energy use for municipal operations in 2022 was 9% lower than in 2021 and 13% lower than the baseline year of 2019. Table 6 shows both electricity and natural gas use by municipal operations. This data includes energy use for facilities other than buildings (streetlights, traffic lights, etc.), but does not include natural gas use for City vehicles. In future years, this data will be disaggregated for clarity on progress toward Measure 1.3.

| TABLE 6: ENERGY USE IN MUNICIPAL BUILDINGS                           |           |           |           |         |                       |                       |
|----------------------------------------------------------------------|-----------|-----------|-----------|---------|-----------------------|-----------------------|
| Energy Use                                                           | 2019      | 2020      | 2021      | 2022    | % Change<br>2021-2022 | % Change<br>2019-2022 |
| Grid Electricity (MWh)                                               | 210,794   | 203,900   | 190,152   | 191,155 | 1%                    | -9%                   |
| Grid Electricity (MMBtu)                                             | 718,704   | 695,198   | 648,326   | 651,744 | 1%                    | -9%                   |
| Natural Gas (million therms)                                         | 3.8       | 3.3       | 3.9       | 3.0     | -24%                  | -21%                  |
| Natural Gas (MMBtu)                                                  | 381,302   | 330,976   | 394,156   | 300,436 | -24%                  | -21%                  |
| Total Energy Use (MMBtu)                                             | 1,100,006 | 1,026,174 | 1,042,482 | 952,180 | -9%                   | -13%                  |
| Natural Gas Emissions does not include natural gas use for vehicles. |           |           |           |         |                       |                       |
| City of San Diego Sustainability & Mobility Department               |           |           |           |         |                       |                       |

The trend in energy use for municipal operations from 2015 to 2022 is given in Figure 8.



SDG&E grid purchases only. Does not include on-site electricity generation.

Does not include natural gas purchases for CNG vehicles.

City of San Diego Sustainability & Mobility Department

## STRATEGY 2: ACCESS TO CLEAN AND RENEWABLE ENERGY

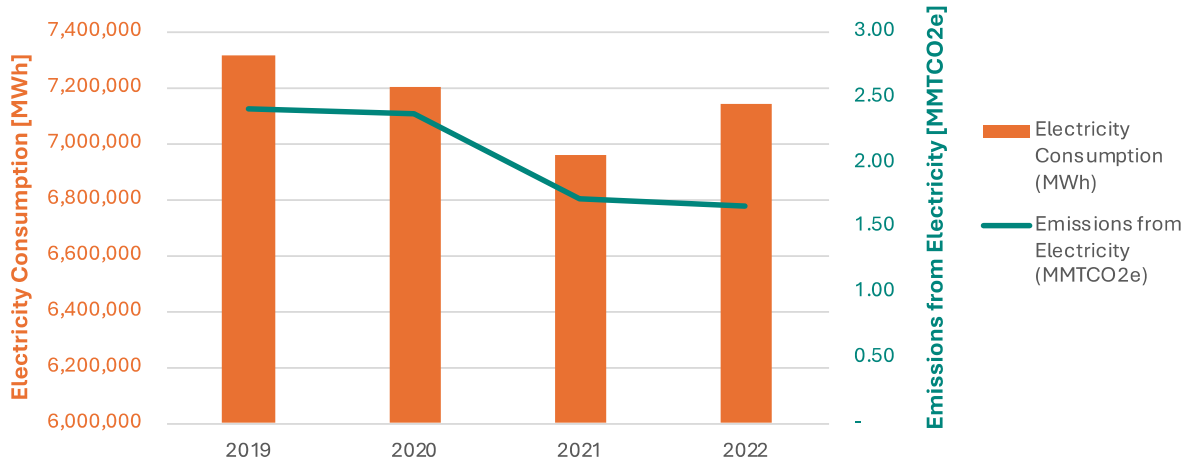
### Baseline and Current State of Renewable Energy Access in the City of San Diego:

While electricity consumption remained relatively stable from 2019–2022, emissions from energy consumption decreased by 31% from 2019 baseline as shown previously in Table 3 above and in Figure 9. This is due to a reduction in the carbon intensity of energy provided to City customers.

San Diego Gas & Electric (SDG&E)’s renewable electricity supply increased from 31% in 2019 to 45% in 2022, as shown in Table 7. In March 2021, SDCP started serving jurisdictions in the San Diego region, including the City of San Diego. By the end of 2021, eligible SDG&E bundled commercial and industrial customers were enrolled in SDCP automatically with the option to opt-out (return to SDG&E) or opt-up to a SDCP product with 100% renewable electricity. In early 2022, eligible SDG&E bundled residential customers were then enrolled in SDCP automatically with the same option to opt-out or opt-up. Emissions are based on a weighted average of SDG&E bundled, SDCP Power On, SDCP Power 100, and Direct Access consumption and their associated emission factors.

**FIGURE 9: ELECTRICITY CONSUMPTION AND EMISSIONS IN THE CITY OF SAN DIEGO [2019–2022]**





SDG&E 2019 - 2022, Energy Policy Initiatives Center, University of San Diego 2024

## Target Progress: Increase Access to Grid Renewables

### Measure 2.1: Citywide Renewable Energy Generation

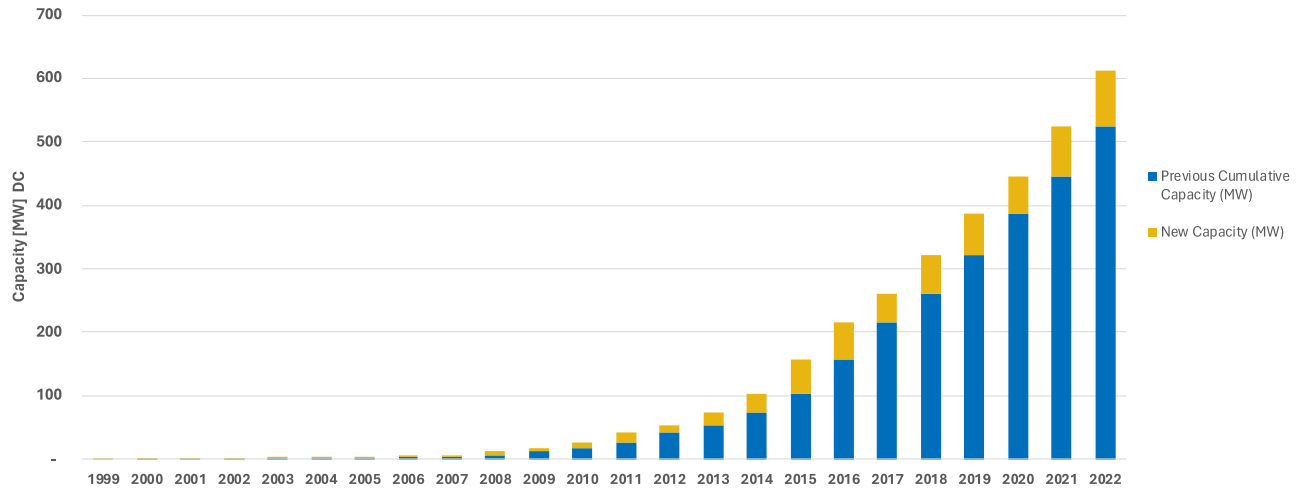
- 2030 Target: 100% renewable or GHG-free power for all SDGP customers in the City of San Diego
- 2035 Target: 100% renewable or GHG-free power for all SDGP customers in the City of San Diego

Percent of renewables in grid-provided electricity through both SDG&E and SDGP from 2019–2022 is outlined in Table 7.

| TABLE 7: PERCENTAGE OF RENEWABLES IN GRID ELECTRICITY SUPPLY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Renewables in Grid Electricity Supply                                                                                 |
| 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 31% (SDG&E)                                                                                                           |
| 2020 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 31% (SDG&E)                                                                                                           |
| 2021 <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 44.5% (SDG&E)<br>54.9% (San Diego Community Power)                                                                    |
| 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 44.8% (SDG&E)<br>54.2% (San Diego Community Power "Power On" Mix)<br>100% (San Diego Community Power "Power 100" Mix) |
| <p>The percent renewable is for the electricity SDG&amp;E supplied to its bundled customers; it does not represent the renewable content of the electricity supplied to SDG&amp;E's Direct Access customers and does not account for behind-the-meter renewable supply.</p> <p><sup>1</sup>The California Energy Commission has updated the method to report renewable content in the Power Source Disclosure Program. The percentage starting 2022 does not reflect the supplier's Renewables Portfolio Standard compliance, and does not include unbundled renewable energy credits.</p> <p><sup>2</sup>San Diego Community Power started serving jurisdictions in the San Diego region, including the City of San Diego, in March 2021. California Energy Commission 2024</p> |                                                                                                                       |

In 2022, solar projects for residential customers accounted for 88% of new solar capacity (approximately 76 out of 87 MW) and 99% of projects. The cumulative capacity of interconnected PV systems installed between 1999 and the end of 2022 was 611 MW in the City. Figure 10 shows the new capacity added each year and prior year's cumulative capacity.

**FIGURE 10: BEHIND-THE-METER PV IN CITY OF SAN DIEGO [1999–2022]**



California Distributed Generation Statistics database, net energy metering (NEM)  
 SDG&E Interconnected Project Sites Database  
 Energy Policy Initiatives Center University of San Diego, 2024

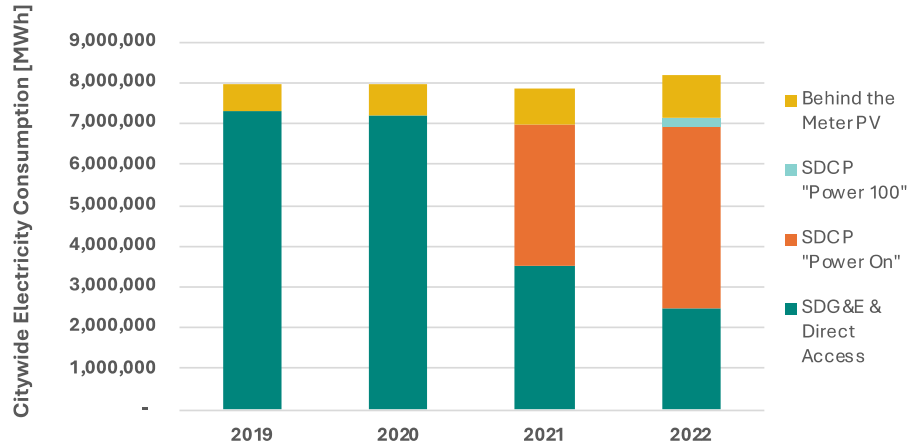
The City also has numerous facilities with on-site renewable generation, including: (1) combined heat and power generation using landfill gas or digester gas at Metropolitan Biosolids Center and Point Loma Wastewater Treatment Plant; (2) hydroelectric generation at Point Loma Wastewater Treatment Plant ocean outfall; and (3) PV systems at water treatment facilities, libraries, recreation centers and fire stations. Total municipal on-site generation for 2021 and 2022 is shown in Table 8.

| TABLE 8: MUNICIPAL ON-SITE GENERATION [2021-2022] |                                    |                                    |
|---------------------------------------------------|------------------------------------|------------------------------------|
| Municipal On-Site Generation                      | Estimated Annual Output 2021 (kWh) | Estimated Annual Output 2022 (kWh) |
| Solar                                             | 4,370,772                          | 4,511,145                          |
| Hydroelectric                                     | Not estimated                      | Not estimated                      |
| Co-gen with Biogas                                | 28,156,816                         | 23,200,496                         |
| Power Plant with Landfill Gas                     | 25,107,338                         | 6,084,753                          |
| Co-gen with Landfill Gas                          | 43,463,260                         | 43,462,998                         |

Total energy consumption and generation source is shown in Figure 11, including grid-supplied electricity from SDCP and SDG&E bundled, Direct Access, and behind-the-meter PV.

**FIGURE 11: CITYWIDE ENERGY CONSUMPTION FROM SDG&E, SDCP, BEHIND METER PV [2019-2022]**





California Distributed Generation Statistics database, net energy metering (NEM)  
 SDG&E Interconnected Project Sites Database  
 Energy Policy Initiatives Center, University of San Diego, 2024

## Target Progress: Increase Municipal Zero Emission Vehicles

### Measure 2.2: Increase Municipal Zero Emission Vehicles

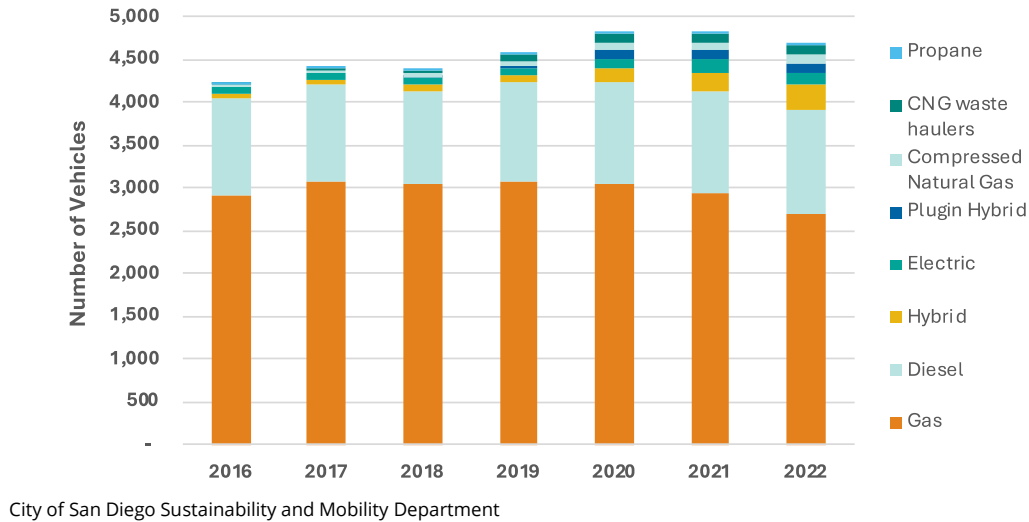
- 2030 Target: Percent of all municipal fleet vehicles to be ZEVs:  
Cars 75%, LDV 50%, MDV 50%, HDV 50%
- 2035 Target: Percent of all municipal fleet vehicles to be ZEVs:  
Cars and LDV 100%, MDV 75%, HDV 75%

As of 2022, 5% of the City's vehicle fleet of 4,344 vehicles were zero emission vehicles (ZEVs), including 127 battery electric vehicles (BEVs) and 119 plug-in hybrid electric vehicles (PHEVs). Table 9 shows the percentage of ZEVs in the Municipal fleet from 2016 – 2022.

| TABLE 9: PERCENT OF ZEVs IN MUNICIPAL VEHICLE FLEET [2016–2022] |      |      |      |      |      |      |      |
|-----------------------------------------------------------------|------|------|------|------|------|------|------|
| Calendar Year                                                   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Percent of ZEVs in Municipal Fleet                              | 2.1% | 2.0% | 2.0% | 2.2% | 4.5% | 5.2% | 5.4% |
| City of San Diego Sustainability and Mobility Department        |      |      |      |      |      |      |      |

The City also had 302 gasoline-electric hybrids and 99 CNG waste trucks. Figure 12 shows the breakdown of Municipal vehicles from 2016 to 2022.

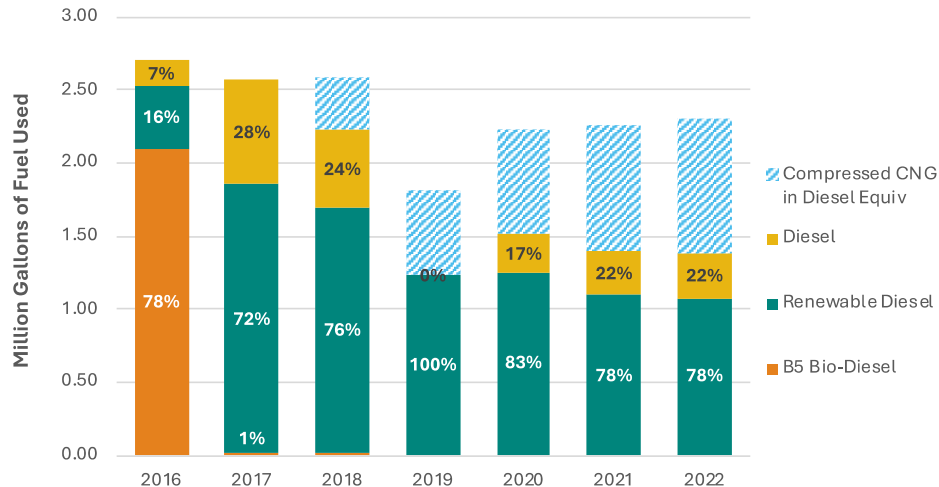
**FIGURE 12: VEHICLE TYPES IN MUNICIPAL FLEET [2016–2022]**



### Supporting Action Progress: Convert All Diesel Consumption to Renewable Diesel and Waste Collection Trucks to Low-Emissions Fuel

In 2016, the City municipal fleet started the transition to 100% renewable diesel to help meet the CAP supporting action of reducing municipal fuel GHG emissions during the transition to ZEVs. The percentage of renewable diesel in the overall fuel used increased from 16% in 2016 to 78% in 2022 as shown in Figure 13. Additionally, in 2022, the number of compressed natural gas (CNG) waste collection trucks in service has increased steadily in recent years from 68 in 2019, and 91 in 2020, to 102 in 2022. CNG vehicles represents more than 70% of the waste collection truck fleet. CNG, a low emission fuel compared with diesel, has displaced diesel fuel use as shown in Figure 13.

**FIGURE 13: MUNICIPAL FLEET COMPRESSED NATURAL GAS AND DIESEL FUEL USE BY TYPE [2016–2022]**



Consistent with the CARB statewide GHG Inventory and the IPCC Guidelines, the CO<sub>2</sub> emissions from biofuel (e.g., ethanol, biodiesel, and renewable diesel) are classified as “biogenic CO<sub>2</sub>” and not included in the GHG inventory. Only the CH<sub>4</sub> and N<sub>2</sub>O emissions from biofuel are accounted for in the GHG inventory. For regular diesel, all CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions are accounted for in the GHG inventory.

