APPENDIX C

AIR QUALITY AND GREENHOUSE GAS EMISSIONS DATA

Land Use Statistics - San Mateo, San Mateo County

	Existing Conditions 2019	Buildout Estimates 2040	Projected Growth (Proposed Project) 2019-2040	Growth Factor from Existing for Horizon Year 2040
City + Sphere of Influence (SOI)				
Housing Units	43,770	65,180	21,410	0.49
Population	108,020	160,040	52,020	0.48
Employment	62,440	79,360	16,920	0.27
Service Population	170,460	239,400	68,940	0.40
City				
Housing Units	42,400	63,800	21,400	0.50
Population	104,600	156,590	51,990	0.50
Employment	61,230	77,760	16,530	0.27
Service Population	165,830	234,350	68,520	0.41
Sphere of Influence (SOI)				
Housing Units	1,370	1,380	10	0.01
Population	3,420	3,450	30	0.01
Employment	1,210	1,600	390	0.32
Service Population	4,630	5,050	420	0.09

City of San Mateo Community Criteria Air Pollutant Emissions Inventory and Forecast: City + SOI

Notes:

[1] Source: Kittelson and Associates, Inc. 2023; EMFAC2021 Version 1.0.2 Emissions Database (Region - San Mateo)

[2] Sources: PG&E and PCE 2022 and CalEEMod User's Guide for natural gas criteria air pollutant emission rates. Excludes criteria air pollutant emissions natural gas use from Permitted Sources within the City.

[3] Source: OFFROAD 2021.

[4] Source: CalEEMod User's Guide

City + SOI

EXISTING (2019)

Phase	Existing Criteria Air Pollutant Emissions (lbs/day) - City + SOI				Existing Criteria Air Pollutant Emissions (tons/year)			
	VOC	NO_X	PM_{10}	$PM_{2.5}$	VOC	NO_X	PM_{10}	$PM_{2.5}$
Transportation[1]	260	1,940	203	85	45	337	35	15
Energy[2]	35	656	49	49	6	120	9	9
Offroad Equipment[3]	390	246	10	8	71	45	2	1
Consumer Products[4]	1,698				310			
Total	**2,383**	**2,842**	**262**	**141**	**433**	**501**	**46**	**25**

EXISTING (2040 No Project Baseline)

Phase	Existing Criteria Air Pollutant Emissions (lbs/day) - City + SOI				Existing Criteria Air Pollutant Emissions (tons/year) - City + SOI			
	VOC	NO_X	PM_{10}	$PM_{2.5}$	VOC	NO_X	PM_{10}	$PM_{2.5}$
Transportation[1]	71	352	182	61	12	61	32	11
Energy[2]	35	656	49	49	6	120	9	9
Offroad Equipment[3]	390	246	10	8	71	45	2	1
Consumer Products[4]	1,698				310			
Total	**2,193**	**1,255**	**241**	**118**	**400**	**226**	**42**	**21**

Year 2040 (Proposed Project)

Phase	Project (2040) Criteria Air Pollutant Emissions (lbs/day) - City + SOI				Project (2040) Criteria Air Pollutant Emissions (tons/year)			
	VOC	NO_X	PM_{10}	$PM_{2.5}$	VOC	NO_X	PM_{10}	$PM_{2.5}$
Transportation[1]	92	459	237	80	16	80	41	14
Energy[2]	49	922	69	69	9	168	13	13
Offroad Equipment[3]	550	314	13	10	100	57	2	2
Consumer Products[4]	2,819				515			
Total	**3,510**	**1,696**	**319**	**159**	**640**	**305**	**56**	**28**

NET CHANGE (from 2040 No Project Baseline)

Phase	Net Change (2040-2019) Criteria Air Pollutant Emissions (lbs/day) - City + SOI				Net Change (2040-2019) Criteria Air Pollutant Emissions (tons/year) - City + SOI			
	VOC	NO_X	PM_{10}	$PM_{2.5}$	VOC	NO_X	PM_{10}	$PM_{2.5}$
Transportation[1]	21	107	55	19	4	19	10	3
Energy[2]	14	266	20	20	3	49	4	4
Offroad Equipment[3]	160	67	3	2	29	12	1	0
Consumer Products[4]	1,121	0	0	0	205	0	0	0
Total	**1,317**	**441**	**78**	**41**	**240**	**79**	**14**	**7**
BAAQMD Threshold	**54**	**54**	**82**	**54**	**10**	**10**	**15**	**10**
Exceeds Threshold	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**	**No**	**No**

NET CHANGE (from Existing) - Friant Ranch

Phase	Net Change (2040-2019) Criteria Air Pollutant Emissions (lbs/day) - City + SOI				Net Change (2040-2019) Criteria Air Pollutant Emissions (tons/day)			
	VOC	NO_X	PM_{10}	$PM_{2.5}$	VOC	NO_X	PM_{10}	$PM_{2.5}$
Transportation[1]	-168	-1,480	34	-5	-29	-257	6	-1
Energy[2]	14	266	20	20	3	49	4	4
Offroad Equipment[3]	160	67	3	2	29	12	1	0
Consumer Products[4]	1,121				205			
Total	**1,127**	**-1,147**	**57**	**17**	**207**	**-196**	**10**	**3**
BAAQMD Threshold	**54**	**54**	**82**	**54**	**10**	**10**	**15**	**10**
Exceeds Threshold	**Yes**	**No**	**No**	**No**	**Yes**	**No**	**No**	**No**

AQMP Consistency Analysis

Comparison of the Change in Population and VMT in San Mateo(O-D Method)

Category	Existing	GP 2040 Update (Proposed Project)	Change from Existing	
			Change	Percent
Population	108,020	160,040	52,020	48.2%
Employment	62,440	79,360	16,920	27.1%
SP	170,460	239,400	68,940	40.4%
VMT per Day	3,918,221	5,108,862	1,190,641	30.4%
VMT/SP	22.99	21.34	-1.65	-7.2%

Note Origin-Destination (O-D) Methodology is not necessarily the same methodology for SB 743.

Modeling of vehicle miles traveled (VMT) is provided by Kittelson and Associates, Inc. 2023. VMT from passenger vehicles and trucks that have an origin or destination in the City using a transportation origin-destination methodology. Accounting of VMT is based on the recommendations of CARB's Regional Targets Advisory Committee (RTAC) created under Senate Bill 375 (SB 375).

For accounting purposes, there are three types of trips:

» Vehicle trips that originated and terminated within the City (Internal-Internal, I-I). Using the accounting rules established by RTAC, 100 percent of the length of these trips, and their emissions, are attributed to the City.

» Vehicle trips that either originated or terminated (but not both) within the City (Internal-External or External-Internal, I-X and X-I). Using the accounting rules established by RTAC, 50 percent of the trip length for these trips is attributed to the City.

» Vehicle trips that neither originated nor terminated within the City. These trips are commonly called pass-through trips (External-External, X-X). Using the accounting rules established by RTAC, these trips are not counted towards the City's VMT or emissions.

Area Sources - Residential Consumer Products[a]

Emissions = EF x Building Area

EF = 2.14E-05 lbs/sqft/day

Sources/Notes:

a. California Emissions Estimator Model, Version 2021.1, Users Guide. Appendix D3.

AVERAGE HOUSING SQFT ASSUMPTIONS

Year Structure was Built	Percent of Housing Stock [a]	Average Square Feet of New Single Family Homes[b]	Average Square Feet (Weighted)
2020 or Later	0.10%	2,448	2
2010 to 2019	4.40%	2,524	111
2000 to 2009	5.40%	2,404	130
1990 to 1999	6.10%	2,116	129
1980 to 1989	9.40%	1,819	171
1979 or earlier	74.70%	1,699	1,269
	100%		1,813

Sources/Notes: https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/

a. United States Census Bureau, Selected Housing Characteristics, County of San Mateo, 2023. Table DP04. 2021 American Community Survey 5-Year Estimate https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2019/

b. United States Census Bureau, Characteristics of New Housing, Characteristics of New Single-Family Houses Completed, Median and Average Square Feet by Location. https://www.census.gov/construction/chars/completed.html

	Existing 2019 EIR Study Area	2040 GP Update EIR Study Area
Housing Units	43,770	65,180
Residential SQFT	79,345,150	131,746,125
lbs VOC per day	1,698	2,819
tons VOC per year	310	515

Notes:

[1] New housing units constructed post-2020 assumed to be 2,448 square feet (based on Source 2).

[2] Daily emissions converted to annual emissions by multiplying by 365 days/year.

Area Sources

Source: OFFROAD2021. https://arb.ca.gov/emfac/emissions-inventory/2f6c8fa1b8ec8bd9f8a4f23b3d84c74a77f77161

OFFROAD2021 Estimate based on:

Agricultural Equipment	Based on the percentage of agricultural acreage within the City compared to the County of San Mateo (San Mateo County 2019, San Mateo CAP Update)
Construction Equipment	Based on the percentage of total County Service Population Change Attributable to City (US Census Bureau 2023)
Lawn & Garden	Based on the percentage of City population in San Mateo compared to the San Mateo County Population (US Census Bureau 2023)
Light Commercial and Industrial Equipment	Based on the percentage of employment in San Mateo compared to San Mateo County (EDD 2023)

Farmland Acreage

Source: San Mateo General Plan EIR, Conservation, Open Space, and Recreation Element, 2023.

Construction (percentage of total County SP change attributable to City)

Department of Finance E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2020; and US Census Bureau https://onthemap.ces.census.gov/

Employment

Source. Employment Development Department (EDD). 2023, March 20 (Accessed). Unemployment Rates (Labor Force). https://labormarketinfo.edd.ca.gov/cgi/dataanalysis/labForceReport.asp?menuchoice=LABFORCE

2019 Existing		ROG Exhaust	NO_x Exhaust	CO Exhaust	SO_2 Exhaust	PM_{10} Exhaust	$PM_{2.5}$ Exhaust*
		lbs/year					
Agricultural	No agricultural use in the EIR Study Area	0.0	0.0	0.0	0.0	0.0	0.0
Construction Equipment		7	25	168	0	2	2
Lawn & Garden		259	35	3,031	0	3	2
Light Commercial/ Industrial Equipment		124	186	5,756	0	5	4
TOTAL City+ SOI		390	246	8,954	0	10	8

Horizon Year 2040	Forecast Adjusted for:	ROG Exhaust	NO_x Exhaust	CO Exhaust	SO2 Exhaust	PM10 Exhaust	PM2.5 Exhaust*
		lbs/year					
Agricultural	No agricultural use in the EIR Study Area at buildout	0	0	0	0	0	0
Construction Equipment	Similar to historic	7	25	168	0	2	2
Lawn & Garden	Proportional to housing growth	385	52	4,513	0	5	4
Light Commercial/ Industrial Equipment	Proportional to employment growth	158	237	7,316	0	6	5
TOTAL City+ SOI		550	314	11,996	1	13	10

San Mateo County OFFROAD2019

Source: https://arb.ca.gov/emfac/emissions-inventory/e681c37cb7093ea75b08ef761dfdc43659684b99
Construction includes: Over 25 horsepower, self-propelled, diesel equipment only subjected to In-Use Regulation; AND Under 25 horsepower equipment not subject to the In-Use Regulation

Model Output: OFFROAD2021 (v1.0.3) Emissions Inventory
Region Type: County
Region: San Mateo
Calendar Year: 2019
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2019 Equipment Types
Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horsepower-hours

Construction and Mining

Region	CalYr	VehClass	MdlYr	HP_Bin	Fuel	ROG_tpd	NOx_tpd	CO_tpd	SOx_tpd	PM10_tpd	PM2_5_tpd
San Mateo	2019	Construction and Mining - Bore/Drill Rigs	Aggregate	Aggregate	Diesel	1.24E-04	1.60E-03	1.18E-03	3.66E-06	5.82E-05	5.35E-05
San Mateo	2019	Construction and Mining - Cranes	Aggregate	Aggregate	Diesel	7.73E-04	8.81E-03	5.03E-03	8.70E-06	4.06E-04	3.73E-04
San Mateo	2019	Construction and Mining - Crawler Tractors	Aggregate	Aggregate	Diesel	1.82E-03	2.03E-02	1.06E-02	2.15E-05	1.00E-03	9.21E-04
San Mateo	2019	Construction and Mining - Excavators	Aggregate	Aggregate	Diesel	1.79E-03	1.85E-02	1.50E-02	3.87E-05	7.70E-04	7.08E-04
San Mateo	2019	Construction and Mining - Graders	Aggregate	Aggregate	Diesel	1.34E-03	1.51E-02	6.46E-03	1.46E-05	6.58E-04	6.06E-04
San Mateo	2019	Construction and Mining - Misc - Asphalt Pavers	Aggregate	Aggregate	Gasoline	6.91E-04	5.96E-04	2.56E-02	9.87E-07	2.27E-04	1.72E-04
San Mateo	2019	Construction and Mining - Misc - Bore/Drill Rigs	Aggregate	Aggregate	Gasoline	1.95E-04	3.04E-04	7.23E-03	6.26E-07	6.43E-05	4.86E-05
San Mateo	2019	Construction and Mining - Misc - Bore/Drill Rigs	Aggregate	Aggregate	Diesel	4.81E-05	3.03E-04	1.76E-04	4.34E-09	1.02E-05	7.73E-06
San Mateo	2019	Construction and Mining - Misc - Cement And Mortar Mixers	Aggregate	Aggregate	Gasoline	9.47E-03	5.00E-03	2.64E-01	4.36E-06	2.22E-03	1.67E-03
San Mateo	2019	Construction and Mining - Misc - Cement And Mortar Mixers	Aggregate	Aggregate	Diesel	5.87E-05	3.66E-04	2.84E-04	6.33E-09	1.32E-05	9.98E-06
San Mateo	2019	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate	Aggregate	Gasoline	6.90E-03	4.84E-03	2.29E-01	5.11E-06	2.51E-03	1.90E-03
San Mateo	2019	Construction and Mining - Misc - Concrete/Industrial Saws	Aggregate	Aggregate	Diesel	4.10E-05	2.43E-04	2.33E-04	3.26E-07	1.25E-05	1.12E-05
San Mateo	2019	Construction and Mining - Misc - Cranes	Aggregate	Aggregate	Gasoline	7.80E-05	2.13E-04	3.51E-03	4.95E-07	3.39E-06	2.56E-06
San Mateo	2019	Construction and Mining - Misc - Crushing/Proc. Equipment	Aggregate	Aggregate	Gasoline	4.65E-05	3.13E-05	1.63E-03	2.58E-08	1.87E-05	1.41E-05
San Mateo	2019	Construction and Mining - Misc - Dumpers/Tenders	Aggregate	Aggregate	Gasoline	9.96E-04	5.84E-04	2.49E-02	4.41E-07	2.46E-04	1.86E-04
San Mateo	2019	Construction and Mining - Misc - Dumpers/Tenders	Aggregate	Aggregate	Diesel	5.85E-06	3.70E-05	2.00E-05	5.07E-10	1.28E-06	9.63E-07
San Mateo	2019	Construction and Mining - Misc - Excavators	Aggregate	Aggregate	Diesel	4.18E-05	2.64E-04	1.43E-04	3.63E-09	8.89E-06	6.72E-06
San Mateo	2019	Construction and Mining - Misc - Other	Aggregate	Aggregate	Gasoline	2.95E-05	1.04E-04	2.78E-03	7.77E-07	5.61E-06	4.24E-06
San Mateo	2019	Construction and Mining - Misc - Other	Aggregate	Aggregate	Diesel	1.23E-04	7.70E-04	6.04E-04	1.34E-08	2.69E-05	2.03E-05
San Mateo	2019	Construction and Mining - Misc - Pavers	Aggregate	Aggregate	Diesel	1.10E-05	6.96E-05	3.75E-05	9.52E-10	2.42E-06	1.83E-06
San Mateo	2019	Construction and Mining - Misc - Paving Equipment	Aggregate	Aggregate	Gasoline	1.48E-02	9.87E-03	4.42E-01	7.70E-06	4.35E-03	3.29E-03
San Mateo	2019	Construction and Mining - Misc - Paving Equipment	Aggregate	Aggregate	Diesel	1.87E-05	1.18E-04	6.38E-05	1.62E-09	3.95E-06	2.99E-06
San Mateo	2019	Construction and Mining - Misc - Plate Compactors	Aggregate	Aggregate	Gasoline	6.14E-03	3.82E-03	1.74E-01	2.82E-06	1.48E-03	1.12E-03
San Mateo	2019	Construction and Mining - Misc - Plate Compactors	Aggregate	Aggregate	Diesel	3.97E-05	2.49E-04	2.08E-04	4.53E-09	8.75E-06	6.61E-06
San Mateo	2019	Construction and Mining - Misc - Rollers	Aggregate	Aggregate	Gasoline	3.23E-03	2.73E-03	1.11E-01	3.29E-06	1.05E-03	7.95E-04
San Mateo	2019	Construction and Mining - Misc - Rollers	Aggregate	Aggregate	Diesel	2.76E-04	1.74E-03	1.21E-03	2.79E-08	5.97E-05	4.51E-05
San Mateo	2019	Construction and Mining - Misc - Rough Terrain Forklifts	Aggregate	Aggregate	Gasoline	5.00E-04	1.55E-03	1.92E-02	3.44E-06	2.46E-05	1.86E-05
San Mateo	2019	Construction and Mining - Misc - Rubber Tired Loaders	Aggregate	Aggregate	Gasoline	2.74E-04	7.40E-04	1.18E-02	1.81E-06	1.28E-05	9.66E-06
San Mateo	2019	Construction and Mining - Misc - Rubber Tired Loaders	Aggregate	Aggregate	Diesel	6.82E-06	4.31E-05	2.33E-05	5.91E-10	1.45E-06	1.09E-06
San Mateo	2019	Construction and Mining - Misc - Signal Boards	Aggregate	Aggregate	Gasoline	1.47E-04	1.04E-04	4.97E-03	7.93E-08	5.68E-05	4.29E-05
San Mateo	2019	Construction and Mining - Misc - Signal Boards	Aggregate	Aggregate	Diesel	6.36E-04	3.97E-03	3.35E-03	2.15E-07	1.41E-04	1.08E-04
San Mateo	2019	Construction and Mining - Misc - Skid Steer Loaders	Aggregate	Aggregate	Gasoline	4.73E-03	3.52E-03	1.60E-01	7.48E-06	1.51E-03	1.14E-03
San Mateo	2019	Construction and Mining - Misc - Skid Steer Loaders	Aggregate	Aggregate	Diesel	2.23E-03	1.39E-02	7.51E-03	1.92E-07	5.00E-04	3.78E-04
San Mateo	2019	Construction and Mining - Misc - Surfacing Equipment	Aggregate	Aggregate	Gasoline	7.99E-03	5.54E-03	2.10E-01	3.41E-06	2.30E-03	1.74E-03
San Mateo	2019	Construction and Mining - Misc - Tampers/Rammers	Aggregate	Aggregate	Gasoline	7.09E-04	5.46E-04	2.72E-02	4.39E-07	3.85E-04	2.91E-04
San Mateo	2019	Construction and Mining - Misc - Tractors/Loaders/Backhoes	Aggregate	Aggregate	Gasoline	1.08E-04	2.94E-04	7.33E-03	1.15E-06	8.26E-06	6.24E-06
San Mateo	2019	Construction and Mining - Misc - Tractors/Loaders/Backhoes	Aggregate	Aggregate	Diesel	1.99E-04	1.26E-03	6.81E-04	1.73E-08	4.31E-05	3.25E-05
San Mateo	2019	Construction and Mining - Misc - Trenchers	Aggregate	Aggregate	Gasoline	5.73E-03	4.76E-03	2.02E-01	6.22E-06	1.92E-03	1.45E-03
San Mateo	2019	Construction and Mining - Misc - Trenchers	Aggregate	Aggregate	Diesel	2.52E-04	1.59E-03	9.64E-04	2.34E-08	5.39E-05	4.08E-05
San Mateo	2019	Construction and Mining - Off-Highway Tractors	Aggregate	Aggregate	Diesel	5.91E-04	4.99E-03	4.02E-03	8.18E-06	2.72E-04	2.50E-04
San Mateo	2019	Construction and Mining - Off-Highway Trucks	Aggregate	Aggregate	Diesel	2.91E-03	3.28E-02	1.66E-02	4.91E-05	1.13E-03	1.04E-03
San Mateo	2019	Construction and Mining - Other	Aggregate	Aggregate	Diesel	7.78E-04	8.03E-03	4.98E-03	1.10E-05	3.99E-04	3.67E-04
San Mateo	2019	Construction and Mining - Pavers	Aggregate	Aggregate	Diesel	1.78E-04	1.86E-03	1.35E-03	2.58E-06	1.00E-04	9.20E-05
San Mateo	2019	Construction and Mining - Paving Equipment	Aggregate	Aggregate	Diesel	9.55E-05	1.02E-03	7.52E-04	1.50E-06	5.09E-05	4.69E-05
San Mateo	2019	Construction and Mining - Rollers	Aggregate	Aggregate	Diesel	5.95E-04	4.85E-03	4.54E-03	6.69E-06	2.93E-04	2.70E-04
San Mateo	2019	Construction and Mining - Rough Terrain Forklifts	Aggregate	Aggregate	Diesel	2.97E-04	3.78E-03	4.71E-03	7.27E-06	1.65E-04	1.52E-04
San Mateo	2019	Construction and Mining - Rubber Tired Dozers	Aggregate	Aggregate	Diesel	5.34E-04	5.52E-03	3.80E-03	4.29E-06	2.76E-04	2.53E-04
San Mateo	2019	Construction and Mining - Rubber Tired Loaders	Aggregate	Aggregate	Diesel	4.31E-03	4.52E-02	2.57E-02	5.90E-05	2.02E-03	1.86E-03
San Mateo	2019	Construction and Mining - Scrapers	Aggregate	Aggregate	Diesel	2.79E-03	3.34E-02	1.98E-02	3.84E-05	1.35E-03	1.24E-03

San Mateo	2019 Construction and Mining - Skid Steer Loaders	Aggregate	Aggregate	Diesel	3.32E-04	3.98E-03	4.72E-03	7.04E-06	1.78E-04	1.64E-04
San Mateo	2019 Construction and Mining - Surfacing Equipment	Aggregate	Aggregate	Diesel	3.28E-05	4.51E-04	2.46E-04	8.08E-07	1.71E-05	1.57E-05
San Mateo	2019 Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	Aggregate	Diesel	3.82E-03	3.80E-02	3.48E-02	5.38E-05	2.26E-03	2.08E-03
San Mateo	2019 Construction and Mining - Trenchers	Aggregate	Aggregate	Diesel	2.61E-04	1.97E-03	1.51E-03	2.22E-06	1.29E-04	1.18E-04
TOTAL CONSTRUCTION OFFROAD (tons/day)					9.01E-02	3.20E-01	2.11E+00	3.91E-04	3.08E-02	2.52E-02
ESTIMATED San Mateo (tons/yr)					1.31	4.65	30.61	0.01	0.45	0.37
ESTIMATED San Mateo (lbs/day)					7	25	168	0	2	2

City and County Population: Department of Finance E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2020; and US Census Bureau https://onthemap.ces.census.gov/	**2019**
City Absolute Change Service Population Previous Year	834
County Absolute Change Service Population Previous Year	20,973
% of total County Service Population Change Attributable to City	**4%**

