Port of San Diego

2022 Greenhouse Gas Emissions Inventory

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PORT of SAN DIEGO Environment

Prepared by:

ASCENT

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Terminalift

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ACRONYMS AND ABBREVIATIONS

ABM	Activity Based Model
CalEEMod	California Emission Estimator Model
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEC	California Energy Commission
CH_4	methane
CHC	commercial harbor craft
CHE	cargo handling equipment
CNG	compressed natural gas
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CST	Cruise Ship Terminals
DA	Direct Access
DOE	U.S. Department of Energy
EIA	U.S. Energy Information Administration
EMFAC	Emission Factor Model
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GREET	Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies Model
GWP	global warming potential
HFC	hydrofluorocarbon
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
MCAS	Maritime Clean Air Strategy
kWh	kilowatt-hour
MWh	megawatt-hour
N_2O	nitrous oxide
NCMT	National City Marine Terminal
OGV	ocean-going vessel
RTAC	Regional Targets Advisory Committee
SANDAG	San Diego Association of Governments
SDCP	San Diego Community Power
SDG&E	San Diego Gas & Electric
TAMT	Tenth Avenue Marine Terminal
TCR	The Climate Registry
VMT	vehicle miles traveled

1 EXECUTIVE SUMMARY

This report describes the approach and results for estimating the Port of San Diego's (Port's) greenhouse gas (GHG) emissions for calendar year 2022 activities. The 2022 emissions inventory (2022 Climate Action Plan Inventory) provides an update on progress in achieving the GHG emission reduction goals of the Port's Climate Action Plan (CAP), adopted in 2013: a 10 percent decrease in GHG emissions from the 2006 baseline by 2020 and a 25 percent decrease from the baseline by 2035. The inventory includes three general categories of emission sectors: maritime, non-maritime, and Port operations.

- Maritime emissions include activities related to the movement of goods and passengers associated with marine terminal operations.[1] The emission sources in this category are ocean-going vessels, harbor craft, cargo handling equipment, trucks, and freight rail.[2]
- Non-maritime emissions encompass operations at various businesses at the Port whose primary activity is not maritime-related. This category includes energy and fuel consumption in restaurants, marinas, hotels, retail, shipyards, and boatyards, as well as vehicle miles traveled (VMT) from visitors to the Port.
- Port operations emissions encompass energy and fuel consumption from Port operations including activities from Port buildings, outdoor lighting in public areas, and the Port's vehicle fleet.

These definitions are consistent with those of the previous emissions inventory, *Overview of Methods and Results for the Recalibrated 2006 Baseline Greenhouse Gas Inventory and 2016 Greenhouse Gas Inventory Progress Report*, which is referred to hereafter as the 2016 Progress Report and is provided as Appendix C of this report. A comparison of the data and methods used for the various inventory years is provided in Appendix A of this report, while methodological details of the revised 2006 and 2016 inventories are provided in Appendix B of this report.

This is the first comprehensive GHG emissions inventory since calendar year 2016 and the first since the Maritime Clean Air Strategy (MCAS) was adopted by the Board of Port Commissioners in October 2021. However, few, if any, GHG emission reduction actions identified in the MCAS were implemented in calendar year 2022.

1.1 OVERVIEW

This report describes in detail the methodologies and results for emissions related to non-maritime activity and Port operations. Methods and GHG emissions estimates for the maritime category are documented in the *2022 Maritime Air Emissions Inventory* (Appendix D of this report) and are incorporated here by reference to include in total Port emissions.

Table 1 summarizes the results of the emissions analysis by general sector, including emissions from maritime, non-maritime, and Port operations. These emissions were calculated by multiplying the quantities of each emissions-generating activity (e.g., VMT and electricity consumption) with the appropriate emission factor (e.g., metric tons of carbon dioxide equivalent [$MTCO_2e$] per mile and per kilowatt-hour [kWh], respectively). All calculations assumed 100-year global warming potentials of 1, 27, and 273 for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), respectively. These values are derived from the Intergovernmental Panel on Climate Change's (IPCC's) Sixth Assessment Report (IPCC 2022: 1831).

Table 2 distinguishes GHG emissions by type. As shown, the majority (79 percent) of GHG emissions are associated with non-maritime operations, while the remainder are associated with maritime (20 percent) and Port operations (1 percent). More discussion related to the activities associated with each of these types is provided below. **Figure 1** summarizes the relative contributions of each type for the 2022 inventory.

The 2022 inventory reveals the following key findings regarding the trend in the Port's GHG emissions. **Table 3** summarizes the results of previous GHG emissions inventories.

[1] The Port has four marine terminals: Cruise Ship Terminals (CST; B Street Cruise Ship Terminal and Port Pavilion on Broadway Pier [Broadway Pavilion]), Tenth Avenue Marine Terminal (TAMT), and National City Marine Terminal (NCMT).

[2] Within this report, the term "tenants" is used to describe maritime and non-maritime leaseholders and equipment owners within the Port boundary that operate equipment or otherwise operate land uses that attract visitors which directly (e.g., emit emissions from their owned or rented equipment) or indirectly (e.g., emissions emit from visitors attracted to the site) emit emissions associated with operations at the Port.

Since 2006, the year of the Port's first comprehensive GHG emissions inventory (Recalibrated 2006 Baseline), GHG emissions have been reduced across all sectors. Overall, GHG emissions are down 26 percent since 2006.

Since 2016, GHG emissions are down 5 percent. However, the trend by sector since 2016 is less uniform than the trend since 2006. For instance, emissions from some sectors, such as electricity and water, have decreased, while emissions from other sectors, such as natural gas, solid waste, and off-road transportation, have increased.

The trajectory of emission reductions at the Port is consistent with the trajectory of reductions at the state level. In California, GHG emissions in 2022 (371.1 million $MTCO_2e$) were 22 percent lower than 2006 emissions (476.5 million $MTCO_2e$) and 10 percent lower than 2016 emissions (414.1 million $MTCO_2e$). This is shown in **Figure 2**.

Further details regarding sources, methodology, and results are provided in the next section.

Table 1. 2022 Emissions by Sector

General Sector	Total Emissions ($MTCO_2e$)
Electricity	68,320
Natural Gas[1]	30,368
On-Road Transportation[2]	102,752
Off-Road Transportation[3]	122,724
Water Use	1,886
Solid Waste	5,963
High-GWP Gases[4]	63
Total	**332,075**

Note: GWP = global warming potential.

[1] The value shown here does not include emissions from combustion of natural gas at CP Kelco, a manufacturing plant within the Port boundary. Unlike other Port tenants, CP Kelco is obligated to reduce its emissions under the California Air Resources Board's (CARB's) Cap-and-Trade Program because those emissions exceed 10,000 $MTCO_2e$ per year (CARB 2018). Thus, CP Kelco's emissions are tracked and reported separately from those shown in Table 1. See Table 3 for more details on how CP Kelco's emissions were calculated.

[2] On-road transportation includes passenger car activity for all Port-wide uses, heavy-duty terminal truck activity, and offloading of new cars at National City Marine Terminal.

[3] Off-road transportation includes all other maritime-related mobile emission sources (e.g., ocean-going vessels, harbor craft, cargo handling equipment, and rail) as well as mobile and stationary equipment at industrial tenants' facilities (e.g., boatyards and shipyards).

[4] High-GWP gases are used as refrigerants as well as in various industrial applications. For example, HFC-134a (1,1,1,2-tetrafluoroethane) is a common refrigerant with a 100-year GWP of 1,526 (IPCC 2022: 1831). This analysis only includes emissions estimates for refrigerants used in Port vehicles and buildings, as no other data on refrigerant usage at the Port was available.