The 2010 to 2022 City fleet gasoline consumption is given in Table 10.

| TABLE 10: CITY FLEET GASOLINE CONSUMPTION                                                                                                        |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Year                                                                                                                                             | Total Gasoline (gallons) |
| 2019                                                                                                                                             | 2,047,504                |
| 2020                                                                                                                                             | 2,154,536                |
| 2021                                                                                                                                             | 2,090,527                |
| 2022                                                                                                                                             | 2,060,978                |
| Updates to 2020 and 2021 data reflects updated primary data from the City of San Diego. City of San Diego Sustainability and Mobility Department |                          |

## Target Progress: Increase Citywide Zero Emission Vehicles

### Measure 2.3: Increase Electric Vehicle Adoption

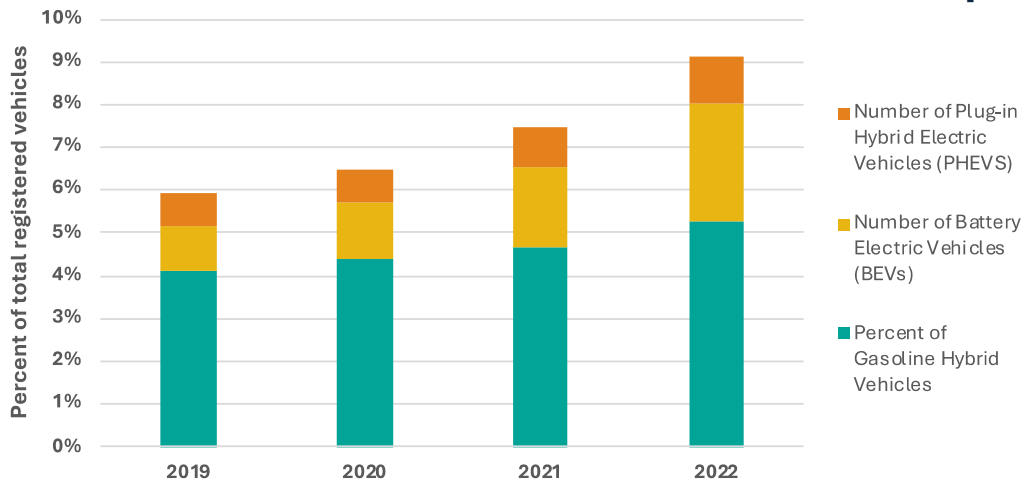
- 2030 Target: 16% e-VMT out of all Light-duty VMT
- 2035 Target: 25% e-VMT out of all Light-duty VMT

The emissions impact of zero-emission vehicles (ZEVs) policies and programs is included in GHG reduction from State policies and actions, not as a result of a particular CAP strategy. However, the impact is reflected at the local level. While data for registered ZEVs is not available at the city level, the total number of registered ZEVs in San Diego County, including battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) shown in Table 11.

| TABLE 11: NUMBER OF REGISTERED ELECTRIC VEHICLES IN SAN DIEGO COUNTY |           |           |           |           |                    |                    |
|----------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------------|--------------------|
| Number of Vehicles                                                   | 2019      | 2020      | 2021      | 2022      | % Change 2021-2022 | % Change 2019-2022 |
| Number of Battery Electric Vehicles (BEVs)                           | 25,673    | 32,057    | 45,979    | 67,444    | 47%                | 163%               |
| Number of Plug-in Hybrid Electric Vehicles (PHEVs)                   | 18,309    | 19,559    | 23,785    | 27,165    | 14%                | 48%                |
| Total Number of Electric Vehicles (BEVs + PHEVs)                     | 43,982    | 51,616    | 69,764    | 94,609    | 36%                | 115%               |
| Total Number of Registered Vehicles                                  | 2,453,257 | 2,425,831 | 2,514,519 | 2,446,883 | -3%                | 0%                 |
| Percent of Electric Vehicles to All Registered Vehicles              | 1.8%      | 2.1%      | 2.8%      | 3.9%      | 39%                | 116%               |
| California Energy Commission 2019 – 2024                             |           |           |           |           |                    |                    |

The number of ZEVs has more than doubled from 2019 to 2022. In 2022, approximately 4% of all registered vehicles in the County were ZEVs. Gasoline hybrids and ZEVs as a percentage of total registered vehicles in San Diego County is shown in Figure 14. The percentages shown do not represent ZEV market share (the percentage of new ZEVs sold out of all new vehicles sales). ZEVs accounted for approximately 8% of market share in the state in 2020, and 20% in 2022.



**FIGURE 14: PERCENT OF HYBRID AND ELECTRIC VEHICLES IN SAN DIEGO COUNTY [2019–2022]**

California Energy Commission 2019 – 2024

The increasing number of EVs leads to increasing demand for EV charging. Table 12 shows the number of public electric vehicle charging stations (EVCs) and the number of EVCs offered through SDG&E's Power Your Drive program at multi-family buildings and workplaces within the City.

**TABLE 12: ESTIMATED NUMBER OF ELECTRIC VEHICLE CHARGING STATIONS**

| Number of Charging Sites or Chargers       | 2019  | 2022            |
|--------------------------------------------|-------|-----------------|
| Number of EVCs                             | 300   | 719             |
| Number of Public Level 2 EVCs at all Sites | 932   | 1557            |
| Number of Public DC Fast EVCs at all Sites | 230   | 325             |
| Number of SDG&E Power Your Drive EVCs      | 1,755 | Program expired |

EVCs = electric vehicle charging station  
 Number of EVCs are the number of nozzles or plugs. One site may have more than one nozzle or plug. EVCs 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.  
**SDG&E 2019, Energy Policy Initiatives Center, University of San Diego 2024**

## STRATEGY 3: MOBILITY AND LAND USE

### Baseline and Current State of Transportation in the City of San Diego

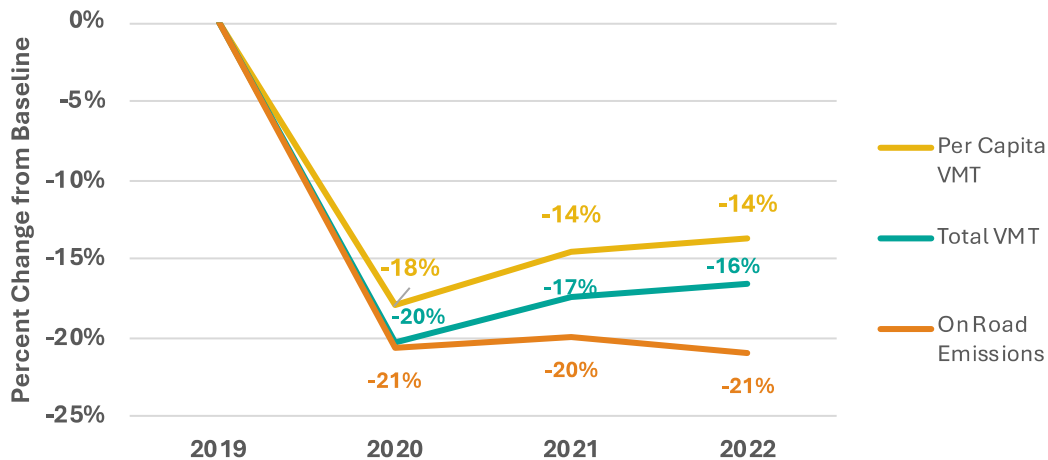
Transportation accounted for 54% of all GHG emissions within the City of San Diego in 2022. Strategy 3 aims to reduce vehicle miles traveled (VMT) by increasing the use of mass transit, bicycling, and walking throughout the city.

The 2019–2022 VMT and on-road transportation emissions in the City of San Diego are shown in Table 13. The impact of the COVID-19 pandemic on VMT in 2020 and 2021 was estimated from 2016 VMT using the 2016–2021 regional public road VMT monitoring data, which showed that the decrease was mostly likely from light-duty vehicles after shelter-in-place orders were enacted in 2020. However, emissions from on-road transportation have been increasing since 2020. This is evidence that the full impact of the COVID-19 pandemic on driving may not be sustained long term. The data sources and method to calculate on-road transportation emissions are provided in the supplemental inventory documentation to this report.

| TABLE 13: VEHICLE MILES TRAVELED (VMT) IN CITY OF SAN DIEGO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |           |           |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2019      | 2020      | 2021      | 2022      |
| Total VMT (million miles/year)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 13,666    | 10,891    | 11,228    | 11,416    |
| San Diego Regional Average Vehicle Emission Rate (g CO <sub>2</sub> e/mile)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 428       | 427       | 415       | 405       |
| GHG Emissions (MT CO <sub>2</sub> e)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5,854,000 | 4,650,000 | 4,683,000 | 4,628,000 |
| <p>The 2019 VMT are estimates based on the 2016 City of San Diego VMT estimates from SANDAG's Activity Based Mode I (ABM2+) and Final 2021 Regional Plan, multiplied by the 2016-2022 San Diego regional VMT annual rates of growth. Annual rates of growth are estimated from the annual California Department of Transportation (CalTrans) Highway Performance Monitoring System public road data and Performance Measure System freeway data.</p> <p>SANDAG 2021, CalTrans, CARB2021, Energy Policy Initiatives Center, University of San Diego 2024</p> |           |           |           |           |

Figure 15 shows the changes to total VMT, per capita VMT, and on-road emissions in relation to the 2019 baseline.

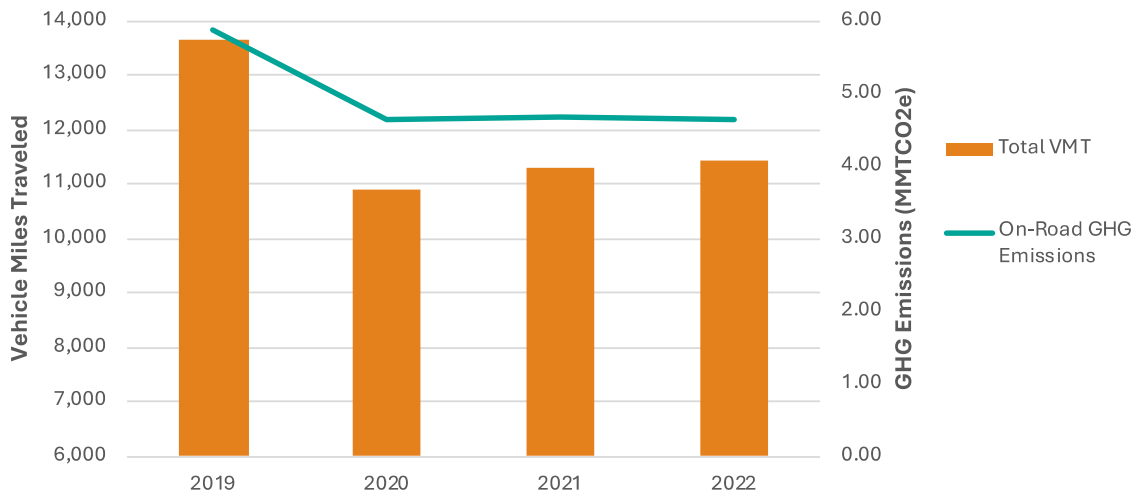
**FIGURE 15: CHANGES IN VMT, PER CAPITA VMT, AND ON-ROAD EMISSIONS FROM 2019 BASELINE**



SANDAG 2021, CalTrans, CARB2021, Energy Policy Initiatives Center, University of San Diego 2024

Similar to the electricity sector, due to reduction in carbon intensity per mile, emissions from on-road transportation are lower in 2022 despite the increase in VMT since 2020, as shown in

Figure 16.

**FIGURE 16: ON ROAD EMISSIONS VS. VEHICLE MILES TRAVELED IN THE CITY OF SAN DIEGO [2019–2022]**

SANDAG 2021, CalTrans, CARB2021, Energy Policy Initiatives Center, University of San Diego 2024

## Target Progress: Reducing Vehicle Miles Traveled

### Measure 3.1: Safe and Enjoyable Routes for Pedestrians and Cyclists

- 2030 Target: 19% walking and 7% cycling mode share of all San Diego resident trips
- 2035 Target: 25% walking and 10% cycling mode share of all San Diego resident trips

While mode share data for all City of San Diego resident trips is not available at this time, data is available for trips related to work commuting. Resident commute trips by transportation mode are shown in Table 14.

| TABLE 14: PERCENT OF MODE SHARE FOR EMPLOYEE COMMUTE |      |      |
|------------------------------------------------------|------|------|
| Mode                                                 | 2019 | 2023 |
| Drive Alone                                          | 78   | 75   |
| Carpool                                              | 12   | 13   |
| Transit                                              | 6    | 7    |
| Walk                                                 | 2    | 3    |
| Bike or E-Bike                                       | 2    | 3    |
| TNC or Taxi                                          | 0    | <1%  |
| SANDAG Employment Centers 1.0 and 2.0                |      |      |

Bicycle facility improvements from 2013 to 2022 are shown in Table 15. Class I bike lanes are paved right-of-way for exclusive use by bicyclists, pedestrians and other non-motorized modes of travel. Class II bike lanes are defined by pavement striping and signage used to allocate a portion of a roadway for exclusive or preferential bicycle travel. Class IV bike lanes are referred to as “protected bike lanes” and are lanes specifically separated from motor traffic and distinct from the sidewalk.



**TABLE 15: BICYCLE FACILITIES IMPROVEMENTS SINCE 2013**

| Year                               | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021  | 2022  | Total 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 | 2.2  | 17.4  | 52.4  | 185.1            |
| New Class IV Bike Lane Miles Added | -    | -    | -    | -    | -    | -    | 2    | 3.7  | 34.2  | 34.9  | 103.5            |
| Existing Bike Lane Miles Improved  | 35.7 | 51.7 | 42.2 | 43.6 | 21.4 | 2.3  | 34.6 | 81.6 | 65.3  | 15.2  | 393.6            |
| 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 | 87.5 | 103.6 | 102.4 | 702.3            |

Data provided for bicycle facility improvements pertains to fiscal year progress. The remainder of the report uses calendar years to track emissions and progress.

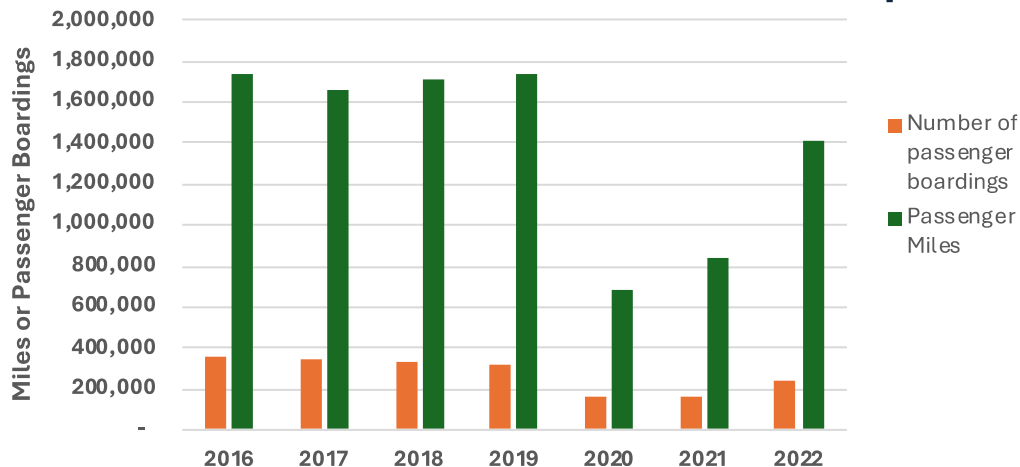
City of San Diego Transportation and Storm Water Department

### Measure 3.2: Increase Safe, Convenient and Enjoyable Transit Use

- 2030 Target: 10% transit mode share of all San Diego resident trips
- 2035 Target: 15% transit mode share of all San Diego resident trips

Ridership data specific to the City of San Diego is currently not available, so regional data is used as a proxy. While regional transit ridership is increasing between 2020 and 2022, as shown in

Figure 17, regional ridership is still below pre-pandemic levels.

**FIGURE 17: REGIONAL TRANSIT BOARDINGS AND PASSENGER MILES [2016–2022]**

## SANDAG Weekday Transit Ridership

**Measure 3.3: Work from Anywhere**

- 2030 Target: Achieve 4% citywide VMT reduction through telecommute
- 2035 Target: Achieve 6% citywide VMT reduction through telecommute

While data specific to the City of San Diego is currently unavailable, SANDAG's regional Survey of Businesses and Employees estimated the percentage of employees able to work from home along with average number of days those employees are able to work from home. Results of this survey, summarized in Table 16, show that the percentage of employees able to partially work from home dropped after the pandemic but are still higher than pre-pandemic levels. Similarly, the number of days nearly worked fully from home doubled from pre-pandemic levels.

| <b>TABLE 16: REGIONAL REMOTE WORK SURVEY</b>                       |                     |                        |                      |
|--------------------------------------------------------------------|---------------------|------------------------|----------------------|
| <b>Time Era</b>                                                    | <b>Pre-Pandemic</b> | <b>During Pandemic</b> | <b>Post-Pandemic</b> |
| Percentage of SD County Employees Able to Partially Work from Home | 25%                 | 54%                    | 44%                  |
| Average Number of Days per Week Worked Fully from Home             | 0.6                 | 1.9                    | 1.2                  |
| SANDAG Survey of Businesses and Employees                          |                     |                        |                      |

**Measure 3.4: Reduce Traffic Congestion to Improve Air Quality**

- 2030 Target: Install 13 new roundabouts
- 2035 Target: Install 20 new roundabouts

The City installed seven roundabouts in 2022, improving vehicle flow and reducing emissions from idling. Additionally, the City retimed 404 traffic signals in 2022 and 60 traffic signals in 2021 that led to traffic flow improvements and subsequent fuel reductions, as shown in Table 17.

| <b>TABLE 17: ROUNDABOUTS INSTALLED AND TRAFFIC SIGNALS RETIMED</b> |             |             |             |             |             |             |             |
|--------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Year</b>                                                        | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Roundabouts Installed                                              | 2           | 0           | 0           | 0           | 0           | 0           | 7           |
| Traffic Signals Retimed                                            | 60          | 70          | 52          | 64          | 75          | 60          | 404         |
| City of San Diego Transportation and Storm Water Department        |             |             |             |             |             |             |             |

**Measure 3.5: Climate-Focused Land Use**

- 2030 Target: 8% VMT (commuter and non-commuter) reduction per capita
- 2035 Target: 15% VMT (commuter and non-commuter) reduction per capita

**Measure 3.6: Vehicle Management**

- No associated targets

The goals of measures 3.5 and 3.6 are to reduce VMT through land use and parking reform policies. While VMT reductions associated with these specific policies are difficult to track, citywide VMT changes are shown in Table 13 above.