Industrial and Light Commercial

Region	CalYr	VehClass	MdlYr	HP_Bin	Fuel	ROG_tpd	NOx_tpd	CO_tpd	SOx_tpd	PM10_tpd	PM2_5_tpd
San Mateo	2019	Industrial - Aerial Lifts	Aggregate	Aggregate	Diesel	3.35E-04	5.70E-03	7.79E-03	1.26E-05	1.13E-04	1.04E-04
San Mateo	2019	Industrial - Forklifts	Aggregate	Aggregate	Diesel	5.50E-03	4.73E-02	3.97E-02	5.29E-05	3.38E-03	3.11E-03
San Mateo	2019	Industrial - Misc - Aerial Lifts	Aggregate	Aggregate	Gasoline	3.09E-03	2.80E-03	1.11E-01	9.05E-06	8.13E-04	6.14E-04
San Mateo	2019	Industrial - Misc - Aerial Lifts	Aggregate	Aggregate	Diesel	1.65E-04	1.04E-03	6.69E-04	1.59E-08	3.95E-05	2.98E-05
San Mateo	2019	Industrial - Misc - Aerial Lifts	Aggregate	Aggregate	Electric	3.88E-05	3.01E-04	1.10E-02	2.34E-08	2.95E-05	2.23E-05
San Mateo	2019	Industrial - Misc - Forklifts	Aggregate	Aggregate	Gasoline	2.53E-02	1.14E-01	2.81E+00	2.51E-04	1.74E-03	1.32E-03
San Mateo	2019	Industrial - Misc - Forklifts	Aggregate	Aggregate	Electric	7.22E-06	3.20E-05	1.15E-03	2.59E-09	3.54E-06	2.67E-06
San Mateo	2019	Industrial - Misc - Forklifts	Aggregate	Aggregate	Nat Gas	0.00E+00	1.75E-01	1.62E+00	0.00E+00	3.55E-03	0.00E+00
San Mateo	2019	Industrial - Misc - Other General Industrial Equipment	Aggregate	Aggregate	Gasoline	1.32E-03	1.68E-03	1.05E-01	4.88E-06	2.73E-05	2.07E-05
San Mateo	2019	Industrial - Misc - Other General Industrial Equipment	Aggregate	Aggregate	Diesel	1.28E-04	8.31E-04	5.17E-04	1.23E-08	2.83E-05	2.14E-05
San Mateo	2019	Industrial - Misc - Other Material Handling Equipment	Aggregate	Aggregate	Gasoline	2.22E-04	9.78E-04	1.00E-02	1.98E-06	1.42E-05	1.08E-05
San Mateo	2019	Industrial - Misc - Sweepers/Scrubbers	Aggregate	Aggregate	Gasoline	1.76E-03	4.70E-03	1.51E-01	1.62E-05	1.01E-04	7.66E-05
San Mateo	2019	Industrial - Misc - Sweepers/Scrubbers	Aggregate	Aggregate	Diesel	3.10E-05	2.05E-04	1.37E-04	3.15E-09	7.02E-06	5.31E-06
San Mateo	2019	Industrial - Other General Industrial Equipment	Aggregate	Aggregate	Diesel	2.46E-03	1.82E-02	1.58E-02	2.55E-05	1.10E-03	1.01E-03
San Mateo	2019	Industrial - Other Material Handling Equipment	Aggregate	Aggregate	Diesel	9.81E-04	1.04E-02	7.07E-03	1.50E-05	4.79E-04	4.41E-04
San Mateo	2019	Light Commercial - Misc - Air Compressors	Aggregate	Aggregate	Gasoline	7.44E-02	4.83E-02	4.08E+00	1.56E-04	3.66E-04	3.88E-04
San Mateo	2019	Light Commercial - Misc - Air Compressors	Aggregate	Aggregate	Diesel	1.20E-03	6.24E-03	6.99E-03	1.01E-05	3.63E-04	3.39E-04
San Mateo	2019	Light Commercial - Misc - Air Compressors	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Light Commercial - Misc - Gas Compressors	Aggregate	Aggregate	Nat Gas	0.00E+00	1.96E-02	2.29E-01	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Light Commercial - Misc - Generator Sets	Aggregate	Aggregate	Gasoline	2.09E-01	8.54E-02	5.98E+00	2.59E-04	9.92E-04	1.15E-03
San Mateo	2019	Light Commercial - Misc - Generator Sets	Aggregate	Aggregate	Diesel	3.68E-03	2.50E-02	2.09E-02	3.85E-05	1.08E-03	1.13E-03
San Mateo	2019	Light Commercial - Misc - Generator Sets	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Light Commercial - Misc - Generator Sets	Aggregate	Aggregate	Nat Gas	0.00E+00	7.72E-04	5.71E-03	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Light Commercial - Misc - Pressure Washers	Aggregate	Aggregate	Gasoline	5.25E-02	2.28E-02	2.94E+00	1.02E-04	1.69E-04	2.22E-04
San Mateo	2019	Light Commercial - Misc - Pressure Washers	Aggregate	Aggregate	Diesel	1.58E-05	1.25E-04	9.93E-05	1.94E-07	4.88E-06	5.24E-06
San Mateo	2019	Light Commercial - Misc - Pressure Washers	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Light Commercial - Misc - Pumps	Aggregate	Aggregate	Gasoline	1.72E-02	1.06E-02	6.28E-01	3.98E-05	1.77E-04	1.58E-04
San Mateo	2019	Light Commercial - Misc - Pumps	Aggregate	Aggregate	Diesel	2.23E-03	1.40E-02	1.23E-02	2.17E-05	6.39E-04	6.59E-04
San Mateo	2019	Light Commercial - Misc - Pumps	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Light Commercial - Misc - Welders	Aggregate	Aggregate	Gasoline	3.75E-02	2.06E-02	1.79E+00	7.52E-05	2.58E-04	2.56E-04
San Mateo	2019	Light Commercial - Misc - Welders	Aggregate	Aggregate	Diesel	5.63E-03	3.09E-02	3.20E-02	4.97E-05	1.68E-03	1.61E-03
San Mateo	2019	Light Commercial - Misc - Welders	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL LIGHT COMMERCIAL + INDUSTRIAL OFFROAD (tons/day)						0.445	0.667	20.631	0.001	0.017	0.013
ESTIMATED San Mateo (tons/yr)						22.65	33.98	1050.47	0.06	0.87	0.65
ESTIMATED San Mateo (lbs/day)						124	186	5756	0	5	4

EMPLOYMENT: https://labormarketinfo.edd.ca.gov/cgi/dataanalysis/labForceReport.asp?menuchoice=LABFORCE	**2019**
Employment in San Mateo County	447,600
Employment in San Mateo	62,440
Percent in the City	14%

Lawn and Garden

Region	CalYr	VehClass	MdlYr	HP_Bin	Fuel	ROG_tpd	NOx_tpd	CO_tpd	SOx_tpd	PM10_tpd	PM2_5_tpd
San Mateo	2019	Lawn and Garden - Misc - Chainsaws	Aggregate	Aggregate	Gasoline	1.67E-01	5.29E-03	4.91E-01	3.72E-05	2.17E-03	1.64E-03
San Mateo	2019	Lawn and Garden - Misc - Chainsaws	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Chainsaws Preempt	Aggregate	Aggregate	Gasoline	1.45E-01	5.00E-03	2.64E-01	2.18E-05	1.17E-03	8.85E-04
San Mateo	2019	Lawn and Garden - Misc - Chainsaws Preempt	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Chippers/Stump Grinders	Aggregate	Aggregate	Gasoline	2.31E-04	8.63E-05	1.10E-02	4.03E-07	9.28E-07	7.02E-07
San Mateo	2019	Lawn and Garden - Misc - Chippers/Stump Grinders	Aggregate	Aggregate	Diesel	3.41E-06	2.15E-05	1.16E-05	2.70E-08	7.24E-07	5.47E-07
San Mateo	2019	Lawn and Garden - Misc - Chippers/Stump Grinders	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Lawn Mowers	Aggregate	Aggregate	Gasoline	5.59E-02	2.94E-02	2.25E+00	9.79E-05	1.61E-03	1.22E-03
San Mateo	2019	Lawn and Garden - Misc - Lawn Mowers	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Leaf Blowers/Vacuums	Aggregate	Aggregate	Gasoline	2.77E-01	9.84E-03	1.41E+00	9.70E-05	4.05E-03	3.06E-03
San Mateo	2019	Lawn and Garden - Misc - Leaf Blowers/Vacuums	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Other	Aggregate	Aggregate	Gasoline	9.43E-04	3.88E-04	5.09E-02	1.93E-06	4.45E-06	3.37E-06
San Mateo	2019	Lawn and Garden - Misc - Other	Aggregate	Aggregate	Diesel	1.50E-06	1.04E-05	8.27E-06	1.35E-08	3.62E-07	2.74E-07
San Mateo	2019	Lawn and Garden - Misc - Rear Engine Riding Mowers	Aggregate	Aggregate	Gasoline	1.12E-01	5.28E-02	5.09E+00	1.76E-04	7.36E-04	5.56E-04
San Mateo	2019	Lawn and Garden - Misc - Rear Engine Riding Mowers	Aggregate	Aggregate	Diesel	1.31E-03	8.53E-03	5.29E-03	1.08E-05	2.93E-04	2.21E-04
San Mateo	2019	Lawn and Garden - Misc - Rear Engine Riding Mowers	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Snowblowers	Aggregate	Aggregate	Gasoline	3.36E-04	1.67E-04	1.98E-02	6.77E-07	1.96E-06	1.49E-06
San Mateo	2019	Lawn and Garden - Misc - Snowblowers	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Tillers	Aggregate	Aggregate	Gasoline	2.18E-03	3.67E-04	4.13E-02	1.86E-06	7.03E-06	5.31E-06
San Mateo	2019	Lawn and Garden - Misc - Tillers	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Trimmers/Edgers/Brush Cutters	Aggregate	Aggregate	Gasoline	1.79E-01	1.11E-02	1.11E+00	7.38E-05	1.56E-03	1.18E-03
San Mateo	2019	Lawn and Garden - Misc - Trimmers/Edgers/Brush Cutters	Aggregate	Aggregate	Electric	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
San Mateo	2019	Lawn and Garden - Misc - Wood Splitters	Aggregate	Aggregate	Gasoline	1.18E-02	4.79E-03	4.40E-01	1.68E-05	7.08E-05	5.34E-05
TOTAL LAWN & GARDEN (tons/day)						0.95	0.13	11.17	0.00	0.01	0.01
ESTIMATED San Mateo (tons/yr)						47.18	6.33	553.08	0.03	0.58	0.44
ESTIMATED San Mateo (lbs/day)						259	35	3031	0	3	2

City and County Population: Department of Finance E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2020; and US Census Bureau https://onthemap.ces.census.gov/	**2019**
County Jurisdiction Population	771,160
City Jurisdiction Population	104,599
City % Total Population in County	**13.6%**

San Mateo — TRANSPORTATION SECTOR (Criteria Air Pollutants)

Source: EMFAC2021 V.1.0.2., Web Database - Emission Rates. San Mateo County. Based on the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) Global Warming Potentials (GWPs); Kittelson and Associates, Inc. 2023.

Criteria Air Pollutants

	lbs/day					
	ROG	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Existing EIR Study Area	260	1,940	9,116	32	203	85
Existing in Year 2040 EIR Study Area	71	352	4,097	23	182	61
Proposed 2040 EIR Study Area	92	459	5,341	30	237	80
Change from Existing Conditions (2019-2040)	-168	-1,480	-3,775	-2	34	-5
Change from Existing Land Uses (2040 Emission Rates)	-190	-1,587	-5,020	-9	-21	-23

	Tons/year					
	ROG	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Existing EIR Study Area	45	337	1,582	6	35	15
Existing in Year 2040 EIR Study Area	12	61	711	4	32	11
Proposed 2040 EIR Study Area	16	80	927	5	41	14
Change from Existing Conditions (2019-2040)	-29	-257	-655	0	6	-1
Change from Existing Land Uses (2040 Emission Rates)	-4	-19	-216	-1	-10	-3

Notes:

[1] lbs to Tons 2000

[2] MTons = metric tons; CO2e = carbon dioxide-equivalent.

City of San Mateo VMT

Source: Kittelson & Associates, Inc. 2023.

Scenario	Daily VMT IX	XI	II	Total Daily VMT	Total with RTAC	Service Population	VMT/SP	VMT/SP w RTAC
ExistingYear (Year 2019)	1,656,534	2,096,050	165,637	3,918,221	2,041,929	170,460	23.0	12.0
GP Update (Year 2040)	2,231,799	2,656,020	221,043	5,108,862	2,664,953	239,400	21.3	11.1

Notes: Total may not add to 100% due to rounding.

IX = Internal-External

XI = External- Internal

II = Internal-Internal

Daily VMT and Fleet Mix Percentage				
	Existing Year (Year 2019)		GP Update (Year 2040)	
	Daily VMT	Percent	Daily VMT	Percent
Passenger Vehicles	3,752,639	96%	4,899,852	96%
Trucks	165,761	4%	209,010	4%

Modeling of vehicle miles traveled (VMT) provided by Kittelson & Associates Inc., 2023. VMT from passenger vehicles and trucks that have an origin or destination in the City using a transportation origin-destination methodology. Accounting of VMT is based on the recommendations of CARB's Regional Targets Advisory Committee (RTAC) created under Senate Bill 375 (SB 375). For accounting purposes, there are three types of trips:

- Vehicle trips that originated and terminated within the City (Internal-Internal, I-I). Using the accounting rules established by RTAC, 100 percent of the length of these trips, and their emissions, are attributed to the City.
- Vehicle trips that either originated or terminated (but not both) within the City (Internal-External or External-Internal, I-X and X-I). Using the accounting rules established by RTAC, 50 percent of the trip length for these trips is attributed to the City.
- Vehicle trips that neither originated nor terminated within the City. These trips are commonly called pass-through trips (External-External, X-X). Using the accounting rules established by RTAC, these trips are not counted towards the City's VMT or emissions.

Year 2019 Existing: Criteria Air Pollutants

Source: EMFAC2021 Version 1.0.2. PL Emission Rates. San Mateo County

[1.] Based on data provided Kittelson & Associates Inc., 2023.

	Trucks	Passenger Vehicles
Fleet Mix - San Mateo (K)	**4%**	**96%**
Passenger Vehicles	Trucks	EMFAC default
94.98%	5.02%	

Daily VMT	**3,918,221**					**lbs/day**			
Vehicle Type	**Fuel Type**	**Percent of VMT**	**Adjusted Percent for San Mateo**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
All Other Buses	Diesel	0.37%	0.37%	2.89	43.68	8.07	0.36	2.93	1.63
All Other Buses	Natural Gas	0.00%	0.00%	0.00	0.12	1.28	0.00	0.02	0.01
LDA	Gasoline	52.42%	52.86%	69.31	311.65	4,092.60	13.24	74.17	26.46
LDA	Diesel	0.18%	0.18%	0.54	5.04	5.79	0.04	0.57	0.39
LDA	Electricity	2.14%	2.16%	0.00	0.00	0.00	0.00	2.29	0.65
LDA	Plug-in Hybrid	1.17%	1.18%	0.15	0.35	22.09	0.15	1.28	0.42
LDT1	Gasoline	4.32%	4.35%	17.02	77.07	728.05	1.29	7.02	2.69
LDT1	Diesel	0.00%	0.00%	0.03	0.16	0.17	0.00	0.03	0.02
LDT1	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.01	0.00
LDT1	Plug-in Hybrid	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
LDT2	Gasoline	21.36%	21.54%	31.04	195.78	1,865.39	6.77	32.41	11.57
LDT2	Diesel	0.08%	0.08%	0.12	0.49	1.02	0.02	0.17	0.08
LDT2	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.01	0.00
LDT2	Plug-in Hybrid	0.05%	0.05%	0.01	0.02	0.97	0.01	0.06	0.02
LHD1	Gasoline	1.95%	1.64%	9.99	40.14	242.07	1.55	14.79	5.23
LHD1	Diesel	0.64%	0.54%	13.75	164.32	41.48	0.34	8.15	4.70
LHD2	Gasoline	0.22%	0.18%	1.10	5.27	25.75	0.19	1.88	0.66
LHD2	Diesel	0.26%	0.22%	4.53	45.88	12.39	0.17	3.32	1.75
MCY	Gasoline	0.33%	0.33%	40.94	19.94	468.17	0.05	0.51	0.20
MDV	Gasoline	11.83%	11.93%	27.06	155.36	1,247.10	4.51	18.16	6.54
MDV	Diesel	0.20%	0.21%	0.22	1.18	3.44	0.07	0.39	0.19
MDV	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
MDV	Plug-in Hybrid	0.06%	0.06%	0.01	0.02	1.21	0.01	0.07	0.02
MH	Gasoline	0.03%	0.03%	0.63	2.65	18.15	0.06	0.18	0.06
MH	Diesel	0.01%	0.01%	0.15	5.24	0.49	0.01	0.20	0.14
Motor Coach	Diesel	0.05%	0.05%	0.82	19.97	2.87	0.08	0.92	0.62
OBUS	Gasoline	0.10%	0.10%	0.60	3.96	13.63	0.16	0.52	0.17
PTO	Diesel	0.03%	0.02%	0.77	14.20	2.88	0.05	0.26	0.25
SBUS	Gasoline	0.02%	0.02%	0.67	2.85	16.50	0.01	0.09	0.03
SBUS	Diesel	0.02%	0.02%	0.15	11.49	0.43	0.02	0.17	0.09
SBUS	Natural Gas	0.00%	0.00%	0.00	0.04	0.85	0.00	0.00	0.00
T6 CAIRP Class 4	Diesel	0.00%	0.00%	0.01	0.14	0.02	0.00	0.01	0.01
T6 CAIRP Class 5	Diesel	0.00%	0.00%	0.01	0.14	0.02	0.00	0.01	0.01
T6 CAIRP Class 6	Diesel	0.00%	0.00%	0.02	0.48	0.07	0.00	0.03	0.02
T6 CAIRP Class 7	Diesel	0.02%	0.01%	0.12	3.19	0.41	0.01	0.17	0.12
T6 Instate Delivery Class 4	Diesel	0.07%	0.06%	3.51	44.48	9.21	0.07	1.77	1.47
T6 Instate Delivery Class 4	Natural Gas	0.00%	0.00%	0.00	0.01	0.06	0.00	0.00	0.00
T6 Instate Delivery Class 5	Diesel	0.06%	0.05%	1.22	17.62	3.30	0.06	0.77	0.55
T6 Instate Delivery Class 5	Natural Gas	0.00%	0.00%	0.00	0.01	0.07	0.00	0.00	0.00
T6 Instate Delivery Class 6	Diesel	0.12%	0.10%	4.03	51.51	10.60	0.12	2.23	1.76
T6 Instate Delivery Class 6	Natural Gas	0.00%	0.00%	0.00	0.01	0.10	0.00	0.00	0.00
T6 Instate Delivery Class 7	Diesel	0.05%	0.04%	1.06	16.60	2.78	0.05	0.68	0.51
T6 Instate Delivery Class 7	Natural Gas	0.00%	0.00%	0.00	0.01	0.19	0.00	0.00	0.00
T6 Instate Other Class 4	Diesel	0.09%	0.08%	3.93	61.21	11.07	0.09	2.46	2.07
T6 Instate Other Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.06	0.00	0.00	0.00
T6 Instate Other Class 5	Diesel	0.24%	0.20%	3.34	58.49	9.94	0.23	2.86	2.00
T6 Instate Other Class 5	Natural Gas	0.00%	0.00%	0.00	0.02	0.29	0.00	0.01	0.00
T6 Instate Other Class 6	Diesel	0.15%	0.13%	3.51	56.66	10.18	0.14	2.58	2.00
T6 Instate Other Class 6	Natural Gas	0.00%	0.00%	0.00	0.01	0.15	0.00	0.00	0.00
T6 Instate Other Class 7	Diesel	0.07%	0.06%	1.24	21.27	3.43	0.07	1.02	0.75
T6 Instate Other Class 7	Natural Gas	0.00%	0.00%	0.00	0.02	0.32	0.00	0.01	0.00
T6 Instate Tractor Class 6	Diesel	0.00%	0.00%	0.06	0.93	0.17	0.00	0.04	0.03
T6 Instate Tractor Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Instate Tractor Class 7	Diesel	0.02%	0.02%	0.25	5.98	0.77	0.02	0.24	0.16
T6 Instate Tractor Class 7	Natural Gas	0.00%	0.00%	0.00	0.00	0.05	0.00	0.00	0.00
T6 OOS Class 4	Diesel	0.00%	0.00%	0.00	0.08	0.01	0.00	0.00	0.00
T6 OOS Class 5	Diesel	0.00%	0.00%	0.00	0.08	0.01	0.00	0.01	0.00
T6 OOS Class 6	Diesel	0.00%	0.00%	0.01	0.27	0.04	0.00	0.02	0.01

Year 2019 Existing: Criteria Air Pollutants

Source: EMFAC2021 Version 1.0.2. PL Emission Rates. San Mateo County

[1.] Based on data provided Kittelson & Associates Inc., 2023.

	Trucks	Passenger Vehicles
Fleet Mix - San Mateo (K)	**4%**	**96%**
Passenger Vehicles	Trucks	EMFAC default
94.98%	5.02%	

Daily VMT	**3,918,221**					**lbs/day**			
Vehicle Type	**Fuel Type**	**Percent of VMT**	**Adjusted Percent for San Mateo**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
T6 OOS Class 7	Diesel	0.01%	0.01%	0.09	2.17	0.29	0.01	0.12	0.08
T6 Public Class 4	Diesel	0.01%	0.01%	0.06	4.89	0.15	0.01	0.06	0.03
T6 Public Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.04	0.00	0.00	0.00
T6 Public Class 5	Diesel	0.02%	0.02%	0.11	6.84	0.31	0.02	0.14	0.07
T6 Public Class 5	Natural Gas	0.00%	0.00%	0.00	0.02	0.46	0.00	0.01	0.00
T6 Public Class 6	Diesel	0.01%	0.01%	0.14	9.58	0.33	0.01	0.13	0.08
T6 Public Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.09	0.00	0.00	0.00
T6 Public Class 7	Diesel	0.04%	0.03%	0.46	30.63	0.96	0.04	0.39	0.26
T6 Public Class 7	Natural Gas	0.00%	0.00%	0.00	0.01	0.43	0.00	0.01	0.00
T6 Utility Class 5	Diesel	0.00%	0.00%	0.00	0.21	0.02	0.00	0.01	0.00
T6 Utility Class 5	Natural Gas	0.00%	0.00%	0.00	0.00	0.01	0.00	0.00	0.00
T6 Utility Class 6	Diesel	0.00%	0.00%	0.00	0.07	0.00	0.00	0.00	0.00
T6 Utility Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 7	Diesel	0.00%	0.00%	0.00	0.08	0.00	0.00	0.00	0.00
T6 Utility Class 7	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6TS	Gasoline	0.24%	0.20%	4.40	23.67	98.27	0.38	1.21	0.42
T7 CAIRP Class 8	Diesel	0.09%	0.08%	0.71	29.00	2.63	0.12	1.46	0.81
T7 CAIRP Class 8	Natural Gas	0.00%	0.00%	0.00	0.00	0.06	0.00	0.00	0.00
T7 NNOOS Class 8	Diesel	0.11%	0.09%	1.40	37.07	5.52	0.15	2.16	1.36
T7 NOOS Class 8	Diesel	0.04%	0.03%	0.36	13.11	1.31	0.05	0.66	0.37
T7 Other Port Class 8	Diesel	0.01%	0.01%	0.08	2.96	0.25	0.01	0.11	0.05
T7 POAK Class 8	Diesel	0.03%	0.02%	0.37	12.32	1.16	0.04	0.43	0.20
T7 POAK Class 8	Natural Gas	0.00%	0.00%	0.00	0.00	0.06	0.00	0.00	0.00
T7 POAK Class 8	Diesel	0.03%	0.02%	0.37	12.32	1.16	0.04	0.43	0.20
T7 POAK Class 8	Natural Gas	0.00%	0.00%	0.00	0.00	0.06	0.00	0.00	0.00
T7 Public Class 8	Diesel	0.08%	0.07%	1.12	83.11	3.62	0.13	1.65	0.88
T7 Public Class 8	Natural Gas	0.00%	0.00%	0.00	0.02	0.28	0.00	0.00	0.00
T7 Single Concrete/Transit M	Diesel	0.02%	0.02%	0.03	1.89	0.15	0.03	0.23	0.09
T7 Single Concrete/Transit M	Natural Gas	0.00%	0.00%	0.00	0.04	0.71	0.00	0.01	0.00
T7 Single Dump Class 8	Diesel	0.06%	0.05%	0.86	25.02	3.00	0.08	1.12	0.66
T7 Single Dump Class 8	Natural Gas	0.00%	0.00%	0.00	0.11	1.90	0.00	0.03	0.01
T7 Single Other Class 8	Diesel	0.06%	0.05%	0.81	22.34	2.99	0.08	1.14	0.68
T7 Single Other Class 8	Natural Gas	0.00%	0.00%	0.00	0.13	2.37	0.00	0.04	0.01
T7 SWCV Class 8	Diesel	0.06%	0.05%	0.23	43.20	0.63	0.20	1.34	0.48
T7 SWCV Class 8	Natural Gas	0.03%	0.03%	0.47	9.24	72.54	0.00	0.69	0.24
T7 Tractor Class 8	Diesel	0.08%	0.07%	1.02	33.56	3.71	0.10	1.43	0.84
T7 Tractor Class 8	Natural Gas	0.01%	0.01%	0.01	0.32	5.58	0.00	0.07	0.02
T7 Utility Class 8	Diesel	0.00%	0.00%	0.01	0.33	0.03	0.00	0.02	0.01
T7IS	Gasoline	0.00%	0.00%	0.39	1.72	14.41	0.01	0.04	0.01
UBUS	Gasoline	0.02%	0.02%	0.02	0.11	1.17	0.02	0.21	0.07
UBUS	Diesel	0.17%	0.17%	2.37	79.65	4.57	0.21	2.22	0.81
UBUS	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
		100%	**100%**	**260**	**1,940**	**9,116**	**32**	**203**	**85**

Existing inYear 2040: Criteria Air Pollutants

Source: EMFAC2021 Version 1.0.2. PL Emission Rates. San Mateo County

[1.] Based on data provided Kittelson & Associates Inc., 2023.