Source: Prepared by Ascent in 2025.

Table 2. 2022 Emissions by Type

Tenant Type	Total Emissions ($MTCO_2e$)	% of Total
Non-Maritime	263,872	79%
Maritime	65,129	20%
Port Operations	3,073	1%
Total	**332,075**	**100%**

Source: Prepared by Ascent in 2025.

Figure 1. 2022 Emissions by Type

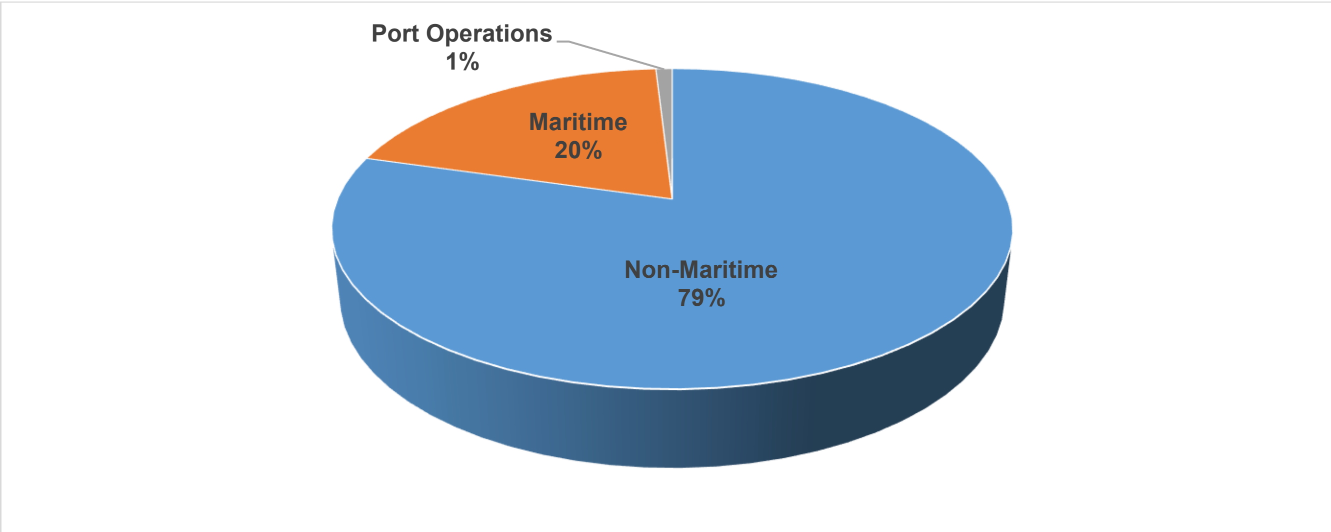
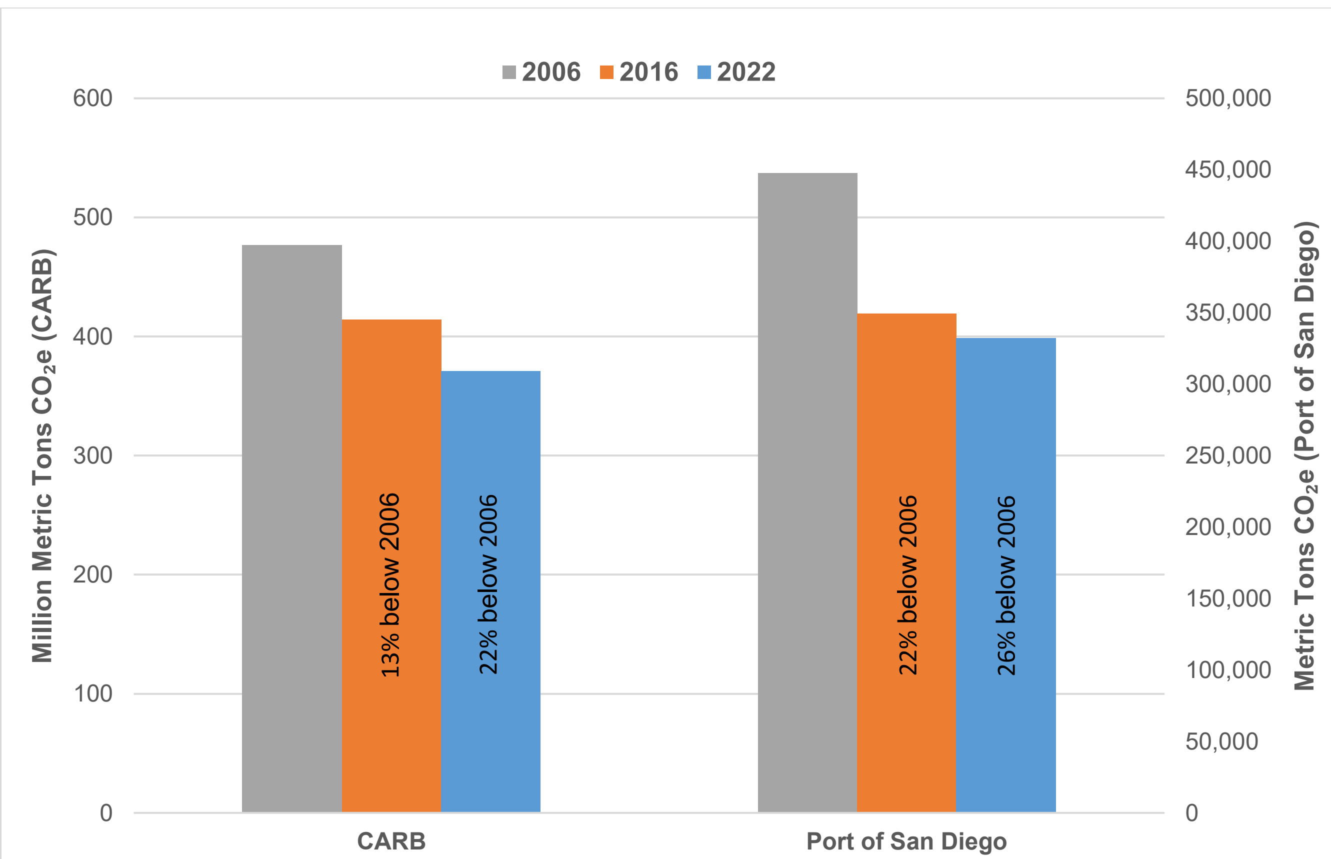


Figure 2. Comparison of CARB and Port of San Diego GHG Inventories Over Time



2 RESULTS DISCUSSION

Table 3 provides a comparison of the 2022 inventory to the 2016 inventory (Recalibrated 2016 CAP Inventory) as well as the Recalibrated 2006 Baseline inventory. Both the 2006 and 2016 GHG inventories have been recalibrated based on updated methodologies and/or data. Table 3 also summarizes the relative changes in emissions by sector and overall emissions. **Figure 3** shows the trend in GHG emissions by sector over time. The Port compares emissions against 2006 levels, using 2016 as an interim milestone for trend analysis where appropriate.