## STRATEGY 4: CIRCULAR ECONOMY AND CLEAN COMMUNITIES

### Baseline and Current State of Waste and Wastewater in the City of San Diego

The 2015–2022 waste disposed and diversion rates in the City are shown in Table 18. The waste disposed and diversion rates in recent year has remained relatively consistent.

| TABLE 18: WASTE DIVERSION RATE AND DISPOSED TONNAGE                                                                                                                   |           |           |           |           |           |           |           |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Year                                                                                                                                                                  | 2015      | 2016      | 2017      | 2018      | 2019      | 2020      | 2021      | 2022      |
| Waste Disposed in Landfills (tons)                                                                                                                                    | 1,583,833 | 1,521,363 | 1,576,105 | 1,639,817 | 1,569,447 | 1,543,627 | 1,543,627 | 1,543,627 |
| Waste Diversion Rate                                                                                                                                                  | 64%       | 66%       | 66%       | 65%       | 66%       | 67%       | 67%       | 67%       |
| Tonnages were adjusted or corrected from tonnages reported in the CalRecycle database based on City information<br>City of San Diego Environmental Service Department |           |           |           |           |           |           |           |           |

The 2015–2022 wastewater flow and associated emissions are shown in Table 19. In 2022, there was a sharp decrease in emissions associated with wastewater treatment. This is because the on-site generation facilities, power plants using landfill gas, at the North City Water Reclamation Plant were decommissioned that year.

| TABLE 19: WASTEWATER FLOW AND EMISSIONS [2016-2022] |        |        |        |        |        |        |        |
|-----------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Year                                                | 2016   | 2017   | 2018   | 2019   | 2020   | 2021   | 2022   |
| Wastewater (million gallons)                        | 36,719 | 37,632 | 36,391 | 38,241 | 38,192 | 37,591 | 36,865 |
| GHG Emissions (MT CO <sub>2</sub> e)                | 21,257 | 20,888 | 20,096 | 25,612 | 23,018 | 23,689 | 12,585 |
| % Emissions Reduction from Baseline                 | -      | -2%    | -5%    | 20%    | 8%     | 11%    | -41%   |
| City of San Diego Public Utilities Department       |        |        |        |        |        |        |        |

### Target Progress: Waste and Wastewater

#### Measure 4.1: Changes to the Waste Stream

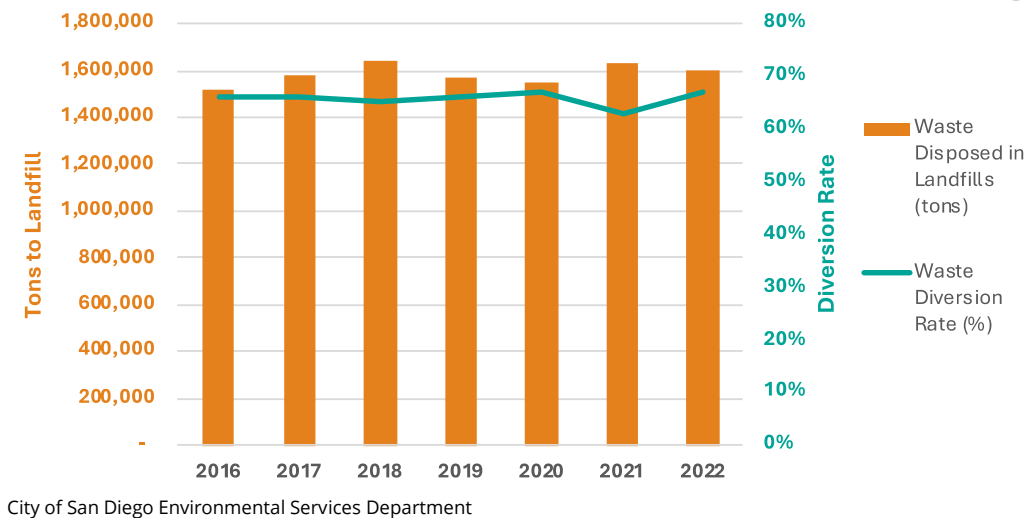
- 2030 Target: 82% Waste Diversion Rate and 85% Landfill Gas Capture
- 2035 Target: 90% Waste Diversion Rate and 90% Landfill Gas Capture

The city's current waste diversion rate has been steady around 67%, as shown in Table 18. The Environmental Services Department completed landfill gas system improvements in 2018 that included additional extraction wells and a new blower system. Additional extraction wells were installed in the West Miramar landfill in 2021. Total quantity of landfill gas collected has increased since 2019 when ownership of the landfill gas rights reverted to the City. Given the complexity in estimating an accurate landfill gas capture rate, an industry-standard landfill gas capture rate of 75%



is assumed and improvements to estimating emissions are being considered for future Annual Reports.

**FIGURE 18: TONS TO LANDFILL AND LANDFILL DIVERSION RATE IN CITY OF SAN DIEGO [2016–2022]**



#### Measure 4.2: Municipal Waste Reduction

- No defined targets

While waste from city facilities has not been tracked in previous years, progress toward this goal will be tracked in future Annual Reports.

#### Measure 4.3: Local Food Systems and Food Recovery

- No defined targets

While improving local food systems and food recovery will have impacts on waste and organics sent to landfill, data is currently not available to track such efforts.

#### Measure 4.4: Zero Waste to Landfill

- No defined targets

As shown in **Error! Reference source not found.** below, the tons sent to landfill by the City of San Diego and waste diversion rate has remained relatively steady from 2016 – 2022.

#### Measure 4.5: Capture Methane from Wastewater Treatment Facilities

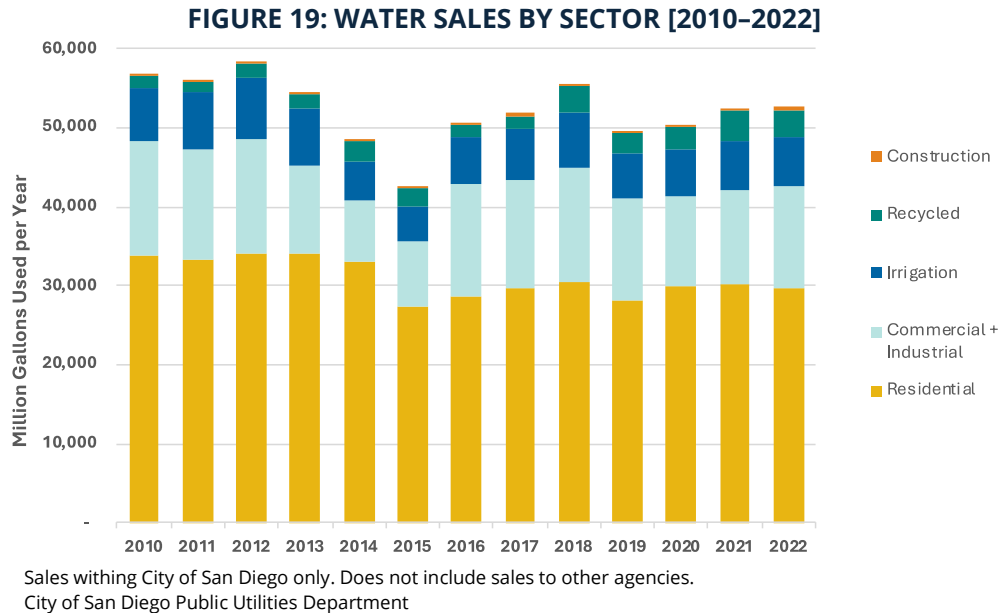
- 2030 Target: 95% Methane Capture
- 2035 Target: 95% Methane Capture

The City of San Diego’s Point Loma Wastewater Treatment Plant (Point Loma WWTP) is energy 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 to the grid. The digester capture rate at Point Loma WWTP is now 99.9%.

## STRATEGY 5: RESILIENT INFRASTRUCTURE AND HEALTHY ECOSYSTEMS

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

Emissions from water consumption are currently 4% of the City of San Diego's total emissions (including water and wastewater). The breakdown of the City of San Diego's water sales by sector including recycled water is given in Figure 19. While overall water use has fluctuated over time, it has been steadily increasing since 2019.



### Target Progress: Trees and Water Systems

#### Measure 5.1: Sequestration

- 2030 Target: Restore 350 acres of salt marsh land and other associated tidal wetland and riparian habitats
- 2035 Target: Restore 700 acres of salt marsh land and other associated tidal wetland and riparian habitats

The City has restored 56 acres of wetland prior to 2022. Table 21 shows new projects that are currently underway along with the phase of the project they are in. In future Annual Reports, this table will be updated with acres of completed projects.

| TABLE 20: ACRES OF RIPARIAN AND WETLAND RESTORATION IN PROGRESS |                                 |                            |                       |
|-----------------------------------------------------------------|---------------------------------|----------------------------|-----------------------|
| Ecosystem Type                                                  | Design, Permitting, Contracting | Restoration Implementation | Long Term Maintenance |
| Fresh and Saltwater Marsh                                       | 4.1                             | 0.0                        | 0.0                   |
| Riparian                                                        | 0.0                             | 0.0                        | 96.1                  |
| Other / Unspecified                                             | 78.3                            | 1.2                        | 17.0                  |
| Fresh and Saltwater Marsh                                       | 4.1                             | 0.0                        | 0.0                   |
| City of San Diego Public Utilities Department                   |                                 |                            |                       |

### Measure 5.2: Tree Canopy

- 2030 Target: 28% urban canopy cover
- 2035 Target: 35% urban canopy cover

The City of San Diego has established a target to increase urban tree canopy from the 2019 baseline<sup>4</sup> of 13% total coverage to 28% by 2030 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 and increased property values. Table 21 shows tree planting and maintenance trends from 2020 to 2022. Progress on maintaining existing trees has shown a sharp increase from 2021 to 2022.

| TABLE 21: TREE PLANTING AND MAINTENANCE                                                                                                                                                                                                                                                                                                                                                                                                      |        |        |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|
| Tree Planting and Maintenance Year                                                                                                                                                                                                                                                                                                                                                                                                           | 2020   | 2021   | 2022   |
| Trees Planted <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                   | 1,863  | 1,707  | 1,649  |
| Trees Trimmed <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                   | 33,254 | 35,206 | 61,665 |
| Trees Removed <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                   | 1,824  | 2,151  | 2,004  |
| Trees Evaluated <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                 | 5,316  | 6,372  | 5,569  |
| 1.Planted or removed by the Transportation Street Division and Parks and Recreation Department<br>2.Includes shade trees and palms trees<br>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.<br>City of San Diego Transportation and Storm Water Department |        |        |        |

### Measure 5.3: Local Water Supply

- 2030 Target Provide 33,000 acre-feet local water supply from PureWater
- 2035 Target Provide 93,000 acre-feet local water supply from PureWater

The PureWater project is still under construction, therefore no data is available to report at this time. However, other local water supply versus total water supply has been fluctuating in recent years as shown in

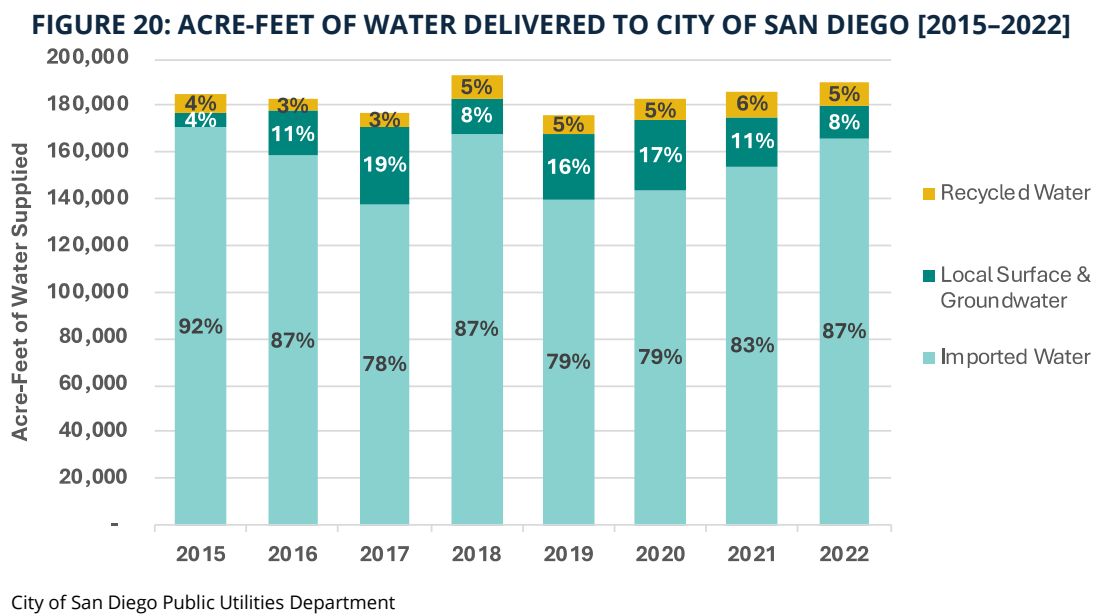
Figure 20. The current availability of local water generally depends on rainfall and runoff in the City reservoirs in the year. In 2019, 17% of total water supply was from local surface and groundwater; while in 2022 8% was from local supply. A higher percentage of local water supply reduces the need to import water from San Diego County Water Authority and the energy and GHG emissions associated

4. The updated urban tree canopy coverage for the 2015-2019 period 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.



with imported water. The total acre-feet of water delivered to the City of San Diego according to source (local, imported and recycled) is shown in

Figure 20 below.



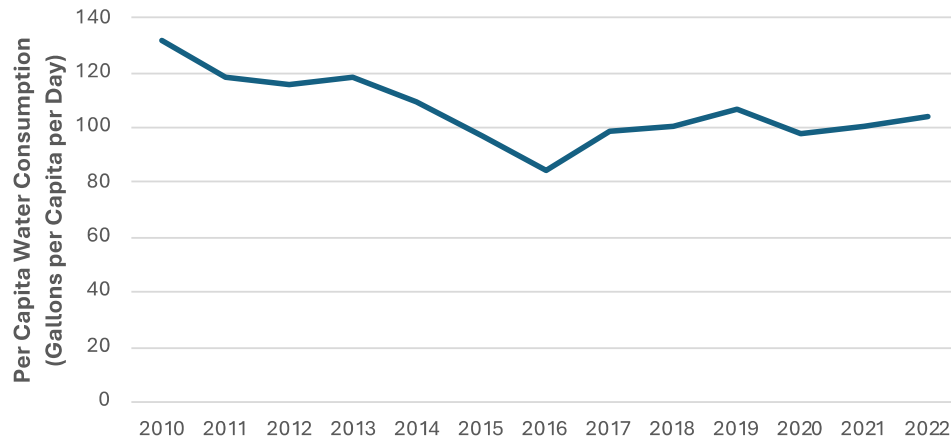
### Supporting Actions: Reduce Daily per Capita Water Consumption

Per capita water use, measured in gallons per capita per day (GPCD), decreased from 2010 to 2022 (

Figure 21). Gov. Jerry 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 been increasing since the 2015 Executive Order.

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.

**FIGURE 21: PER CAPITA WATER USE [2010-2022]**



City of San Diego Public Utilities Department, Energy Policy Initiatives Center, University of San Diego 2024

The amount of recycled water and water used for irrigation from 2019 to 2022 is provided in Table 22. Both recycled and metered irrigation water have been steadily increasing since 2019.

| TABLE 22: METERED RECYCLED AND IRRIGATION WATER USE                                                                                                                                                                  |                                           |                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------|
| Year                                                                                                                                                                                                                 | Recycled Water Sales<br>(million gallons) | Metered Irrigation Water Use<br>(million gallons) |
| 2019                                                                                                                                                                                                                 | 2,606                                     | 5,631                                             |
| 2020                                                                                                                                                                                                                 | 2,881                                     | 5,988                                             |
| 2021                                                                                                                                                                                                                 | 3,688                                     | 6,298                                             |
| 2022                                                                                                                                                                                                                 | 3,263                                     | 6,217                                             |
| Metered irrigation water, including agricultural and landscape water use.<br>2021 data updated from previous Annual Report to reflect most up-to-date primary data.<br>City of San Diego Public Utilities Department |                                           |                                                   |

## STRATEGY 6: EMERGING CLIMATE ACTION

- 2030 Target: Residual Emissions 391,000 additional reduction needed to reach fair-share target
- 2035 Target: Residual Emissions 2,262,000 additional reduction/removal needed to reach carbon neutrality

### Measure 6.1: Explore Further Opportunities to Achieve Net Zero GHG Emissions

As the City of San Diego assesses and plans future climate action, updates will be provided in future reports and on the City's online CAP Dashboard.