	Trucks	Passenger Vehicles
Fleet Mix - San Mateo (K)	**4%**	**96%**
Passenger Vehicles	Trucks	EMFAC default
93%	7%	

Daily VMT	**3,918,221**						**lbs/day**		
Vehicle Type	**Fuel Type**	**Percent of VMT**	**Adjusted Percent for San Mateo**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
All Other Buses	Diesel	0.35%	0.36%	0.40	15.12	2.46	0.29	1.87	0.68
All Other Buses	Natural Gas	0.01%	0.01%	0.01	0.04	1.91	0.00	0.03	0.01
LDA	Gasoline	29.61%	30.62%	7.29	49.87	1,100.86	5.68	39.29	12.50
LDA	Diesel	0.02%	0.02%	0.01	0.04	0.23	0.00	0.03	0.01
LDA	Electricity	4.45%	4.60%	0.00	0.00	0.00	0.00	4.76	1.36
LDA	Plug-in Hybrid	1.43%	1.48%	0.14	0.33	20.73	0.14	1.50	0.44
LDT1	Gasoline	3.58%	3.70%	1.13	7.30	149.75	0.80	5.22	1.69
LDT1	Diesel	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
LDT1	Electricity	0.11%	0.12%	0.00	0.00	0.00	0.00	0.12	0.03
LDT1	Plug-in Hybrid	0.08%	0.08%	0.01	0.02	1.13	0.01	0.08	0.02
LDT2	Gasoline	30.90%	31.95%	10.91	63.88	1,384.97	7.14	44.74	14.38
LDT2	Diesel	0.12%	0.12%	0.12	0.28	1.27	0.02	0.21	0.09
LDT2	Electricity	0.91%	0.94%	0.00	0.00	0.00	0.00	0.97	0.28
LDT2	Plug-in Hybrid	0.82%	0.85%	0.08	0.19	11.86	0.08	0.86	0.25
LHD1	Gasoline	1.56%	0.88%	0.54	2.55	79.70	1.00	11.74	4.10
LHD1	Diesel	0.94%	0.53%	7.06	20.87	17.72	0.46	8.75	3.85
LHD1	Electricity	1.49%	0.84%	0.00	0.00	0.00	0.00	6.05	2.01
LHD2	Gasoline	0.17%	0.10%	0.05	0.33	8.89	0.13	1.50	0.52
LHD2	Diesel	0.43%	0.24%	3.76	11.49	9.51	0.25	4.62	2.04
LHD2	Electricity	0.36%	0.20%	0.00	0.00	0.00	0.00	1.65	0.55
MCY	Gasoline	0.47%	0.49%	30.42	18.62	380.65	0.07	0.74	0.29
MDV	Gasoline	17.94%	18.55%	6.54	38.54	821.19	5.02	26.14	8.41
MDV	Diesel	0.19%	0.20%	0.07	0.16	2.29	0.05	0.29	0.10
MDV	Electricity	0.83%	0.86%	0.00	0.00	0.00	0.00	0.89	0.25
MDV	Plug-in Hybrid	0.52%	0.54%	0.05	0.12	7.53	0.05	0.55	0.16
MH	Gasoline	0.05%	0.05%	0.05	0.46	0.70	0.08	0.26	0.09
MH	Diesel	0.03%	0.03%	0.18	5.72	0.53	0.02	0.19	0.09
Motor Coach	Diesel	0.05%	0.05%	0.05	4.47	0.17	0.07	0.53	0.25
OBUS	Gasoline	0.03%	0.03%	0.05	0.31	0.93	0.04	0.15	0.05
OBUS	Electricity	0.02%	0.03%	0.00	0.00	0.00	0.00	0.07	0.02
PTO	Diesel	0.02%	0.01%	0.03	4.94	0.36	0.03	0.01	0.01
PTO	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.00	0.00
SBUS	Gasoline	0.02%	0.02%	0.01	0.15	0.31	0.01	0.09	0.03
SBUS	Diesel	0.01%	0.01%	0.02	0.87	0.09	0.01	0.07	0.03
SBUS	Electricity	0.02%	0.02%	0.00	0.00	0.00	0.00	0.04	0.01
SBUS	Natural Gas	0.00%	0.00%	0.00	0.02	0.63	0.00	0.00	0.00
T6 CAIRP Class 4	Diesel	0.00%	0.00%	0.00	0.01	0.00	0.00	0.00	0.00
T6 CAIRP Class 4	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 CAIRP Class 5	Diesel	0.00%	0.00%	0.00	0.01	0.00	0.00	0.00	0.00
T6 CAIRP Class 5	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 CAIRP Class 6	Diesel	0.00%	0.00%	0.00	0.02	0.00	0.00	0.01	0.00
T6 CAIRP Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 CAIRP Class 7	Diesel	0.02%	0.01%	0.01	0.26	0.04	0.01	0.08	0.03
T6 CAIRP Class 7	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 Instate Delivery Class 4	Diesel	0.05%	0.03%	0.04	1.79	0.25	0.04	0.25	0.09
T6 Instate Delivery Class 4	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.10	0.03
T6 Instate Delivery Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.19	0.00	0.00	0.00
T6 Instate Delivery Class 5	Diesel	0.04%	0.02%	0.02	1.37	0.19	0.03	0.20	0.07
T6 Instate Delivery Class 5	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.09	0.03
T6 Instate Delivery Class 5	Natural Gas	0.00%	0.00%	0.00	0.00	0.15	0.00	0.00	0.00
T6 Instate Delivery Class 6	Diesel	0.08%	0.04%	0.05	2.90	0.39	0.07	0.42	0.15
T6 Instate Delivery Class 6	Electricity	0.06%	0.03%	0.00	0.00	0.00	0.00	0.18	0.06
T6 Instate Delivery Class 6	Natural Gas	0.00%	0.00%	0.00	0.01	0.31	0.00	0.00	0.00
T6 Instate Delivery Class 7	Diesel	0.04%	0.02%	0.03	2.56	0.26	0.04	0.21	0.08
T6 Instate Delivery Class 7	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.05	0.01
T6 Instate Delivery Class 7	Natural Gas	0.00%	0.00%	0.00	0.01	0.29	0.00	0.00	0.00
T6 Instate Other Class 4	Diesel	0.06%	0.04%	0.04	1.81	0.26	0.05	0.33	0.12
T6 Instate Other Class 4	Electricity	0.05%	0.03%	0.00	0.00	0.00	0.00	0.14	0.04
T6 Instate Other Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.18	0.00	0.00	0.00
T6 Instate Other Class 5	Diesel	0.16%	0.09%	0.08	4.24	0.62	0.14	0.83	0.30

Existing inYear 2040: Criteria Air Pollutants

Source: EMFAC2021 Version 1.0.2. PL Emission Rates. San Mateo County

[1.] Based on data provided Kittelson & Associates Inc., 2023.

	Trucks	Passenger Vehicles
Fleet Mix - San Mateo (K)	**4%**	**96%**
Passenger Vehicles	Trucks	EMFAC default
93%	7%	

Daily VMT	**3,918,221**						**lbs/day**		
Vehicle Type	**Fuel Type**	**Percent of VMT**	**Adjusted Percent for San Mateo**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
T6 Instate Other Class 5	Electricity	0.12%	0.07%	0.00	0.00	0.00	0.00	0.37	0.12
T6 Instate Other Class 5	Natural Gas	0.00%	0.00%	0.00	0.01	0.46	0.00	0.01	0.00
T6 Instate Other Class 6	Diesel	0.10%	0.06%	0.05	2.77	0.40	0.09	0.53	0.19
T6 Instate Other Class 6	Electricity	0.08%	0.04%	0.00	0.00	0.00	0.00	0.23	0.07
T6 Instate Other Class 6	Natural Gas	0.00%	0.00%	0.00	0.01	0.29	0.00	0.01	0.00
T6 Instate Other Class 7	Diesel	0.06%	0.03%	0.04	2.64	0.28	0.05	0.30	0.11
T6 Instate Other Class 7	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.09	0.03
T6 Instate Other Class 7	Natural Gas	0.00%	0.00%	0.00	0.01	0.29	0.00	0.01	0.00
T6 Instate Tractor Class 6	Diesel	0.00%	0.00%	0.00	0.05	0.01	0.00	0.01	0.00
T6 Instate Tractor Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Instate Tractor Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.01	0.00	0.00	0.00
T6 Instate Tractor Class 7	Diesel	0.02%	0.01%	0.01	1.07	0.10	0.02	0.11	0.04
T6 Instate Tractor Class 7	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 Instate Tractor Class 7	Natural Gas	0.00%	0.00%	0.00	0.00	0.10	0.00	0.00	0.00
T6 OOS Class 4	Diesel	0.00%	0.00%	0.00	0.01	0.00	0.00	0.00	0.00
T6 OOS Class 5	Diesel	0.00%	0.00%	0.00	0.01	0.00	0.00	0.00	0.00
T6 OOS Class 6	Diesel	0.00%	0.00%	0.00	0.03	0.00	0.00	0.01	0.00
T6 OOS Class 7	Diesel	0.01%	0.01%	0.01	0.25	0.03	0.01	0.06	0.03
T6 Public Class 4	Diesel	0.00%	0.00%	0.01	0.40	0.03	0.00	0.02	0.01
T6 Public Class 4	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 Public Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.07	0.00	0.00	0.00
T6 Public Class 5	Diesel	0.01%	0.01%	0.02	0.96	0.08	0.01	0.07	0.03
T6 Public Class 5	Electricity	0.01%	0.00%	0.00	0.00	0.00	0.00	0.02	0.01
T6 Public Class 5	Natural Gas	0.00%	0.00%	0.00	0.01	0.30	0.00	0.01	0.00
T6 Public Class 6	Diesel	0.01%	0.00%	0.01	0.68	0.05	0.01	0.04	0.02
T6 Public Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 Public Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.15	0.00	0.00	0.00
T6 Public Class 7	Diesel	0.02%	0.01%	0.03	1.69	0.13	0.02	0.13	0.05
T6 Public Class 7	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.04	0.01
T6 Public Class 7	Natural Gas	0.00%	0.00%	0.00	0.01	0.47	0.00	0.01	0.00
T6 Utility Class 5	Diesel	0.00%	0.00%	0.00	0.02	0.00	0.00	0.00	0.00
T6 Utility Class 5	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 5	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 6	Diesel	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 7	Diesel	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 7	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 7	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6TS	Gasoline	0.17%	0.09%	0.18	1.18	2.95	0.22	0.84	0.29
T6TS	Electricity	0.14%	0.08%	0.00	0.00	0.00	0.00	0.40	0.13
T7 CAIRP Class 8	Diesel	0.09%	0.05%	0.09	9.96	0.32	0.10	1.21	0.54
T7 CAIRP Class 8	Electricity	0.03%	0.01%	0.00	0.00	0.00	0.00	0.17	0.05
T7 CAIRP Class 8	Natural Gas	0.00%	0.00%	0.00	0.00	0.04	0.00	0.00	0.00
T7 NNOOS Class 8	Diesel	0.14%	0.08%	0.14	16.45	0.47	0.14	1.82	0.81
T7 NOOS Class 8	Diesel	0.05%	0.03%	0.05	6.15	0.18	0.05	0.67	0.30
T7 Other Port Class 8	Diesel	0.01%	0.01%	0.01	1.07	0.06	0.01	0.13	0.05
T7 Other Port Class 8	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.02	0.01
T7 POAK Class 8	Diesel	0.03%	0.02%	0.03	3.65	0.18	0.04	0.41	0.16
T7 POAK Class 8	Electricity	0.01%	0.00%	0.00	0.00	0.00	0.00	0.05	0.01
T7 POAK Class 8	Natural Gas	0.00%	0.00%	0.00	0.00	0.03	0.00	0.00	0.00
T7 Public Class 8	Diesel	0.05%	0.03%	0.18	13.12	0.80	0.07	0.73	0.28
T7 Public Class 8	Electricity	0.02%	0.01%	0.00	0.00	0.00	0.00	0.19	0.06
T7 Public Class 8	Natural Gas	0.00%	0.00%	0.00	0.01	0.29	0.00	0.01	0.00
T7 Single Concrete/Transit Mi	Diesel	0.01%	0.01%	0.01	0.67	0.04	0.01	0.11	0.04
T7 Single Concrete/Transit Mi	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.07	0.02
T7 Single Concrete/Transit Mi	Natural Gas	0.00%	0.00%	0.00	0.01	0.20	0.00	0.01	0.00
T7 Single Dump Class 8	Diesel	0.04%	0.02%	0.03	3.73	0.20	0.05	0.44	0.18
T7 Single Dump Class 8	Electricity	0.02%	0.01%	0.00	0.00	0.00	0.00	0.15	0.05
T7 Single Dump Class 8	Natural Gas	0.00%	0.00%	0.00	0.04	0.91	0.00	0.02	0.01

Existing inYear 2040: Criteria Air Pollutants

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T7 Single Other Class 8	Diesel	0.05%	0.03%	0.05	5.35	0.28	0.06	0.61	0.25
T7 Single Other Class 8	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.19	0.06
T7 Single Other Class 8	Natural Gas	0.00%	0.00%	0.00	0.07	1.42	0.00	0.03	0.01
T7 SWCV Class 8	Diesel	0.01%	0.01%	0.04	6.37	0.10	0.03	0.23	0.08
T7 SWCV Class 8	Electricity	0.03%	0.01%	0.00	0.00	0.00	0.00	0.31	0.10
T7 SWCV Class 8	Natural Gas	0.05%	0.03%	0.09	2.09	51.08	0.00	1.11	0.38
T7 Tractor Class 8	Diesel	0.09%	0.05%	0.08	9.28	0.38	0.09	1.08	0.45
T7 Tractor Class 8	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.10	0.03
T7 Tractor Class 8	Natural Gas	0.01%	0.00%	0.01	0.14	3.01	0.00	0.08	0.03
T7 Utility Class 8	Diesel	0.00%	0.00%	0.00	0.09	0.01	0.00	0.01	0.00
T7 Utility Class 8	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T7IS	Gasoline	0.00%	0.00%	0.03	0.16	1.89	0.00	0.01	0.00
T7IS	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
UBUS	Gasoline	0.02%	0.02%	0.01	0.03	1.02	0.01	0.18	0.06
UBUS	Diesel	0.01%	0.01%	0.06	0.34	0.07	0.01	0.14	0.05
UBUS	Electricity	0.14%	0.15%	0.00	0.00	0.00	0.00	1.07	0.34
UBUS	Natural Gas	0.00%	0.00%	0.02	0.02	17.87	0.00	0.05	0.02
		100%	100%	70.58	352.29	4096.56	22.96	181.74	61.28

Year 2040: GP 2040 Update Criteria Air Pollutants

Source: EMFAC2021 Version 1.0.2. PL Emission Rates. San Mateo County

[1.] Based on data provided Kittelson & Associates Inc., 2023.

	Trucks	Passenger Vehicles
Fleet Mix - San Mateo (K)	**4%**	**96%**
Passenger Vehicles	Trucks	EMFAC default
93%	7%	

Daily VMT	**5,108,862**						**lbs/day**		
Vehicle Type	**Fuel Type**	**Percent of VMT**	**Adjusted Percent for San Mateo**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
All Other Buses	Diesel	0.35%	0.36%	0.53	19.71	3.20	0.38	2.43	0.89
All Other Buses	Natural Gas	0.01%	0.01%	0.01	0.06	2.49	0.00	0.04	0.02
LDA	Gasoline	29.61%	30.62%	9.51	65.02	1,435.38	7.40	51.23	16.30
LDA	Diesel	0.02%	0.02%	0.01	0.05	0.30	0.00	0.04	0.01
LDA	Electricity	4.45%	4.60%	0.00	0.00	0.00	0.00	6.20	1.77
LDA	Plug-in Hybrid	1.43%	1.48%	0.18	0.43	27.03	0.18	1.95	0.58
LDT1	Gasoline	3.58%	3.70%	1.47	9.52	195.26	1.04	6.81	2.20
LDT1	Diesel	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
LDT1	Electricity	0.11%	0.12%	0.00	0.00	0.00	0.00	0.16	0.05
LDT1	Plug-in Hybrid	0.08%	0.08%	0.01	0.02	1.48	0.01	0.11	0.03
LDT2	Gasoline	30.90%	31.95%	14.22	83.29	1,805.83	9.31	58.34	18.75
LDT2	Diesel	0.12%	0.12%	0.16	0.36	1.66	0.03	0.27	0.12
LDT2	Electricity	0.91%	0.94%	0.00	0.00	0.00	0.00	1.27	0.36
LDT2	Plug-in Hybrid	0.82%	0.85%	0.10	0.25	15.46	0.10	1.12	0.33
LHD1	Gasoline	1.56%	0.88%	0.70	3.32	103.91	1.31	15.31	5.35
LHD1	Diesel	0.94%	0.53%	9.20	27.21	23.10	0.60	11.41	5.02
LHD1	Electricity	1.49%	0.84%	0.00	0.00	0.00	0.00	7.89	2.63
LHD2	Gasoline	0.17%	0.10%	0.07	0.44	11.59	0.16	1.95	0.68
LHD2	Diesel	0.43%	0.24%	4.90	14.98	12.39	0.32	6.02	2.67
LHD2	Electricity	0.36%	0.20%	0.00	0.00	0.00	0.00	2.16	0.72
MCY	Gasoline	0.47%	0.49%	39.67	24.28	496.32	0.10	0.96	0.38
MDV	Gasoline	17.94%	18.55%	8.53	50.25	1,070.73	6.55	34.08	10.97
MDV	Diesel	0.19%	0.20%	0.10	0.21	2.98	0.07	0.38	0.13
MDV	Electricity	0.83%	0.86%	0.00	0.00	0.00	0.00	1.16	0.33
MDV	Plug-in Hybrid	0.52%	0.54%	0.07	0.16	9.81	0.06	0.71	0.21
MH	Gasoline	0.05%	0.05%	0.07	0.60	0.92	0.11	0.34	0.12
MH	Diesel	0.03%	0.03%	0.24	7.46	0.69	0.03	0.25	0.12
Motor Coach	Diesel	0.05%	0.05%	0.06	5.83	0.22	0.09	0.69	0.32
OBUS	Gasoline	0.03%	0.03%	0.06	0.40	1.21	0.05	0.20	0.07
OBUS	Electricity	0.02%	0.03%	0.00	0.00	0.00	0.00	0.10	0.03
PTO	Diesel	0.02%	0.01%	0.04	6.44	0.47	0.04	0.01	0.01
PTO	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.00	0.00
SBUS	Gasoline	0.02%	0.02%	0.02	0.19	0.40	0.02	0.12	0.04
SBUS	Diesel	0.01%	0.01%	0.03	1.13	0.12	0.02	0.09	0.04
SBUS	Electricity	0.02%	0.02%	0.00	0.00	0.00	0.00	0.06	0.02
SBUS	Natural Gas	0.00%	0.00%	0.00	0.03	0.82	0.00	0.01	0.00
T6 CAIRP Class 4	Diesel	0.00%	0.00%	0.00	0.01	0.00	0.00	0.00	0.00
T6 CAIRP Class 4	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 CAIRP Class 5	Diesel	0.00%	0.00%	0.00	0.01	0.00	0.00	0.00	0.00
T6 CAIRP Class 5	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 CAIRP Class 6	Diesel	0.00%	0.00%	0.00	0.03	0.00	0.00	0.01	0.00
T6 CAIRP Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 CAIRP Class 7	Diesel	0.02%	0.01%	0.01	0.34	0.05	0.01	0.10	0.04
T6 CAIRP Class 7	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.02	0.00
T6 Instate Delivery Class 4	Diesel	0.05%	0.03%	0.05	2.33	0.33	0.05	0.33	0.12
T6 Instate Delivery Class 4	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.14	0.04
T6 Instate Delivery Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.25	0.00	0.00	0.00
T6 Instate Delivery Class 5	Diesel	0.04%	0.02%	0.03	1.78	0.25	0.04	0.27	0.09
T6 Instate Delivery Class 5	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.11	0.04
T6 Instate Delivery Class 5	Natural Gas	0.00%	0.00%	0.00	0.00	0.19	0.00	0.00	0.00
T6 Instate Delivery Class 6	Diesel	0.08%	0.04%	0.06	3.78	0.51	0.09	0.55	0.19
T6 Instate Delivery Class 6	Electricity	0.06%	0.03%	0.00	0.00	0.00	0.00	0.23	0.07
T6 Instate Delivery Class 6	Natural Gas	0.00%	0.00%	0.00	0.01	0.40	0.00	0.01	0.00
T6 Instate Delivery Class 7	Diesel	0.04%	0.02%	0.04	3.34	0.34	0.05	0.28	0.10
T6 Instate Delivery Class 7	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.06	0.02
T6 Instate Delivery Class 7	Natural Gas	0.00%	0.00%	0.00	0.02	0.38	0.00	0.01	0.00
T6 Instate Other Class 4	Diesel	0.06%	0.04%	0.05	2.35	0.34	0.07	0.43	0.16
T6 Instate Other Class 4	Electricity	0.05%	0.03%	0.00	0.00	0.00	0.00	0.19	0.06
T6 Instate Other Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.24	0.00	0.01	0.00
T6 Instate Other Class 5	Diesel	0.16%	0.09%	0.11	5.53	0.80	0.18	1.09	0.40

Year 2040: GP 2040 Update Criteria Air Pollutants

Source: EMFAC2021 Version 1.0.2. PL Emission Rates. San Mateo County

[1.] Based on data provided Kittelson & Associates Inc., 2023.