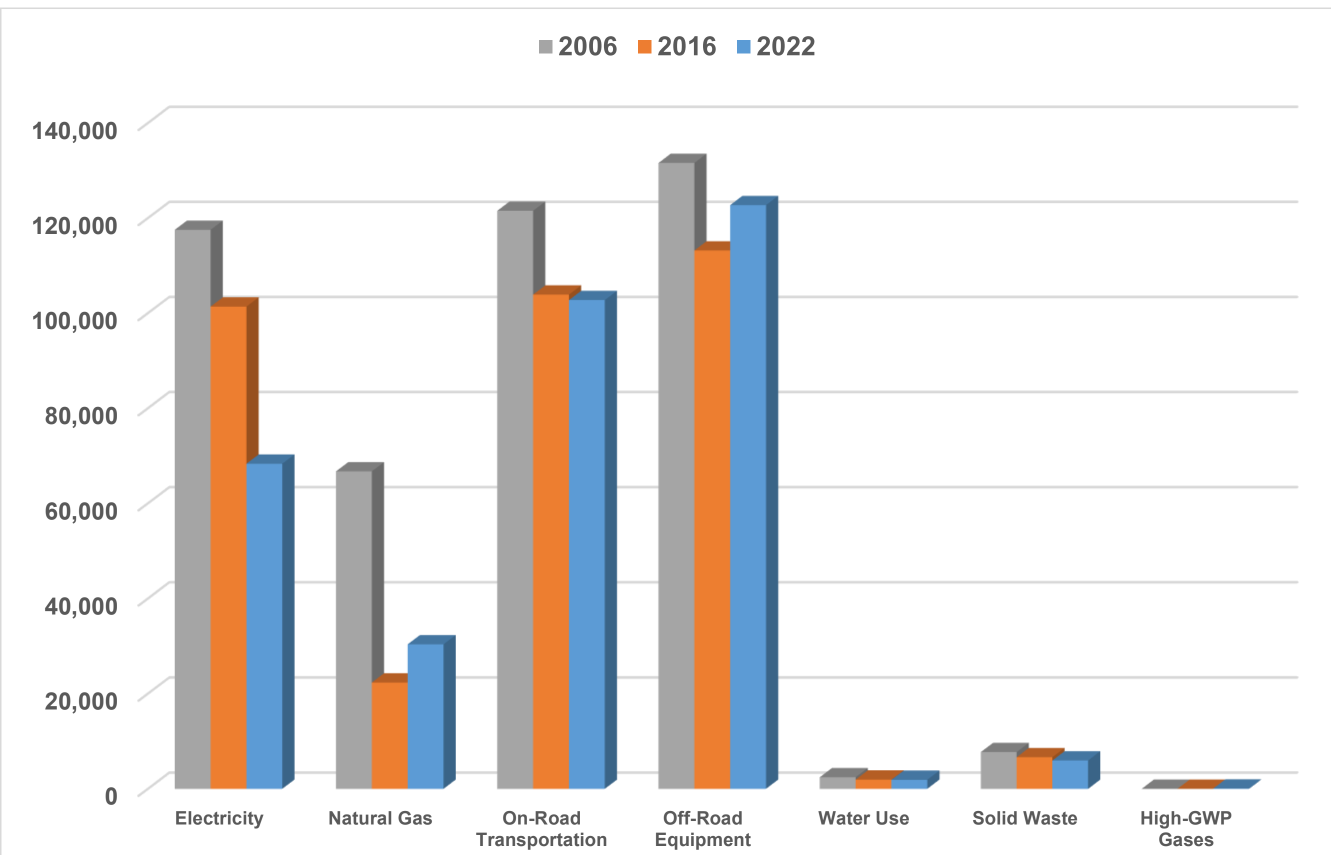
Table 3. Comparison of Emissions by Sector Between Inventory Years (emissions in $MTCO_2e$)

General Sector	2022	Recalibrated 2016[1]	Recalibrated 2006[1]	*Change Since 2016*	*Change Since 2006*
Electricity	68,320	101,381	117,526	*-33%*	*-42%*
Natural Gas	30,368	22,336	66,723	*+36%*	*-54%*
On-Road Transportation	102,752	103,905	121,533	*-1%*	*-15%*
Off-Road Transportation	122,724	113,175	131,596	*+8%*	*-7%*
Water Use	1,886	1,926	2,606	*-2.1%*	*-28%*
Solid Waste	5,963	6,565	7,717	*-9%*	*-23%*
High-GWP Gases	63	-	-	-	-
Total	**332,075**	**349,288**	**447,702**	***-5%***	***-26%***

[1] Emission values for 2006 and 2016 were recalibrated in this report for the on-road transportation, solid waste, and water sectors to reflect data improvements and updated methodologies.

Source: Prepared by Ascent in 2025.

Figure 3. Comparison of GHG Emissions Inventories by Sector (emissions in $MTCO_2e$)



Variations in emissions are the result of shifts in activity (e.g., electricity consumption, visitor VMT, and fuel consumption) and/or changes in the rates of emissions per unit of activity (e.g., GHG emissions per unit electricity consumed and GHG emissions per visitor VMT). Major factors contributing to emission reductions demonstrated in the Port's 2022 inventory compared to the 2006 and 2016 GHG inventories are described below.

GHG emissions due to purchased electricity account for 21 percent of the Port's total emissions. Since 2006, emissions associated with purchased electricity have decreased by 42 percent, which is due to a greater proportion of less carbon-intense sources of grid electricity and a reduction in grid electricity usage. For example, the San Diego Gas & Electric (SDG&E) emission rate per unit of electricity has decreased 35 percent between 2006 and 2022. Additionally, San Diego Community Power (SDCP), founded in 2019, began providing electricity in 2021 to the Port and many Port tenants. SDCP's emission rate for its PowerOn service (which is SDCP's default opt-in option) in 2022 was 26 percent lower than SDG&E's 2022 emission rate.

GHG emissions from non-maritime on-road transportation account for 26 percent of the total emissions. While vehicle miles traveled have increased over time, emissions from this category have decreased by 5 percent since 2006 because of higher fuel efficiency standards and greater availability of electric vehicles.

Maritime-related GHG emissions make up 20 percent of the total emissions. Emissions in this sector are affected by variable activity over time but also cleaner technologies. Compared to 2006, 2022 saw fewer ocean-going vessel calls and less truck activity. Combined with increased shore power use for OGVs, higher fuel efficiency standards for trucks, and the addition of zero-emission cargo handling equipment, maritime emissions have decreased by 36 percent since 2006.

Although the Port's operational emissions are only 1 percent of total emissions, they have decreased by approximately 50 percent since 2006 through lower consumption of purchased electricity, cleaner grid electricity, more fuel-efficient fleet vehicles, and a shift to renewable diesel fuel.

Since 2016, the Port's overall GHG emissions have only decreased 5 percent. While emissions have decreased in several sectors, two sectors, natural gas and off-road transportation, had emissions increases of 36 percent and 8 percent, respectively. The former is the result of increased natural gas consumption, and the latter was driven by an increase in cruise ship calls since 2016. It is expected that emissions from cruise ship activity will decrease in the future, as new infrastructure has been installed that adds greater flexibility for cruises to plug into shore power at berth.

Table 4 further categorizes emissions into specific subsectors and lists 2006 and 2016 emissions side by side for comparison. Two versions of the 2006 and 2016 emission values are shown: 1) the previously "recalibrated" emissions values (Original 2006 and Original 2016) presented "as is," directly from the 2016 Progress Report, and 2) "recalibrated" emission values (Recalibrated 2006 and Recalibrated 2016), for which emissions due to Port visitor on-road VMT, tenant water usage, and tenant solid waste have been recalibrated.[3] These recalibrated values reflect data improvements and updated methodologies that provide a more accurate estimate of 2006 and 2016 emissions. This recalibration allows for "like-for-like" comparisons between inventory years and thus an understanding of the drivers of emissions changes between those years (i.e., changes in activity levels and emission factors).