# Section C: Methodology Differences and Data Refinement

The method differences and data refinements between the previous and current GHG inventory calculations are given in Table 23. The differences are primarily from updated and more accurate data sources. “No change” means no method differences or data refinements since the 2020 Annual Report, or the 2022 CAP.

| Table 23: METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY |                 |                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category                                                                | Category Detail | 2019 Inventory (Used for 2022 CAP)                                                                                              | 2019-2022 Inventory (This Annual Report)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 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 | <p><u>2019-2020</u>: No change</p> <p><u>2021</u>: Data requested from SDG&amp;E by customer class within City of San Diego town code. No service provider or rate schedule available. Direct access and San Diego Community Power customer electricity use were estimated.</p> <p><u>2022</u>: Data requested from SDG&amp;E by customer class within City of San Diego town code. No service provider or rate schedule available. Direct access customer electricity use was estimated based on previous year’s data. SDCP consumption data provided.</p> |

**Table 23: METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY**

| <b>Category</b> | <b>Category Detail</b>                            | <b>2019 Inventory (Used for 2022 CAP)</b>                                                                                                                                                                                                                                                            | <b>2019–2022 Inventory (This Annual Report)</b>                                                                                                                                                                                                                                                                                       |
|-----------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Emission Factor<br>(lbs CO <sub>2</sub> e/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 eGRID2019 database specific plant level emission factor) for SDG&E's purchased power. | <u>2020-2022</u> : Used the SDG&E and San Diego Community Power emission factors reported under CEC's power source disclosure program.                                                                                                                                                                                                |
| Natural Gas     | Activity<br>(Therms)                              | Requested data from SDG&E by customer class, service provider, and rate schedule for customers with City of San Diego town code                                                                                                                                                                      | <u>2020</u> : No change<br><br><u>2021</u> : Data requested from SDG&E by customer class within City of San Diego town code. No service provider or rate schedule available.                                                                                                                                                          |
|                 | Emission Factor<br>(MT CO <sub>2</sub> e / Therm) | Natural gas emission factor in California based on California Air Resources Board statewide inventory                                                                                                                                                                                                | No change                                                                                                                                                                                                                                                                                                                             |
| Transportation  | Activity<br>(VMT)                                 | Applied annual average VMT rate of increase from 2016-2019 HPMS data to 2016 VMT estimates.<br><br>2016 VMT estimates were provided by SANDAG using Series 14 Forecast and ABM2+ from the Draft 2021 Regional Plan                                                                                   | <u>2020</u> : Applied annual average VMT rate of increase from 2016–2019 HPMS data to 2016 VMT estimates provided by SANDAG using Series 14 Forecast and ABM2+ from the Final 2021 Regional Plan<br><br><u>2021</u> : Applied the VMT 2019 to 2021 percent increase from PeMS data to 2019 VMT estimates, due to a delay in HPMS data |

Table 23: METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY

| Category | Category Detail                                       | 2019 Inventory (Used for 2022 CAP)                                                                                                                                                                                                                                                                             | 2019–2022 Inventory (This Annual Report)                                     |
|----------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|          |                                                       |                                                                                                                                                                                                                                                                                                                | <u>2022</u> : Applied HPMS data to 2016 VMT estimates to years 2021 and 2022 |
|          | Emission Factor<br>(g CO <sub>2</sub> e/mile)         | San Diego region emission rate per vehicle class from <u>EMFAC2021</u> with model default assumptions on vehicle mix, travel activities, etc.                                                                                                                                                                  | No change                                                                    |
| Water    | Activity<br>(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)<br><br>Removed water purchased by Del Mar and CalAm service area not in the City                                  | No change                                                                    |
|          | Emission Factor<br>(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<br><br>Upstream supply energy intensity calculated based on Metropolitan Water District and SDCWA 2015 Urban Water Management Plan | No change                                                                    |



**Table 23: METHODOLOGY DIFFERENCES AND DATA REFINEMENTS OF GHG INVENTORY**

| <b>Category</b> | <b>Category Detail</b>                                        | <b>2019 Inventory (Used for 2022 CAP)</b>                                                                                                                                 | <b>2019–2022 Inventory (This Annual Report)</b>                                                                                                                                                     |
|-----------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Electricity<br>Emission Factor<br>(lbs CO <sub>2</sub> e/MWh) | Upstream: eGRID 2016                                                                                                                                                      | <u>2019</u> : eGRID2019<br><u>2020</u> : eGRID2020<br><u>2021</u> : eGRID2021<br><br><u>2022</u> : eGRID2022                                                                                        |
| Wastewater      | Activity<br>(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<br>(MT CO <sub>2</sub> /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<br>(tons)                                            | Annual waste disposed tonnage provided by City of San Diego Environmental Services Department                                                                             | <u>2019–2020</u> : No change<br><br><u>2021</u> : Used 2020 waste tonnage due to a delay in reported data<br><br><u>2022</u> : Updated 2021 waste tonnage with City's primary data. No other change |
|                 | Emission Factor<br>(MT CH <sub>4</sub> /tons)                 | 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 | No change                                                                                                                                                                                           |

# City of San Diego Greenhouse Gas Emissions Inventory Methodology and Updates

Supplement to 2023 Climate Action Plan Annual Report

June 2024

Prepared for the City of San Diego



Prepared by the Energy Policy Initiatives Center





## About EPIC

The Energy Policy Initiatives Center (EPIC) is a non-profit research center of the University of San Diego School of Law that studies energy policy issues affecting California and the San Diego region. EPIC's mission is to increase awareness and understanding of energy- and climate-related policy issues by conducting research and analysis to inform decision makers and educate law students.

For more information, please visit the EPIC website at [www.sandiego.edu/epic](http://www.sandiego.edu/epic).

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## Table of Contents

|            |                                                                                             |           |
|------------|---------------------------------------------------------------------------------------------|-----------|
| <b>1</b>   | <b>Overview .....</b>                                                                       | <b>1</b>  |
| <b>2</b>   | <b>Background .....</b>                                                                     | <b>1</b>  |
| 2.1        | Greenhouse Gases .....                                                                      | 1         |
| 2.2        | Demographics .....                                                                          | 2         |
| <b>3</b>   | <b>Summary of 2019–2021 GHG Emissions Inventory .....</b>                                   | <b>2</b>  |
| <b>4</b>   | <b>Method to Calculate GHG Emissions Inventory .....</b>                                    | <b>4</b>  |
| <b>4.1</b> | <b>On-Road Transportation .....</b>                                                         | <b>4</b>  |
| 4.1.1      | Vehicle Miles Traveled (VMT) .....                                                          | 4         |
| 4.1.2      | Average Annual Vehicle Emission Rate .....                                                  | 7         |
| 4.1.3      | Total Emissions from On-Road Transportation .....                                           | 7         |
| <b>4.2</b> | <b>Electricity .....</b>                                                                    | <b>7</b>  |
| 4.2.1      | Electricity Use .....                                                                       | 7         |
| 4.2.2      | City-Specific Electricity Emission Factor .....                                             | 9         |
| 4.2.3      | Total Emissions from Electricity .....                                                      | 9         |
| <b>4.3</b> | <b>Natural Gas .....</b>                                                                    | <b>10</b> |
| 4.3.1      | Natural Gas Use .....                                                                       | 10        |
| 4.3.2      | Natural Gas Emission Factor .....                                                           | 11        |
| 4.3.3      | Total Emissions from Natural Gas .....                                                      | 11        |
| <b>4.4</b> | <b>Off-Road Transportation (Construction Equipment Only) .....</b>                          | <b>11</b> |
| <b>4.5</b> | <b>Solid Waste .....</b>                                                                    | <b>12</b> |
| 4.5.1      | Solid Waste Disposal .....                                                                  | 12        |
| 4.5.2      | Mixed Solid Waste Emission Factor .....                                                     | 12        |
| 4.5.3      | Total Emissions from Solid Waste Disposed in Landfills .....                                | 14        |
| 4.5.4      | Estimating Emissions from Previously Disposed Solid Waste (Not Reported in Inventory) ..... | 14        |
| <b>4.6</b> | <b>Water .....</b>                                                                          | <b>15</b> |
| 4.6.1      | Water Use .....                                                                             | 16        |
| 4.6.2      | Energy Intensity of Water .....                                                             | 17        |
| 4.6.3      | Total Emissions from Water .....                                                            | 20        |
| <b>4.7</b> | <b>Wastewater .....</b>                                                                     | <b>22</b> |
| 4.7.1      | Wastewater Generation .....                                                                 | 22        |
| 4.7.2      | Wastewater Emission Factor .....                                                            | 23        |
| 4.7.3      | Total Emissions from Wastewater .....                                                       | 23        |

## Tables

|                                                                                                                          |    |
|--------------------------------------------------------------------------------------------------------------------------|----|
| Table 1 Global Warming Potentials Used in San Diego GHG Emission Inventory & Projections .....                           | 2  |
| Table 2 Population, Housing, and Jobs Estimates (San Diego, 2019–2022) .....                                             | 2  |
| Table 3 GHG Emissions by Category from City of San Diego (2019–2021) .....                                               | 3  |
| Table 4 2016 O-D VMT Estimates by Trip Types and Total VMT provided by SANDAG (San Diego, 2016) .....                    | 6  |
| Table 5 San Diego Region Daily VMT Derived from the Caltrans Highway Performance Monitoring System .....                 | 6  |
| Table 6 Net Energy for Load, Emission Factor, and GHG Emissions from Electricity Category (San Diego, 2019–2021) .....   | 10 |
| Table 7 Natural Gas End-Use and GHG Emissions from Natural Gas Category (San Diego, 2019–2021) .....                     | 11 |
| Table 8 GHG Emissions from Off-Road Transportation (Construction Equipment Only) Category (San Diego, 2019 - 2022) ..... | 12 |
| Table 9 Mixed Solid Waste Emission Factor .....                                                                          | 13 |
| Table 10 Solid Waste Disposal into Landfills and Associated GHG Emissions (San Diego, 2019–2021) .....                   | 14 |
| Table 11 Emissions from In-boundary Landfills (Information Only, Not Reported in GHG Inventory) .....                    | 15 |
| Table 12 Water Supplied and Supply Source (San Diego, 2019–2021) .....                                                   | 17 |
| Table 13 Components of Average Upstream Energy Intensity for SDCWA Member Agencies .....                                 | 18 |
| Table 14 Local Water Conveyance and Treatment Energy Intensity (San Diego, 2019–2022) .....                              | 19 |
| Table 15 Local Water Distribution Energy Intensity (San Diego, 2019–2021) .....                                          | 20 |
| Table 16 Electricity Emission Factors for Water-Energy Intensities (2019–2021) .....                                     | 20 |
| Table 17 Water Supplied and GHG Emissions from the Water Category (San Diego, 2019–2021) .....                           | 22 |
| Table 18 City of San Diego Wastewater Generation (San Diego, 2019–2021) .....                                            | 22 |
| Table 19 Emission Factors at Wastewater Treatment Plant (San Diego, 2019–2021) .....                                     | 23 |
| Table 20 Wastewater Generated and GHG Emissions from Wastewater Category (San Diego, 2019–2021) .....                    | 24 |

## Figures

|                                                                                           |    |
|-------------------------------------------------------------------------------------------|----|
| Figure 1 Components of O-D Method for VMT Calculation .....                               | 5  |
| Figure 2 SDG&E Electricity Sales to City of San Diego by Customer Class (2019–2022) ..... | 8  |
| Figure 3 SDG&E Natural Gas Sales to City of San Diego by Customer Class (2019–2021) ..... | 10 |
| Figure 4 Segments of the Water Cycle .....                                                | 15 |

## 1 OVERVIEW

This document presents a summary of the greenhouse gas (GHG) emissions estimates for the City of San Diego (referred to as San Diego or the City) for calendar years 2019–2022 and the methods used. This is a supplement to the City’s Final 2022 Climate Action Plan (CAP) Annual Report and its appendix.

In preparation for this Annual Report and the 2022 GHG emissions inventory, revisions and refinements were made to the 2019 GHG emissions estimates in the previous 2021 Annual Report to reflect updated data supplied by agencies not managed by the City, and to ensure consistency with the 2019–2021 GHG emissions estimates.<sup>1</sup> This follows the approach used by the California Air Resources Board (CARB) when it updates the California statewide inventory, and is based on the Intergovernmental Panel on Climate Change (IPCC) recommendations to maintain a consistent time-series when developing GHG inventories.<sup>2</sup>

This document includes the following sections:

- Section 2 describes the background sources and common assumptions used for the GHG emissions inventory;
- Section 3 provides the 2019–2021 GHG emissions inventory results summary; and
- Section 4 provides the methods used to prepare each category of the inventory.

Rounding is used for the final GHG values within the tables and figures throughout the document. Values are not rounded in the intermediary steps in any calculation. Because of rounding, some totals may not equal the values summed in any table or figure.

## 2 BACKGROUND

### 2.1 Greenhouse Gases

The primary GHGs included in the emissions estimates presented here are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). Each GHG has a different capacity to trap heat in the atmosphere, known as its global warming potential (GWP), which is normalized relative to CO<sub>2</sub> and expressed in carbon dioxide equivalents (CO<sub>2</sub>e). In general, the 100-year GWPs reported by the Intergovernmental Panel on Climate Change (IPCC) are used to estimate GHG emissions. The GWPs used in this inventory are from the IPCC Fourth Assessment Report (AR4),<sup>3</sup> provided in Table 1. The GWPs used in this inventory are consistent with the California statewide GHG inventories and the national GHG inventories.<sup>4</sup>

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<sup>1</sup> City of San Diego: [2022 Climate Action Plan](#), [Climate Action Plan 2020 Annual Report](#) and [Appendix](#).

<sup>2</sup> California Air Resources Board (CARB): [California Greenhouse Gas Emissions for 2000 to 2020. Trends of Emissions and Other Indicators](#), p. 28 Additional Information (2020).

<sup>3</sup> [IPCC Fourth Assessment Report: Climate Change 2007: Direct Global Warming Potentials \(2013\)](#).

<sup>4</sup> Some CARB programs, other than the statewide GHG inventory, may use different GWPs. For example, the short-lived climate pollutants (SLCP) strategy uses the 20-year GWP because the SLCP has greater climate impacts in the near-term compared to the long-lived GHGs.

**Table 1 Global Warming Potentials Used in San Diego GHG Emission Inventory & Projections**

| Greenhouse Gas                    | Global Warming Potential |
|-----------------------------------|--------------------------|
| Carbon dioxide (CO <sub>2</sub> ) | 1                        |
| Methane (CH <sub>4</sub> )        | 25                       |
| Nitrous oxide (N <sub>2</sub> O)  | 298                      |
| IPCC 2013.                        |                          |

## 2.2 Demographics

California Department of Finance develops population and housing estimates for cities and counties in the State. The population and housing estimates used in the inventory are provided in Table 2.<sup>5</sup>

**Table 2 Population, Housing, and Jobs Estimates (San Diego, 2019–2022)**

| Year                                                                                                                                                                                                                                                                                                                                                                            | Population Estimates | Housing Estimates (Units) |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------|----------|
|                                                                                                                                                                                                                                                                                                                                                                                 |                      | Total                     | Occupied |
| 2019                                                                                                                                                                                                                                                                                                                                                                            | 1,420,571            | 545,645                   | 514,548  |
| 2020                                                                                                                                                                                                                                                                                                                                                                            | 1,380,448            | 548,934                   | 515,676  |
| 2021                                                                                                                                                                                                                                                                                                                                                                            | 1,371,832            | 552,410                   | 514,964  |
| 2022                                                                                                                                                                                                                                                                                                                                                                            | 1,374,790            | 571,542                   | 536,856  |
| 2019 population and housing estimates are based on the 2010 census benchmark, and 2020 and 2021 population and housing estimates are based on the 2020 census benchmark.<br>Housing unit types include single detached units, single attached units, two to four units, five plus, or apartment units, and mobile homes.<br><b>California Department of Finance 2021, 2022.</b> |                      |                           |          |

## 3 SUMMARY OF 2019–2021 GHG EMISSIONS INVENTORY

GHG emissions by category from San Diego in 2019–2022 are shown in

| Emissions Category                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2019 Inventory                       |             | 2020 Inventory                       |             | 2021 Inventory                       |             | 2022 Inventory                       |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|--------------------------------------|-------------|--------------------------------------|-------------|--------------------------------------|-------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                      | GHG Emissions (MT CO <sub>2</sub> e) | (%)         | GHG Emissions (MT CO <sub>2</sub> e) | (%)         | GHG Emissions (MT CO <sub>2</sub> e) | (%)         | GHG Emissions (MT CO <sub>2</sub> e) | (%)         |
| On-Road Transportation*                                                                                                                                                                                                                                                                                                                                                                                                                              | 5,854,000                            | 55%         | 4,650,000                            | 50%         | 4,683,000                            | 53%         | 4,628,000                            | 54%         |
| Electricity                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2,398,000                            | 23%         | 2,368,000                            | 26%         | 1,725,000                            | 20%         | 1,661,000                            | 19%         |
| Natural Gas                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1,912,000                            | 18%         | 1,827,000                            | 20%         | 1,918,000                            | 22%         | 1,837,000                            | 21%         |
| Solid Waste**                                                                                                                                                                                                                                                                                                                                                                                                                                        | 277,000                              | 3%          | 273,000                              | 3%          | 288,000                              | 3%          | 282,000                              | 3%          |
| Offroad Transportation (Construction Equipment Only)                                                                                                                                                                                                                                                                                                                                                                                                 | 69,000                               | 1%          | 57,000                               | 1%          | 57,000                               | 1%          | 57,000                               | 1%          |
| Water                                                                                                                                                                                                                                                                                                                                                                                                                                                | 61,000                               | 1%          | 70,000                               | 1%          | 70,000                               | 1%          | 74,000                               | 1%          |
| Wastewater                                                                                                                                                                                                                                                                                                                                                                                                                                           | 26,000                               | 0%          | 23,000                               | 0%          | 24,000                               | 0%          | 13,000                               | 0%          |
| <b>Total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>10,597,000</b>                    | <b>100%</b> | <b>9,268,000</b>                     | <b>100%</b> | <b>8,765,000</b>                     | <b>100%</b> | <b>8,552,000</b>                     | <b>100%</b> |
| Sums may not add up to totals due to rounding. GHG emissions for each category are rounded to the nearest thousand. Values are not rounded in the intermediary steps in the calculation.<br>*Emissions are based on SANDAG's Series 14 modeled vehicle miles traveled (VMT) estimates, and 2019 and 2020 VMT are based on 2016 VMT adjusted to account for regional VMT growth, as reflected in the California Highway Performance Monitoring System |                                      |             |                                      |             |                                      |             |                                      |             |

<sup>5</sup> California Department of Finance: [E-4 Population Estimates for Cities, Counties, and the State, 2021-2022 with 2020 Census Benchmark](#) (May 2022), accessed January 6, 2023. [E-4 Population Estimates for Cities, Counties, and the State, 2011-2020 with 2010 Census Benchmark](#) (May 2021), accessed January 6, 2023.