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Daily VMT	**5,108,862**							**lbs/day**	
Vehicle Type	**Fuel Type**	**Percent of VMT**	**Adjusted Percent for San Mateo**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
T6 Instate Other Class 5	Electricity	0.12%	0.07%	0.00	0.00	0.00	0.00	0.48	0.15
T6 Instate Other Class 5	Natural Gas	0.00%	0.00%	0.00	0.01	0.60	0.00	0.01	0.00
T6 Instate Other Class 6	Diesel	0.10%	0.06%	0.07	3.61	0.52	0.11	0.69	0.25
T6 Instate Other Class 6	Electricity	0.08%	0.04%	0.00	0.00	0.00	0.00	0.30	0.10
T6 Instate Other Class 6	Natural Gas	0.00%	0.00%	0.00	0.01	0.38	0.00	0.01	0.00
T6 Instate Other Class 7	Diesel	0.06%	0.03%	0.05	3.44	0.36	0.06	0.39	0.14
T6 Instate Other Class 7	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.11	0.04
T6 Instate Other Class 7	Natural Gas	0.00%	0.00%	0.00	0.02	0.38	0.00	0.01	0.00
T6 Instate Tractor Class 6	Diesel	0.00%	0.00%	0.00	0.06	0.01	0.00	0.01	0.00
T6 Instate Tractor Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 Instate Tractor Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.01	0.00	0.00	0.00
T6 Instate Tractor Class 7	Diesel	0.02%	0.01%	0.02	1.40	0.14	0.02	0.14	0.05
T6 Instate Tractor Class 7	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 Instate Tractor Class 7	Natural Gas	0.00%	0.00%	0.00	0.00	0.13	0.00	0.00	0.00
T6 OOS Class 4	Diesel	0.00%	0.00%	0.00	0.01	0.00	0.00	0.00	0.00
T6 OOS Class 5	Diesel	0.00%	0.00%	0.00	0.02	0.00	0.00	0.00	0.00
T6 OOS Class 6	Diesel	0.00%	0.00%	0.00	0.04	0.01	0.00	0.01	0.00
T6 OOS Class 7	Diesel	0.01%	0.01%	0.01	0.33	0.04	0.01	0.08	0.03
T6 Public Class 4	Diesel	0.00%	0.00%	0.01	0.52	0.04	0.00	0.03	0.01
T6 Public Class 4	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T6 Public Class 4	Natural Gas	0.00%	0.00%	0.00	0.00	0.10	0.00	0.00	0.00
T6 Public Class 5	Diesel	0.01%	0.01%	0.03	1.25	0.11	0.02	0.10	0.04
T6 Public Class 5	Electricity	0.01%	0.00%	0.00	0.00	0.00	0.00	0.03	0.01
T6 Public Class 5	Natural Gas	0.00%	0.00%	0.00	0.01	0.40	0.00	0.01	0.00
T6 Public Class 6	Diesel	0.01%	0.00%	0.02	0.88	0.07	0.01	0.06	0.02
T6 Public Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.02	0.01
T6 Public Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.20	0.00	0.00	0.00
T6 Public Class 7	Diesel	0.02%	0.01%	0.04	2.21	0.16	0.03	0.16	0.06
T6 Public Class 7	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.05	0.01
T6 Public Class 7	Natural Gas	0.00%	0.00%	0.00	0.01	0.61	0.00	0.01	0.00
T6 Utility Class 5	Diesel	0.00%	0.00%	0.00	0.02	0.00	0.00	0.01	0.00
T6 Utility Class 5	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 5	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 6	Diesel	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 6	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 6	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 7	Diesel	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 7	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6 Utility Class 7	Natural Gas	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
T6TS	Gasoline	0.17%	0.09%	0.24	1.54	3.85	0.29	1.09	0.38
T6TS	Electricity	0.14%	0.08%	0.00	0.00	0.00	0.00	0.53	0.17
T7 CAIRP Class 8	Diesel	0.09%	0.05%	0.12	12.99	0.42	0.13	1.58	0.71
T7 CAIRP Class 8	Electricity	0.03%	0.01%	0.00	0.00	0.00	0.00	0.22	0.07
T7 CAIRP Class 8	Natural Gas	0.00%	0.00%	0.00	0.00	0.06	0.00	0.00	0.00
T7 NNOOS Class 8	Diesel	0.14%	0.08%	0.18	21.45	0.61	0.19	2.37	1.06
T7 NOOS Class 8	Diesel	0.05%	0.03%	0.07	8.01	0.23	0.07	0.87	0.39
T7 Other Port Class 8	Diesel	0.01%	0.01%	0.01	1.40	0.07	0.01	0.17	0.07
T7 Other Port Class 8	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.02	0.01
T7 POAK Class 8	Diesel	0.03%	0.02%	0.04	4.76	0.24	0.05	0.54	0.21
T7 POAK Class 8	Electricity	0.01%	0.00%	0.00	0.00	0.00	0.00	0.06	0.02
T7 POAK Class 8	Natural Gas	0.00%	0.00%	0.00	0.00	0.04	0.00	0.00	0.00
T7 Public Class 8	Diesel	0.05%	0.03%	0.23	17.11	1.04	0.10	0.96	0.36
T7 Public Class 8	Electricity	0.02%	0.01%	0.00	0.00	0.00	0.00	0.24	0.08
T7 Public Class 8	Natural Gas	0.00%	0.00%	0.00	0.01	0.38	0.00	0.01	0.00
T7 Single Concrete/Transit Mi	Diesel	0.01%	0.01%	0.01	0.87	0.05	0.01	0.14	0.06
T7 Single Concrete/Transit Mi	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.09	0.03
T7 Single Concrete/Transit Mi	Natural Gas	0.00%	0.00%	0.00	0.01	0.26	0.00	0.01	0.00
T7 Single Dump Class 8	Diesel	0.04%	0.02%	0.05	4.86	0.26	0.06	0.58	0.23
T7 Single Dump Class 8	Electricity	0.02%	0.01%	0.00	0.00	0.00	0.00	0.20	0.06
T7 Single Dump Class 8	Natural Gas	0.00%	0.00%	0.00	0.05	1.19	0.00	0.03	0.01

Year 2040: GP 2040 Update Criteria Air Pollutants

Source: EMFAC2021 Version 1.0.2. PL Emission Rates. San Mateo County

[1.] Based on data provided Kittelson & Associates Inc., 2023.

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Passenger Vehicles	Trucks	EMFAC default
93%	7%	

Daily VMT	**5,108,862**							**lbs/day**	
Vehicle Type	**Fuel Type**	**Percent of VMT**	**Adjusted Percent for San Mateo**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
T7 Single Other Class 8	Diesel	0.05%	0.03%	0.07	6.97	0.37	0.08	0.79	0.32
T7 Single Other Class 8	Electricity	0.03%	0.02%	0.00	0.00	0.00	0.00	0.25	0.08
T7 Single Other Class 8	Natural Gas	0.00%	0.00%	0.01	0.09	1.85	0.00	0.05	0.01
T7 SWCV Class 8	Diesel	0.01%	0.01%	0.05	8.31	0.14	0.05	0.30	0.11
T7 SWCV Class 8	Electricity	0.03%	0.01%	0.00	0.00	0.00	0.00	0.40	0.13
T7 SWCV Class 8	Natural Gas	0.05%	0.03%	0.12	2.72	66.60	0.00	1.45	0.49
T7 Tractor Class 8	Diesel	0.09%	0.05%	0.10	12.10	0.50	0.12	1.41	0.59
T7 Tractor Class 8	Electricity	0.01%	0.01%	0.00	0.00	0.00	0.00	0.13	0.04
T7 Tractor Class 8	Natural Gas	0.01%	0.00%	0.01	0.19	3.93	0.00	0.11	0.04
T7 Utility Class 8	Diesel	0.00%	0.00%	0.00	0.12	0.01	0.00	0.02	0.01
T7 Utility Class 8	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.01	0.00
T7IS	Gasoline	0.00%	0.00%	0.04	0.20	2.46	0.00	0.01	0.00
T7IS	Electricity	0.00%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
UBUS	Gasoline	0.02%	0.02%	0.01	0.04	1.33	0.02	0.23	0.08
UBUS	Diesel	0.01%	0.01%	0.08	0.45	0.09	0.01	0.18	0.06
UBUS	Electricity	0.14%	0.15%	0.00	0.00	0.00	0.00	1.39	0.44
UBUS	Natural Gas	0.00%	0.00%	0.03	0.03	23.30	0.00	0.07	0.02
		100%	100%	92.03	459.34	5341.40	29.94	236.97	79.91

Source: EMFAC2021 (v1.0.2) Emission Rates
Region Type: County
Region: San Mateo
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC202x Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN. PHEV calculated based on total VMT.

		g/mile																2.205E-03
Vehicle Category	Fuel	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM10_Total	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBW	PM2_5_Total	CO2_RUNEX	CH4_RUNEX	N2O_RUNEX	VMT	% of VMT
All Other Buses	Diesel	0.09023686	1.36259636	0.25165078	0.01128051	0.03327595	0.012	0.0461373	9.14E-02	0.03183645	0.003	0.01614806	5.10E-02	1192.33091	0.00419127	0.1876833	64,141	0.371%
All Other Buses	Natural Gas	0.01042305	0.30013161	3.09186636	0	0.00058185	0.012	0.0461373	5.87E-02	0.00053499	0.003	0.01614806	1.97E-02	1073.83879	0.72949556	0.21890906	830	0.005%
LDA	Gasoline	0.01530634	0.06882302	0.90378829	0.00292279	0.00159989	0.008	0.00677993	1.64E-02	0.00147107	0.002	0.00237298	5.84E-03	295.362746	0.00366328	0.0061982	9,059,972	52.422%
LDA	Diesel	0.03527123	0.33005	0.37968837	0.00230905	0.02221369	0.008	0.00685339	3.71E-02	0.02125274	0.002	0.00239869	2.57E-02	243.905095	0.00163828	0.03839279	30,529	0.177%
LDA	Electricity	0	0	0	0	0	0.008	0.00435954	1.24E-02	0	0.002	0.00152584	3.53E-03	0	0	0	370,112	2.142%
LDA	Plug-in Hybrid	0.00147497	0.00348629	0.21909105	0.00144487	0.00098388	0.008	0.0037207	1.27E-02	0.00090465	0.002	0.00130224	4.21E-03	146.011323	0.00046708	0.00063499	201,713	1.167%
LDT1	Gasoline	0.04564373	0.20667522	1.95243236	0.00345464	0.00250221	0.008	0.00831316	1.88E-02	0.00230125	0.002	0.00290961	7.21E-03	349.10819	0.00979161	0.01352281	746,068	4.317%
LDT1	Diesel	0.32948029	1.71627994	1.74980216	0.00400141	0.2595678	0.008	0.00974693	2.77E-01	0.24833901	0.002	0.00341143	2.54E-01	422.669418	0.01530373	0.06653186	191	0.001%
LDT1	Electricity	0	0	0	0	0	0.008	0.00439457	1.24E-02	0	0.002	0.0015381	3.54E-03	0	0	0	1,489	0.009%
LDT1	Plug-in Hybrid	0.00148565	0.00351155	0.22067637	0.00145534	0.00107671	0.008	0.00371874	1.28E-02	0.00098999	0.002	0.00130156	4.29E-03	147.068798	0.00047142	0.00064206	13	0.000%
LDT2	Gasoline	0.01682603	0.10611928	1.01111408	0.00367151	0.00162213	0.008	0.00794764	1.76E-02	0.00149166	0.002	0.00278167	6.27E-03	371.024169	0.00399448	0.00781007	3,691,162	21.358%
LDT2	Diesel	0.01594744	0.06819664	0.14105965	0.00319887	0.00701135	0.008	0.00792162	2.29E-02	0.00670804	0.002	0.00277257	1.15E-02	337.897344	0.00074073	0.05318799	14,433	0.084%
LDT2	Electricity	0	0	0	0	0	0.008	0.0043492	1.23E-02	0	0.002	0.00152222	3.52E-03	0	0	0	1,032	0.006%
LDT2	Plug-in Hybrid	0.0014536	0.00343578	0.21599352	0.00142409	0.0010437	0.008	0.00372269	1.28E-02	0.00095964	0.002	0.00130294	4.26E-03	143.911039	0.00046381	0.00063479	9,002	0.052%
LHD1	Gasoline	0.05935272	0.2385125	1.43832009	0.00919041	0.00189805	0.008	0.07800002	8.79E-02	0.00174634	0.002	0.02730001	3.10E-02	928.736258	0.01164255	0.0133348	336,732	1.948%
LHD1	Diesel	0.24776536	2.9607525	0.7474862	0.00614123	0.05676349	0.012	0.07800002	1.47E-01	0.05430793	0.003	0.02730001	8.46E-02	648.69946	0.01150823	0.10211096	111,039	0.642%
LHD2	Gasoline	0.05915216	0.28354714	1.38479235	0.01044345	0.00189906	0.008	0.09100003	1.01E-01	0.00174611	0.002	0.03185001	3.56E-02	1055.36143	0.01210184	0.01575783	37,198	0.215%
LHD2	Diesel	0.20223413	2.0462862	0.55266625	0.00753069	0.04515676	0.012	0.09100003	1.48E-01	0.0432033	0.003	0.03185001	7.81E-02	795.468393	0.00939339	0.12521367	44,855	0.260%
MCY	Gasoline	1.44302706	0.70285756	16.5007904	0.00193185	0.00199749	0.004	0.012	1.80E-02	0.00188	0.001	0.0042	7.08E-03	195.222634	0.20593077	0.04514856	56,767	0.328%
MDV	Gasoline	0.02646904	0.15198238	1.21999981	0.00441121	0.00171417	0.008	0.00805101	1.78E-02	0.00157696	0.002	0.00281785	6.39E-03	445.773984	0.00568427	0.01005737	2,045,190	11.834%
MDV	Diesel	0.01258222	0.06645486	0.19418471	0.00410529	0.00618437	0.008	0.00788387	2.21E-02	0.00591683	0.002	0.00275935	1.07E-02	433.642573	0.00058442	0.06825913	35,425	0.205%
MDV	Electricity	0	0	0	0	0	0.008	0.00442935	1.24E-02	0	0.002	0.00155027	3.55E-03	0	0	0	18	0.000%
MDV	Plug-in Hybrid	0.0014774	0.00349203	0.21948831	0.00144732	0.00108074	0.008	0.00371668	1.28E-02	0.0009937	0.002	0.00130084	4.29E-03	146.259111	0.00047282	0.0006488	11,022	0.064%
MH	Gasoline	0.2153827	0.90128713	6.18173836	0.01932942	0.00308388	0.012	0.04501744	6.01E-02	0.00284639	0.003	0.0157561	2.16E-02	1953.33228	0.04051957	0.04519606	5,874	0.034%
MH	Diesel	0.11614871	4.11457091	0.38618374	0.01025578	0.09843782	0.016	0.04478528	1.59E-01	0.09417944	0.004	0.01567485	1.14E-01	1083.32004	0.00539489	0.17052404	2,548	0.015%
Motor Coach	Diesel	0.17747673	4.32936964	0.62334635	0.01663978	0.10785399	0.012	0.07908361	1.99E-01	0.10318828	0.003	0.02767927	1.34E-01	1758.79752	0.00824333	0.27685009	9,228	0.053%
OBUS	Gasoline	0.0677254	0.44383266	1.52746629	0.01789527	0.00097071	0.012	0.0447987	5.78E-02	0.0008932	0.003	0.01567955	1.96E-02	1808.40518	0.01394141	0.02306813	17,849	0.103%
PTO	Diesel	0.30465766	5.6434306	1.14532265	0.02062149	0.10244242	0	0	1.02E-01	0.0980108	0	0	9.80E-02	2179.65709	0.01415056	0.34309706	5,033	0.029%
SBUS	Gasoline	0.4112129	1.74465294	10.1104796	0.00842645	0.00346695	0.008	0.04491714	5.64E-02	0.00318773	0.002	0.015721	2.09E-02	851.534042	0.07638922	0.07512445	3,266	0.019%
SBUS	Diesel	0.07653507	6.03031914	0.22383078	0.01104314	0.03087698	0.012	0.04491714	8.78E-02	0.02954126	0.003	0.015721	4.83E-02	1167.24193	0.00355486	0.18373407	3,813	0.022%
SBUS	Natural Gas	0.05224567	0.64622569	12.6839862	0	0.00367426	0.012	0.04491714	6.06E-02	0.00337835	0.003	0.015721	2.21E-02	1299.394	3.65660487	0.26488997	134	0.001%
T6 CAIRP Class 4	Diesel	0.08784755	2.1737169	0.31179644	0.01078547	0.0743992	0.012	0.04231382	1.29E-01	0.07118072	0.003	0.01480984	8.90E-02	1140.00653	0.00408029	0.17944699	125	0.001%
T6 CAIRP Class 5	Diesel	0.05992534	1.63433027	0.22811691	0.01072807	0.05443978	0.012	0.04231382	1.09E-01	0.05208474	0.003	0.01480984	6.99E-02	1133.93937	0.00278338	0.17849196	171	0.001%
T6 CAIRP Class 6	Diesel	0.08555584	2.13799622	0.31782699	0.0106028	0.07668048	0.012	0.04231382	1.31E-01	0.07336332	0.003	0.01480984	9.12E-02	1120.69876	0.00397385	0.17640777	447	0.003%
T6 CAIRP Class 7	Diesel	0.08481135	2.27508197	0.28918725	0.00998568	0.06942336	0.012	0.04231382	1.24E-01	0.06642013	0.003	0.01480984	8.42E-02	1055.46983	0.00393927	0.16614017	2,804	0.016%
T6 Instate Delivery Class 4	Diesel	0.59496108	7.55017277	1.56250121	0.01195801	0.24061795	0.012	0.04756293	3.00E-01	0.23020893	0.003	0.01664703	2.50E-01	1263.94158	0.0276344	0.19895544	11,788	0.068%
T6 Instate Delivery Class 4	Natural Gas	0.0103841	0.29943898	3.24575461	0	0.00063872	0.012	0.04756293	6.02E-02	0.00058728	0.003	0.01664703	2.02E-02	1111.19651	0.72676944	0.22652468	34	0.000%
T6 Instate Delivery Class 5	Diesel	0.25521981	3.67373973	0.68774855	0.01169047	0.10011212	0.012	0.04756293	1.60E-01	0.09578132	0.003	0.01664703	1.15E-01	1235.66318	0.0118543	0.19450418	9,597	0.056%
T6 Instate Delivery Class 5	Natural Gas	0.0103841	0.29943898	3.24575461	0	0.00063872	0.012	0.04756293	6.02E-02	0.00058728	0.003	0.01664703	2.02E-02	1108.71798	0.72676944	0.22601941	40	0.000%
T6 Instate Delivery Class 6	Diesel	0.40447454	5.16943399	1.06355775	0.01172405	0.16459337	0.012	0.04756293	2.24E-01	0.15747313	0.003	0.01664703	1.77E-01	1239.21305	0.01878679	0.19506296	19,937	0.115%
T6 Instate Delivery Class 6	Natural Gas	0.01042335	0.2949372	3.25650458	0	0.0006646	0.012	0.04756293	6.02E-02	0.00061107	0.003	0.01664703	2.03E-02	1109.40141	0.72951628	0.22615873	62	0.000%
T6 Instate Delivery Class 7	Diesel	0.26824867	4.20913211	0.70580777	0.01162311	0.1136416	0.012	0.04756293	1.73E-01	0.10872551	0.003	0.01664703	1.28E-01	1228.54307	0.01245946	0.19338341	7,892	0.046%
T6 Instate Delivery Class 7	Natural Gas	0.0115213	0.17017706	3.5712466	0	0.00139045	0.012	0.04756293	6.10E-02	0.00127846	0.003	0.01664703	2.09E-02	1089.29352	0.80636063	0.22205961	109	0.001%
T6 Instate Other Class 4	Diesel	0.4866387	7.57858455	1.37111892	0.01119878	0.2476878	0.012	0.04486375	3.05E-01	0.23697294	0.003	0.01570231	2.56E-01	1183.69275	0.02260311	0.18632358	16,160	0.094%
T6 Instate Other Class 4	Natural Gas	0.00797511	0.22677008	2.83141339	0	0.00051465	0.012	0.04486375	5.74E-02	0.00047321	0.003	0.01570231	1.92E-02	965.789581	0.55816765	0.19688252	41	0.000%
T6 Instate Other Class 5	Diesel	0.16108746	2.82166106	0.47969694	0.01106262	0.08118327	0.012	0.04486375	1.38E-01	0.07767132	0.003	0.01570231	9.64E-02	1169.30037	0.0074821	0.18405809	41,474	0.240%
T6 Instate Other Class 5	Natural Gas	0.00794531	0.22939073	2.83380805	0	0.00049903	0.012	0.04486375	5.74E-02	0.00045884	0.003	0.01570231	1.92E-02	964.595217	0.55608151	0.19663905	203	0.001%
T6 Instate Other Class 6	Diesel	0.26802884	4.32427874	0.77674974	0.0110206	0.14025644	0.012	0.04486375	1.97E-01	0.13418901	0.003	0.01570231	1.53E-01	1164.85938	0.01244925	0.18335904	26,214	0.152%
T6 Instate Other Class 6	Natural Gas	0.00799923	0.22465022	2.82947633	0	0.00052729	0.012	0.04486375	5.74E-02	0.00048483	0.003	0.01570231	1.92E-02	964.292282	0.55985514	0.19657729	104	0.001%
T6 Instate Other Class 7	Diesel	0.20061264	3.44506975	0.55493191	0.01097241	0.1082147	0.012	0.04486375	1.65E-01	0.10353338	0.003	0.01570231	1.22E-01	1159.76547	0.00931794	0.18255721	12,352	0.071%
T6 Instate Other Class 7	Natural Gas	0.00863108	0.17340284	2.82100571	0	0.00086481	0.012	0.04486375	5.77E-02	0.00079516	0.003	0.01570231	1.95E-02	931.346168	0.60407756	0.18986101	229	0.001%
T6 Instate Tractor Class 6	Diesel	0.23018066	3.63339609	0.67394967	0.01116863	0.11906074	0.012	0.04486375	1.76E-01	0.11391023	0.003	0.01570231	1.33E-01	1180.5059	0.0106913	0.18582194	512	0.003%
T6 Instate Tractor Class 6	Natural Gas	0.00793434	0.23035491	2.83468909	0	0.00049328	0.012	0.04486375	5.74E-02	0.00045356	0.003	0.01570231	1.92E-02	960.642415	0.55531398	0.19583324	3	0.000%
T6 Instate Tractor Class 7	Diesel	0.14079338	3.30087665	0.42297878	0.01043841	0.07437769	0.012	0.04486375	1.31E-01	0.07116015	0.003	0.01570231	8.99E-02	1103.32279	0.00653949	0.17367264	3,624	0.021%
T6 Instate Tractor Class 7	Natural Gas	0.0081321	0.21464828	2.83530701	0	0.00059941	0.012	0.04486375	5.75E-02	0.00055114	0.003	0.01570231	1.93E-02	930.923185	0.56915475	0.18977478	37	0.000%
T6 OOS Class 4	Diesel	0.08784755	2.1737169	0.31179644	0.01078547	0.0743992	0.012	0.04231382	1.29E-01	0.07118072	0.003	0.01480984	8.90E-02	1140.00653	0.00408029	0.17944699	70	0.000%
T6 OOS Class 5	Diesel	0.05992535	1.63433027	0.22811691	0.01072807	0.05443978	0.012	0.04231382	1.09E-01	0.05208474	0.003	0.01480984	6.99E-02	1133.93937	0.00278338	0.17849196	96	0.001%
T6 OOS Class 6	Diesel	0.08555584	2.13799622	0.31782699	0.0106028	0.07668048	0.012	0.04231382	1.31E-01	0.07336332	0.003	0.01480984	9.12E-02	1120.69876	0.00397385	0.17640777	250	0.001%
T6 OOS Class 7	Diesel	0.09387198	2.39103639	0.31939947	0.00997905	0.07658002	0.012	0.04231382	1.31E-01	0.07326721	0.003	0.01480984	9.11E-02	1054.76907	0.00436011	0.16602986	1,818	0.011%
T6 Public Class 4	Diesel	0.10856159	8.30400678	0.24755965	0.01224814	0.04002355	0.012	0.04616939	9.82E-02	0.03829215	0.003	0.01615929	5.75E-02	1294.60803	0.0050424	0.20378261	1,177	0.007%
T6 Public Class 4	Natural Gas	0.01227588	0.11442081	3.05156654	0	0.00152723	0.012	0.04616939	5.97E-02	0.00140423	0.003	0.01615929	2.06E-02	1065.16906	0.85917219	0.21714168	23	0.000%
T6 Public Class 5	Diesel	0.05693536	3.55208906	0.16155508	0.01165363	0.01691637	0.012	0.04616939	7.51E-02	0.01618457	0.003	0.01615929	3.53E-02	1231.76886	0.0026445	0.19389118	3,854	0.022%
T6 Public Class 5	Natural Gas	0.01205547	0.15141065	3.08898854	0	0.00135111	0.012	0.04616939	5.95E-02	0.00124229	0.003	0.01615929	2.04E-02	1051.4511	0.84374607	0.21434519	299	0.002%