The following steps were performed in the 2006 and 2016 recalibration

- For on-road vehicles, 2016 VMT activity data was updated because the San Diego Association of Governments' (SANDAG's) travel model had been updated. Additionally, VMT estimates for 2006 were updated based on data from CARB's EMission FACtor (EMFAC) model. Finally, the 2006 and 2016 vehicle emission factors were updated from their original values because of a new version of the EMFAC model. For tenant solid waste emissions, emission factors were updated to only include CH_4 from waste decomposition. The CO_2 released by the combustion of waste was not included in solid waste emissions, consistent with guidance from CARB. Additionally, the methodology for estimating waste tonnage and emissions for 2006 and 2016 was updated to be consistent with the latest guidance from Local Governments for Sustainability (ICLEI).
- For tenant water usage, water consumption and energy intensity (electricity consumption per unit volume of water delivered) were updated based on more granular locational energy intensity data and more current studies.

[3] Consistent with the IPCC guidelines and CARB's most recent GHG inventory, recalculations are made to incorporate new methods or reflect updated data for all years to maintain a consistent inventory time series (CARB 2024a).

Recalibration for Port visitor on-road vehicles. Emissions from VMT by Port visitors in 2006 and 2016 were recalibrated from the original values in the 2016 Progress Report. This recalibration included two changes. First, since the 2016 Progress Report's release in 2017, SANDAG updated its travel demand model from Activity-Based Travel Demand Model 2+ (ABM2+), which was based on the Series 13 growth forecast, to ABM3, which is based on the Series 14 growth forecast. Second, since the 2016 Progress Report's release in 2017, CARB updated its EMFAC model from EMFAC2017 to EMFAC2021.

Using the SANDAG's ABM3 resulted in the 2016 annual VMT being revised downward from approximately 243 million to 195 million (a decrease of approximately 20 percent). The 2016 vehicle emission factor was revised upward from approximately 438 grams CO_2e per VMT to 455 grams CO_2e per VMT (an increase of approximately 4 percent) by using CARB's EMFAC2021. The net effect of these two adjustments was to revise 2016 on-road vehicle emissions from 106,414 $MTCO_2$e to 88,592 $MTCO_2$e (a decrease of approximately 17 percent).

Additionally, the 2006 VMT estimate was recalibrated from the original value in the 2016 Progress Report. The first year for which SANDAG travel model data is available is 2016, so there is no SANDAG data available to estimate VMT for years prior to 2016. Instead, 2006 VMT was estimated using VMT data from the EMFAC2021 model, based on the ratio of VMT for San Diego County for 2006 (28.3 billion annual VMT) and for 2016 (31.8 billion annual VMT). This ratio of 2006 to 2016 VMT (0.89 ratio) was multiplied by the 2016 VMT data from SANDAG in order to estimate 2006 VMT. This revision resulted in the 2006 annual VMT being revised downward from approximately 214 million to 173 million (a decrease of approximately 19 percent). In addition, the 2006 vehicle emission factor was revised based on EMFAC2021, resulting in an increase from the approximately 499 grams CO_2e per VMT used previously to 524 grams CO_2e per VMT (an increase of approximately 4 percent). The net effect of these two adjustments was to revise 2006 on-road vehicle emissions from 106,672 $MTCO_2$e to 90,541 $MTCO_2$e (a decrease of approximately 17 percent).

Recalibration for solid waste. Emissions from solid waste were not recalibrated from the original value in the 2016 Progress Report. To calculate recalibrated 2006 and 2016 solid waste emissions here, waste tonnage values were input into Equation SW.4.1 from the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Appendix E: Solid Waste Emission Activities and Sources, Version 1.1 (ICLEI 2013: 24). This formula only counts emissions from CH_4 produced by decomposition; it does not account for the CO_2 released when CH_4 is combusted. This is consistent with CARB accounting rules, which do not include CO_2 emissions from combustion of biogenic fuel such as landfill waste (CARB 2024a:16).

This updated methodology for waste emissions differs from that of the 2016 Progress Report, which counted both CO_2 from combustion and CH_4 emissions from decomposition of waste in total solid waste emissions. In the 2016 Progress Report, these sources comprised 47 and 53 percent of total solid waste emissions, respectively. The recalibrated emissions do not count CO_2 from combustion and thus are lower than the original value.

The net effect of these adjustments was a downward revision of the 2016 tenant solid waste emissions from 21,346 $MTCO_2$e (as shown in the CAP) to 5,358 $MTCO_2$e and a downward revision of the 2006 tenant solid waste emissions from 19,239 $MTCO_2$e to 2,606 $MTCO_2$e.

Recalibration for water usage. For energy related to tenant water usage, the 2016 Progress Report used energy intensity factors (in kilowatt-hours per million gallons, or kWh/MG) from the California Energy Commission's (CEC's) 2006 *Refining Estimates of Water-Related Energy Use in California* report (CEC 2006: 2). These factors were 13,022 kWh/MG for indoor uses and 11,111 kWh/MG for outdoor uses for the Southern California region. (CEC's report estimated water energy intensity for two regions, Northern California and Southern California.) To calculate water usage, the report compiled information from a literature review spanning from approximately 1996 to 2006.

The recalibration used more recent data from CalEEMod Version 2022.1, which was sourced from a 2021 Pacific Institute study (Szinai et al. 2021). These energy intensity values are 6,807 kWh/MG for indoor uses and 5,307 kWh/MG for outdoor uses in the South Coast Hydrologic Region (South Coast region) specifically, which encompasses a small portion of Santa Barbara County, all of Orange County, and major portions of Los Angeles, Riverside, San Bernardino, San Diego, and Ventura counties. These energy intensity values were derived by collecting and analyzing data from multiple water districts' 2015 Urban Water Management Plans, and they are approximately 52 and 48 percent of the values in the CEC's 2006 *Refining Estimates of Water-Related Energy Use in California* report, respectively.

It was assumed that these more current energy intensity factors represent methodology improvements for calculating energy intensity rather than improvements in the underlying technology used to pump, treat, and deliver water between these years. For example, the South Coast region (used to develop the CalEEMod estimates) is a subregion of the Southern California region (used to develop the 2006 *Refining Estimates of Water-Related Energy Use in California* report), and evaluating the former region's operations would thus result in more granular estimates of water-related energy usage. Although some improvement in the underlying efficiency of water pumps may have contributed to the decline in energy intensity, no data is available to support this claim. Additionally, it was assumed to be unlikely that higher-efficiency equipment could decrease energy use by the magnitudes of 52 and 48 percent, the values previously referenced.

Table 4. Emissions by Subsector for the Port of San Diego in 2022, 2016, and 2006 (in MTCO$_2$e)

General Sector	Sector	Subsector	2022	Recalibrated 2016	Original 2016	Recalibrated 2006	Original 2006
Electricity	Electricity	Tenants[1]	67,106	99,844	99,844	113,959	113,959
		Port Operations	1,215	1,537	1,537	3,567	3,567
Natural Gas	Natural Gas	Tenants[2]	30,217	22,191	22,191	66,396	66,396
		Port Operations	151	145	145	327	327
On-Road Transportation	Non-Maritime On-Road Transportation	Port Visitor VMT	86,435	88,592	106,414	90,541	106,672
		Port-Owned Vehicle VMT	745	988	988	1,045	1,045
	Maritime On-Road Transportation	Terminal Trucks and Car Offloading	15,572	14,325	14,325	29,947	29,947
Off-Road Transportation	Off-Road Equipment (Non-Maritime)[3]	Yacht Clubs & Lumber Yards	1,315	1,286	1,286	1,545	1,545
		Shipyards	4,002	1,825	1,825	2,109	2,109
		Boatyards	108	575	575	693	693
		Generators	29	718	718	717	717
		Port Operations	447	715	715	591	591
	Recreational Boating	Recreational Boating	67,266	55,227	55,227	57,662	57,662
	Off-Road Equipment (Maritime)	Ocean-Going Vessels (not including Shore Power)	32,294	20,766	20,766	38,975	38,975
		Harbor Craft	12,645	25,500	25,500	22,785	22,785
		Cargo-Handling Equipment	2,168	2,183	2,183	3,435	3,435
		Rail	2,450	2,646	2,646	3,084	3,084
		Shore Power for Ocean-Going Vessels[4]	0	1,734	1,734	NA	NA
Water Use	Water Use	Tenant Water	1,886	1,926	9,741	2,606	19,239
Solid Waste	Solid Waste	Tenant Solid Waste	5,509	5,358	19,604	6,166	11,200
		Port Operations	454	1,207	1,742	1,551	1,969
High-GWP Gases	High-GWP Gases	Port Operations	63	NA	NA	NA	NA
Total Emissions			**332,075**	**349,288**	**389,706**	**447,702**	**485,917**
CARB Cap-and-Trade Regulated Sources [5]			**116,001**	**114,847**	**114,847**	**95,833**	**95,833**
Total Emissions with CARB Regulated Sources			**448,076**	**464,135**	**504,553**	**543,535**	**581,750**

Note: NA = not applicable or not quantified.