(HPMS) from 2016 to 2019 and to 2020. 2021 VMT are based on 2019 VMT adjusted to account for regional freeway VMT difference between 2019 and 2020 in the California Performance Measurement System (PeMS), due to a delay in HPMS data. 2016 VMT is the output from SANDAG's Final 2021 Regional Plan and activity-based model (ABM2+).

\*\*2020 waste tonnage was used to calculate 2021 emissions from waste due to a delay in reported waste data

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**Table 3 GHG Emissions by Category from City of San Diego (2019–2021)**

| Emissions Category                                   | 2019 Inventory <sup>6</sup>          |             | 2020 Inventory                       |             | 2021 Inventory                       |             | 2022 Inventory                       |             |
|------------------------------------------------------|--------------------------------------|-------------|--------------------------------------|-------------|--------------------------------------|-------------|--------------------------------------|-------------|
|                                                      | GHG Emissions (MT CO <sub>2</sub> e) | (%)         | GHG Emissions (MT CO <sub>2</sub> e) | (%)         | GHG Emissions (MT CO <sub>2</sub> e) | (%)         | GHG Emissions (MT CO <sub>2</sub> e) | (%)         |
| On-Road Transportation*                              | 5,854,000                            | 55%         | 4,650,000                            | 50%         | 4,683,000                            | 53%         | 4,628,000                            | 54%         |
| Electricity                                          | 2,398,000                            | 23%         | 2,368,000                            | 26%         | 1,725,000                            | 20%         | 1,661,000                            | 19%         |
| Natural Gas                                          | 1,912,000                            | 18%         | 1,827,000                            | 20%         | 1,918,000                            | 22%         | 1,837,000                            | 21%         |
| Solid Waste**                                        | 277,000                              | 3%          | 273,000                              | 3%          | 288,000                              | 3%          | 282,000                              | 3%          |
| Offroad Transportation (Construction Equipment Only) | 69,000                               | 1%          | 57,000                               | 1%          | 57,000                               | 1%          | 57,000                               | 1%          |
| Water                                                | 61,000                               | 1%          | 70,000                               | 1%          | 70,000                               | 1%          | 74,000                               | 1%          |
| Wastewater                                           | 26,000                               | 0%          | 23,000                               | 0%          | 24,000                               | 0%          | 13,000                               | 0%          |
| <b>Total</b>                                         | <b>10,597,000</b>                    | <b>100%</b> | <b>9,268,000</b>                     | <b>100%</b> | <b>8,765,000</b>                     | <b>100%</b> | <b>8,552,000</b>                     | <b>100%</b> |

Sums may not add up to totals due to rounding. GHG emissions for each category are rounded to the nearest thousand. Values are not rounded in the intermediary steps in the calculation.

\*Emissions are based on SANDAG's Series 14 modeled vehicle miles traveled (VMT) estimates, and 2019 and 2020 VMT are based on 2016 VMT adjusted to account for regional VMT growth, as reflected in the California Highway Performance Monitoring System (HPMS) from 2016 to 2019 and to 2020. 2021 VMT are based on 2019 VMT adjusted to account for regional freeway VMT difference between 2019 and 2020 in the California Performance Measurement System (PeMS), due to a delay in HPMS data. 2016 VMT is the output from SANDAG's Final 2021 Regional Plan and activity-based model (ABM2+).

\*\*2020 waste tonnage was used to calculate 2021 emissions from waste due to a delay in reported waste data

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In 2022, total emissions were 8.6 MMTCO<sub>2</sub>e, a 19% reduction from the 2019 baseline and 2% reduction from 2021. This decrease was mainly due to improvements in the carbon intensity of electricity supplied to the City and increased on-road vehicle efficiency and adoption of electric and hybrid vehicles. Although COVID-19 temporarily reduced on-road transportation emissions by lowering vehicle miles traveled, these miles are now returning to pre-pandemic levels. Despite this, emissions remain lower because the adoption of electric and hybrid vehicles has reduced the carbon intensity of on-road vehicles.

Furthermore, SDG&E has expanded its renewable energy portfolio, and San Diego Community Power, the City's Community Choice Energy provider, now supplies electricity to commercial, industrial, and residential sectors. This shift has decreased the carbon intensity of the City's electricity consumption, further reducing overall emissions.

<sup>6</sup> The 2019 GHG emissions inventory in this document updated from the 2019 inventory in the [CAP Annual Report 2020](#), due to updated data sources after the Annual Report release: (1) 2019 electricity emissions factor became available in December 2020; and (2) new mobile sources emissions inventory (EMFAC2021) became available in 2021; (3) new solid waste data became available in 2022;

## 4 METHOD TO CALCULATE GHG EMISSIONS INVENTORY

The CAP inventory follows the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (U.S. Community Protocol),<sup>7</sup> developed by ICLEI USA. It requires a minimum of five basic emissions-generating activities to be included in a Protocol-compliant community-scale GHG inventory. These categories are: electricity, natural gas, on-road transportation, water and wastewater, and solid waste. GHG emissions are calculated by multiplying activity data (e.g., kilowatt-hours of electricity, tons of solid waste) by an emission factor (e.g., pounds of CO<sub>2</sub>e per unit of electricity). Off-road emissions from construction equipment were added to the 2022 CAP and subsequent Annual Reports as an optional category. For these categories, methods based on the U.S. Community Protocol were modified with regional- or City-specific data when available.

The U.S. Community Protocol provides guidance for developing community-scale inventories. Protocols and guidance for reporting GHG emissions for individual entities, such as corporations and public agencies, are different from those for communities. The Local Government Operations Protocol, developed by ICLEI, CARB, and the Climate Registry (TCR), and the General Reporting Protocol, developed by TCR, are widely used to develop GHG inventories for local governments and public agencies.<sup>8</sup> The method to determine boundaries in the U.S. Community Protocol is different from the method in the Local Government Operations Protocol or the General Reporting Protocol, which depends on the entity's financial or operational control. This inventory accounts for the emission generating activities in the City of San Diego, not based on City's financial or operational control. All activity data and GHG emissions reported in this document are annual values, and all emission factors reported in this document are annual average values, unless stated otherwise.

### 4.1 On-Road Transportation

The emissions associated with on-road transportation are calculated by multiplying the estimated City of San Diego VMT and the average vehicle emission rate in the San Diego region from 2019 to 2022, from the statewide mobile source emissions model.

#### 4.1.1 Vehicle Miles Traveled (VMT)

SANDAG uses an activity-based model (ABM) to support development of Regional Transportation Plans and generate outputs related to the transportation system performance, including VMT. Every three to five years, SANDAG produces the Regional Growth Forecast, a long-range forecast of population, housing employment growth, and produces VMT for the San Diego region, and by jurisdiction. As of the Annual Report development, the most recent forecast is the Series 14 Growth Forecast with a base year of 2016. This Forecast was used in SANDAG's Final 2021 Regional Plan with the most recent version of the ABM model, ABM2+.

SANDAG provided VMT estimates for the City of San Diego for year 2016.<sup>9</sup> However, 2017–2022 VMT data from Series 14 are not available at the jurisdictional level. Therefore, for the City of San Diego, post-2016 VMT data were estimated using the Series 14 2016 VMT adjusted using VMT monitoring data for 2017–2022 from other sources. The two sources available are public road and freeway data in the San

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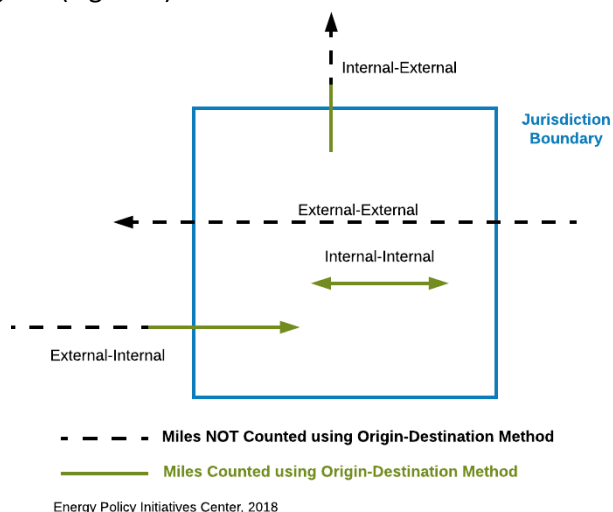
<sup>7</sup> [ICLEI – Local Governments for Sustainability USA](#): U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2 (2019).

<sup>8</sup> CARB, ICLEI, and The Climate Registry: [Local Government Operations Protocol](#); the Climate Registry: [General Reporting Protocol Version 3.0](#).

<sup>9</sup> 2016 VMT was provided by SANDAG to City of San Diego (January 2022). SANDAG Activity Based Model 2+ Release v14.2.2, Final 2021 Regional Plan Networks, Policies, and Assumptions, Year 2016, Reference Scenario 458. The forecast in the Final 2021 Regional Plan was based on the Sustainable Communities Strategy land use pattern, which may be different from jurisdictions' general plan land use pattern.

Diego region derived from the California Department of Transportation (Caltrans) Highway Performance Monitoring System (HPMS) and Performance Measurement System (PeMS).<sup>10</sup>

SANDAG allocates the VMT derived from ABM2+ to a jurisdiction using the Origin-Destination (O-D) method.<sup>11</sup> The O-D VMT method is the preferred method proposed by the U.S Community Protocol in “TR.1 Emissions from Passenger Vehicles” and “TR.2 Emissions from Freight and Service Trucks” that estimates miles traveled based on where a trip originates and where it ends to attribute on-road emissions to cities and regions (Figure 1).<sup>12</sup>



**Figure 1 Components of O-D Method for VMT Calculation**

O-D VMT allocated to San Diego includes all miles traveled for trips that originate and end within San Diego city limits (referred to as Internal-Internal), and half of the miles traveled for trips that either begin within San Diego and end outside the City (referred to as Internal-External), or vice versa (referred to as External-Internal). In accordance with the methodology, VMT from trips that begin and end outside San Diego that only pass through the City limits (referred to as External-External) are not included in the total City VMT. The total average weekday VMT were multiplied by 347 to adjust from average weekday VMT to average annual VMT, which includes weekends.<sup>13</sup>

The average weekday Series 14 O-D VMT estimates for each trip type in 2016 provided by SANDAG and the total VMT allocated to the City based on the ICLEI methodology described above are given in Table 4.<sup>14</sup>

<sup>10</sup> California Department of Transportation: [Highway Performance Monitoring System \(HPMS\) Data](#).

<sup>11</sup> SANDAG (2013): [Vehicle Miles Traveled Calculation Using the SANDAG Regional Travel Demand Model](#). Technical White Paper.

<sup>12</sup> [ICLEI – Local Governments for Sustainability USA](#): U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2 (2019), Appendix D: Transportation and Other Mobile Emission Activities and Sources.

<sup>13</sup> The conversion of 347 weekdays to 365 days per year as used by CARB. [CARB: California's 2000–2014 Greenhouse Gas Emission Inventory Technical Support Document \(2016 Edition\)](#), p. 41 (September 2016).

<sup>14</sup> The 2016 data used here are different from (1-3% lower) the 2016 data used in the San Diego Climate Action Plan update 2022, which were from SANDAG ABM2+ Release v14.2.1, Draft 2021 Regional plan (October 2020).

**Table 4 2016 O-D VMT Estimates by Trip Types and Total VMT provided by SANDAG (San Diego, 2016)**

| Year                                                                                                                                                                                                                                                                                                                                                                                                                           | VMT by Trip Type<br>(Miles/Weekday)  |                                                             |                                                                              | Total City VMT<br>(100% * I-I +<br>50% * I-E/E-I)<br>(Miles per<br>Weekday) | Total City VMT<br>(Miles per Year) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                | Internal-<br>Internal (I-I)<br>Trips | External-<br>Internal/Internal-<br>External (I-E/E-I) Trips | External-External Trips<br>(Information only,<br>excluded from City<br>VMT)* |                                                                             |                                    |
| 2016                                                                                                                                                                                                                                                                                                                                                                                                                           | 22,264,735                           | 28,279,389                                                  | 32,824,891                                                                   | 36,404,429                                                                  | 12,632,336,902                     |
| *Though excluded from this analysis, miles from External-External trips (pass-through trips) shown here are the portion only within the City boundary, not from the entire trip.<br>Based on SANDAG Series 14 (Final 2021 Regional Plan) and ABM2+ VMT estimates. The conversion factor from miles per weekday to miles per year is 347.<br><b>SANDAG 2022, Energy Policy Initiatives Center, University of San Diego 2024</b> |                                      |                                                             |                                                                              |                                                                             |                                    |

Historical year data from other than the 2016 base year are not available under SANDAG ABM2+. Therefore, to estimate 2020 O-D VMT, the 2016 O-D VMT was adjusted by the annual rates of increase from 2016 to 2020, as indicated by the State public road VMT monitoring system (Caltrans HPMS). Annual Caltrans HPMS VMT was used to estimate annual VMT growth rates for the San Diego region. These growth rates were applied to the City of San Diego's 2016 O-D VMT data (Table 4) as an approximation of VMT growth since 2016. The Caltrans HPMS VMT estimate for the San Diego region is based on daily monitoring on all public roads, including city streets, county roads, state highways, roads maintained by state and federal agencies, freeways, etc. The estimated daily VMT and annual rate of increase or decrease from 2016 to 2022 with Caltrans HPMS data are given in Table 5.<sup>15</sup>

**Table 5 San Diego Region Daily VMT Derived from the Caltrans Highway Performance Monitoring System**

| Year                                                                                                                            | San Diego Region<br>Daily VMT | Annual Rate of<br>Increase |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|
|                                                                                                                                 | (thousand miles/day)          | (%)                        |
| 2016                                                                                                                            | 79,622                        | -                          |
| 2017                                                                                                                            | 81,253                        | 2.0%                       |
| 2018                                                                                                                            | 82,618                        | 1.7%                       |
| 2019                                                                                                                            | 86,136                        | 4.3%                       |
| 2020                                                                                                                            | 68,650                        | -20.3%                     |
| 2021*                                                                                                                           | 71,151                        | 3.6%                       |
| 2022                                                                                                                            | 71,954                        | 1.1%                       |
| *Updated to use 2021 Caltrans HPMS data<br><b>Caltrans 2022, Energy Policy Initiatives Center, University of San Diego 2024</b> |                               |                            |

The 2020 San Diego regional daily VMT was 20% lower than in 2019, which reflects the travel pattern change due to the COVID-19 pandemic. Statewide, 2020 VMT showed an average decline of 15% compared with 2019.<sup>16</sup>

<sup>15</sup> Caltrans: [HPMS Data](#), accessed January 18, 2023.

<sup>16</sup> Caltrans: [California Public Road Data 2022](#). Statistical Information Derived from the Highway Performance Monitoring System (Released November 2023).



2021 HPMS data were not available for the previous Annual Report, therefore, annual San Diego regional freeway VMT from Caltrans freeway monitoring system (Caltrans PeMS) was used to estimate the VMT growth rate for calendar year 2021. To maintain methodological continuity, the 2021 VMT value has been updated in this 2023 Annual Report to use the published HPMS data to estimate growth rate instead of PeMS data.

#### 4.1.2 Average Annual Vehicle Emission Rate

The average annual vehicle emission rate expressed in grams of CO<sub>2</sub>e per mile driven (g CO<sub>2</sub>e/mile) is derived from the statewide mobile source emissions model EMFAC2021 developed by CARB.<sup>17</sup>

EMFAC2021 was run in the default activity mode to generate the total VMT and total vehicle GHG emissions for the San Diego region, including all vehicle model years, classes, and fuel types.<sup>18</sup> This document assumes that the City of San Diego has the same distribution of vehicle types as the San Diego region.

#### 4.1.3 Total Emissions from On-Road Transportation

Total estimated VMT, average vehicle emission rates, and corresponding GHG emissions from on-road transportation from 2019–2022 are given in Table 6.

**Table 6 VMT, Emission Rate, and GHG Emissions from On-Road Transportation (San Diego, 2019–2022)**

| Year                                                                                                                                                                                                                                                    | Total VMT<br>(Million<br>Miles/year) | Average Vehicle<br>Emission Rate<br>(g CO <sub>2</sub> e/mile) | GHG Emissions<br>(MMT CO <sub>2</sub> e) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------|------------------------------------------|
| 2019                                                                                                                                                                                                                                                    | 13,666                               | 428                                                            | 5.85                                     |
| 2020                                                                                                                                                                                                                                                    | 10,892                               | 427                                                            | 4.65                                     |
| 2021*                                                                                                                                                                                                                                                   | 11,288                               | 415                                                            | 4.68                                     |
| 2022                                                                                                                                                                                                                                                    | 11,416                               | 405                                                            | 4.63                                     |
| GHG emissions for each category are rounded. Values are not rounded in the intermediary steps in the calculation.<br>*2021 VMT estimate updated for methodological continuity.<br><b>Energy Policy Initiatives Center, University of San Diego 2024</b> |                                      |                                                                |                                          |

## 4.2 Electricity

Emissions from electricity in the City of San Diego were estimated using the Built Environment (BE.2) method from the U.S. Community Protocol, by multiplying electricity use by the City-specific electricity emission factor in a given year.<sup>19</sup>

#### 4.2.1 Electricity Use

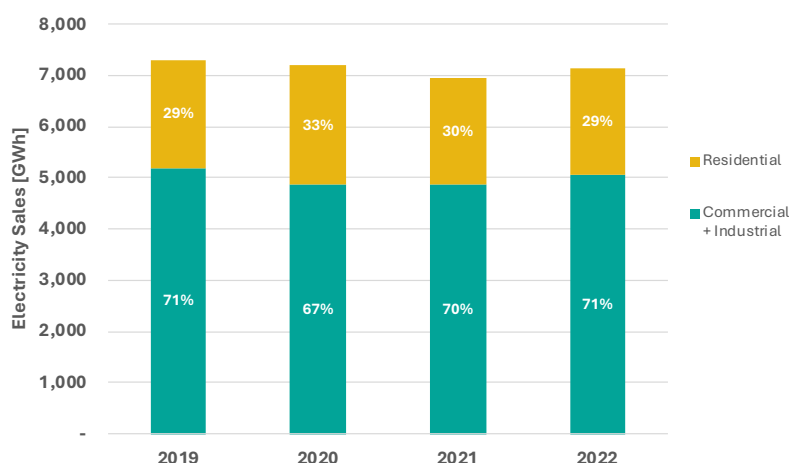
Annual metered electricity sales data within the City were provided by the local utility, San Diego Gas & Electric (SDG&E).<sup>20</sup> The electricity sales data do not include the electricity sales to San Diego County Regional Airport Authority, San Diego Unified Port District, and the military. The electricity sales from 2019 to 2022 by customer class are shown in Figure 2.