T6 Public Class 6	Diesel	0.12163152	8.13689371	0.27605642	0.01214251	0.05174469	0.012	0.04616939	1.10E-01	0.04950624	0.003	0.01615929	6.87E-02	1283.4429	0.00564947	0.20202512	2,356	0.014%
T6 Public Class 6	Natural Gas	0.01199717	0.16096717	3.09025512	0	0.00130571	0.012	0.04616939	5.95E-02	0.00120056	0.003	0.01615929	2.04E-02	1048.23906	0.83966619	0.21369039	58	0.000%
T6 Public Class 7	Diesel	0.14343546	9.6234489	0.30160376	0.01246516	0.06574629	0.012	0.04616939	1.24E-01	0.06290213	0.003	0.01615929	8.21E-02	1317.54708	0.00666221	0.20739342	6,369	0.037%
T6 Public Class 7	Natural Gas	0.01239707	0.09500838	3.06630431	0	0.00161921	0.012	0.04616939	5.98E-02	0.0014888	0.003	0.01615929	2.06E-02	1066.63726	0.86765436	0.21744098	279	0.002%
T6 Utility Class 5	Diesel	0.02450442	1.27008519	0.09541822	0.01078078	0.00614293	0.012	0.0454967	6.36E-02	0.00587719	0.003	0.01592385	2.48E-02	1139.51065	0.00113817	0.17936893	334	0.002%
T6 Utility Class 5	Natural Gas	0.00934313	0.26930485	2.89365192	0	0.00051779	0.012	0.0454967	5.80E-02	0.00047609	0.003	0.01592385	1.94E-02	1011.11173	0.65391293	0.20612174	5	0.000%
T6 Utility Class 6	Diesel	0.03709456	2.0788349	0.12396768	0.0110259	0.01076047	0.012	0.0454967	6.83E-02	0.01029498	0.003	0.01592385	2.92E-02	1165.41917	0.00172295	0.18344716	63	0.000%
T6 Utility Class 6	Natural Gas	0.00934313	0.26930485	2.89365192	0	0.00051779	0.012	0.0454967	5.80E-02	0.00047609	0.003	0.01592385	1.94E-02	994.839253	0.65391293	0.20280449	1	0.000%
T6 Utility Class 7	Diesel	0.02797374	1.91513665	0.10022891	0.01102339	0.01031175	0.012	0.0454967	6.78E-02	0.00986567	0.003	0.01592385	2.88E-02	1165.15346	0.00129931	0.18340533	87	0.001%
T6 Utility Class 7	Natural Gas	0.00934313	0.26930485	2.89365192	0	0.00051779	0.012	0.0454967	5.80E-02	0.00047609	0.003	0.01592385	1.94E-02	1001.30262	0.65391293	0.20412209	2	0.000%
T6TS	Gasoline	0.21451971	1.15440498	4.79295976	0.01865882	0.00189729	0.012	0.04501744	5.89E-02	0.00174932	0.003	0.0157561	2.05E-02	1885.56546	0.04022217	0.04919389	41,022	0.237%
T7 CAIRP Class 8	Diesel	0.08806958	3.57408466	0.32381457	0.01514726	0.06620886	0.03600001	0.07731106	1.80E-01	0.06334469	0.009	0.02705887	9.94E-02	1601.03976	0.0040906	0.25201764	16,234	0.094%
T7 CAIRP Class 8	Natural Gas	0.01319225	0.26157553	4.59554446	0	0.0017359	0.03600001	0.07409835	1.12E-01	0.0015961	0.009	0.02593442	3.65E-02	1180.99757	0.92330803	0.24075408	28	0.000%
T7 NNOOS Class 8	Diesel	0.14512589	3.8417573	0.57207431	0.0152459	0.10942661	0.03600001	0.0781827	2.24E-01	0.10469286	0.009	0.02736394	1.41E-01	1611.46586	0.00674072	0.2536588	19,308	0.112%
T7 NOOS Class 8	Diesel	0.10285462	3.73929593	0.37499636	0.01514619	0.0737909	0.03600001	0.07747096	1.87E-01	0.07059874	0.009	0.02711483	1.07E-01	1600.92743	0.00477733	0.25199996	7,016	0.041%
T7 Other Port Class 8	Diesel	0.11913469	4.45857695	0.38018881	0.01630522	0.03110788	0.03600001	0.09404076	1.61E-01	0.02976217	0.009	0.03291427	7.17E-02	1723.43466	0.0055335	0.27128367	1,328	0.008%
T7 POAK Class 8	Diesel	0.14737656	4.96540185	0.4688535	0.01632274	0.04140362	0.03600001	0.09604652	1.73E-01	0.03961252	0.009	0.03361628	8.22E-02	1725.2861	0.00684526	0.2715751	4,964	0.029%
T7 POAK Class 8	Natural Gas	0.01695642	0.70398211	11.0161129	0	0.00135516	0.03600001	0.0852388	1.23E-01	0.00124602	0.009	0.02983358	4.01E-02	1492.29997	1.18675744	0.30421511	11	0.000%
T7 Public Class 8	Diesel	0.15636703	11.6208712	0.50601442	0.01858935	0.07508387	0.03600001	0.11901788	2.30E-01	0.07183578	0.009	0.04165626	1.22E-01	1964.86386	0.00726284	0.30928673	14,309	0.083%
T7 Public Class 8	Natural Gas	0.02621664	0.7743524	10.7404495	0	0.00242358	0.03600001	0.10598133	1.44E-01	0.00222839	0.009	0.03709346	4.83E-02	1669.71212	1.83486766	0.34038174	53	0.000%
T7 Single Concrete/Transit Mix Cla	Diesel	0.01741355	1.11827576	0.09040432	0.01619691	0.01920311	0.03600001	0.08115877	1.36E-01	0.01837239	0.009	0.02840557	5.58E-02	1711.98678	0.00080881	0.26948167	3,381	0.020%
T7 Single Concrete/Transit Mix Cla	Natural Gas	0.01516677	0.35905678	6.65029162	0	0.00182789	0.03600001	0.08072408	1.19E-01	0.00168068	0.009	0.02825343	3.89E-02	1265.94428	1.06150241	0.25807102	213	0.001%
T7 Single Dump Class 8	Diesel	0.1660726	4.85762583	0.58262447	0.01606351	0.09306281	0.03600001	0.08782037	2.17E-01	0.08903695	0.009	0.03073713	1.29E-01	1697.88672	0.00771364	0.2672622	10,305	0.060%
T7 Single Dump Class 8	Natural Gas	0.0151328	0.42671798	7.6384999	0	0.00166932	0.03600001	0.08267386	1.20E-01	0.00153488	0.009	0.02893585	3.95E-02	1313.2269	1.05912467	0.26770989	497	0.003%
T7 Single Other Class 8	Diesel	0.15784723	4.32777949	0.57900138	0.0160521	0.09652549	0.03600001	0.08756635	2.20E-01	0.09234984	0.009	0.03064822	1.32E-01	1696.68016	0.00733159	0.26707228	10,326	0.060%
T7 Single Other Class 8	Natural Gas	0.01513986	0.42905485	7.56444482	0	0.00167724	0.03600001	0.08269895	1.20E-01	0.00154216	0.009	0.02894463	3.95E-02	1299.84827	1.05961838	0.26498257	627	0.004%
T7 SWCV Class 8	Diesel	0.04377787	8.24370699	0.12018721	0.03889449	0.01019477	0.03600001	0.21000006	2.56E-01	0.00975375	0.009	0.07350002	9.23E-02	4111.08307	0.00203337	0.64712038	10,484	0.061%
T7 SWCV Class 8	Natural Gas	0.16882529	3.35297856	26.3169916	0	0.0035084	0.03600001	0.21000006	2.50E-01	0.00322585	0.009	0.07350002	8.57E-02	1803.55406	6.1069263	0.36766629	5,515	0.032%
T7 Tractor Class 8	Diesel	0.14878377	4.87798154	0.53921417	0.01511066	0.08692597	0.03600001	0.08537644	2.08E-01	0.08316559	0.009	0.02988175	1.22E-01	1597.17173	0.00691062	0.25140878	13,764	0.080%
T7 Tractor Class 8	Natural Gas	0.01422534	0.56368257	9.75574144	0	0.00124061	0.03600001	0.0784622	1.16E-01	0.0011407	0.009	0.02746177	3.76E-02	1222.10413	0.99561278	0.24913392	1,144	0.007%
T7 Utility Class 8	Diesel	0.04099307	2.46174933	0.19832984	0.01681248	0.01136378	0.03600001	0.09839523	1.46E-01	0.01087219	0.009	0.03443833	5.43E-02	1777.05075	0.00190402	0.27972331	267	0.002%
T7IS	Gasoline	1.23904181	5.42401847	45.5168532	0.0232596	0.00269846	0.02000001	0.09164384	1.14E-01	0.00251227	0.005	0.03207534	3.96E-02	2350.49649	0.18489648	0.1721445	634	0.004%
UBUS	Gasoline	0.00787002	0.05339247	0.56692448	0.01046387	0.00071715	0.00829031	0.09237901	1.01E-01	0.00065939	0.00207258	0.03233265	3.51E-02	1057.42535	0.00263456	0.00627767	4,118	0.024%
UBUS	Diesel	0.16158143	5.4205765	0.3110225	0.01442431	0.0090402	0.0317932	0.11000003	1.51E-01	0.00864913	0.0079483	0.03850001	5.51E-02	1523.64316	0.00750504	0.23983474	29,399	0.170%
UBUS	Electricity	0	0	0	0	0	0.03600001	0.05500002	9.10E-02	0	0.009	0.01925001	2.83E-02	0	0	0	15	0.000%
																	17,282,737	100.000%

Source: EMFAC2021 (v1.0.2) Emission Rates
Region Type: County
Region: San Mateo
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC202x Categori
Units: miles/day for CVMT and EVMT, trips,

lbs/Mile 1.0E-06

Vehicle Category	Fuel	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM10_Total	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBW	PM2_5_Total	CO2(Pavley+AACC)_RUNEX	CH4_RUNEX	N2O_RUNEX	
All Other Buses	Diesel	1.989E-04	3.004E-03	5.548E-04	2.487E-05	7.336E-05	2.646E-05	1.017E-04	2.015E-04	7.019E-05	6.614E-06	3.560E-05	1.124E-04	2.629E+00	9.240E-06	4.138E-04	
All Other Buses	Natural Gas	2.298E-05	6.617E-04	6.816E-03	0.000E+00	1.283E-06	2.646E-05	1.017E-04	1.295E-04	1.179E-06	6.614E-06	3.560E-05	4.339E-05	2.367E+00	1.608E-03	4.826E-04	
LDA	Gasoline	3.374E-05	1.517E-04	1.992E-03	6.444E-06	3.527E-06	1.764E-05	1.495E-05	3.611E-05	3.243E-06	4.409E-06	5.231E-06	1.288E-05	6.512E-01	8.076E-06	1.366E-05	
LDA	Diesel	7.776E-05	7.276E-04	8.371E-04	5.091E-06	4.897E-05	1.764E-05	1.511E-05	8.172E-05	4.685E-05	4.409E-06	5.288E-06	5.655E-05	5.377E-01	3.612E-06	8.464E-05	
LDA	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.611E-06	2.725E-05	0.000E+00	4.409E-06	3.364E-06	7.773E-06	0.000E+00	0.000E+00	0.000E+00	
LDA	Plug-in Hybrid	3.252E-06	7.686E-06	4.830E-04	3.185E-06	2.169E-06	1.764E-05	8.203E-06	2.801E-05	1.994E-06	4.409E-06	2.871E-06	9.275E-06	3.219E-01	1.030E-06	1.400E-06	
LDT1	Gasoline	1.006E-04	4.556E-04	4.304E-03	7.616E-06	5.516E-06	1.764E-05	1.833E-05	4.148E-05	5.073E-06	4.409E-06	6.415E-06	1.590E-05	7.696E-01	2.159E-05	2.981E-05	
LDT1	Diesel	7.264E-04	3.784E-03	3.858E-03	8.821E-06	5.722E-04	1.764E-05	2.149E-05	6.114E-04	5.475E-04	4.409E-06	7.521E-06	5.594E-04	9.318E-01	3.374E-05	1.467E-04	
LDT1	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.688E-06	2.733E-05	0.000E+00	4.409E-06	3.391E-06	7.800E-06	0.000E+00	0.000E+00	0.000E+00	
LDT1	Plug-in Hybrid	3.275E-06	7.742E-06	4.865E-04	3.208E-06	2.374E-06	1.764E-05	8.198E-06	2.821E-05	2.183E-06	4.409E-06	2.869E-06	9.461E-06	3.242E-01	1.039E-06	1.415E-06	
LDT2	Gasoline	3.709E-05	2.340E-04	2.229E-03	8.094E-06	3.576E-06	1.764E-05	1.752E-05	3.873E-05	3.289E-06	4.409E-06	6.132E-06	1.383E-05	8.180E-01	8.806E-06	1.722E-05	
LDT2	Diesel	3.516E-05	1.503E-04	3.110E-04	7.052E-06	1.546E-05	1.764E-05	1.746E-05	5.056E-05	1.479E-05	4.409E-06	6.112E-06	2.531E-05	7.449E-01	1.633E-06	1.173E-04	
LDT2	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.588E-06	2.723E-05	0.000E+00	4.409E-06	3.356E-06	7.765E-06	0.000E+00	0.000E+00	0.000E+00	
LDT2	Plug-in Hybrid	3.205E-06	7.575E-06	4.762E-04	3.140E-06	2.301E-06	1.764E-05	8.207E-06	2.814E-05	2.116E-06	4.409E-06	2.872E-06	9.397E-06	3.173E-01	1.023E-06	1.399E-06	
LHD1	Gasoline	1.308E-04	5.258E-04	3.171E-03	2.026E-05	4.184E-06	1.764E-05	1.720E-04	1.938E-04	3.850E-06	4.409E-06	6.019E-05	6.844E-05	2.047E+00	2.567E-05	2.940E-05	
LHD1	Diesel	5.462E-04	6.527E-03	1.648E-03	1.354E-05	1.251E-04	2.646E-05	1.720E-04	3.236E-04	1.197E-04	6.614E-06	6.019E-05	1.865E-04	1.430E+00	2.537E-05	2.251E-04	
LHD2	Gasoline	1.304E-04	6.251E-04	3.053E-03	2.302E-05	4.187E-06	1.764E-05	2.006E-04	2.224E-04	3.849E-06	4.409E-06	7.022E-05	7.848E-05	2.327E+00	2.668E-05	3.474E-05	
LHD2	Diesel	4.458E-04	4.511E-03	1.218E-03	1.660E-05	9.955E-05	2.646E-05	2.006E-04	3.266E-04	9.525E-05	6.614E-06	7.022E-05	1.721E-04	1.754E+00	2.071E-05	2.760E-04	
MCY	Gasoline	3.181E-03	1.550E-03	3.638E-02	4.259E-06	4.404E-06	8.818E-06	2.646E-05	3.968E-05	4.145E-06	2.205E-06	9.259E-06	1.561E-05	4.304E-01	4.540E-04	9.953E-05	
MDV	Gasoline	5.835E-05	3.351E-04	2.690E-03	9.725E-06	3.779E-06	1.764E-05	1.775E-05	3.917E-05	3.477E-06	4.409E-06	6.212E-06	1.410E-05	9.828E-01	1.253E-05	2.217E-05	
MDV	Diesel	2.774E-05	1.465E-04	4.281E-04	9.051E-06	1.363E-05	1.764E-05	1.738E-05	4.865E-05	1.304E-05	4.409E-06	6.083E-06	2.354E-05	9.560E-01	1.288E-06	1.505E-04	
MDV	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.765E-06	2.740E-05	0.000E+00	4.409E-06	3.418E-06	7.827E-06	0.000E+00	0.000E+00	0.000E+00	
MDV	Plug-in Hybrid	3.257E-06	7.699E-06	4.839E-04	3.191E-06	2.383E-06	1.764E-05	8.194E-06	2.821E-05	2.191E-06	4.409E-06	2.868E-06	9.468E-06	3.224E-01	1.042E-06	1.430E-06	
MH	Gasoline	4.748E-04	1.987E-03	1.363E-02	4.261E-05	6.799E-06	2.646E-05	9.925E-05	1.325E-04	6.275E-06	6.614E-06	3.474E-05	4.762E-05	4.306E+00	8.933E-05	9.964E-05	
MH	Diesel	2.561E-04	9.071E-03	8.514E-04	2.261E-05	2.170E-04	3.527E-05	9.873E-05	3.510E-04	2.076E-04	8.818E-06	3.456E-05	2.510E-04	2.388E+00	1.189E-05	3.759E-04	
Motor Coach	Diesel	3.913E-04	9.545E-03	1.374E-03	3.668E-05	2.378E-04	2.646E-05	1.743E-04	4.386E-04	2.275E-04	6.614E-06	6.102E-05	2.951E-04	3.877E+00	1.817E-05	6.103E-04	
OBUS	Gasoline	1.493E-04	9.785E-04	3.367E-03	3.945E-05	2.140E-06	2.646E-05	9.876E-05	1.274E-04	1.969E-06	6.614E-06	3.457E-05	4.315E-05	3.987E+00	3.074E-05	5.086E-05	
PTO	Diesel	6.716E-04	1.244E-02	2.525E-03	4.546E-05	2.258E-04	0.000E+00	0.000E+00	2.258E-04	2.161E-04	0.000E+00	0.000E+00	2.161E-04	4.805E+00	3.120E-05	7.564E-04	
SBUS	Gasoline	9.066E-04	3.846E-03	2.229E-02	1.858E-05	7.643E-06	1.764E-05	9.902E-05	1.243E-04	7.028E-06	4.409E-06	3.466E-05	4.610E-05	1.877E+00	1.684E-04	1.656E-04	
SBUS	Diesel	1.687E-04	1.329E-02	4.935E-04	2.435E-05	6.807E-05	2.646E-05	9.902E-05	1.936E-04	6.513E-05	6.614E-06	3.466E-05	1.064E-04	2.573E+00	7.837E-06	4.051E-04	
SBUS	Natural Gas	1.152E-04	1.425E-03	2.796E-02	0.000E+00	8.100E-06	2.646E-05	9.902E-05	1.336E-04	7.448E-06	6.614E-06	3.466E-05	4.872E-05	2.865E+00	8.061E-03	5.840E-04	
T6 CAIRP Class 4	Diesel	1.937E-04	4.792E-03	6.874E-04	2.378E-05	1.640E-04	2.646E-05	9.329E-05	2.838E-04	1.569E-04	6.614E-06	3.265E-05	1.962E-04	2.513E+00	8.995E-06	3.956E-04	
T6 CAIRP Class 5	Diesel	1.321E-04	3.603E-03	5.029E-04	2.365E-05	1.200E-04	2.646E-05	9.329E-05	2.398E-04	1.148E-04	6.614E-06	3.265E-05	1.541E-04	2.500E+00	6.136E-06	3.935E-04	
T6 CAIRP Class 6	Diesel	1.886E-04	4.713E-03	7.007E-04	2.337E-05	1.690E-04	2.646E-05	9.329E-05	2.888E-04	1.617E-04	6.614E-06	3.265E-05	2.010E-04	2.471E+00	8.761E-06	3.889E-04	
T6 CAIRP Class 7	Diesel	1.870E-04	5.016E-03	6.375E-04	2.201E-05	1.531E-04	2.646E-05	9.329E-05	2.728E-04	1.464E-04	6.614E-06	3.265E-05	1.857E-04	2.327E+00	8.685E-06	3.663E-04	
T6 Instate Delivery Class 4	Diesel	1.312E-03	1.665E-02	3.445E-03	2.636E-05	5.305E-04	2.646E-05	1.049E-04	6.618E-04	5.075E-04	6.614E-06	3.670E-05	5.508E-04	2.786E+00	6.092E-05	4.386E-04	
T6 Instate Delivery Class 4	Natural Gas	2.289E-05	6.601E-04	7.156E-03	0.000E+00	1.408E-06	2.646E-05	1.049E-04	1.327E-04	1.295E-06	6.614E-06	3.670E-05	4.461E-05	2.450E+00	1.602E-03	4.994E-04	
T6 Instate Delivery Class 5	Diesel	5.627E-04	8.099E-03	1.516E-03	2.577E-05	2.207E-04	2.646E-05	1.049E-04	3.520E-04	2.112E-04	6.614E-06	3.670E-05	2.545E-04	2.724E+00	2.613E-05	4.288E-04	
T6 Instate Delivery Class 5	Natural Gas	2.289E-05	6.601E-04	7.156E-03	0.000E+00	1.408E-06	2.646E-05	1.049E-04	1.327E-04	1.295E-06	6.614E-06	3.670E-05	4.461E-05	2.444E+00	1.602E-03	4.983E-04	
T6 Instate Delivery Class 6	Diesel	8.917E-04	1.140E-02	2.345E-03	2.585E-05	3.629E-04	2.646E-05	1.049E-04	4.942E-04	3.472E-04	6.614E-06	3.670E-05	3.905E-04	2.732E+00	4.142E-05	4.300E-04	
T6 Instate Delivery Class 6	Natural Gas	2.298E-05	6.502E-04	7.179E-03	0.000E+00	1.465E-06	2.646E-05	1.049E-04	1.328E-04	1.347E-06	6.614E-06	3.670E-05	4.466E-05	2.446E+00	1.608E-03	4.986E-04	
T6 Instate Delivery Class 7	Diesel	5.914E-04	9.279E-03	1.556E-03	2.562E-05	2.505E-04	2.646E-05	1.049E-04	3.818E-04	2.397E-04	6.614E-06	3.670E-05	2.830E-04	2.708E+00	2.747E-05	4.263E-04	
T6 Instate Delivery Class 7	Natural Gas	2.540E-05	3.752E-04	7.873E-03	0.000E+00	3.065E-06	2.646E-05	1.049E-04	1.344E-04	2.818E-06	6.614E-06	3.670E-05	4.613E-05	2.401E+00	1.778E-03	4.896E-04	
T6 Instate Other Class 4	Diesel	1.073E-03	1.671E-02	3.023E-03	2.469E-05	5.461E-04	2.646E-05	9.891E-05	6.714E-04	5.224E-04	6.614E-06	3.462E-05	5.637E-04	2.610E+00	4.983E-05	4.108E-04	
T6 Instate Other Class 4	Natural Gas	1.758E-05	4.999E-04	6.242E-03	0.000E+00	1.135E-06	2.646E-05	9.891E-05	1.265E-04	1.043E-06	6.614E-06	3.462E-05	4.227E-05	2.129E+00	1.231E-03	4.340E-04	
T6 Instate Other Class 5	Diesel	3.551E-04	6.221E-03	1.058E-03	2.439E-05	1.790E-04	2.646E-05	9.891E-05	3.043E-04	1.712E-04	6.614E-06	3.462E-05	2.125E-04	2.578E+00	1.650E-05	4.058E-04	
T6 Instate Other Class 5	Natural Gas	1.752E-05	5.057E-04	6.247E-03	0.000E+00	1.100E-06	2.646E-05	9.891E-05	1.265E-04	1.012E-06	6.614E-06	3.462E-05	4.224E-05	2.127E+00	1.226E-03	4.335E-04	
T6 Instate Other Class 6	Diesel	5.909E-04	9.533E-03	1.712E-03	2.430E-05	3.092E-04	2.646E-05	9.891E-05	4.346E-04	2.958E-04	6.614E-06	3.462E-05	3.371E-04	2.568E+00	2.745E-05	4.042E-04	
T6 Instate Other Class 6	Natural Gas	1.764E-05	4.953E-04	6.238E-03	0.000E+00	1.162E-06	2.646E-05	9.891E-05	1.265E-04	1.069E-06	6.614E-06	3.462E-05	4.230E-05	2.126E+00	1.234E-03	4.334E-04	
T6 Instate Other Class 7	Diesel	4.423E-04	7.595E-03	1.223E-03	2.419E-05	2.386E-04	2.646E-05	9.891E-05	3.639E-04	2.282E-04	6.614E-06	3.462E-05	2.695E-04	2.557E+00	2.054E-05	4.025E-04	
T6 Instate Other Class 7	Natural Gas	1.903E-05	3.823E-04	6.219E-03	0.000E+00	1.907E-06	2.646E-05	9.891E-05	1.273E-04	1.753E-06	6.614E-06	3.462E-05	4.298E-05	2.053E+00	1.332E-03	4.186E-04	
T6 Instate Tractor Class 6	Diesel	5.075E-04	8.010E-03	1.486E-03	2.462E-05	2.625E-04	2.646E-05	9.891E-05	3.878E-04	2.511E-04	6.614E-06	3.462E-05	2.924E-04	2.603E+00	2.357E-05	4.097E-04	
T6 Instate Tractor Class 6	Natural Gas	1.749E-05	5.078E-04	6.249E-03	0.000E+00	1.087E-06	2.646E-05	9.891E-05	1.264E-04	9.999E-07	6.614E-06	3.462E-05	4.223E-05	2.118E+00	1.224E-03	4.317E-04	
T6 Instate Tractor Class 7	Diesel	3.104E-04	7.277E-03	9.325E-04	2.301E-05	1.640E-04	2.646E-05	9.891E-05	2.893E-04	1.569E-04	6.614E-06	3.462E-05	1.981E-04	2.432E+00	1.442E-05	3.829E-04	
T6 Instate Tractor Class 7	Natural Gas	1.793E-05	4.732E-04	6.251E-03	0.000E+00	1.321E-06	2.646E-05	9.891E-05	1.267E-04	1.215E-06	6.614E-06	3.462E-05	4.245E-05	2.052E+00	1.255E-03	4.184E-04	
T6 OOS Class 4	Diesel	1.937E-04	4.792E-03	6.874E-04	2.378E-05	1.640E-04	2.646E-05	9.329E-05	2.838E-04	1.569E-04	6.614E-06	3.265E-05	1.962E-04	2.513E+00	8.995E-06	3.956E-04	
T6 OOS Class 5	Diesel	1.321E-04	3.603E-03	5.029E-04	2.365E-05	1.200E-04	2.646E-05	9.329E-05	2.398E-04	1.148E-04	6.614E-06	3.265E-05	1.541E-04	2.500E+00	6.136E-06	3.935E-04	
T6 OOS Class 6	Diesel	1.886E-04	4.713E-03	7.007E-04	2.337E-05	1.690E-04	2.646E-05	9.329E-05	2.888E-04	1.617E-04	6.614E-06	3.265E-05	2.010E-04	2.471E+00	8.761E-06	3.889E-04	
T6 OOS Class 7	Diesel	2.070E-04	5.271E-03	7.041E-04	2.200E-05	1.688E-04	2.646E-05	9.329E-05	2.886E-04	1.615E-04	6.614E-06	3.265E-05	2.008E-04	2.325E+00	9.612E-06	3.660E-04	
T6 Public Class 4	Diesel	2.393E-04	1.831E-02	5.458E-04	2.700E-05	8.824E-05	2.646E-05	1.018E-04	2.165E-04	8.442E-05	6.614E-06	3.562E-05	1.267E-04	2.854E+00	1.112E-05	4.493E-04	
T6 Public Class 4	Natural Gas	2.706E-05	2.523E-04	6.727E-03	0.000E+00	3.367E-06	2.646E-05	1.018E-04	1.316E-04	3.096E-06	6.614E-06	3.562E-05	4.533E-05	2.348E+00	1.894E-03	4.787E-04	
T6 Public Class 5	Diesel	1.255E-04	7.831E-03	3.562E-04	2.569E-05	3.729E-05	2.646E-05	1.018E-04	1.655E-04	3.568E-05	6.614E-06	3.562E-05	7.792E-05	2.716E+00	5.830E-06	4.275E-04	
T6 Public Class 5	Natural Gas	2.658E-05	3.338E-04	6.810E-03	0.000E+00	2.979E-06	2.646E-05	1.018E-04	1.312E-04	2.739E-06	6.614E-06	3.562E-05	4.498E-05	2.318E+00	1.860E-03	4.725E-04	