[1] Tenant electricity includes all consumption from SDG&E customers, SDCP customers, and Direct Access customers. SDCP was founded in 2019 and began providing electricity in 2021.

[2] Tenant natural gas includes all consumption from SDG&E customers and Direct Access customers.

[3] Emissions from biogenic fuels are reported separately, consistent with CARB's reporting; the totals in Table 4 do not include biogenic emissions. The total GHG emissions from off-road equipment (non-maritime) and Port operations include 3,050 $MTCO_2e$ from biogenic fuels associated with renewable diesel.

[4] Renewable Energy Certificates were procured as part of the Low Carbon Fuel Standard program to offset emissions due to electricity usage at the Port's marine terminals. Therefore, the electrical grid emission factor used to estimate emissions associated with shore power was assigned an emission rate of 0 grams CO_2e per kilowatt-hour based upon guidance from Port staff.

[5] CP Kelco is a manufacturing plant within the Port boundary that is subject to CARB's Cap-and-Trade Program; see notes for Table 1. Its emissions were derived from publicly available Mandatory Reporting Regulation data (CARB 2024b). As of 2022, CP Kelco is the only Cap-and-Trade regulated source within the Port's boundary. However, in 2016, Solar Turbines Incorporated was also in the Cap-and-Trade Program; CP Kelco and Solar Turbines had 108,003 $MTCO_2e$ and 6,844 $MTCO_2e$ of emissions in 2016, respectively.

Source: Prepared by Ascent in 2025.

The net effects of these adjustments were downward revisions of the 2016 tenant water emissions, from 9,741 $MTCO_2e$ to 1,926 $MTCO_2e$, and the 2006 tenant water emissions, from 19,239 $MTCO_2e$ to 2,606 $MTCO_2e$.

Methodologies and results for calculating emissions, by sector, are discussed in the following text. Unless otherwise noted, all detailed methodology descriptions below refer to non-maritime and non-Port operations emissions. Maritime and Port operations emissions calculations are summarized in the final section but are not described in detail in this report. The focus of this report is on those tenant types and sources that are not covered by either the maritime air emissions inventory or the Port operations emissions inventory, which have been conducted separately from this analysis and are incorporated by reference. Detailed emission calculation methodologies for the Maritime and Port operations are provided separately.

2.1 ELECTRICITY

Activity Data. Anonymized aggregated data on the amount of grid electricity purchased by Port tenants was provided by SDG&E through its Energy Data Request Program and combined with data on tenant electricity purchases under utility accounts managed by the Port as well as data on purchases of Renewable Energy Certificates. SDG&E provided anonymized aggregated data for three groups of customers: SDG&E customers, SDCP customers, and Direct Access (DA) customers. The amounts of grid electricity purchased for Port operations and tenant utility accounts managed by the Port were obtained from utility account bills.

Emission Factor. The CEC's 2022 Power Source Disclosure data (CEC 2024) was used to determine the emission factors for electricity. These data provide statewide electricity usage (in megawatt-hours) and emission factors (in pounds of CO_2 equivalent per megawatt-hour [lbs per MWh]) for 136 different energy portfolios, which map to 94 retail electricity providers (such as DA, SDCP, and SDG&E). Some retail electricity providers offer their customers a choice between a standard portfolio or a lower-carbon portfolio containing a greater proportion of renewable energy, while others offer only one portfolio. Electricity use by portfolio within the Port boundary was not available; therefore, the most conservative emission factors across all portfolios offered by SDG&E and SDCP were used. For DA specifically, it was not known which DA providers served customers within the Port boundary (there were 12 statewide in the Power Source Disclosure Data), so a weighted average emission factor across all DA providers in the state was calculated. **Table 5** shows the results of this analysis.

Table 5. Calculation of Electricity Emissions

Electricity User	Utility	CO_2e Emission Factor (metric tons per MWh)	Total Emissions ($MTCO_2e$)
Port Operations	SDG&E	0.230	1,215
	SDCP	0.170	
Tenants	SDG&E	0.230	67,106
	SDCP	0.170	
	DA	0.291	
		Electricity Emissions Grand Total	**68,320**

Source: Prepared by Ascent in 2025.

2.2 NATURAL GAS

Activity Data. Anonymized aggregated data on tenant natural gas usage was provided by SDG&E through its Energy Data Request Program and combined with tenant usage under utility accounts managed by the Port. Natural gas consumption associated with Port operations and tenant utility accounts managed by the Port was obtained from utility account bills.

Emission Factor. Natural gas emission factors for CO_2, CH_4, and N_2O were derived from the U.S. Environmental Protection Agency (EPA 2022) and converted to pounds of CO_2 equivalent per therm (resulting in a value of approximately 11.7 pounds CO_2 equivalent per therm). These emission factors were then applied to total therms to calculate emissions, as shown in **Table 6** below. The DA values shown in the table exclude CP Kelco, which is a CARB-regulated entity under the Cap-and-Trade Program.

Table 6. Calculation of Natural Gas Emissions

Natural Gas User	Utility	CO_2e Emission Factor (pounds per therm)	Total Emissions ($MTCO_2e$)
Port Operations	SDG&E	11.7	151
Tenants	SDG&E	11.7	30,217
	DA	11.7	
		Natural Gas Emissions Grand Total	**30,368**

Source: Prepared by Ascent in 2025.

2.3 ON-ROAD TRANSPORTATION

Activity Data. Staff from SANDAG, in coordination with Intersecting Metrics, provided daily VMT for the Port for the years 2016 and 2025 (C. Arellano, pers. comm., 2024, and S. Cook, pers. comm., 2024). The 2022 values were linearly interpolated between the 2016 and 2025 values. These data were generated using the Series 14 Regional Growth Forecast model, and they included the following types of trips:

- Vehicle trips that both originated and terminated within the Port's jurisdictional boundary (Interior-Interior trips);
- Vehicle trips that originated within the Port's jurisdictional boundary and terminated outside the boundary (Interior-Exterior trips);
- Vehicle trips that originated outside the Port's jurisdictional boundary and terminated within the boundary (Exterior-Interior trips); and
- Vehicle trips that neither originated nor terminated within the Port's jurisdictional boundary. These trips are commonly called pass-through trips, or Exterior-Exterior trips.

Per the VMT accounting guidelines of the Regional Targets Advisory Committee (RTAC) established under California Senate Bill 375 (2008), these trips are assigned weights of 1, 0.5, 0.5, and 0, respectively, to calculate Port VMT. These daily VMT were converted to annual VMT using a factor of 347 travel days per year to account for reduced weekend and holiday mileage, consistent with the method in the 2016 Progress Report. **Table 7** presents the calculated VMT.