<sup>17</sup> CARB: Emission FACTors model, [EMFAC2021 v1.0.1](#), released on April 30, 2021, downloaded on August 30, 2021. CARB published an updated version, [EMFAC2021 v1.0.2](#), on May 2, 2022. The updates fixed bugs that were not related to GHG emissions.

<sup>18</sup> *Id.*

<sup>19</sup> [ICLEI – Local Governments for Sustainability USA](#): U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2 (2019), Appendix C: Built Environment Emission Activities and Sources.

<sup>20</sup> 2020 and 2021 metered electricity sales were provided to EPIC by SDG&E (March 16, 2021, and October 31, 2022).

**Figure 2 SDG&E Electricity Sales to City of San Diego by Customer Class (2019–2022)**

SDG&E's electricity sales in City of San Diego. Sales do not include transmission and distribution 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 2019-2022

The percentage of electricity use from each customer class (residential, commercial, and industrial) was similar in each of the three years. In 2020, a higher percentage of electricity use, 33%, was from residential customers, potentially due to the COVID stay-at-home order in 2020.

In 2019 and 2020, the electricity sales included the sales to SDG&E bundled customers<sup>21</sup> and Direct Access (DA) customers.<sup>22</sup> In March 2021, San Diego Community Power (SDCP), a community choice energy provider, started serving jurisdictions in the San Diego region, including the City of San Diego. By the end of 2021, eligible SDG&E bundled commercial and industrial customers were enrolled in SDCP automatically with the option to opt-out (return to SDG&E) or opt-up to a SDCP product with higher renewable electricity. In early 2022, residential accounts were automatically enrolled in SDCP with the same options to opt-out or opt-up.

The 2019 and 2020 electricity use per customer class provided by SDG&E have the same format, with bundled and DA customers' electricity use identified separately. However, for 2021 and 2022, only total electricity use per customer class was provided by SDG&E. To estimate the 2021 electricity use by DA customers in each customer class, the ratio of 2020 DA customers to total electricity use was applied to the total 2021 electricity use in each customer class. Based on the SDCP participation rate, 98% of the remaining 2021 commercial and industrial electricity use was assumed to be from SDCP commercial and industrial customers.<sup>23</sup> The remaining commercial and industrial electricity use, and residential use, were assumed to be from SDG&E customers. Additionally, in 2022, SDCP provided the energy consumption in kWh for commercial/industrial customers and residential customers. In 2022 instead of using participation rates as used in 2021, the actual kWh consumption was attributed to SDG&E (Direct & Bundled) and SDCP. Direct and bundled electricity was then disaggregated using the proportion from the last data year received (2020).

<sup>21</sup> SDG&E bundled power includes the electricity from SDG&E-owned power plants and the electricity from its net procurements.

<sup>22</sup> Direct Access refers to electricity that customers purchase from non-SDG&E electric service providers (ESPs), but SDG&E still provides transmission and distribution services. See [SDG&E Direct Access Program](#).

<sup>23</sup> The participation rate is the rate by number of accounts, not by electricity use. Due to lack of data, the number of accounts is used as a proxy to estimate the SDCP commercial and industrial electricity use.

The electricity sales were then adjusted by 1) a loss factor<sup>24</sup> of 1.082<sup>25</sup> to account for transmission and distribution losses; and 2) subtracting electricity use associated with moving water within the City limits, which is allocated to the water category emissions.

The adjusted net energy for load (electricity sales + losses) is provided in Table 6.

#### 4.2.2 City-Specific Electricity Emission Factor

For a given year, the City-specific electricity emission factor, expressed in pounds of CO<sub>2</sub>e per Megawatt-hour (lbs CO<sub>2</sub>e/MWh), is estimated based on the specific mix of bundled power, DA power, and SDCP power, if any, in the City and their respective emission factors.

The 2019 SDG&E bundled emission factors are calculated using Federal Energy Regulatory Commission (FERC) Form 1<sup>26</sup> data, the California Energy Commission (CEC) Power Source Disclosure (PSD) Program<sup>27</sup> data on SDG&E-owned and purchased power, and U.S. EPA Emissions and Generating Resource Integrated Database (eGRID) 2019 Edition<sup>28</sup> on specific power plant emissions. The 2019 SDG&E bundled emission factor calculated using the sources above is 633 lbs CO<sub>2</sub>e/MWh, with 31% eligible renewable.

The CEC PSD Program, under the requirements of Assembly Bill (AB) 1110 (Ting, Chapter 656, Statutes of 2016), requires retail electric providers to disclose GHG emissions intensity (i.e., electricity emission factor) separately from unbundled renewable energy credits, starting in 2021 for 2020 procurements. So the SDG&E bundled emission factors, are provided directly in the power content labels reported under the CEC PSD Program and listed below in Table 6.

The DA emission factor, 836 lbs CO<sub>2</sub>e/MWh, is based on California Public Utilities Commission (CPUC) Decision D.14-12-037.<sup>29</sup> The City-specific electricity emission factors are provided in Table 6.

#### 4.2.3 Total Emissions from Electricity

Emissions are calculated by multiplying the adjusted net energy for load (electricity sales + losses) and the corresponding City-specific electricity emission factor. The net energy for San Diego's load (electricity sales + losses), electricity emission factors, and corresponding GHG emissions from the electricity category for 2019-2022 are shown in Table 6.

<sup>24</sup> The transmission and distribution loss factor is used to scale end-use demand or retail sales to produce net energy for load. L. Wong, [A Review of Transmission Losses In Planning Studies](#), CEC Staff Paper (August 2011).

<sup>25</sup> California Energy Commission (CEC): [California Energy Demand 2015–2025 Final Forecast Mid-Case Final Baseline Demand Forecast Forms](#), SDG&E Mid. The transmission and distribution loss factor is calculated based on the ratio of net energy for load (total sales + net losses) and total sales from SDG&E Form 1.2 Mid.

<sup>26</sup> FERC: [Form 1 – Electric Utility Annual Report](#).

<sup>27</sup> CEC: [Power Source Disclosure Program](#) under Senate Bill 1305. The SDG&E annual power source disclosure reports in 2019 were provided to EPIC by CEC staff. SDG&E [2019 Power Content Label](#), version October 2020. The CEC PSD Program, under the requirements of Assembly Bill (AB) 1110 (Ting, Chapter 656, Statutes of 2016), requires retail electric providers to disclose GHG emissions intensity (i.e., electricity emission factor) and unbundled renewable energy credits, starting in 2021 for 2020 procurements. Starting in 2021, the GHG emissions intensity reported by retail electric providers for the PSD Program will be used directly to calculate GHG emissions from the electricity category.

<sup>28</sup> U.S. EPA. [eGRID 2019 Edition](#), released on February 23, 2021.

<sup>29</sup> CPUC: [Decision 14-12-037](#), December 18, 2014 in Rulemaking 11-03-012 (filed March 24, 2011). The recommended emission factor is 0.379 MT CO<sub>2</sub>e/MWh (836 lbs CO<sub>2</sub>e/MWh). The recommended emission factor has not changed since 2014. However, all electric service suppliers must meet the Renewables Portfolio Standards in the target years.

**Table 6 Net Energy for Load, Emission Factor, and GHG Emissions from Electricity Category (San Diego, 2019–2022)**

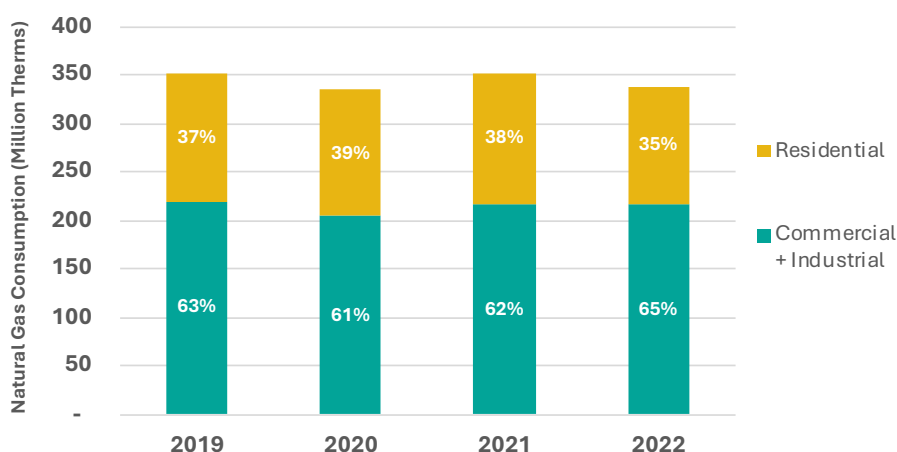
| Year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | SDG&E Bundled Emission Factor (lbs CO <sub>2</sub> e/MWh) | SDCP 'Power On' Emission Factor (lbs CO <sub>2</sub> e/MWh) | Net Energy for Load (electricity sales + losses) <sup>1</sup> (MWh) | City-Specific Emission Factor (lbs CO <sub>2</sub> e/MWh) <sup>2</sup> | GHG Emissions (MT CO <sub>2</sub> e) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------|
| 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 633                                                       | -                                                           | 7,912,365                                                           | 668                                                                    | 2,398,000                            |
| 2020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 636                                                       | -                                                           | 7,788,903                                                           | 670                                                                    | 2,368,000                            |
| 2021                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 504                                                       | 378                                                         | 7,527,776                                                           | 505                                                                    | 1,725,000                            |
| 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 508                                                       | 375                                                         | 7,722,329                                                           | 474                                                                    | 1,661,000                            |
| <sup>1</sup> The net energy for load does not include the net energy for load from San Diego County Regional Airport Authority, San Diego Unified Port District, and the military.<br><sup>2</sup> City-Specific emission factors are for City of San Diego only and do not represent the emission factors of SDG&E bundled electricity or of other jurisdictions in the San Diego region.<br>GHG emissions for each category are rounded. Values are not rounded in the intermediary steps in the calculation.<br><b>Energy Policy Initiatives Center, University of San Diego 2024</b> |                                                           |                                                             |                                                                     |                                                                        |                                      |

### 4.3 Natural Gas

Emissions from natural gas use in San Diego were estimated using method Built Environment (BE.1) from the U.S. Community Protocol, by multiplying the natural gas use (the activity) and the natural gas emission factor each year.<sup>30</sup>

#### 4.3.1 Natural Gas Use

Annual natural gas sales were provided by SDG&E, broken down by residential, commercial and industrial customer class.<sup>31</sup> The natural gas sales data do not include the sales to San Diego County Regional Airport Authority, San Diego Unified Port District, and the military. The natural gas sales from 2019 to 2022 by customer class are shown in Figure 3.

**Figure 3 SDG&E Natural Gas Sales to City of San Diego by Customer Class (2019–2022)**

SDG&E's natural gas sales in City of San Diego do not include transmission and distribution 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.

<sup>30</sup> [ICLEI– Local Governments for Sustainability USA](#): U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2 (2019), Appendix C: Built Environment Emission Activities and Sources.

<sup>31</sup> 2020 and 2021 metered electricity sales were provided to EPIC by SDG&E (March 16, 2021, and October 31, 2022).



## SDG&amp;E 2019-2022

The natural gas end-use in 2020 was approximately 4% lower than the end-use in 2019 but has fluctuated in recent years.

#### 4.3.2 Natural Gas Emission Factor

The natural gas emission factor is based on the heat content of the fuel and the fuel's CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions. The heat content of fuel and the emissions from CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were based on the CARB statewide inventory.<sup>32</sup> The natural gas emission factor is given in Table 7.

#### 4.3.3 Total Emissions from Natural Gas

To estimate emissions from the combustion of natural gas, end-use sales were multiplied by the emission factor. The total natural gas end-use and corresponding GHG emissions from the natural gas category for 2019-2022 are given in Table 7.

**Table 7 Natural Gas End-Use and GHG Emissions from Natural Gas Category (San Diego, 2019-2022)**

| Year                                                                                                                                                                                                                                                                                                                                                                                         | Natural Gas End-Use<br>(Million Therms) | Natural Gas Emission<br>Factor<br>(Million MT CO <sub>2</sub> e/Million<br>Therms) | GHG Emissions<br>(MT CO <sub>2</sub> e) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------|
| 2019                                                                                                                                                                                                                                                                                                                                                                                         | 351                                     | 0.00545                                                                            | 1,912,000                               |
| 2020                                                                                                                                                                                                                                                                                                                                                                                         | 335                                     | 0.00545                                                                            | 1,827,000                               |
| 2021                                                                                                                                                                                                                                                                                                                                                                                         | 352                                     | 0.00545                                                                            | 1,918,000                               |
| 2022                                                                                                                                                                                                                                                                                                                                                                                         | 337                                     | 0.00545                                                                            | 1,837,000                               |
| The natural gas sales do not include the sales to San Diego County Regional Airport Authority, San Diego Unified Port District, and the military.<br>GHG emissions for each category are rounded to the nearest thousand. Values are not rounded in the intermediary steps in the calculation.<br><b>SDG&amp;E 2020-2022, Energy Policy Initiatives Center, University of San Diego 2024</b> |                                         |                                                                                    |                                         |

#### 4.4 Off-Road Transportation (Construction Equipment Only)

The emissions from off-road transportation in the City, such as gasoline and diesel fuel use for off-road vehicles and equipment, were estimated based on CARB off-road models. The CARB models include many off-road equipment types, only construction related equipment and its emissions are covered here. Common equipment types are excavators, off-highway tractors, paving equipment. OFFROAD2021 is the main model for estimating off-road transportation emissions.<sup>33</sup>

Due to the lack of jurisdiction-specific data from CARB models, the construction emissions from CARB model outputs for the San Diego region were scaled to the City based on the ratio of regional and citywide construction jobs. The ratio and the corresponding GHG emissions from the off-road transportation category for 2019-2022 are given in Table 8.

<sup>32</sup> CARB: [GHG Current California Emission Inventory Data](#).

<sup>33</sup> CARB: OFFROAD2021 (v1.0.6) Emissions Inventory, all adopted rules -exhaust. Downloaded on May 20, 2024.

**Table 8 GHG Emissions from Off-Road Transportation (Construction Equipment Only) Category (San Diego, 2019 - 2022)**

| Year                                                                                                                                                                                                        | GHG Emissions from Construction Equipment in San Diego Region (MMT CO <sub>2</sub> e) | Construction Jobs Ratio (City of San Diego/San Diego Region) | GHG Emissions from Construction Equipment in City of San Diego (MT CO <sub>2</sub> e) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 2019*                                                                                                                                                                                                       | 177                                                                                   | 39%                                                          | 69,000                                                                                |
| 2020                                                                                                                                                                                                        | 145                                                                                   | 39%                                                          | 57,000                                                                                |
| 2021                                                                                                                                                                                                        | 145                                                                                   | 39%                                                          | 57,000                                                                                |
| 2022                                                                                                                                                                                                        | 145                                                                                   | 39%                                                          | 57,000                                                                                |
| *Emissions from 2019 have been updated since the 2022 CAP to reflect updates to the underlying CARB model. <b>CARB OFFROAD2021 (v1.0.6), Energy Policy Initiatives Center, University of San Diego 2024</b> |                                                                                       |                                                              |                                                                                       |

## 4.5 Solid Waste

Emissions from the decomposition of organic material in waste disposed at landfills were estimated using method Solid Waste (SW.4) from the U.S. Community Protocol, by multiplying the amount of waste disposed by the City in 2019 and an emission factor for mixed solid waste.<sup>34</sup> This represents the immediate and all future emissions from decay of this waste.

### 4.5.1 Solid Waste Disposal

Solid waste disposal is the waste disposed by the City in landfills, regardless of whether the landfills accepting the waste are located inside or outside of the City boundary. The majority of the waste from the City is disposed at West Miramar Sanitary Landfill, Otay Landfill, and Sycamore Landfill.<sup>35</sup>

The total waste disposal from the City was 1,597,546 short tons (1,449,270 metric tons) in 2022, 2% lower than the waste disposal in 2019. The total waste disposal from the City in 2021 was not available for the previously published Annual Report, so the 2021 waste disposal figure has been updated in this report now that data is available. The total and per-capita solid waste disposal are given in Table 10 below.<sup>36</sup>

### 4.5.2 Mixed Solid Waste Emission Factor

The emission factor of mixed solid waste depends on the percentage of each waste type within the waste stream disposed in a landfill. The City of San Diego's 2012–2013 Waste Characterization Study, conducted at Miramar Landfill, is the most recent waste characterization study done by the City and was used as a proxy for San Diego's solid waste composition.<sup>37</sup> Only the CH<sub>4</sub> emissions from waste degradation are considered non-biogenic and included in this category. The CO<sub>2</sub> emissions from waste degradation are considered biogenic and not included in this category.

The EPA Waste Reduction Model (WARM) is used to determine the emission factor of each waste type. WARM is a life-cycle GHG model to assess and compare waste management options (e.g., landfilling, recycling, source reduction, composting), through the life-cycle of waste materials (from material extraction to disposal). However, under the U.S Community Protocol, only emissions from the disposal

<sup>34</sup> [ICLEI – Local Governments for Sustainability USA](#): U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2 (2019), Appendix E: Solid Waste Emission Activities and Sources.

<sup>35</sup> CalRecycle: [Disposal Reporting System \(DRS\): Jurisdiction Disposal and Alternative Daily Cover \(ADC\) Tons by Facility](#).