T6 Public Class 6	Diesel	2.681E-04	1.794E-02	6.086E-04	2.677E-05	1.141E-04	2.646E-05	1.018E-04	2.423E-04	1.091E-04	6.614E-06	3.562E-05	1.514E-04	2.829E+00	1.245E-05	4.454E-04	
T6 Public Class 6	Natural Gas	2.645E-05	3.549E-04	6.813E-03	0.000E+00	2.879E-06	2.646E-05	1.018E-04	1.311E-04	2.647E-06	6.614E-06	3.562E-05	4.489E-05	2.311E+00	1.851E-03	4.711E-04	
T6 Public Class 7	Diesel	3.162E-04	2.122E-02	6.649E-04	2.748E-05	1.449E-04	2.646E-05	1.018E-04	2.732E-04	1.387E-04	6.614E-06	3.562E-05	1.809E-04	2.905E+00	1.469E-05	4.572E-04	
T6 Public Class 7	Natural Gas	2.733E-05	2.095E-04	6.760E-03	0.000E+00	3.570E-06	2.646E-05	1.018E-04	1.318E-04	3.282E-06	6.614E-06	3.562E-05	4.552E-05	2.352E+00	1.913E-03	4.794E-04	
T6 Utility Class 5	Diesel	5.402E-05	2.800E-03	2.104E-04	2.377E-05	1.354E-05	2.646E-05	1.003E-04	1.403E-04	1.296E-05	6.614E-06	3.511E-05	5.468E-05	2.512E+00	2.509E-06	3.954E-04	
T6 Utility Class 5	Natural Gas	2.060E-05	5.937E-04	6.379E-03	0.000E+00	1.142E-06	2.646E-05	1.003E-04	1.279E-04	1.050E-06	6.614E-06	3.511E-05	4.277E-05	2.229E+00	1.442E-03	4.544E-04	
T6 Utility Class 6	Diesel	8.178E-05	4.583E-03	2.733E-04	2.431E-05	2.372E-05	2.646E-05	1.003E-04	1.505E-04	2.270E-05	6.614E-06	3.511E-05	6.442E-05	2.569E+00	3.798E-06	4.044E-04	
T6 Utility Class 6	Natural Gas	2.060E-05	5.937E-04	6.379E-03	0.000E+00	1.142E-06	2.646E-05	1.003E-04	1.279E-04	1.050E-06	6.614E-06	3.511E-05	4.277E-05	2.193E+00	1.442E-03	4.471E-04	
T6 Utility Class 7	Diesel	6.167E-05	4.222E-03	2.210E-04	2.430E-05	2.273E-05	2.646E-05	1.003E-04	1.495E-04	2.175E-05	6.614E-06	3.511E-05	6.347E-05	2.569E+00	2.864E-06	4.043E-04	
T6 Utility Class 7	Natural Gas	2.060E-05	5.937E-04	6.379E-03	0.000E+00	1.142E-06	2.646E-05	1.003E-04	1.279E-04	1.050E-06	6.614E-06	3.511E-05	4.277E-05	2.207E+00	1.442E-03	4.500E-04	
T6TS	Gasoline	4.729E-04	2.545E-03	1.057E-02	4.114E-05	4.183E-06	2.646E-05	9.925E-05	1.299E-04	3.857E-06	6.614E-06	3.474E-05	4.521E-05	4.157E+00	8.867E-05	1.085E-04	
T7 CAIRP Class 8	Diesel	1.942E-04	7.879E-03	7.139E-04	3.339E-05	1.460E-04	7.937E-05	1.704E-04	3.958E-04	1.396E-04	1.984E-05	5.965E-05	2.191E-04	3.530E+00	9.018E-06	5.556E-04	
T7 CAIRP Class 8	Natural Gas	2.908E-05	5.767E-04	1.013E-02	0.000E+00	3.827E-06	7.937E-05	1.634E-04	2.465E-04	3.519E-06	1.984E-05	5.718E-05	8.054E-05	2.604E+00	2.036E-03	5.308E-04	
T7 NNOOS Class 8	Diesel	3.199E-04	8.470E-03	1.261E-03	3.361E-05	2.412E-04	7.937E-05	1.724E-04	4.930E-04	2.308E-04	1.984E-05	6.033E-05	3.110E-04	3.553E+00	1.486E-05	5.592E-04	
T7 NOOS Class 8	Diesel	2.268E-04	8.244E-03	8.267E-04	3.339E-05	1.627E-04	7.937E-05	1.708E-04	4.128E-04	1.556E-04	1.984E-05	5.978E-05	2.353E-04	3.529E+00	1.053E-05	5.556E-04	
T7 Other Port Class 8	Diesel	2.626E-04	9.829E-03	8.382E-04	3.595E-05	6.858E-05	7.937E-05	2.073E-04	3.553E-04	6.561E-05	1.984E-05	7.256E-05	1.580E-04	3.799E+00	1.220E-05	5.981E-04	
T7 POAK Class 8	Diesel	3.249E-04	1.095E-02	1.034E-03	3.599E-05	9.128E-05	7.937E-05	2.117E-04	3.824E-04	8.733E-05	1.984E-05	7.411E-05	1.813E-04	3.804E+00	1.509E-05	5.987E-04	
T7 POAK Class 8	Natural Gas	3.738E-05	1.552E-03	2.429E-02	0.000E+00	2.988E-06	7.937E-05	1.879E-04	2.703E-04	2.747E-06	1.984E-05	6.577E-05	8.836E-05	3.290E+00	2.616E-03	6.707E-04	
T7 Public Class 8	Diesel	3.447E-04	2.562E-02	1.116E-03	4.098E-05	1.655E-04	7.937E-05	2.624E-04	5.073E-04	1.584E-04	1.984E-05	9.184E-05	2.700E-04	4.332E+00	1.601E-05	6.819E-04	
T7 Public Class 8	Natural Gas	5.780E-05	1.707E-03	2.368E-02	0.000E+00	5.343E-06	7.937E-05	2.336E-04	3.184E-04	4.913E-06	1.984E-05	8.178E-05	1.065E-04	3.681E+00	4.045E-03	7.504E-04	
T7 Single Concrete/Transit Mix Cla	Diesel	3.839E-05	2.465E-03	1.993E-04	3.571E-05	4.234E-05	7.937E-05	1.789E-04	3.006E-04	4.050E-05	1.984E-05	6.262E-05	1.230E-04	3.774E+00	1.783E-06	5.941E-04	
T7 Single Concrete/Transit Mix Cla	Natural Gas	3.344E-05	7.916E-04	1.466E-02	0.000E+00	4.030E-06	7.937E-05	1.780E-04	2.614E-04	3.705E-06	1.984E-05	6.229E-05	8.583E-05	2.791E+00	2.340E-03	5.689E-04	
T7 Single Dump Class 8	Diesel	3.661E-04	1.071E-02	1.284E-03	3.541E-05	2.052E-04	7.937E-05	1.936E-04	4.781E-04	1.963E-04	1.984E-05	6.776E-05	2.839E-04	3.743E+00	1.701E-05	5.892E-04	
T7 Single Dump Class 8	Natural Gas	3.336E-05	9.407E-04	1.684E-02	0.000E+00	3.680E-06	7.937E-05	1.823E-04	2.653E-04	3.384E-06	1.984E-05	6.379E-05	8.702E-05	2.895E+00	2.335E-03	5.902E-04	
T7 Single Other Class 8	Diesel	3.480E-04	9.541E-03	1.276E-03	3.539E-05	2.128E-04	7.937E-05	1.930E-04	4.852E-04	2.036E-04	1.984E-05	6.757E-05	2.910E-04	3.741E+00	1.616E-05	5.888E-04	
T7 Single Other Class 8	Natural Gas	3.338E-05	9.459E-04	1.668E-02	0.000E+00	3.698E-06	7.937E-05	1.823E-04	2.654E-04	3.400E-06	1.984E-05	6.381E-05	8.705E-05	2.866E+00	2.336E-03	5.842E-04	
T7 SWCV Class 8	Diesel	9.651E-05	1.817E-02	2.650E-04	8.575E-05	2.248E-05	7.937E-05	4.630E-04	5.648E-04	2.150E-05	1.984E-05	1.620E-04	2.034E-04	9.063E+00	4.483E-06	1.427E-03	
T7 SWCV Class 8	Natural Gas	3.722E-04	7.392E-03	5.802E-02	0.000E+00	7.735E-06	7.937E-05	4.630E-04	5.501E-04	7.112E-06	1.984E-05	1.620E-04	1.890E-04	3.976E+00	1.346E-02	8.106E-04	
T7 Tractor Class 8	Diesel	3.280E-04	1.075E-02	1.189E-03	3.331E-05	1.916E-04	7.937E-05	1.882E-04	4.592E-04	1.833E-04	1.984E-05	6.588E-05	2.691E-04	3.521E+00	1.524E-05	5.543E-04	
T7 Tractor Class 8	Natural Gas	3.136E-05	1.243E-03	2.151E-02	0.000E+00	2.735E-06	7.937E-05	1.730E-04	2.551E-04	2.515E-06	1.984E-05	6.054E-05	8.290E-05	2.694E+00	2.195E-03	5.492E-04	
T7 Utility Class 8	Diesel	9.037E-05	5.427E-03	4.372E-04	3.706E-05	2.505E-05	7.937E-05	2.169E-04	3.213E-04	2.397E-05	1.984E-05	7.592E-05	1.197E-04	3.918E+00	4.198E-06	6.167E-04	
T7IS	Gasoline	2.732E-03	1.196E-02	1.003E-01	5.128E-05	5.949E-06	4.409E-05	2.020E-04	2.521E-04	5.539E-06	1.102E-05	7.071E-05	8.727E-05	5.182E+00	4.076E-04	3.795E-04	
UBUS	Gasoline	1.735E-05	1.177E-04	1.250E-03	2.307E-05	1.581E-06	1.828E-05	2.037E-04	2.235E-04	1.454E-06	4.569E-06	7.128E-05	7.730E-05	2.331E+00	5.808E-06	1.384E-05	
UBUS	Diesel	3.562E-04	1.195E-02	6.857E-04	3.180E-05	1.993E-05	7.009E-05	2.425E-04	3.325E-04	1.907E-05	1.752E-05	8.488E-05	1.215E-04	3.359E+00	1.655E-05	5.287E-04	
UBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	1.213E-04	2.006E-04	0.000E+00	1.984E-05	4.244E-05	6.228E-05	0.000E+00	0.000E+00	0.000E+00	

Source: EMFAC2021 (v1.0.2) Emission Rates
Region Type: County
Region: San Mateo
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC202x Categori
Units: miles/day for CVMT and EVMT, trips,