Table 7. Total Annual Port of San Diego Vehicle Miles Traveled (RTAC Method)

Year	I-I trips (weight = 1)	I-E and E-I trips (weight = 0.5)	E-E trips (weight = 0)	Total (RTAC Method)
2016	1,511,879	386,650,649	28,626,456,918	194,837,204
2025	1,573,298	423,221,326	30,204,644,148	213,183,961
2022	1,552,825	411,031,100	29,678,581,738	207,068,375

Notes: E = Exterior; I = Interior.

Source: Prepared by Ascent in 2025.

Emission Factor. SANDAG staff provided data on VMT by speed bin (defined as the vehicle speed increments used for VMT modeling, which in this case span a range of five miles per hour) within the Port boundary for 2016 and 2025 (C. Arellano, pers. comm., 2024). These values were used to linearly interpolate VMT by speed bin values for 2022. The 2022 VMT by speed bin was then mapped to CARB's EMFAC2021 model data, which contains emission factors by speed bin for San Diego County for 2022 (CARB 2024c). A weighted average emission factor of 417 grams CO_2e per VMT was then calculated for 2022, as shown in **Table 8**.

Table 8. Calculation of 2022 Port of San Diego Emission Factors for On-Road Transportation

	Daily VMT by speed bin			Percent of total VMT in each speed bin	EMFAC Emission Factor (g CO_2e/VMT)
Speed bin	**2016**	**2025**	**2022**	**2022**	**2022**
1 - 5 mph	11,845	13,337	12,840	1%	853
5 - 10 mph	33,326	36,601	35,509	3%	736
10 - 15 mph	33,846	39,896	37,879	3%	618
15 - 20 mph	29,443	35,503	33,483	3%	502
20 - 25 mph	80,264	83,611	82,496	7%	426
25 - 30 mph	54,152	55,167	54,829	5%	373
30 - 35 mph	90,427	103,630	99,229	8%	339
35 - 40 mph	77,587	78,996	78,526	7%	327
40 - 45 mph	78,616	80,041	79,566	7%	323
45 - 50 mph	80,013	90,968	87,316	7%	341
50 - 55 mph	66,551	79,664	75,293	6%	361
55 - 60 mph	165,991	176,890	173,257	15%	403
60 - 65 mph	218,293	251,189	240,224	20%	423
65 - 70 mph	95,321	96,491	96,101	8%	496
70+ mph	2,039	1,263	1,522	0%	1,358
Total	**1,117,711**	**1,223,248**	**1,188,069**	**100%**	**417**

Notes: g CO_2e = grams carbon dioxide equivalent. The total EMFAC emission factor represents a VMT-weighted average across all speed bins.

Source: Compiled by Ascent in 2025.

2.4 SOLID WASTE

Activity Data. Average solid waste disposal rates were obtained from the California Emissions Estimator Model (CalEEMod) Version 2022.1, Appendix G (California Air Pollution Control Officers Association [CAPCOA] 2022a). For most land use types, this information is provided as tons of solid waste per square foot per year by land use type. The exceptions were hotel/resort land uses, for which data was available in terms of tons of solid waste per room, and open space/golf land use types, for which data was in terms of tons of solid waste per acre.

These CalEEMod data were matched with Port tenant types and the associated square footage from land use data that was provided by Port staff (M. Giron, pers. comm., 2024) to estimate the amount of solid waste disposed by Port tenants. Where area was not available, square footage was estimated using Google Maps for single-story buildings based on data from the U.S. Energy Information Administration's (EIA's) Commercial Buildings Energy Consumption Survey (EIA 2022a and 2022b). When a tenant's analogous CalEEMod building type could not be established (e.g., marinas), the highest solid waste disposal rate in the CalEEMod data (restaurants) was assumed as a conservative estimate. **Table 9** lists the calculated solid waste tonnage.

Emission Factor. Emissions from solid waste generated by Port tenants were calculated using Equation SW.4.1 from the *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions*, Appendix E: Solid Waste Emission Activities and Sources Version 1.1 (ICLEI 2013: 24). This equation estimates emissions from the decomposition of organic material in landfills and accounts for landfill gas collection efficiency and an oxidation factor, which were assumed to be the default values of 0.75 and 0.10, respectively. No data was available on the specific mix of items in the solid waste stream, so the default value of 0.06 metric tons of CH_4 per wet short ton of mixed municipal solid waste was used (ICLEI 2013: 34).

The emissions calculations in this protocol do not include CO_2 emissions generated from the combustion of landfill gas. This is consistent with accounting conventions from CARB, which do not include CO_2 emissions from combustion of biogenic fuel in its comparison of statewide emissions to emission limits mandated by California Assembly Bill 32 (AB 32 [2006]; CARB 2024a: 16).

Table 9. Calculation of 2022 Solid Waste Disposal Tonnage

Tenant Type	Quantity	Units	Solid Waste Disposal (tons per unit)	Total solid waste disposed (tons)
Retail	89	1,000 sq ft	1.05	94
Office	105	1,000 sq ft	0.93	98
Restaurant	344	1,000 sq ft	11.90	4,097
Hotel/Lodging	8,674	Rooms	0.55	4,749
Warehouse/Storage	116	1,000 sq ft	0.94	109
Museums	29	1,000 sq ft	0.92	27
Industrial	2,569	1,000 sq ft	1.24	3,186
Boatyards	81	1,000 sq ft	1.24	100
Rental Car	58	1,000 sq ft	3.82	223
Yacht Clubs	99	1,000 sq ft	5.70	564
Marinas	126	1,000 sq ft	11.90	1,502
Sportfishing	11	1,000 sq ft	11.90	130
Commercial Fishing	35	1,000 sq ft	1.05	36
Excursions	3	1,000 sq ft	11.90	34
Ship/Boat Petroleum	17	1,000 sq ft	3.01	52
Open Space	227	Acres	0.09	20
Golf Course	100	Acres	0.93	93
			Total Solid Waste Disposed	**15,115**

Note: sq ft = square feet.

Source: Prepared by Ascent in 2025.

2.5 WATER

Activity Data. Indoor water consumption rates were obtained from CalEEMod Version 2022.1, Appendix G (CAPCOA 2022a). The method was identical to the one described in the Solid Waste section above, except the data is presented in terms of gallons of water per unit.

For outdoor water consumption at golf courses and parks, water use was estimated using the Maximum Applied Water Allowance (MAWA) methodology provided in CalEEMod, available in Section 5.4.1.2 (CAPCOA 2022b: C-55). Acreage estimates of these areas were obtained from land use data provided by Port staff (M. Giron, pers. comm., 2024). **Table 10** shows the calculated total water volumes.

Emission Factor. The water energy intensity factor (in kilowatt-hours per gallon used) was calculated based on CalEEMod's water energy intensity data for the South Coast region (CAPCOA 2022a), which includes the Port. For indoor water use, this value was assumed to include energy associated with supply, treatment, distribution, and wastewater treatment. For outdoor water use, this value was assumed to include energy associated with supply, distribution, and treatment only. Wastewater treatment was not included in outdoor usage, which was assumed to be for water vegetation purposes only (i.e., the water would be taken up by the vegetation and would not enter the municipal wastewater processing system).

These data were used to calculate total energy used for water consumption. The emission factor assigned to this electricity was sourced from EPA (2022), assuming an average emission factor from the CAMX region, which covers the majority of California. This CAMX value was used because the exact sources of the Port's water (e.g., the Colorado River, the State Water Project, and local groundwater pumps) are not known. These water sources could be in different parts of California, each with their own local utility and electric emission factors. To reflect this uncertainty in which utilities' electricity is used to provide water to the Port, the CAMX value was used. **Table 11** below shows these calculated emissions.