<sup>36</sup> 2021 & 2022 waste disposal was provided by City of San Diego to EPIC in January 2023.

<sup>37</sup> City of San Diego: [Waste Characterization Study 2012–2013 Final Report](#) (2014), accessed November 4, 2019.

and associated degradation of waste are included. Therefore, only the landfill emission factors in EPA WARM are used in the calculation. WARM reports the landfill CH<sub>4</sub> emission factor of each waste material in MT CO<sub>2</sub>e/short ton, with and without Landfill Gas (LFG) recovery.

The mixed solid waste emission factor is given in Table 9. The landfill emission factors without LFG recovery are identified here; the LFG recovery is applied later.

**Table 9 Mixed Solid Waste Emission Factor**

| Waste Component                                                                                          | Waste Distribution (%) <sup>1</sup> | Landfill Gas Emission Factors                                                           |                                              |
|----------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------|
|                                                                                                          |                                     | CH <sub>4</sub> without Landfill Gas Recovery (MT CO <sub>2</sub> e/short ton disposed) | Source <sup>2</sup>                          |
| Paper                                                                                                    | 16.8%                               |                                                                                         |                                              |
| <i>Corrugated Containers/Cardboard</i>                                                                   | 5.0%                                | 2.36                                                                                    | Exhibit 3-27, WARM v15 Containers /Packaging |
| <i>Newspaper</i>                                                                                         | 0.8%                                | 0.94                                                                                    | Exhibit 3-27, WARM v15 Containers /Packaging |
| <i>Magazine</i>                                                                                          | 0.6%                                | 1.08                                                                                    | Exhibit 3-27, WARM v15 Containers /Packaging |
| <i>Mixed Paper (general)</i>                                                                             | 10.4%                               | 2.14                                                                                    | Exhibit 3-27, WARM v15 Containers /Packaging |
| Plastic                                                                                                  | 8.9%                                | 0                                                                                       | -                                            |
| Glass                                                                                                    | 1.7%                                | 0                                                                                       | -                                            |
| Metal                                                                                                    | 3.5%                                | 0                                                                                       | -                                            |
| Organics                                                                                                 | 38.9%                               |                                                                                         |                                              |
| <i>Food</i>                                                                                              | 15%                                 | 1.62                                                                                    | Exhibit 1-49, WARM V15 Organic Materials     |
| <i>Tree (Branches)</i>                                                                                   | 5.3%                                | 1.3                                                                                     | Exhibit 2-13 WARM V15 Organic Materials      |
| <i>Leaves and Grass</i>                                                                                  | 6.8%                                | 0.59 (leaves)                                                                           | Exhibit 2-13 WARM V15 Organic Materials      |
| <i>Trimmings</i>                                                                                         | 3.5%                                | 0.73                                                                                    | Exhibit 2-13 WARM V15 Organic Materials      |
| <i>Mixed Organics</i>                                                                                    | 8.3%                                | 0.53                                                                                    | Exhibit 1-48 WARM V15 Organic Materials      |
| Electronics                                                                                              | 0.6%                                | 0                                                                                       | -                                            |
| Construction & Demolition                                                                                | 24.6%                               | 0                                                                                       | -                                            |
| Household Hazardous Waste                                                                                | 0.2%                                | 0                                                                                       | -                                            |
| Special Waste                                                                                            | 3.1%                                | 0                                                                                       | -                                            |
| Mixed Residue                                                                                            | 1.6%                                | 0.53                                                                                    |                                              |
| <b>Mixed Waste Emission Factor</b>                                                                       |                                     | <b>0.785</b>                                                                            |                                              |
| <sup>1</sup> City of San Diego 2014. <sup>2</sup> EPA Waste Reduction Model (WARM) Version 15 (May 2019) |                                     |                                                                                         |                                              |

#### 4.5.3 Total Emissions from Solid Waste Disposed in Landfills

The mixed waste emission factor given in Table 9 is the emission factor without landfill gas collection. The 75% default capture rate of CH<sub>4</sub> emissions from landfills, from the U.S. Community Protocol, is applied in the emissions calculation. The total and per-capita solid waste disposal and the corresponding GHG emissions for 2019 are given in Table 10.

**Table 10 Solid Waste Disposal into Landfills and Associated GHG Emissions (San Diego, 2019–2022)**

| Year  | Solid Waste Disposed       |                    |                                                              | GHG Emission Factor (MT CO <sub>2</sub> e/Short Ton) | Oxidation Rate <sup>2</sup> | Total GHG Emissions (MT CO <sub>2</sub> e) | Default CH <sub>4</sub> Capture Rate | Remaining Emissions (MT CO <sub>2</sub> e) |
|-------|----------------------------|--------------------|--------------------------------------------------------------|------------------------------------------------------|-----------------------------|--------------------------------------------|--------------------------------------|--------------------------------------------|
|       | Citywide (Short Tons/Year) | Citywide (MT/Year) | Per Capita Solid Waste Disposal (kg/person/day) <sup>1</sup> |                                                      |                             |                                            |                                      |                                            |
| 2019  | 1,569,447                  | 1,423,779          | 2.7                                                          | 0.785                                                | 10%                         | 1,108,249                                  | 75%                                  | 277,000                                    |
| 2020  | 1,543,627                  | 1,400,355          | 2.8                                                          | 0.785                                                | 10%                         | 1,090,017                                  | 75%                                  | 273,000                                    |
| 2021* | 1,631,802                  | 1,400,355          | 3.0                                                          | 0.785                                                | 10%                         | 1,152,281                                  | 75%                                  | 288,000                                    |
| 2022  | 1,596,546                  | 1,449,270          | 2.9                                                          | 0.785                                                | 10%                         | 1,128,091                                  | 75%                                  | 282,000                                    |

GHG emissions for each category are rounded. Values are not rounded in the intermediary steps in the calculation.

<sup>1</sup> Informational, based on total waste disposal and population estimates. 2019 population is based on 2010 census benchmark, and 2020, 2021, & 2022 population are based on 2020 census benchmark.

<sup>2</sup> The oxidation rate is a default estimate of methane that is oxidized and not emitted, therefore only 90% of total methane emissions are produced per the ICLEI Community Protocol.

\*The total waste disposal from the City in 2021 was not available for the previous Annual Report, so this figure has been updated to reflect the corrected data once available.

Energy Policy Initiatives Center, University of San Diego 2024

#### 4.5.4 Estimating Emissions from Previously Disposed Solid Waste (Not Reported in Inventory)

The Community Protocol recognizes that there are emissions from waste previously disposed in landfills located within the City boundary. The emissions from waste-in-place can be reported optionally in addition to waste disposal. The Protocol provides a separate method to estimate emissions from past disposal. The City of San Diego has two active landfills and four closed landfills within its boundary. Emissions from waste already in place in City landfills are tracked separately here and are not included in the reported value for solid waste emissions in the City GHG emissions total.

For landfills that are required to report GHG emissions through the Environmental Protection Agency's Mandatory Greenhouse Gas Reporting Program (EPA MRR), the reported values are used directly.<sup>38</sup> For the landfills not subject to EPA MRR, emissions were calculated based on the Landfill Emissions Tool developed by CARB using the first order decay model recommended by the IPCC.<sup>39</sup>

Emissions from in-boundary landfills cannot be directly added to emissions from solid waste disposed in the current year. This is because emissions from solid waste disposal (method provided in Section 4.5.3) are calculated to include the projected future GHG emissions from the waste disposed in the current year, regardless of disposal location, while emissions from in-boundary landfills are emissions in the current year from waste that has already been in place at the landfills, regardless of where the waste was generated.

<sup>38</sup> EPA: [2019 Greenhouse Gas Emissions from Large Facilities](#), accessed November 10, 2020.

<sup>39</sup> CARB: [Landfill gas tool](#), released September 24, 2021, download date: January 9, 2023. Results may differ from the previous v1.3 tool released in 2011. tool reports CO<sub>2</sub>e of CH<sub>4</sub> using 21 as CH<sub>4</sub> GWP, recalculated using 25 as CH<sub>4</sub> GWP.



The emissions from San Diego landfills are given in Table 11.

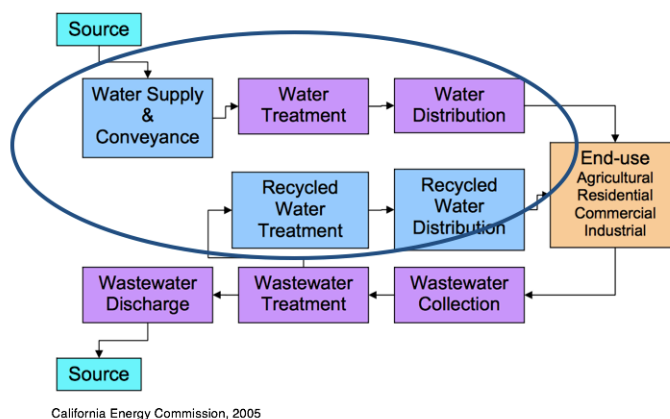
**Table 11 Emissions from In-boundary Landfills (Information Only, Not Reported in GHG Inventory)**

| Landfill                                                                                                                                                                                                                                                                                     | Status         | 2019<br>Landfill<br>Emissions<br>(MT CO <sub>2</sub> e) | 2020<br>Landfill<br>Emissions<br>(MT CO <sub>2</sub> e) | 2021<br>Landfill<br>Emissions<br>(MT CO <sub>2</sub> e) | 2022<br>Landfill<br>Emissions<br>(MT CO <sub>2</sub> e) | Source                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------|
| West Miramar Sanitary Landfill                                                                                                                                                                                                                                                               | Active         | 154,932                                                 | 198,685                                                 | 152,566                                                 | 141,544                                                 | EPA MRR                                                                                  |
| Sycamore Landfill                                                                                                                                                                                                                                                                            | Active         | 86,057                                                  | 87,168                                                  | 107,175                                                 | 155,748                                                 | EPA MRR                                                                                  |
| North Miramar Sanitary Landfill                                                                                                                                                                                                                                                              | Closed in 1983 | 2,974                                                   | 2,211                                                   | 3,420                                                   | 3,210                                                   | EPA MRR                                                                                  |
| South Chollas Sanitary Landfill                                                                                                                                                                                                                                                              | Closed in 1981 | n/a                                                     | n/a                                                     | n/a                                                     | n/a                                                     | Discontinued reporting to EPA MRR in 2015                                                |
| Arizona Street Landfill                                                                                                                                                                                                                                                                      | Closed in 1974 | 9,598                                                   | 9,408                                                   | 9,222                                                   | 9,039                                                   | CARB Landfill Emission Tool (CARB LET) result using waste received before closing        |
| Mission Bay Landfill #1                                                                                                                                                                                                                                                                      | Closed in 1959 | 5,530                                                   | 5,420                                                   | 5,313                                                   | 5,104                                                   | CARB LET result using operational period 1952-1959 and waste-in-place at the end of 1990 |
| <b>Total</b>                                                                                                                                                                                                                                                                                 | -----          | 259,091                                                 | 302,892                                                 | 277,696                                                 | 314,645                                                 | -                                                                                        |
| n/a = not available<br>Landfill emissions reported in EPA MRR were estimated from methane recovery, destruction and other factors. The emissions may differ from modeled methane generation and from previous versions.<br><b>CARB 2024, EPA 2024, Energy Policy Initiatives Center 2024</b> |                |                                                         |                                                         |                                                         |                                                         |                                                                                          |

## 4.6 Water

Emissions from water use in a jurisdiction result from the energy required to move water from origin sources to end-use customers, including upstream supply and conveyance, water treatment, and water distribution, as circled in Figure 4. The energy required to move water is primarily electricity but may include natural gas or other fuels.

**Figure 4 Segments of the Water Cycle**



Emissions from water were estimated using the method Wastewater and Water (WW.14) from the U.S. Community Protocol.<sup>40</sup> Emissions associated with water end-use, such as water heating and cooling, are included in the electricity and natural gas categories, not in this water category, as data are not available to separate out those values.

Water agencies developing their own GHG inventories would not follow the U.S. Community Protocol because the U.S. Community Protocol is specifically for community-wide inventories, not for other types of entities. Therefore, the scope and boundary of emissions included in this sector are different from those of a water agency's GHG inventory. For example, the water agencies may account only the emission generating activities within their operational or financial control in their GHG inventories.

#### 4.6.1 Water Use

The City of San Diego is a member agency of the water wholesaler in the San Diego region, the San Diego County Water Authority (SDCWA). The City of San Diego delivers potable and recycled water within the City boundary, and also sells water to or treats water for neighboring water agencies and cities, such as the City of Del Mar, South Bay Irrigation Water District, and the California American Water Company (CalAm).<sup>41</sup>

The potable water supply sources for the City of San Diego include: 1) imported untreated water from SDCWA; 2) imported treated water from SDCWA; 3) surface water from local reservoirs; and 4) groundwater from the Santee-El Monte Basin.<sup>42</sup> Recycled water is produced at the City's North City Water Reclamation Plant (North City WRP) and South Bay Water Reclamation Plant (South Bay WRP) and is used for non-potable use, such as landscape irrigation.

The potable water supplied within City of San Diego (excluding sales to other water agencies) and the percentage of water from each source, and the recycled water are given in Table 12.<sup>43</sup>

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<sup>40</sup> [ICLEI – Local Governments for Sustainability USA](#); U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2 (2019), Appendix F: Wastewater and Water Emission Activities and Sources.

<sup>41</sup> California American Water Company (CalAm)'s service area in San Diego region includes Cities of Imperial Beach and Coronado, and portions of the City of Chula Vista. California American Water: [2015 Urban Water Management Plan](#), Southern Division – San Diego County District (2016).

<sup>42</sup> City of San Diego, [2015 Urban Water Management Plan](#), Section 6 System Water Supplies (2016).

<sup>43</sup> Recycled water sales, water production at each of City's water treatment plants (WTPs) from each water source and sales to other agencies (City of Del Mar and CalAm) were provided by City of San Diego from 2017 to 2019. Water sale to City of Del Mar is from the imported raw water treated in City of San Diego's WTPs. The water sale to CalAm (excluding CalAm's service area in City of San Diego's South Bay area) is from local water treated in WTPs. Starting in 2021, water sales to South Bay Irrigation District is from a mixture of local supply and imported water treated in Otay WTP. Recycled water was produced at the City's North City Water Reclamation Plant and provided to City customers only.

**Table 12 Water Supplied and Supply Source (San Diego, 2019–2022)**

| Year                                                                                                                                                                                                                                                                    | Potable Water Supply   |                          |                         |                         |                                    | Recycled Water Supply (Acre-Feet) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------|-------------------------|-------------------------|------------------------------------|-----------------------------------|
|                                                                                                                                                                                                                                                                         | Imported SDCWA Treated | Imported SDCWA Untreated | Local Surface Reservoir | Local Groundwater Basin | Potable Water Supplied (Acre-Feet) |                                   |
| 2019                                                                                                                                                                                                                                                                    | 10%                    | 77%                      | 14%                     | 0.1%                    | 161,472                            | 7,999                             |
| 2020                                                                                                                                                                                                                                                                    | 12%                    | 73%                      | 14%                     | 0.1%                    | 166,742                            | 8,842                             |
| 2021                                                                                                                                                                                                                                                                    | 8%                     | 84%                      | 7%                      | 0.3%                    | 161,995                            | 8,586                             |
| 2022                                                                                                                                                                                                                                                                    | 6%                     | 86%                      | 8%                      | 0.3%                    | 179,695                            | 10,012                            |
| Percentages may not add up to totals due to rounding. Potable water supplied (acre-feet) is the City of San Diego's water production excluding sales to other water agencies.<br>City of San Diego 2024, Energy Policy Initiatives Center, University of San Diego 2024 |                        |                          |                         |                         |                                    |                                   |

#### 4.6.2 Energy Intensity of Water

The energy used to produce and distribute water from each source is different due to the different raw source type and its location. The energy intensity of water, or the energy needed to move one unit of water through each segment of the water-use cycle (water supply and conveyance, water treatment, and water distribution) individually, expressed in kWh per acre foot (kWh/Acre-foot), are described below.

Upstream Supply and Conveyance – This is defined as supply and conveyance of water from the raw sources to the local service area. The upstream supply and conveyance energy use for SDCWA untreated water consists of conveyance of water from the State Water Project and the Colorado River through Metropolitan Water District's (MWD) and SDCWA's service area. The energy use associated with upstream supply and conveyance for SDCWA treated water consists of that associated with SDCWA untreated water and water treatment before the water is delivered to City of San Diego's service area. The water may be treated at MWD or SDCWA's water treatment plants (WTPs).<sup>44</sup> The City does not have operational control over the upstream supply and conveyance.

Water suppliers have begun to voluntarily report the energy intensity in their service areas in Urban Water Management Plans (UWMPs). SDCWA's and MWD's reported 2015 UWMP energy intensities are used to calculate the upstream supply energy intensity for SDCWA's member agencies. The energy intensity is based on the average of fiscal years 2013 and 2014 is shown in Table 13.

<sup>44</sup> SDCWA 2016: [Urban Water Management Plan 2015](#), Metropolitan Water District of Southern California, [Urban Water Management Plan 2015](#).

**Table 13 Components of Average Upstream Energy Intensity for SDCWA Member Agencies**

| Water System Segment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | FY 2013 and 2014 Average Energy Intensity (kWh/Acre-Foot) | Data Source                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------|
| MWD delivered untreated*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1,817                                                     | MWD UWMP 2015 Appendix 9   |
| SDCWA conveyance**                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -62                                                       | SDCWA UWMP 2015 Appendix K |
| <b>SDCWA Untreated Subtotal</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>1,755</b>                                              |                            |
| SDCWA treatment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60                                                        | SDCWA UWMP 2015 Appendix K |
| SDCWA distribution***                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.1                                                       | SDCWA UWMP 2015 Appendix K |
| <b>SDCWA Treated Total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>1,816</b>                                              |                            |
| MWD - Metropolitan Water District, SDCWA – San Diego County Water Authority, UWMP - Urban Water Management Plan.<br>*Includes conveyance from the State Water Project & Colorado River water to MWD’s distribution system, and distribution from MWD to MWD’s member agencies.<br>**Conveyance of raw water supplies to the water treatment plants or to member agency connections (negative value means hydro-electric generation by SDCWA).<br>*** Distribution of treated water from SDCWA’s Twin Oaks Water Treatment Plant to SDCWA’s member agencies.<br>“Upstream” refers to moving water from the original source to SDCWA’s member agency’s service area or first connection point<br><b>MWD 2016, SDCWA 2016, Energy Policy Initiatives Center, University of San Diego 2018</b> |                                                           |                            |

Local Supply and Conveyance – This is defined as supply and conveyance of local surface and groundwater within the water agency service area to water treatment plants, such as pumping water from local surface water reservoirs to nearby water treatment plants. Due to the way data is provided, the local supply and conveyance energy intensity is combined with local water treatment energy intensity.