		MTons/Mile														
Vehicle Category	Fuel	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM10_Total	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBW	PM2_5_Total	CO2(Pavley+AACC)_RUNEX	CH4_RUNEX	N2O_RUNEX
All Other Buses	Diesel	9.024E-08	1.363E-06	2.517E-07	1.128E-08	3.328E-08	1.200E-08	4.614E-08	9.141E-08	3.184E-08	3.000E-09	1.615E-08	5.098E-08	1.192E-03	4.191E-09	1.877E-07
All Other Buses	Natural Gas	1.042E-08	3.001E-07	3.092E-06	0.000E+00	5.819E-10	1.200E-08	4.614E-08	5.872E-08	5.350E-10	3.000E-09	1.615E-08	1.968E-08	1.074E-03	7.295E-07	2.189E-07
LDA	Gasoline	1.531E-08	6.882E-08	9.038E-07	2.923E-09	1.600E-09	8.000E-09	6.780E-09	1.638E-08	1.471E-09	2.000E-09	2.373E-09	5.844E-09	2.954E-04	3.663E-09	6.198E-09
LDA	Diesel	3.527E-08	3.300E-07	3.797E-07	2.309E-09	2.221E-08	8.000E-09	6.853E-09	3.707E-08	2.125E-08	2.000E-09	2.399E-09	2.565E-08	2.439E-04	1.638E-09	3.839E-08
LDA	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.360E-09	1.236E-08	0.000E+00	2.000E-09	1.526E-09	3.526E-09	0.000E+00	0.000E+00	0.000E+00
LDA	Plug-in Hybrid	1.475E-09	3.486E-09	2.191E-07	1.445E-09	9.839E-10	8.000E-09	3.721E-09	1.270E-08	9.046E-10	2.000E-09	1.302E-09	4.207E-09	1.460E-04	4.671E-10	6.350E-10
LDT1	Gasoline	4.564E-08	2.067E-07	1.952E-06	3.455E-09	2.502E-09	8.000E-09	8.313E-09	1.882E-08	2.301E-09	2.000E-09	2.910E-09	7.211E-09	3.491E-04	9.792E-09	1.352E-08
LDT1	Diesel	3.295E-07	1.716E-06	1.750E-06	4.001E-09	2.596E-07	8.000E-09	9.747E-09	2.773E-07	2.483E-07	2.000E-09	3.411E-09	2.538E-07	4.227E-04	1.530E-08	6.653E-08
LDT1	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.395E-09	1.239E-08	0.000E+00	2.000E-09	1.538E-09	3.538E-09	0.000E+00	0.000E+00	0.000E+00
LDT1	Plug-in Hybrid	1.486E-09	3.512E-09	2.207E-07	1.455E-09	1.077E-09	8.000E-09	3.719E-09	1.280E-08	9.900E-10	2.000E-09	1.302E-09	4.292E-09	1.471E-04	4.714E-10	6.421E-10
LDT2	Gasoline	1.683E-08	1.061E-07	1.011E-06	3.672E-09	1.622E-09	8.000E-09	7.948E-09	1.757E-08	1.492E-09	2.000E-09	2.782E-09	6.273E-09	3.710E-04	3.994E-09	7.810E-09
LDT2	Diesel	1.595E-08	6.820E-08	1.411E-07	3.199E-09	7.011E-09	8.000E-09	7.922E-09	2.293E-08	6.708E-09	2.000E-09	2.773E-09	1.148E-08	3.379E-04	7.407E-10	5.319E-08
LDT2	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.349E-09	1.235E-08	0.000E+00	2.000E-09	1.522E-09	3.522E-09	0.000E+00	0.000E+00	0.000E+00
LDT2	Plug-in Hybrid	1.454E-09	3.436E-09	2.160E-07	1.424E-09	1.044E-09	8.000E-09	3.723E-09	1.277E-08	9.596E-10	2.000E-09	1.303E-09	4.263E-09	1.439E-04	4.638E-10	6.348E-10
LHD1	Gasoline	5.935E-08	2.385E-07	1.438E-06	9.190E-09	1.898E-09	8.000E-09	7.800E-08	8.790E-08	1.746E-09	2.000E-09	2.730E-08	3.105E-08	9.287E-04	1.164E-08	1.333E-08
LHD1	Diesel	2.478E-07	2.961E-06	7.475E-07	6.141E-09	5.676E-08	1.200E-08	7.800E-08	1.468E-07	5.431E-08	3.000E-09	2.730E-08	8.461E-08	6.487E-04	1.151E-08	1.021E-07
LHD2	Gasoline	5.915E-08	2.835E-07	1.385E-06	1.044E-08	1.899E-09	8.000E-09	9.100E-08	1.009E-07	1.746E-09	2.000E-09	3.185E-08	3.560E-08	1.055E-03	1.210E-08	1.576E-08
LHD2	Diesel	2.022E-07	2.046E-06	5.527E-07	7.531E-09	4.516E-08	1.200E-08	9.100E-08	1.482E-07	4.320E-08	3.000E-09	3.185E-08	7.805E-08	7.955E-04	9.393E-09	1.252E-07
MCY	Gasoline	1.443E-06	7.029E-07	1.650E-05	1.932E-09	1.997E-09	4.000E-09	1.200E-08	1.800E-08	1.880E-09	1.000E-09	4.200E-09	7.080E-09	1.952E-04	2.059E-07	4.515E-08
MDV	Gasoline	2.647E-08	1.520E-07	1.220E-06	4.411E-09	1.714E-09	8.000E-09	8.051E-09	1.777E-08	1.577E-09	2.000E-09	2.818E-09	6.395E-09	4.458E-04	5.684E-09	1.006E-08
MDV	Diesel	1.258E-08	6.645E-08	1.942E-07	4.105E-09	6.184E-09	8.000E-09	7.884E-09	2.207E-08	5.917E-09	2.000E-09	2.759E-09	1.068E-08	4.336E-04	5.844E-10	6.826E-08
MDV	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.429E-09	1.243E-08	0.000E+00	2.000E-09	1.550E-09	3.550E-09	0.000E+00	0.000E+00	0.000E+00
MDV	Plug-in Hybrid	1.477E-09	3.492E-09	2.195E-07	1.447E-09	1.081E-09	8.000E-09	3.717E-09	1.280E-08	9.937E-10	2.000E-09	1.301E-09	4.295E-09	1.463E-04	4.728E-10	6.488E-10
MH	Gasoline	2.154E-07	9.013E-07	6.182E-06	1.933E-08	3.084E-09	1.200E-08	4.502E-08	6.010E-08	2.846E-09	3.000E-09	1.576E-08	2.160E-08	1.953E-03	4.052E-08	4.520E-08
MH	Diesel	1.161E-07	4.115E-06	3.862E-07	1.026E-08	9.844E-08	1.600E-08	4.479E-08	1.592E-07	9.418E-08	4.000E-09	1.567E-08	1.139E-07	1.083E-03	5.395E-09	1.705E-07
Motor Coach	Diesel	1.775E-07	4.329E-06	6.233E-07	1.664E-08	1.079E-07	1.200E-08	7.908E-08	1.989E-07	1.032E-07	3.000E-09	2.768E-08	1.339E-07	1.759E-03	8.243E-09	2.769E-07
OBUS	Gasoline	6.773E-08	4.438E-07	1.527E-06	1.790E-08	9.707E-10	1.200E-08	4.480E-08	5.777E-08	8.932E-10	3.000E-09	1.568E-08	1.957E-08	1.808E-03	1.394E-08	2.307E-08
PTO	Diesel	3.047E-07	5.643E-06	1.145E-06	2.062E-08	1.024E-07	0.000E+00	0.000E+00	1.024E-07	9.801E-08	0.000E+00	0.000E+00	9.801E-08	2.180E-03	1.415E-08	3.431E-07
SBUS	Gasoline	4.112E-07	1.745E-06	1.011E-05	8.426E-09	3.467E-09	8.000E-09	4.492E-08	5.638E-08	3.188E-09	2.000E-09	1.572E-08	2.091E-08	8.515E-04	7.639E-08	7.512E-08
SBUS	Diesel	7.654E-08	6.030E-06	2.238E-07	1.104E-08	3.088E-08	1.200E-08	4.492E-08	8.779E-08	2.954E-08	3.000E-09	1.572E-08	4.826E-08	1.167E-03	3.555E-09	1.837E-07
SBUS	Natural Gas	5.225E-08	6.462E-07	1.268E-05	0.000E+00	3.674E-09	1.200E-08	4.492E-08	6.059E-08	3.378E-09	3.000E-09	1.572E-08	2.210E-08	1.299E-03	3.657E-06	2.649E-07
T6 CAIRP Class 4	Diesel	8.785E-08	2.174E-06	3.118E-07	1.079E-08	7.440E-08	1.200E-08	4.231E-08	1.287E-07	7.118E-08	3.000E-09	1.481E-08	8.899E-08	1.140E-03	4.080E-09	1.794E-07
T6 CAIRP Class 5	Diesel	5.993E-08	1.634E-06	2.281E-07	1.073E-08	5.444E-08	1.200E-08	4.231E-08	1.088E-07	5.208E-08	3.000E-09	1.481E-08	6.989E-08	1.134E-03	2.783E-09	1.785E-07
T6 CAIRP Class 6	Diesel	8.556E-08	2.138E-06	3.178E-07	1.060E-08	7.668E-08	1.200E-08	4.231E-08	1.310E-07	7.336E-08	3.000E-09	1.481E-08	9.117E-08	1.121E-03	3.974E-09	1.764E-07
T6 CAIRP Class 7	Diesel	8.481E-08	2.275E-06	2.892E-07	9.986E-09	6.942E-08	1.200E-08	4.231E-08	1.237E-07	6.642E-08	3.000E-09	1.481E-08	8.423E-08	1.055E-03	3.939E-09	1.661E-07
T6 Instate Delivery Class 4	Diesel	5.950E-07	7.550E-06	1.563E-06	1.196E-08	2.406E-07	1.200E-08	4.756E-08	3.002E-07	2.302E-07	3.000E-09	1.665E-08	2.499E-07	1.264E-03	2.763E-08	1.990E-07
T6 Instate Delivery Class 4	Natural Gas	1.038E-08	2.994E-07	3.246E-06	0.000E+00	6.387E-10	1.200E-08	4.756E-08	6.020E-08	5.873E-10	3.000E-09	1.665E-08	2.023E-08	1.111E-03	7.268E-07	2.265E-07
T6 Instate Delivery Class 5	Diesel	2.552E-07	3.674E-06	6.877E-07	1.169E-08	1.001E-07	1.200E-08	4.756E-08	1.597E-07	9.578E-08	3.000E-09	1.665E-08	1.154E-07	1.236E-03	1.185E-08	1.945E-07
T6 Instate Delivery Class 5	Natural Gas	1.038E-08	2.994E-07	3.246E-06	0.000E+00	6.387E-10	1.200E-08	4.756E-08	6.020E-08	5.873E-10	3.000E-09	1.665E-08	2.023E-08	1.109E-03	7.268E-07	2.260E-07
T6 Instate Delivery Class 6	Diesel	4.045E-07	5.169E-06	1.064E-06	1.172E-08	1.646E-07	1.200E-08	4.756E-08	2.242E-07	1.575E-07	3.000E-09	1.665E-08	1.771E-07	1.239E-03	1.879E-08	1.951E-07
T6 Instate Delivery Class 6	Natural Gas	1.042E-08	2.949E-07	3.257E-06	0.000E+00	6.646E-10	1.200E-08	4.756E-08	6.023E-08	6.111E-10	3.000E-09	1.665E-08	2.026E-08	1.109E-03	7.295E-07	2.262E-07
T6 Instate Delivery Class 7	Diesel	2.682E-07	4.209E-06	7.058E-07	1.162E-08	1.136E-07	1.200E-08	4.756E-08	1.732E-07	1.087E-07	3.000E-09	1.665E-08	1.284E-07	1.229E-03	1.246E-08	1.934E-07
T6 Instate Delivery Class 7	Natural Gas	1.152E-08	1.702E-07	3.571E-06	0.000E+00	1.390E-09	1.200E-08	4.756E-08	6.095E-08	1.278E-09	3.000E-09	1.665E-08	2.093E-08	1.089E-03	8.064E-07	2.221E-07
T6 Instate Other Class 4	Diesel	4.866E-07	7.579E-06	1.371E-06	1.120E-08	2.477E-07	1.200E-08	4.486E-08	3.046E-07	2.370E-07	3.000E-09	1.570E-08	2.557E-07	1.184E-03	2.260E-08	1.863E-07
T6 Instate Other Class 4	Natural Gas	7.975E-09	2.268E-07	2.831E-06	0.000E+00	5.147E-10	1.200E-08	4.486E-08	5.738E-08	4.732E-10	3.000E-09	1.570E-08	1.918E-08	9.658E-04	5.582E-07	1.969E-07
T6 Instate Other Class 5	Diesel	1.611E-07	2.822E-06	4.797E-07	1.106E-08	8.118E-08	1.200E-08	4.486E-08	1.380E-07	7.767E-08	3.000E-09	1.570E-08	9.637E-08	1.169E-03	7.482E-09	1.841E-07
T6 Instate Other Class 5	Natural Gas	7.945E-09	2.294E-07	2.834E-06	0.000E+00	4.990E-10	1.200E-08	4.486E-08	5.736E-08	4.588E-10	3.000E-09	1.570E-08	1.916E-08	9.646E-04	5.561E-07	1.966E-07
T6 Instate Other Class 6	Diesel	2.680E-07	4.324E-06	7.767E-07	1.102E-08	1.403E-07	1.200E-08	4.486E-08	1.971E-07	1.342E-07	3.000E-09	1.570E-08	1.529E-07	1.165E-03	1.245E-08	1.834E-07
T6 Instate Other Class 6	Natural Gas	7.999E-09	2.247E-07	2.829E-06	0.000E+00	5.273E-10	1.200E-08	4.486E-08	5.739E-08	4.848E-10	3.000E-09	1.570E-08	1.919E-08	9.643E-04	5.599E-07	1.966E-07
T6 Instate Other Class 7	Diesel	2.006E-07	3.445E-06	5.549E-07	1.097E-08	1.082E-07	1.200E-08	4.486E-08	1.651E-07	1.035E-07	3.000E-09	1.570E-08	1.222E-07	1.160E-03	9.318E-09	1.826E-07
T6 Instate Other Class 7	Natural Gas	8.631E-09	1.734E-07	2.821E-06	0.000E+00	8.648E-10	1.200E-08	4.486E-08	5.773E-08	7.952E-10	3.000E-09	1.570E-08	1.950E-08	9.313E-04	6.041E-07	1.899E-07
T6 Instate Tractor Class 6	Diesel	2.302E-07	3.633E-06	6.739E-07	1.117E-08	1.191E-07	1.200E-08	4.486E-08	1.759E-07	1.139E-07	3.000E-09	1.570E-08	1.326E-07	1.181E-03	1.069E-08	1.858E-07
T6 Instate Tractor Class 6	Natural Gas	7.934E-09	2.304E-07	2.835E-06	0.000E+00	4.933E-10	1.200E-08	4.486E-08	5.736E-08	4.536E-10	3.000E-09	1.570E-08	1.916E-08	9.606E-04	5.553E-07	1.958E-07
T6 Instate Tractor Class 7	Diesel	1.408E-07	3.301E-06	4.230E-07	1.044E-08	7.438E-08	1.200E-08	4.486E-08	1.312E-07	7.116E-08	3.000E-09	1.570E-08	8.986E-08	1.103E-03	6.539E-09	1.737E-07
T6 Instate Tractor Class 7	Natural Gas	8.132E-09	2.146E-07	2.835E-06	0.000E+00	5.994E-10	1.200E-08	4.486E-08	5.746E-08	5.511E-10	3.000E-09	1.570E-08	1.925E-08	9.309E-04	5.692E-07	1.898E-07
T6 OOS Class 4	Diesel	8.785E-08	2.174E-06	3.118E-07	1.079E-08	7.440E-08	1.200E-08	4.231E-08	1.287E-07	7.118E-08	3.000E-09	1.481E-08	8.899E-08	1.140E-03	4.080E-09	1.794E-07
T6 OOS Class 5	Diesel	5.993E-08	1.634E-06	2.281E-07	1.073E-08	5.444E-08	1.200E-08	4.231E-08	1.088E-07	5.208E-08	3.000E-09	1.481E-08	6.989E-08	1.134E-03	2.783E-09	1.785E-07
T6 OOS Class 6	Diesel	8.556E-08	2.138E-06	3.178E-07	1.060E-08	7.668E-08	1.200E-08	4.231E-08	1.310E-07	7.336E-08	3.000E-09	1.481E-08	9.117E-08	1.121E-03	3.974E-09	1.764E-07
T6 OOS Class 7	Diesel	9.387E-08	2.391E-06	3.194E-07	9.979E-09	7.658E-08	1.200E-08	4.231E-08	1.309E-07	7.327E-08	3.000E-09	1.481E-08	9.108E-08	1.055E-03	4.360E-09	1.660E-07
T6 Public Class 4	Diesel	1.086E-07	8.304E-06	2.476E-07	1.225E-08	4.002E-08	1.200E-08	4.617E-08	9.819E-08	3.829E-08	3.000E-09	1.616E-08	5.745E-08	1.295E-03	5.042E-09	2.038E-07
T6 Public Class 4	Natural Gas	1.228E-08	1.144E-07	3.052E-06	0.000E+00	1.527E-09	1.200E-08	4.617E-08	5.970E-08	1.404E-09	3.000E-09	1.616E-08	2.056E-08	1.065E-03	8.592E-07	2.171E-07
T6 Public Class 5	Diesel	5.694E-08	3.552E-06	1.616E-07	1.165E-08	1.692E-08	1.200E-08	4.617E-08	7.509E-08	1.618E-08	3.000E-09	1.616E-08	3.534E-08	1.232E-03	2.645E-09	1.939E-07
T6 Public Class 5	Natural Gas	1.206E-08	1.514E-07	3.089E-06	0.000E+00	1.351E-09	1.200E-08	4.617E-08	5.952E-08	1.242E-09	3.000E-09	1.616E-08	2.040E-08	1.051E-03	8.437E-07	2.143E-07

T6 Public Class 6	Diesel	1.216E-07	8.137E-06	2.761E-07	1.214E-08	5.174E-08	1.200E-08	4.617E-08	1.099E-07	4.951E-08	3.000E-09	1.616E-08	6.867E-08	1.283E-03	5.649E-09	2.020E-07
T6 Public Class 6	Natural Gas	1.200E-08	1.610E-07	3.090E-06	0.000E+00	1.306E-09	1.200E-08	4.617E-08	5.948E-08	1.201E-09	3.000E-09	1.616E-08	2.036E-08	1.048E-03	8.397E-07	2.137E-07
T6 Public Class 7	Diesel	1.434E-07	9.623E-06	3.016E-07	1.247E-08	6.575E-08	1.200E-08	4.617E-08	1.239E-07	6.290E-08	3.000E-09	1.616E-08	8.206E-08	1.318E-03	6.662E-09	2.074E-07
T6 Public Class 7	Natural Gas	1.240E-08	9.501E-08	3.066E-06	0.000E+00	1.619E-09	1.200E-08	4.617E-08	5.979E-08	1.489E-09	3.000E-09	1.616E-08	2.065E-08	1.067E-03	8.677E-07	2.174E-07
T6 Utility Class 5	Diesel	2.450E-08	1.270E-06	9.542E-08	1.078E-08	6.143E-09	1.200E-08	4.550E-08	6.364E-08	5.877E-09	3.000E-09	1.592E-08	2.480E-08	1.140E-03	1.138E-09	1.794E-07
T6 Utility Class 5	Natural Gas	9.343E-09	2.693E-07	2.894E-06	0.000E+00	5.178E-10	1.200E-08	4.550E-08	5.801E-08	4.761E-10	3.000E-09	1.592E-08	1.940E-08	1.011E-03	6.539E-07	2.061E-07
T6 Utility Class 6	Diesel	3.709E-08	2.079E-06	1.240E-07	1.103E-08	1.076E-08	1.200E-08	4.550E-08	6.826E-08	1.029E-08	3.000E-09	1.592E-08	2.922E-08	1.165E-03	1.723E-09	1.834E-07
T6 Utility Class 6	Natural Gas	9.343E-09	2.693E-07	2.894E-06	0.000E+00	5.178E-10	1.200E-08	4.550E-08	5.801E-08	4.761E-10	3.000E-09	1.592E-08	1.940E-08	9.948E-04	6.539E-07	2.028E-07
T6 Utility Class 7	Diesel	2.797E-08	1.915E-06	1.002E-07	1.102E-08	1.031E-08	1.200E-08	4.550E-08	6.781E-08	9.866E-09	3.000E-09	1.592E-08	2.879E-08	1.165E-03	1.299E-09	1.834E-07
T6 Utility Class 7	Natural Gas	9.343E-09	2.693E-07	2.894E-06	0.000E+00	5.178E-10	1.200E-08	4.550E-08	5.801E-08	4.761E-10	3.000E-09	1.592E-08	1.940E-08	1.001E-03	6.539E-07	2.041E-07
T6TS	Gasoline	2.145E-07	1.154E-06	4.793E-06	1.866E-08	1.897E-09	1.200E-08	4.502E-08	5.891E-08	1.749E-09	3.000E-09	1.576E-08	2.051E-08	1.886E-03	4.022E-08	4.919E-08
T7 CAIRP Class 8	Diesel	8.807E-08	3.574E-06	3.238E-07	1.515E-08	6.621E-08	3.600E-08	7.731E-08	1.795E-07	6.334E-08	9.000E-09	2.706E-08	9.940E-08	1.601E-03	4.091E-09	2.520E-07
T7 CAIRP Class 8	Natural Gas	1.319E-08	2.616E-07	4.596E-06	0.000E+00	1.736E-09	3.600E-08	7.410E-08	1.118E-07	1.596E-09	9.000E-09	2.593E-08	3.653E-08	1.181E-03	9.233E-07	2.408E-07
T7 NNOOS Class 8	Diesel	1.451E-07	3.842E-06	5.721E-07	1.525E-08	1.094E-07	3.600E-08	7.818E-08	2.236E-07	1.047E-07	9.000E-09	2.736E-08	1.411E-07	1.611E-03	6.741E-09	2.537E-07
T7 NOOS Class 8	Diesel	1.029E-07	3.739E-06	3.750E-07	1.515E-08	7.379E-08	3.600E-08	7.747E-08	1.873E-07	7.060E-08	9.000E-09	2.711E-08	1.067E-07	1.601E-03	4.777E-09	2.520E-07
T7 Other Port Class 8	Diesel	1.191E-07	4.459E-06	3.802E-07	1.631E-08	3.111E-08	3.600E-08	9.404E-08	1.611E-07	2.976E-08	9.000E-09	3.291E-08	7.168E-08	1.723E-03	5.533E-09	2.713E-07
T7 POAK Class 8	Diesel	1.474E-07	4.965E-06	4.689E-07	1.632E-08	4.140E-08	3.600E-08	9.605E-08	1.735E-07	3.961E-08	9.000E-09	3.362E-08	8.223E-08	1.725E-03	6.845E-09	2.716E-07
T7 POAK Class 8	Natural Gas	1.696E-08	7.040E-07	1.102E-05	0.000E+00	1.355E-09	3.600E-08	8.524E-08	1.226E-07	1.246E-09	9.000E-09	2.983E-08	4.008E-08	1.492E-03	1.187E-06	3.042E-07
T7 Public Class 8	Diesel	1.564E-07	1.162E-05	5.060E-07	1.859E-08	7.508E-08	3.600E-08	1.190E-07	2.301E-07	7.184E-08	9.000E-09	4.166E-08	1.225E-07	1.965E-03	7.263E-09	3.093E-07
T7 Public Class 8	Natural Gas	2.622E-08	7.744E-07	1.074E-05	0.000E+00	2.424E-09	3.600E-08	1.060E-07	1.444E-07	2.228E-09	9.000E-09	3.709E-08	4.832E-08	1.670E-03	1.835E-06	3.404E-07
T7 Single Concrete/Transit Mix Cla	Diesel	1.741E-08	1.118E-06	9.040E-08	1.620E-08	1.920E-08	3.600E-08	8.116E-08	1.364E-07	1.837E-08	9.000E-09	2.841E-08	5.578E-08	1.712E-03	8.088E-10	2.695E-07
T7 Single Concrete/Transit Mix Cla	Natural Gas	1.517E-08	3.591E-07	6.650E-06	0.000E+00	1.828E-09	3.600E-08	8.072E-08	1.186E-07	1.681E-09	9.000E-09	2.825E-08	3.893E-08	1.266E-03	1.062E-06	2.581E-07
T7 Single Dump Class 8	Diesel	1.661E-07	4.858E-06	5.826E-07	1.606E-08	9.306E-08	3.600E-08	8.782E-08	2.169E-07	8.904E-08	9.000E-09	3.074E-08	1.288E-07	1.698E-03	7.714E-09	2.673E-07
T7 Single Dump Class 8	Natural Gas	1.513E-08	4.267E-07	7.638E-06	0.000E+00	1.669E-09	3.600E-08	8.267E-08	1.203E-07	1.535E-09	9.000E-09	2.894E-08	3.947E-08	1.313E-03	1.059E-06	2.677E-07
T7 Single Other Class 8	Diesel	1.578E-07	4.328E-06	5.790E-07	1.605E-08	9.653E-08	3.600E-08	8.757E-08	2.201E-07	9.235E-08	9.000E-09	3.065E-08	1.320E-07	1.697E-03	7.332E-09	2.671E-07
T7 Single Other Class 8	Natural Gas	1.514E-08	4.291E-07	7.564E-06	0.000E+00	1.677E-09	3.600E-08	8.270E-08	1.204E-07	1.542E-09	9.000E-09	2.894E-08	3.949E-08	1.300E-03	1.060E-06	2.650E-07
T7 SWCV Class 8	Diesel	4.378E-08	8.244E-06	1.202E-07	3.889E-08	1.019E-08	3.600E-08	2.100E-07	2.562E-07	9.754E-09	9.000E-09	7.350E-08	9.225E-08	4.111E-03	2.033E-09	6.471E-07
T7 SWCV Class 8	Natural Gas	1.688E-07	3.353E-06	2.632E-05	0.000E+00	3.508E-09	3.600E-08	2.100E-07	2.495E-07	3.226E-09	9.000E-09	7.350E-08	8.573E-08	1.804E-03	6.107E-06	3.677E-07
T7 Tractor Class 8	Diesel	1.488E-07	4.878E-06	5.392E-07	1.511E-08	8.693E-08	3.600E-08	8.538E-08	2.083E-07	8.317E-08	9.000E-09	2.988E-08	1.220E-07	1.597E-03	6.911E-09	2.514E-07
T7 Tractor Class 8	Natural Gas	1.423E-08	5.637E-07	9.756E-06	0.000E+00	1.241E-09	3.600E-08	7.846E-08	1.157E-07	1.141E-09	9.000E-09	2.746E-08	3.760E-08	1.222E-03	9.956E-07	2.491E-07
T7 Utility Class 8	Diesel	4.099E-08	2.462E-06	1.983E-07	1.681E-08	1.136E-08	3.600E-08	9.840E-08	1.458E-07	1.087E-08	9.000E-09	3.444E-08	5.431E-08	1.777E-03	1.904E-09	2.797E-07
T7IS	Gasoline	1.239E-06	5.424E-06	4.552E-05	2.326E-08	2.698E-09	2.000E-08	9.164E-08	1.143E-07	2.512E-09	5.000E-09	3.208E-08	3.959E-08	2.350E-03	1.849E-07	1.721E-07
UBUS	Gasoline	7.870E-09	5.339E-08	5.669E-07	1.046E-08	7.171E-10	8.290E-09	9.238E-08	1.014E-07	6.594E-10	2.073E-09	3.233E-08	3.506E-08	1.057E-03	2.635E-09	6.278E-09
UBUS	Diesel	1.616E-07	5.421E-06	3.110E-07	1.442E-08	9.040E-09	3.179E-08	1.100E-07	1.508E-07	8.649E-09	7.948E-09	3.850E-08	5.510E-08	1.524E-03	7.505E-09	2.398E-07
UBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	5.500E-08	9.100E-08	0.000E+00	9.000E-09	1.925E-08	2.825E-08	0.000E+00	0.000E+00	0.000E+00

Source: EMFAC2021 (v1.0.2) Emission Rates
Region Type: County
Region: San Mateo
Calendar Year: 2040
Season: Annual
Vehicle Classification: EMFAC202x Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN. PHEV calculated based on total VMT.