Table 10. Calculation of Water Volume Consumed

Indoor or Outdoor	Tenant Types	Quantity	Units	Water Consumption Rates (gallons per unit)	Total Water Consumption (gallons)
Indoor	Retail	89	1,000 sq ft	74,073	6,598,773
Indoor	Office	105	1,000 sq ft	177,734	18,696,026
Indoor	Restaurant	344	1,000 sq ft	303,534	104,514,154
Indoor	Hotel/Lodging	8,674	Rooms	25,367	220,031,363
Indoor	Warehouse/Storage	116	1,000 sq ft	231,250	26,817,600
Indoor	Museums	29	1,000 sq ft	31,289	919,894
Indoor	Industrial	2,569	1,000 sq ft	231,250	594,244,050
Indoor	Boatyards	81	1,000 sq ft	231,250	18,728,706
Indoor	Rental Car	58	1,000 sq ft	94,081	5,498,100
Indoor	Yacht Clubs	99	1,000 sq ft	59,143	5,857,774
Indoor	Marinas	126	1,000 sq ft	303,534	38,299,884
Indoor	Sportfishing	11	1,000 sq ft	303,534	3,308,517
Indoor	Commercial Fishing	35	1,000 sq ft	74,073	2,566,983
Indoor	Excursions	3	1,000 sq ft	303,534	862,339
Indoor	Ship/Boat Petroleum	17	1,000 sq ft	74,073	1,288,343
Outdoor	Open Space	227	Acres	534,743	121,582,144
Outdoor	Golf Course	100	Acres	534,743	53,495,661
				Total Indoor Water Used	**1,048,232,507**
				Total Outdoor Water Used	**175,077,804**

Note: NA = not applicable.

Source: Prepared by Ascent in 2025.

Table 11. Total Emissions from Indoor and Outdoor Water Usage

Area	Water Consumption (million gallons)	Energy Intensity (megawatt-hours per million gallons)	Electricity Emission Factor ($MTCO_2e$ per MWh)	Total Emissions ($MTCO_2e$)
Indoor	1,048	6.81	0.2338	1,668
Outdoor	175	5.31	0.2338	217
			Total	**1,886**

Source: Prepared by Ascent in 2025.

2.6 OFF-ROAD EQUIPMENT

Activity Data. Fuel consumption amounts from activity at boatyards, shipyards, marinas, yacht clubs, and lumber yards were either obtained from tenants within these sectors or estimated for non-participating tenants through the use of metrics developed from the participating representative tenant(s).

For shipyards, diesel fuel consumption data was obtained from all four tenants, but consumption data for other fuels was only obtained from three tenants. The non-diesel consumption data gap was filled based on the ratio of diesel consumption at the shipyards.

For boatyards, fuel consumption data was obtained from two tenants. This information was used to calculate a fuel consumption metric (in gallons per leased square foot) based on the fuel consumption data and leased square footage for these tenants. Fuel consumption for the other boatyard tenants was estimated based on this fuel consumption metric and their leased square footage. Total boatyard leased square footage was assumed to be 697,860 square feet.

For marinas and yacht clubs, fuel consumption data was obtained from three tenants. This information was used to calculate a fuel consumption metric (in gallons per boat slip) based on the fuel consumption and leased number of boat slips for these tenants. Fuel consumption for the marinas and yacht club tenants that did not provide fuel consumption data was estimated based on this fuel consumption metric and the numbers of boat slips at these locations. It was assumed there are 7,641 boat slips and moorings at the Port. (This number does not include residential boat slips and Navy MWR marina slips and moorings.)

For lumber yards, fuel consumption data was not obtained. Instead, fuel consumption was estimated based on the fuel consumption metrics from the CAP's 2006 baseline emissions inventory and the leased square footage area shown in the Port Master Plan Update Final Program Environmental Impact Report (Port of San Diego 2024). It was assumed that the total lumber yard area is 687,023 square feet.

For event generators, Port staff provided activity data, in terms of the generator hours per event, generator size, fuel type, and the number of events held in 2022 by event type (e.g., special events, large events, and food trucks). Fuel consumption was then estimated based on the assumed size of generators and activity hours per year, assuming 0.7 gallons of gasoline consumed per hour of generator use based on a review of proxy generator specifications. It was assumed that there are 329 events occurring in one year that use generators and that generators run for an average of 8.5 hours per event, which resulted in an estimated 3,312 gallons of gasoline consumption annually.

Emission Factor. To estimate the fuel used by off-road equipment at boatyards, shipyards, marinas, yacht clubs, and lumber yards and by portable generators during special events, the emission factors for CO_2, CH_4, and N_2O shown in **Table 12** below were converted to CO_2e emission factors. All data in Table 12 is from EPA (2022), with the exception of R99, a diesel blend with 99 percent renewable diesel and 1 percent conventional petroleum diesel. Consistent with accounting conventions from CARB, which does not include emissions from renewable diesel in its comparison of statewide emissions to emission limits mandated by AB 32 (CARB 2024a: 16), emissions from combustion of the renewable portion of this fuel are not counted towards the Port's overall emissions. Hence, R99's emission factor is assumed to be equal to 1 percent of conventional diesel's emission factor.

Table 12. Emission Factors for Fuel Used in Off-Road Equipment (in grams per gallon)

Fuel	CO_2	CH_4	N_2O	CO_2e
Diesel	10,210	0.95	0.27	10,310
Gasoline	8,780	0.38	0.08	8,812
Propane	5,720	0.27	0.05	5,741
LPG	5,680	0.28	0.06	5,704
R99	102	0.01	0.003	103

Note: LPG = liquefied petroleum gas.

Source: Prepared by Ascent in 2025.

The CO_2e rates shown in Table 12 above were then multiplied by the gallons of corresponding fuel types, as shown in **Table 13**.

Table 13. Calculation of Total Off-Road Equipment Emissions

Tenant Type	Fuel	Gallons of Fuel	CO_2e Emission Factor (grams per gallon)	Total Emissions[1] ($MTCO_2e$)
Shipyards	Diesel	369,957	10,310	3,814
	R99	278,134	103	29
	Gasoline	15,752	8,812	139
	Propane	3,436	5,741	20
Boatyards	Diesel	9,667	10,310	100
	R99	-	103	-
	Gasoline	295	8,812	3
	Propane	863	5,741	5
Marinas/Yacht Clubs	Diesel	2,084	10,310	21
	R99	-	103	-
	Gasoline	106,974	8,812	943
	Propane	816	5,741	5
Lumber Yards	Diesel	28,764	10,310	297
	R99	-	103	-
	Gasoline	-	8,812	-
	LPG	8,762	5,704	50
Event Generators	Diesel	-	10,310	-
	R99	-	103	-
	Gasoline	3,312	8,812	29
	LPG	-	5,704	-
			Total	**5,453**

[1] Emissions from biogenic fuels are reported separately, consistent with CARB's reporting; the totals in Table 13 do not include biogenic emissions. The total GHG emissions from off-road equipment fuel consumption include 2,839 $MTCO_2e$ from biogenic fuels associated with renewable diesel use.

Source: Prepared by Ascent in 2025.

2.7 RECREATIONAL BOATING

Activity Data. The methodology for estimating fuel consumption and emissions due to recreational boating activity is consistent with the method employed in the 2016 Progress Report. At a high level, emissions were estimated using the following three steps. First, data on total fuel sales (including gasoline and diesel) from the Port's three fuel docks were obtained. Second, estimated fuel consumption associated with the commercial and sport fishing fleet as well as the Port's fleet were subtracted from total fuel sales; the remaining fuel use was assumed to be from recreational boating. Third, the remaining gasoline fuel consumption was scaled upwards to account for those boaters that burn fuel within the Port's jurisdiction but do not purchase fuel at the fuel docks. Details on each calculation step are provided below.