Local Potable Water Treatment – This is the energy used for water treatment plant operations. The energy intensity depends on the source water quality, the treatment level, and capacity and efficiency of the associated WTP. The City of San Diego owns three WTPs: Alvarado, Miramar, and Otay WTP that treat raw water to potable levels. The WTPs treat both imported untreated SDCWA water and local water. Both Alvarado and Otay WTP have on-site behind-the-meter PV systems. The PV systems are connected to the raw water pump stations at Alvarado and Otay WTP that pump water to and from the WTPs to the nearby reservoirs. Because the water conveyance and treatment operations are connected, the local water conveyance and treatment energy intensity are combined and given in Table 14.



**Table 14 Local Water Conveyance and Treatment Energy Intensity (San Diego, 2019–2022)**

| <b>Combined Miramar, Otay and Alvarado WTPs</b>                                        | <b>2019</b> | <b>2020</b> | <b>2021</b>    | <b>2022</b> | <b>Description</b>                                                                                                                                      |
|----------------------------------------------------------------------------------------|-------------|-------------|----------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water Treated (Acre-Feet)                                                              | 152,586     | 153,389     | No data        | 169,185     | Total water treated at three WTPs                                                                                                                       |
| Total Treatment + Conveyance Energy Use (kWh)                                          | 11,519,163  | 7,747,558   | No data        | 15,297,562  | Total electricity consumption including treatment plant operation, lake pump stations and electricity generated at Alvarado and Otay on-site PV systems |
| Total Treatment + Conveyance Energy Intensity (kWh/Acre-Foot)                          | 75          | 51          | No data        | 90          | Total Energy Intensity (total electricity divided by water treated)                                                                                     |
| Solar Production (kWh)                                                                 | 2,272,785   | 2,172,498   | No data        | 2,138,351   | Annual electricity generated Alvarado and Otay on-site PV systems                                                                                       |
| Net Treatment + Conveyance Energy Use (kWh)                                            | 9,255,955   | 9,279,866   | No data        | 13,159,211  | Net electricity purchase from the grid (SDG&E). Total electricity consumption minus solar production.                                                   |
| <b>Net Treatment + Conveyance Energy Intensity (kWh/Acre-Foot)</b>                     | <b>61</b>   | <b>60</b>   | <b>No data</b> | <b>78</b>   | <b>Net Energy Intensity (net energy divided by water treated)</b>                                                                                       |
| City of San Diego 2024, Energy Policy Initiatives Center, University of San Diego 2024 |             |             |                |             |                                                                                                                                                         |

Starting in March 2019, not all the solar generated at Otay Lake Pump Station (OLPS) is used solely by the pump station anymore. The excess solar generation goes to the grid and is shared with other Otay accounts. The solar generation share allocated to the OLPS was available for 2020 but not for 2021, therefore, the 2020 energy intensity was used as a proxy for 2021.

Local Potable Water Distribution – This is defined as the energy required to move treated water from water treatment plants to end-use customers. Distribution energy use includes energy use for water pump stations and/or pressure reduction stations, water storage tanks, etc. Local distribution energy intensity depends on the service area’s geological conditions, such as the elevation the water is pumped to/from, the pump station’s energy efficiency, and whether a pump station is offline for maintenance or repair, which would cause water to be pumped to other pressure zones and rerouted back. The City of San Diego’s water service area has some areas with gravity-fed system (no energy needed) and some areas that need water pumping. The citywide water distribution energy intensity is given in Table 15.

**Table 15 Local Water Distribution Energy Intensity (San Diego, 2019–2022)**

| Citywide Water Distribution                                                                                                                                                                                                                                                       | 2019       | 2020       | 2021       | 2022       | Description                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------------|-----------------------------------------------------------------------------------------------------------|
| Total Water Moved (Acre-Feet)                                                                                                                                                                                                                                                     | 168,014    | 173,787    | 174,952    | 179,695    | Total City of San Diego water production from all water sources (including sales to other water agencies) |
| Distribution Pump Stations Energy Use (kWh)                                                                                                                                                                                                                                       | 25,340,506 | 26,614,233 | 27,273,076 | 27,185,368 | Electricity use at water pump stations excluding lake pump stations                                       |
| <b>Water Distribution Energy Intensity (kWh/Acre-Foot)</b>                                                                                                                                                                                                                        | <b>151</b> | <b>153</b> | <b>156</b> | <b>151</b> | <b>Citywide water distribution energy intensity</b>                                                       |
| The energy intensities are the citywide water distribution system energy intensities, do not represent the energy intensity of a specific area or pressure zone within the City.<br><b>City of San Diego 2024, Energy Policy Initiatives Center, University of San Diego 2024</b> |            |            |            |            |                                                                                                           |

Local Recycled Treatment and Distribution – This is energy required to treat recycled water (tertiary treatment, in addition to conventional wastewater treatment) and deliver it to end-use customers. In the City, the recycled water is delivered to customers in purple pipes, separated from the potable water distribution system. The recycled water energy intensity from the City’s 2015 UWMP voluntary reporting, 38 kWh/Acre-Foot, is used for all years.<sup>45</sup> The intensity includes energy use for tertiary treatment at WTPs and for recycled water distribution.

#### 4.6.3 Total Emissions from Water

To convert the energy intensity of water to GHG emissions per unit of water, the electricity emission factor associated with the energy use is applied. For upstream energy use, a California-wide average emission factor from EPA eGRID is applied.<sup>46</sup> For local energy use, including potable water conveyance and treatment, distribution, and recycled water treatment and distribution, SDG&E’s bundled electricity emission factor is applied for 2019 and 2020 because SDG&E was the electricity supplier. SDCP’s default electricity emission factor is applied for 2021 and 2022 because the municipal accounts were switched to SDCP. The electricity emission factors are given in Table 16.

**Table 16 Electricity Emission Factors for Water-Energy Intensities (2019–2022)**

| Year | Electricity Emission Factors for Water-Energy Intensities (lbs CO <sub>2</sub> e/MWh) |                        |
|------|---------------------------------------------------------------------------------------|------------------------|
|      | Upstream (WECC-California from eGRID)                                                 | Local (SDG&E or SDCP)* |
| 2019 | 455                                                                                   | 633 (SDG&E bundled)    |
| 2020 | 515                                                                                   | 636 (SDG&E bundled)    |
| 2021 | 534                                                                                   | 378 (SDCP)             |

<sup>45</sup> City of San Diego, [2015 Urban Water Management Plan](#), Table 10-4 Energy Intensity for Wastewater and Recycled Water.

<sup>46</sup> The Western Electricity Coordinating Council (WECC) CAMX (eGRID Subregion) emission rates from eGRID were used as representative of the average California electricity emission rate for upstream electricity. U.S. EPA. [eGRID2019](#), released February 23, 2021; [eGRID2020](#), re-released January 30, 2023; [eGRID2021](#), released January 30, 2023; [eGRID2022](#) released Feb 26, 2024.

|                                                                                                                                                                                                                                                                                                          |     |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------|
| 2022                                                                                                                                                                                                                                                                                                     | 499 | 375 (SDCP) |
| *SDG&E bundled emission factor is different from City-specific electricity emission factor, which is based on percentages of electricity sales to SDG&E bundled and DA customers, SDG&E and DA emission factors. SDCP<br><b>EPA 2024, Energy Policy Initiatives Center, University of San Diego 2024</b> |     |            |

For upstream supply and conveyance emissions, the volume of water from SDCWA (treated and untreated) was multiplied by the upstream energy intensities (Table 13) and the upstream electricity emission factor (Table 16). Because the electricity use and GHG emissions associated with upstream supply and conveyance are outside the City boundary and would not be included in the electricity category, they are accounted for in the water category.

For local conveyance and treatment emissions, the volume of water treated at three WTPs and delivered within the City (excluding sales to other agencies) was multiplied by the net water treatment energy intensity (Table 14) and local grid electricity emission factor (Table 16). Because WTPs are located within San Diego, the electricity use associated with water treatment is included in the electricity category for San Diego. Therefore, electricity and GHG emissions associated with water treatment occur within the City boundary and have been subtracted from the electricity category, as they are accounted for in the water category.

For local water distribution emissions, total water within the City (excluding sales to other agencies) was multiplied by the water distribution energy intensity (Table 15) and local grid electricity emission factor (Table 16). Electricity and GHG emissions associated with water distribution occur within the City boundary and have been subtracted from the electricity category, as they are accounted for in the water category.

For recycled water treatment and distribution emissions, total recycled water supplied was multiplied by the recycled water energy intensity (38 kWh/Acre-Foot, Table 15) and local grid electricity emission factor (Table 16). Electricity and GHG emissions associated with recycled water treatment and distribution occur within the City boundary and have been subtracted from the electricity category, as they are accounted for in the water category.

The total potable and recycled water supplied and the corresponding GHG emissions from the water category in 2019 are given in Table 17.

**Table 17 Water Supplied and GHG Emissions from the Water Category (San Diego, 2019–2022)**

| Year                                                                                                                                                                                                                | Potable Water Supplied (Acre-Feet) | Recycled Water Supplied (Acre-Feet) | GHG Emissions (MT CO <sub>2</sub> e) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|--------------------------------------|
| 2019                                                                                                                                                                                                                | 161,472                            | 7,999                               | 61,000                               |
| 2020                                                                                                                                                                                                                | 166,742                            | 8,842                               | 70,000                               |
| 2021                                                                                                                                                                                                                | 161,995                            | 8,586                               | 70,000                               |
| 2022                                                                                                                                                                                                                | 179,695                            | 10,012                              | 74,000                               |
| GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.<br><b>Energy Policy Initiatives Center, University of San Diego 2024</b> |                                    |                                     |                                      |

## 4.7 Wastewater

The emissions from wastewater generated by San Diego were estimated by multiplying the total amount of wastewater generated in 2019 and the emission factor of the wastewater treatment processes. Unlike the water category, in which the GHG emissions result from the energy used to move and treat water, wastewater-related GHG emissions include only “*process, stationary and fugitive GHG emissions*,” as described in U.S. Community Protocol “WW.1 – WW.14.”<sup>47</sup>

### 4.7.1 Wastewater Generation

Wastewater generated in the City of San Diego is conveyed to the City of San Diego Metropolitan Sewerage System (Metro System). The Metro System collects and treats wastewater from 12 partner agencies. Wastewater collected by the Metro System is treated at one of the three wastewater treatment plants (WWTPs): Point Loma WWTP, North City WRP, and South Bay WRP.<sup>48</sup>

It is assumed the percentage of City of San Diego’s wastewater treated at each WWTP is the same as that of the entire Metro System. The City’s wastewater generation and the percentage treated at each WWTP are given in Table 18.

**Table 18 City of San Diego Wastewater Generation (San Diego, 2019–2022)**

| Year                                                                                                                                                                                                                | % of Wastewater Treated at Each WWTP |               |                | Wastewater Flow to Metro System       |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------|----------------|---------------------------------------|--------------------------|
|                                                                                                                                                                                                                     | Point Loma WWTP                      | South Bay WRP | North City WRP | Average Million Gallons per Day (MGD) | Million Gallons per Year |
| 2019                                                                                                                                                                                                                | 86%                                  | 4%            | 10%            | 105                                   | 38,241                   |
| 2020                                                                                                                                                                                                                | 86%                                  | 4%            | 10%            | 105                                   | 38,192                   |
| 2021                                                                                                                                                                                                                | 87%                                  | 4%            | 9%             | 103                                   | 37,591                   |
| 2022                                                                                                                                                                                                                | 88%                                  | 4%            | 8%             | 101                                   | 36,865                   |
| Sum may not add up to totals due to rounding.<br>WWTP – wastewater treatment plant; WRP – water reclamation plant.<br><b>City of San Diego 2024, Energy Policy Initiatives Center, University of San Diego 2024</b> |                                      |               |                |                                       |                          |

<sup>47</sup> ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.2 (2019), Appendix F: Wastewater and Water Emission Activities and Sources.

<sup>48</sup> City of San Diego, [2015 Urban Water Management Plan](#), Section 3 Description of Existing Water System. Some of the North City WRP’s flow (non-tertiary flow) is conveyed to Point Loma WWTP for discharge.



#### 4.7.2 Wastewater Emission Factor

Point Loma WWTP and North City WRP both report plant operation GHG emissions to CARB under the Mandatory GHG Reporting Regulation (MRR) program.<sup>49</sup> The reported GHG emissions include three components: (1) direct CO<sub>2</sub> from combustion of anaerobic digester gas; (2) CH<sub>4</sub> and N<sub>2</sub>O emissions from digester gas combustion; and (3) operational fossil fuel emissions assuming complete combustion. The direct CO<sub>2</sub> from combustion of anaerobic digester gas is considered biogenic, while the other two components of CO<sub>2</sub> emissions are considered non-biogenic emissions.

The wastewater treatment emission factor (MT CO<sub>2</sub>e/million gallons) at Point Loma WWTP and North City WRP are calculated by dividing the reported GHG emissions by the plants' wastewater flows, as shown in Table 19.<sup>50</sup>

**Table 19 Emission Factors at Wastewater Treatment Plant (San Diego, 2019–2022)**

| Year                                                                                                                                                                                                                                                                              | Point Loma WWTP                  |                                            |                                                                           | North City WRP                         |                                            |                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------|---------------------------------------------------------------------------|----------------------------------------|--------------------------------------------|---------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                   | Annual Flow<br>(million gallons) | GHG<br>Emissions<br>(MT CO <sub>2</sub> e) | Wastewater<br>Emission Factor<br>(MT CO <sub>2</sub> e/million<br>gallon) | Annual<br>Flow<br>(million<br>gallons) | GHG<br>Emissions<br>(MT CO <sub>2</sub> e) | Wastewater<br>Emission Factor<br>(MT CO <sub>2</sub> e/million<br>gallon) |
| 2019                                                                                                                                                                                                                                                                              | 52,571                           | 15,955                                     | 0.30                                                                      | 5,905                                  | 17,733                                     | 3.0                                                                       |
| 2020                                                                                                                                                                                                                                                                              | 52,122                           | 17,403                                     | 0.33                                                                      | 5,858                                  | 13,503                                     | 2.3                                                                       |
| 2021                                                                                                                                                                                                                                                                              | 51,556                           | 17,289                                     | 0.34                                                                      | 5,074                                  | 13,503                                     | 2.7                                                                       |
| 2022                                                                                                                                                                                                                                                                              | 53,546                           | 15,072                                     | 0.28                                                                      | 4,873                                  | 3,815                                      | 0.8                                                                       |
| WWTP – wastewater treatment plant; WRP – water reclamation plant.<br>On average 99% of the emissions from Point Loma WWTP and 98% of emissions from North City WRP are biogenic.<br><b>City of San Diego 2022, Energy Policy Initiatives Center, University of San Diego 2024</b> |                                  |                                            |                                                                           |                                        |                                            |                                                                           |

#### 4.7.3 Total Emissions from Wastewater

For the GHG emissions calculation, the wastewater emission factor derived from Point Loma WWTP was applied to the wastewater flow into Point Loma WWTP and the emission factor derived from North City WRP was applied to the flow into both North City WRP and South Bay WRP. The total wastewater flow, the citywide weighted average wastewater emission factors, as well as the corresponding GHG emissions are given in Table 20. In 2022, there was a sharp decrease in emissions associated with wastewater treatment. This is because the on-site generation facilities, power plants using landfill gas, at the North City Water Reclamation Plant were decommissioned that year.

<sup>49</sup> CARB: [Mandatory GHG Reporting – Reported Emissions](#). 2020 and 2021 GHG emissions data, current as of November 4, 2022. CARB MRR uses 21 as the CH<sub>4</sub> GWP, therefore the CO<sub>2</sub>e for CH<sub>4</sub> in this report is recalculated using 25 as the CH<sub>4</sub> GWP to be consistent with other categories in the inventory.

<sup>50</sup> Point Loma WWTP and North City WRP GHG Reports are from CARB Mandatory GHG Reporting. Wastewater flow into each facility was provided by City of San Diego to EPIC in November 2022.

**Table 20 Wastewater Generated and GHG Emissions from Wastewater Category (San Diego, 2019–2022)**

| <b>Year</b>                                                                                                                                                                                                                                                                                                                                          | <b>Total Wastewater Generated<br/>(Million Gallons/year)</b> | <b>Wastewater Emission Factor<sup>1</sup><br/>(MT CO<sub>2</sub>e/ Million Gallon)</b> | <b>GHG Emissions<br/>(MT CO<sub>2</sub>e)</b> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------|
| 2019                                                                                                                                                                                                                                                                                                                                                 | 38,241                                                       | 0.67                                                                                   | 26,000                                        |
| 2020                                                                                                                                                                                                                                                                                                                                                 | 38,192                                                       | 0.60                                                                                   | 23,000                                        |
| 2021                                                                                                                                                                                                                                                                                                                                                 | 37,591                                                       | 0.63                                                                                   | 24,000                                        |
| 2022                                                                                                                                                                                                                                                                                                                                                 | 38,865                                                       | 0.34                                                                                   | 13,000                                        |
| <sup>1</sup> Weighted average emission factor of wastewater treated at three wastewater treatment plants in City of San Diego.<br>GHG emissions for each category are rounded to the nearest thousand. Values are not rounded in the intermediary steps in the calculation.<br><b>Energy Policy Initiatives Center, University of San Diego 2024</b> |                                                              |                                                                                        |                                               |