Gasoline and diesel fuel sales data were obtained from the three fuel docks within San Diego Bay. Various types of vessels use these fuel docks, including commercial and charter fishing vessels, Port-owned vessels, and recreational boats. To obtain an estimate of fuel sales directly attributed to recreational boating activity, fuel consumption from commercial and charter fishing vessels as well as Port-owned vessels (e.g., Harbor Police vessels) was subtracted from the fuel sales data based on activity and fuel data from the *2022 Maritime Air Emissions Inventory* and the *2022 Port Operations Greenhouse Gas Emissions Inventory*. The difference for diesel fuel was assumed to be usage by diesel-fueled recreational boats, and the difference for gasoline fuel was scaled to account for fuel purchased elsewhere.

San Diego Bay contains four public boat launch access points, which allow boaters to launch boats that are not docked at local slips. These boat launch facilities are typically not used by diesel-powered recreational boats, which are larger in size (i.e., yachts), so it was assumed that these boats are refueled at the fuel docks only. Based on the California Division of Boating and Waterways California Boater Survey (California Division of Boating and Waterways 2011), most operators of recreational boats do not use the fuel docks in San Diego Bay. Instead, boaters either refuel their boats at a gas station prior to launching their boats or refuel with a pre-filled gas can during the activity. Based on this survey data, it is assumed that gasoline sales at fuel docks in San Diego Bay represent only 37.2% of fuel consumption in the bay from recreational boats (see Appendix C). Therefore, to estimate gasoline fuel usage in the bay due to recreational boating, the commercial harbor craft fuel usage was subtracted from fuel dock sales, and the difference was divided by 0.372. **Table 14** below shows the results of this analysis for recreational boating.

Table 14. Recreational Boating Fuel Estimates

Tenant Types	Total Fuel Sales (gallons)	Portion of Total Fuel Sales Used by Fishing and Port Fleets (gallons)	Fuel Markup for Use of Own Gas Can[1]	Total Fuel Usage Attributed to Recreational Boating (gallons)
Gasoline	984,129	5,360	37.2%	2,631,759
Diesel	4,532,956	258,046	NA	4,274,910

Note: NA = not applicable.

[1] Markup assuming fuel sales represent approximately 37.2% of fuel usage associated with recreational boating. This only applies to gasoline.

Source: Prepared by Ascent in 2025.

Emission Factor. The emission factors listed in Table 12 were applied to the total fuel usage attributed to recreational boating, resulting in the emissions shown in **Table 15**.

Table 15. Calculation of Recreational Boating Emissions

Fuel Type	Sector	Gallons of Fuel	CO_2e Emission Factor (grams per gallon)	Total Emissions ($MTCO_2e$)
Gasoline	Recreational Boating	2,631,759	8,812	23,191
Diesel	Recreational Boating	4,274,910	10,310	44,075
			Total	**67,266**

Source: Prepared by Ascent in 2025.

2.8 MARITIME AIR EMISSIONS INVENTORY

Maritime activity refers to operations directly related to goods movement (e.g., goods carried by ship, truck, or rail), goods movement services (e.g., tugboats that assist vessels and commercial and charter fishing), and passenger movement (e.g., cruise ships and ferries that carry passengers over water to the Port). Emissions from these activities are described in detail in the *2022 Maritime Air Emissions Inventory* report (Appendix D). The maritime air emissions inventory is based on data obtained through various means, including tenant surveys, third-party vendors, and independent research. GHG emissions estimates from the inventory are presented in **Table 16**. A comparison to recent inventory years is provided in **Table 17**.

2.9 PORT OPERATIONS

Port operations include direct and indirect activity associated with Port-owned on- and off-road vehicle fleet as well as energy consumption, solid waste generation, and refrigerant leakage from vehicles and equipment at Port-owned buildings. Port staff prepared the *2022 Port Operations Greenhouse Gas Emissions Inventory*. Activity data was based on various sources, including fuel use data for each fleet vehicle, vessel, and piece of equipment; energy bills for electricity and natural gas; and refrigerant leakage data for motor vehicle air conditioning and stationary refrigeration systems. GHG emissions estimates from the inventory are presented in **Table 18**.

A comparison of activity associated with Port operations is presented in **Table 19**. Since the baseline year of 2006, GHG emissions from Port operations have decreased approximately 50%. This decrease is due, in part, to the following:

- 41% reduction in electricity consumption;
- 46% reduction in the carbon intensity of electricity;
- 54% reduction in natural gas usage;
- 10% reduction in fuel consumption across the Port's on-road and off-road fleet of vehicles, equipment, and vessels; and
- Increased use of renewable diesel—renewable diesel accounted for 13.5% of diesel fuel consumption in 2022.

Table 16. 2022 Maritime Air Emissions Inventory

Sector	Total Emissions ($MTCO_2e$)
Ocean-Going Vessels	32,294
Harbor Craft	12,645
Cargo-Handling Equipment	2,168
Freight Rail	2,450
Trucks	15,572
Total	**65,129**

Source: Prepared by Ascent in 2025.

Table 17. Comparison of Recent Maritime Air Emissions Inventories

Year	Total Emissions ($MTCO_2e$)
2022	65,129
2019	61,143
2016	67,431
2012	59,314
2006	102,056

Source: Prepared by Ascent in 2025.

Table 18. 2022 Port Operations Greenhouse Gas Emissions Inventory

Sector	Total Emissions ($MTCO_2e$)
Electricity	1,215
Natural Gas	151
On-Road Transportation[1]	745
Off-Road Transportation[1,2]	447
Solid Waste	454
Refrigerants	63
Total	**3,028**

[1] Emissions from biogenic fuels are reported separately, consistent with CARB's reporting; the totals in Table 18 do not include biogenic emissions. The total GHG emissions from on-road and off-road transportation include 211 $MTCO_2e$ from biogenic fuels associated with renewable diesel use in the on-road and off-road fleet.

[2] The Port's mobile harbor crane emissions (48 $MTCO_2e$) were deducted from the off-road equipment sector because these are included in the maritime off-road transportation emissions.

Source: Prepared by Ascent in 2025.

Table 19. Comparison of Port Operations Activity and Consumption Levels

Sector	Unit	2006	2016	2022	Comparison to 2006 (%)
Electricity	kWh	10,051,718	6,349,537	5,902,209	-41%
Electricity Carbon Intensity	$MTCO_2e/MWh$	0.354	0.242	0.1905[2]	-46%
Natural Gas	Therms	61,524	27,319	28,298	-54%
On-Road Fuel – Gasoline	Gallons	100,691	94,211	80,197	-20%
On-Road Fuel – Diesel[1]	Gallons	7,787	5,302	18,752	141%
On-Road Fuel – CNG	Gallons	882	3,301	4,407	400%
Off-Road Fuel – Gasoline	Gallons	42,151	55,601	6,468	-85%
Off-Road Fuel – Diesel[1]	Gallons	17,155	15,833	43,323	141%
Off-Road Fuel – CNG	Gallons	1,109	-	-	-100%
Total Fuel	**Gallons**	**169,776**	**174,248**	**153,147**	**-10%**

[1] Renewable diesel accounted for 20,656 gallons of total diesel consumption in 2022, which is 13.5% of all fuel consumption, equating to approximately 211 $MTCO_2e$.

[2] The carbon intensity factor is the average of SDG&E and SDCP's carbon intensities.

Source: Prepared by Ascent in 2025.

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