g/mile 2.205E-03

Vehicle Category	Fuel	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM10_Total	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBW	PM2_5_Total	CO2_RUNEX	CH4_RUNEX	N2O_RUNEX	VMT	% of VMT
All Other Buses	Diesel	0.01334618	0.50024792	0.08127863	0.00971388	0.00364617	0.012	0.0461373	6.18E-02	0.00348844	0.003	0.01614806	2.26E-02	1025.81784	0.0006199	0.16161802	68,924	0.350%
All Other Buses	Natural Gas	0.01215435	0.07922587	3.41832093	0	0.00172963	0.012	0.0461373	5.99E-02	0.00159033	0.003	0.01614806	2.07E-02	899.167166	0.85066713	0.18330111	1,276	0.006%
LDA	Gasoline	0.002851	0.01949512	0.43035809	0.00221937	0.00054791	0.008	0.00681325	1.54E-02	0.00050379	0.002	0.00238464	4.89E-03	224.49575	0.0009123	0.00292407	5,833,280	29.613%
LDA	Diesel	0.00534929	0.02493682	0.14221828	0.00175617	0.00172176	0.008	0.00686473	1.66E-02	0.00164727	0.002	0.00240265	6.05E-03	185.337833	0.00024846	0.02920005	3,702	0.019%
LDA	Electricity	0	0	0	0	0	0.008	0.00438639	1.24E-02	0	0.002	0.00153524	3.54E-03	0	0	0	875,819	4.446%
LDA	Plug-in Hybrid	0.00113655	0.0026759	0.16817577	0.00110839	0.00022918	0.008	0.00391252	1.21E-02	0.00021072	0.002	0.00136938	3.58E-03	112.116585	0.00032605	0.00040088	281,077	1.427%
LDT1	Gasoline	0.00364626	0.02358625	0.4839539	0.00258139	0.00060168	0.008	0.00826558	1.69E-02	0.00055322	0.002	0.00289295	5.45E-03	261.115255	0.00109815	0.00320762	705,649	3.582%
LDT1	Diesel	0.01195255	0.02660206	0.12328523	0.00318971	0.00397563	0.008	0.00816438	2.01E-02	0.00380365	0.002	0.00285753	8.66E-03	336.626688	0.00055517	0.05303567	8	0.000%
LDT1	Electricity	0	0	0	0	0	0.008	0.00438913	1.24E-02	0	0.002	0.00153619	3.54E-03	0	0	0	22,339	0.113%
LDT1	Plug-in Hybrid	0.00112403	0.00264642	0.16631491	0.00109616	0.0002027	0.008	0.00391998	1.21E-02	0.00018637	0.002	0.00137199	3.56E-03	110.87982	0.00032177	0.00039468	15,547	0.079%
LDT2	Gasoline	0.00408575	0.02393031	0.51886024	0.00267386	0.00056277	0.008	0.008199	1.68E-02	0.00051744	0.002	0.00286965	5.39E-03	270.468513	0.00124763	0.00321541	6,086,991	30.901%
LDT2	Diesel	0.01200888	0.02721418	0.12479376	0.00237512	0.00402062	0.008	0.00819041	2.02E-02	0.00384669	0.002	0.00286665	8.71E-03	250.658766	0.00055779	0.03949139	23,202	0.118%
LDT2	Electricity	0	0	0	0	0	0.008	0.00439111	1.24E-02	0	0.002	0.00153689	3.54E-03	0	0	0	179,285	0.910%
LDT2	Plug-in Hybrid	0.00113006	0.00266063	0.16719846	0.00110202	0.00021531	0.008	0.00392025	1.21E-02	0.00019797	0.002	0.00137209	3.57E-03	111.473079	0.00032203	0.00039313	161,728	0.821%
LHD1	Gasoline	0.00401723	0.01892416	0.59248327	0.00744321	0.00128291	0.008	0.07800002	8.73E-02	0.00117959	0.002	0.02730001	3.05E-02	752.902897	0.00114083	0.00150956	306,742	1.557%
LHD1	Diesel	0.08711647	0.25752873	0.218704	0.00570546	0.01803987	0.012	0.07800002	1.08E-01	0.01725948	0.003	0.02730001	4.76E-02	602.127171	0.00404639	0.09486538	184,764	0.938%
LHD1	Electricity	0	0	0	0	0	0.008	0.03900001	4.70E-02	0	0.002	0.01365	1.57E-02	0	0	0	293,604	1.490%
LHD2	Gasoline	0.00363114	0.02238521	0.5955606	0.00837847	0.00125894	0.008	0.09100003	1.00E-01	0.00115755	0.002	0.03185001	3.50E-02	847.507512	0.00105504	0.00198533	34,025	0.173%
LHD2	Diesel	0.10100701	0.30857275	0.25530291	0.00664075	0.02097521	0.012	0.09100003	1.24E-01	0.02006783	0.003	0.03185001	5.49E-02	700.832769	0.00469158	0.11041649	84,902	0.431%
LHD2	Electricity	0	0	0	0	0	0.008	0.04550001	5.35E-02	0	0.002	0.015925	1.79E-02	0	0	0	70,466	0.358%
MCY	Gasoline	0.74799415	0.45790234	9.35911672	0.00183236	0.00214499	0.004	0.012	1.81E-02	0.00199978	0.001	0.0042	7.20E-03	185.348611	0.12531148	0.03468199	92,749	0.471%
MDV	Gasoline	0.0042214	0.02487057	0.52993193	0.00324077	0.00056762	0.008	0.00830071	1.69E-02	0.0005219	0.002	0.00290525	5.43E-03	327.813049	0.00128192	0.00328642	3,533,747	17.939%
MDV	Diesel	0.00433423	0.00960663	0.13590628	0.00309904	0.00099079	0.008	0.00832006	1.73E-02	0.00094793	0.002	0.00291202	5.86E-03	327.057576	0.00020132	0.05152805	38,378	0.195%
MDV	Electricity	0	0	0	0	0	0.008	0.00439636	1.24E-02	0	0.002	0.00153873	3.54E-03	0	0	0	163,991	0.833%
MDV	Plug-in Hybrid	0.00112942	0.0026591	0.16710448	0.0011014	0.00021653	0.008	0.00392365	1.21E-02	0.00019909	0.002	0.00137328	3.57E-03	111.409612	0.00032287	0.00039551	102,722	0.521%
MH	Gasoline	0.01168099	0.10412525	0.15995233	0.01922673	0.00149118	0.012	0.04501744	5.85E-02	0.00137109	0.003	0.0157561	2.01E-02	1944.84098	0.00407457	0.01236424	10,018	0.051%
MH	Diesel	0.07869023	2.45036835	0.22641149	0.01031241	0.01973011	0.016	0.04478528	8.05E-02	0.01887659	0.004	0.01567485	3.86E-02	1088.32296	0.00365501	0.17146572	5,325	0.027%
Motor Coach	Diesel	0.01066015	0.99200931	0.03802564	0.0147306	0.02441419	0.012	0.08072442	1.17E-01	0.02335805	0.003	0.02825355	5.46E-02	1555.59987	0.00049514	0.24508539	10,276	0.052%
OBUS	Gasoline	0.01787828	0.11892206	0.36181651	0.01527091	0.00131878	0.012	0.0447987	5.81E-02	0.00121257	0.003	0.01567955	1.99E-02	1544.69812	0.00414751	0.0081918	5,871	0.030%
OBUS	Electricity	0	0	0	0	0	0.012	0.02239935	3.44E-02	0	0.003	0.00783977	1.08E-02	0	0	0	4,910	0.025%
PTO	Diesel	0.01696958	2.82616395	0.20685869	0.01729902	0.00453598	0	0	4.54E-03	0.00433975	0	0	4.34E-03	1826.8337	0.00078819	0.28781839	3,984	0.020%
PTO	Electricity	0	0	0	0	0	0	0	0.00E+00	0	0	0	0.00E+00	0	0	0	2,334	0.012%
SBUS	Gasoline	0.00891594	0.08805086	0.18504588	0.00709853	0.00123556	0.008	0.04491714	5.42E-02	0.00113605	0.002	0.015721	1.89E-02	718.037049	0.00204542	0.00902638	3,828	0.019%
SBUS	Diesel	0.01702162	0.74961055	0.08025546	0.01008918	0.00514978	0.012	0.04491714	6.21E-02	0.00492701	0.003	0.015721	2.36E-02	1065.45089	0.00079061	0.16786222	2,634	0.013%
SBUS	Electricity	0	0	0	0	0	0.00950219	0.02245857	3.20E-02	0	0.00237555	0.0078605	1.02E-02	0	0	0	3,060	0.016%
SBUS	Natural Gas	0.04022974	0.34141862	8.72643145	0	0.00367426	0.012	0.04491714	6.06E-02	0.00337835	0.003	0.015721	2.21E-02	1149.67628	2.81562607	0.23436903	164	0.001%
T6 CAIRP Class 4	Diesel	0.00565164	0.19295927	0.02857247	0.00973324	0.00565363	0.012	0.04231382	6.00E-02	0.00540906	0.003	0.01480984	2.32E-02	1027.86209	0.0002625	0.16194009	82	0.000%
T6 CAIRP Class 4	Electricity	0	0	0	0	0	0.012	0.02115691	3.32E-02	0	0.003	0.00740492	1.04E-02	0	0	0	87	0.000%
T6 CAIRP Class 5	Diesel	0.00559067	0.19462736	0.02846544	0.00974389	0.00563724	0.012	0.04231382	6.00E-02	0.00539337	0.003	0.01480984	2.32E-02	1028.98716	0.00025967	0.16211735	113	0.001%
T6 CAIRP Class 5	Electricity	0	0	0	0	0	0.012	0.02115691	3.32E-02	0	0.003	0.00740492	1.04E-02	0	0	0	118	0.001%
T6 CAIRP Class 6	Diesel	0.00554233	0.18788336	0.02822002	0.00970387	0.00558146	0.012	0.04231382	5.99E-02	0.00534001	0.003	0.01480984	2.31E-02	1024.7602	0.00025743	0.16145139	291	0.001%
T6 CAIRP Class 6	Electricity	0	0	0	0	0	0.012	0.02115691	3.32E-02	0	0.003	0.00740492	1.04E-02	0	0	0	313	0.002%
T6 CAIRP Class 7	Diesel	0.00581962	0.20301557	0.02983924	0.00856452	0.00584039	0.012	0.04231382	6.02E-02	0.00558774	0.003	0.01480984	2.34E-02	904.441338	0.00027031	0.1424951	2,959	0.015%
T6 CAIRP Class 7	Electricity	0	0	0	0	0	0.012	0.02115691	3.32E-02	0	0.003	0.00740492	1.04E-02	0	0	0	834	0.004%
T6 Instate Delivery Class 4	Diesel	0.00900783	0.44240884	0.06282248	0.0101609	0.00306976	0.012	0.04756293	6.26E-02	0.00293696	0.003	0.01664703	2.26E-02	1073.02442	0.00041839	0.16905543	9,201	0.047%
T6 Instate Delivery Class 4	Electricity	0	0	0	0	0	0.012	0.02378147	3.58E-02	0	0.003	0.00832351	1.13E-02	0	0	0	6,673	0.034%
T6 Instate Delivery Class 4	Natural Gas	0.01245779	0.06157767	3.81375222	0	0.00200607	0.012	0.04756293	6.16E-02	0.00184451	0.003	0.01664703	2.15E-02	1009.86019	0.87190429	0.20586661	114	0.001%
T6 Instate Delivery Class 5	Diesel	0.0068932	0.41588677	0.05716589	0.01019244	0.00222164	0.012	0.04756293	6.18E-02	0.00212554	0.003	0.01664703	2.18E-02	1076.35534	0.00032017	0.16958022	7,503	0.038%
T6 Instate Delivery Class 5	Electricity	0	0	0	0	0	0.012	0.02378147	3.58E-02	0	0.003	0.00832351	1.13E-02	0	0	0	5,442	0.028%
T6 Instate Delivery Class 5	Natural Gas	0.01244982	0.06249155	3.81156993	0	0.00200081	0.012	0.04756293	6.16E-02	0.00183967	0.003	0.01664703	2.15E-02	1007.40548	0.87134667	0.2053662	88	0.000%
T6 Instate Delivery Class 6	Diesel	0.00702862	0.42527393	0.05789712	0.01017387	0.00229809	0.012	0.04756293	6.19E-02	0.00219868	0.003	0.01664703	2.18E-02	1074.3945	0.00032646	0.16927129	15,553	0.079%
T6 Instate Delivery Class 6	Electricity	0	0	0	0	0	0.012	0.02378147	3.58E-02	0	0.003	0.00832351	1.13E-02	0	0	0	11,308	0.057%
T6 Instate Delivery Class 6	Natural Gas	0.01245613	0.0617681	3.81329746	0	0.00200497	0.012	0.04756293	6.16E-02	0.0018435	0.003	0.01664703	2.15E-02	1008.32758	0.87178809	0.20555417	185	0.001%
T6 Instate Delivery Class 7	Diesel	0.00891629	0.75359111	0.07737455	0.01050559	0.00274781	0.012	0.04756293	6.23E-02	0.00262894	0.003	0.01664703	2.23E-02	1109.42469	0.00041414	0.17479031	7,751	0.039%
T6 Instate Delivery Class 7	Electricity	0	0	0	0	0	0.012	0.02378147	3.58E-02	0	0.003	0.00832351	1.13E-02	0	0	0	2,884	0.015%
T6 Instate Delivery Class 7	Natural Gas	0.01169549	0.14990201	3.61545415	0	0.00150483	0.012	0.04756293	6.11E-02	0.00138364	0.003	0.01664703	2.10E-02	1052.22305	0.81855168	0.21450255	184	0.001%
T6 Instate Other Class 4	Diesel	0.00715351	0.33473053	0.04801904	0.00978865	0.00391256	0.012	0.04486375	6.08E-02	0.0037433	0.003	0.01570231	2.24E-02	1033.714	0.00033226	0.16286206	12,297	0.062%
T6 Instate Other Class 4	Electricity	0	0	0	0	0	0.012	0.02243187	3.44E-02	0	0.003	0.00785116	1.09E-02	0	0	0	9,455	0.048%
T6 Instate Other Class 4	Natural Gas	0.00995506	0.05269097	2.6723457	0	0.00155244	0.012	0.04486375	5.84E-02	0.00142741	0.003	0.01570231	2.01E-02	880.549413	0.6967414	0.17950576	157	0.001%
T6 Instate Other Class 5	Diesel	0.00598033	0.30578835	0.04451414	0.00981862	0.00339031	0.012	0.04486375	6.03E-02	0.00324364	0.003	0.01570231	2.19E-02	1036.87895	0.00027777	0.1633607	31,601	0.160%
T6 Instate Other Class 5	Electricity	0	0	0	0	0	0.012	0.02243187	3.44E-02	0	0.003	0.00785116	1.09E-02	0	0	0	24,372	0.124%
T6 Instate Other Class 5	Natural Gas	0.00995004	0.05313238	2.67274905	0	0.00154981	0.012	0.04486375	5.84E-02	0.001425	0.003	0.01570231	2.01E-02	878.314683	0.69639003	0.17905019	390	0.002%
T6 Instate Other Class 6	Diesel	0.00623621	0.31652662	0.04538307	0.00980297	0.00350085	0.012	0.04486375	6.04E-02	0.00334941	0.003	0.01570231	2.21E-02	1035.22625	0.00028966	0.16310032	19,969	0.101%
T6 Instate Other Class 6	Electricity	0	0	0	0	0	0.012	0.02243187	3.44E-02	0	0.003	0.00785116	1.09E-02	0	0	0	15,374	0.078%
T6 Instate Other Class 6	Natural Gas	0.00994858	0.05326045	2.67286607	0	0.00154905	0.012	0.04486375	5.84E-02	0.00142429	0.003	0.01570231	2.01E-02	878.455658	0.69628808	0.17907893	248	0.001%
T6 Instate Other Class 7	Diesel	0.00812447	0.54525064	0.05715501	0.00993301	0.00441192	0.012	0.04486375	6.13E-02	0.00422106	0.003	0.01570231	2.29E-02	1048.95901	0.00037736	0.16526392	11,025	0.056%

T6 Instate Other Class 7	Electricity	0	0	0	0	0	0.012	0.02243187	3.44E-02	0	0.003	0.00785116	1.09E-02	0	0	0	5,744	0.029%
T6 Instate Other Class 7	Natural Gas	0.00933529	0.10882084	2.73823765	0	0.00123	0.012	0.04486375	5.81E-02	0.00113094	0.003	0.01570231	1.98E-02	903.086435	0.65336466	0.18410008	245	0.001%
T6 Instate Tractor Class 6	Diesel	0.00673036	0.28981446	0.04532752	0.00985221	0.00366586	0.012	0.04486375	6.05E-02	0.00350728	0.003	0.01570231	2.22E-02	1040.42582	0.00031261	0.16391951	376	0.002%
T6 Instate Tractor Class 6	Electricity	0	0	0	0	0	0.012	0.02243187	3.44E-02	0	0.003	0.00785116	1.09E-02	0	0	0	315	0.002%
T6 Instate Tractor Class 6	Natural Gas	0.00994384	0.0536772	2.67324689	0	0.00154656	0.012	0.04486375	5.84E-02	0.00142201	0.003	0.01570231	2.01E-02	877.139052	0.69595632	0.17881053	5	0.000%
T6 Instate Tractor Class 7	Diesel	0.00765668	0.59127735	0.05782909	0.00917782	0.00443371	0.012	0.04486375	6.13E-02	0.00424191	0.003	0.01570231	2.29E-02	969.208271	0.00035563	0.15269916	4,137	0.021%
T6 Instate Tractor Class 7	Electricity	0	0	0	0	0	0.012	0.02243187	3.44E-02	0	0.003	0.00785116	1.09E-02	0	0	0	733	0.004%
T6 Instate Tractor Class 7	Natural Gas	0.00934477	0.10728491	2.73057675	0	0.00123394	0.012	0.04486375	5.81E-02	0.00113456	0.003	0.01570231	1.98E-02	886.025433	0.65402818	0.18062208	80	0.000%
T6 OOS Class 4	Diesel	0.00602887	0.24395281	0.0288823	0.0090856	0.00598727	0.012	0.04231382	6.03E-02	0.00572827	0.003	0.01480984	2.35E-02	959.468946	0.00028003	0.15116472	94	0.000%
T6 OOS Class 5	Diesel	0.00558614	0.23682194	0.02779053	0.00909784	0.00577202	0.012	0.04231382	6.01E-02	0.00552233	0.003	0.01480984	2.33E-02	960.762343	0.00025946	0.1513685	129	0.001%
T6 OOS Class 6	Diesel	0.00562774	0.23050878	0.02780688	0.00904892	0.00576519	0.012	0.04231382	6.01E-02	0.00551579	0.003	0.01480984	2.33E-02	955.595447	0.00026139	0.15055445	338	0.002%
T6 OOS Class 7	Diesel	0.0056729	0.2358367	0.02909449	0.00820031	0.00592554	0.012	0.04231382	6.02E-02	0.0056692	0.003	0.01480984	2.35E-02	865.979778	0.00026349	0.13643547	2,459	0.012%
T6 Public Class 4	Diesel	0.02302736	1.16363448	0.0790161	0.01059514	0.00706104	0.012	0.04616939	6.52E-02	0.00675558	0.003	0.01615929	2.59E-02	1118.88149	0.00106956	0.17628023	784	0.004%
T6 Public Class 4	Electricity	0	0	0	0	0	0.012	0.0230847	3.51E-02	0	0.003	0.00807964	1.11E-02	0	0	0	459	0.002%
T6 Public Class 4	Natural Gas	0.01259505	0.0624283	3.05733314	0	0.00177402	0.012	0.04616939	5.99E-02	0.00163115	0.003	0.01615929	2.08E-02	989.210771	0.88151115	0.20165709	54	0.000%
T6 Public Class 5	Diesel	0.01743166	0.81685325	0.07147426	0.01058307	0.00510399	0.012	0.04616939	6.33E-02	0.0048832	0.003	0.01615929	2.40E-02	1117.60707	0.00080966	0.17607945	2,685	0.014%
T6 Public Class 5	Electricity	0	0	0	0	0	0.012	0.0230847	3.51E-02	0	0.003	0.00807964	1.11E-02	0	0	0	1,576	0.008%
T6 Public Class 5	Natural Gas	0.0124412	0.08787252	3.06913493	0	0.00165306	0.012	0.04616939	5.98E-02	0.00151993	0.003	0.01615929	2.07E-02	1003.27567	0.87074326	0.20452431	227	0.001%
T6 Public Class 6	Diesel	0.01910918	0.97474483	0.0728299	0.01055032	0.00594445	0.012	0.04616939	6.41E-02	0.00568729	0.003	0.01615929	2.48E-02	1114.14821	0.00088757	0.1755345	1,585	0.008%
T6 Public Class 6	Electricity	0	0	0	0	0	0.012	0.0230847	3.51E-02	0	0.003	0.00807964	1.11E-02	0	0	0	910	0.005%
T6 Public Class 6	Natural Gas	0.01254584	0.07060273	3.06245233	0	0.00173514	0.012	0.04616939	5.99E-02	0.0015954	0.003	0.01615929	2.08E-02	989.725046	0.87806669	0.20176193	112	0.001%
T6 Public Class 7	Diesel	0.01632499	0.85682853	0.06377335	0.01043953	0.00529261	0.012	0.04616939	6.35E-02	0.00506366	0.003	0.01615929	2.42E-02	1102.44841	0.00075825	0.1736912	4,501	0.023%
T6 Public Class 7	Electricity	0	0	0	0	0	0.012	0.0230847	3.51E-02	0	0.003	0.00807964	1.11E-02	0	0	0	2,333	0.012%
T6 Public Class 7	Natural Gas	0.01258407	0.06427951	3.05950544	0	0.00176521	0.012	0.04616939	5.99E-02	0.00162304	0.003	0.01615929	2.08E-02	996.552238	0.88074249	0.20315369	349	0.002%
T6 Utility Class 5	Diesel	0.00516336	0.20143095	0.03605799	0.00973195	0.0023529	0.012	0.0454967	5.98E-02	0.00225112	0.003	0.01592385	2.12E-02	1027.72607	0.00023982	0.16191866	175	0.001%
T6 Utility Class 5	Electricity	0	0	0	0	0	0.012	0.02274835	3.47E-02	0	0.003	0.00796192	1.10E-02	0	0	0	189	0.001%
T6 Utility Class 5	Natural Gas	0.01113687	0.05410456	2.74533962	0	0.0016363	0.012	0.0454967	5.91E-02	0.00150452	0.003	0.01592385	2.04E-02	916.208669	0.77945454	0.18677513	1	0.000%
T6 Utility Class 6	Diesel	0.0051625	0.1951802	0.03605199	0.00972862	0.00232369	0.012	0.0454967	5.98E-02	0.00222317	0.003	0.01592385	2.11E-02	1027.3747	0.00023978	0.1618633	33	0.000%
T6 Utility Class 6	Electricity	0	0	0	0	0	0.012	0.02274835	3.47E-02	0	0.003	0.00796192	1.10E-02	0	0	0	36	0.000%
T6 Utility Class 6	Natural Gas	0.01113687	0.05410456	2.74533962	0	0.0016363	0.012	0.0454967	5.91E-02	0.00150452	0.003	0.01592385	2.04E-02	916.355932	0.77945454	0.18680515	0	0.000%
T6 Utility Class 7	Diesel	0.00510715	0.19007141	0.03566546	0.00972543	0.00230936	0.012	0.0454967	5.98E-02	0.00220946	0.003	0.01592385	2.11E-02	1027.03692	0.00023721	0.16181009	44	0.000%
T6 Utility Class 7	Electricity	0	0	0	0	0	0.012	0.02274835	3.47E-02	0	0.003	0.00796192	1.10E-02	0	0	0	51	0.000%
T6 Utility Class 7	Natural Gas	0.01113687	0.05410456	2.74533962	0	0.0016363	0.012	0.0454967	5.91E-02	0.00150452	0.003	0.01592385	2.04E-02	916.412599	0.77945454	0.1868167	0	0.000%
T6TS	Gasoline	0.01262177	0.08210157	0.20555964	0.01543612	0.00149035	0.012	0.04501744	5.85E-02	0.00137032	0.003	0.0157561	2.01E-02	1561.40971	0.00322473	0.00728003	32,720	0.166%
T6TS	Electricity	0	0	0	0	0	0.012	0.02250872	3.45E-02	0	0.003	0.00787805	1.09E-02	0	0	0	26,746	0.136%
T7 CAIRP Class 8	Diesel	0.01150415	1.21651699	0.03903093	0.01216446	0.03017864	0.03600001	0.08158414	1.48E-01	0.02887313	0.009	0.02855445	6.64E-02	1284.60657	0.00053434	0.20239029	18,679	0.095%
T7 CAIRP Class 8	Electricity	0	0	0	0	0	0.03600001	0.04094388	7.69E-02	0	0.009	0.01433036	2.33E-02	0	0	0	5,008	0.025%
T7 CAIRP Class 8	Natural Gas	0.01336169	0.15337108	2.89316157	0	0.00196489	0.03600001	0.081554	1.20E-01	0.00180665	0.009	0.0285439	3.94E-02	1024.78338	0.93516719	0.2089088	34	0.000%
T7 NNOOS Class 8	Diesel	0.01117313	1.3319583	0.03796197	0.01165528	0.0295415	0.03600001	0.08160938	1.47E-01	0.02826355	0.009	0.02856328	6.58E-02	1230.83551	0.00051896	0.19391864	28,165	0.143%
T7 NOOS Class 8	Diesel	0.01151972	1.3693814	0.03906448	0.01164598	0.03127624	0.03600001	0.08161705	1.49E-01	0.02992324	0.009	0.02856597	6.75E-02	1229.85427	0.00053506	0.19376404	10,234	0.052%
T7 Other Port Class 8	Diesel	0.01001227	1.23108955	0.06334857	0.01302458	0.01648651	0.03600001	0.09400111	1.46E-01	0.01577331	0.009	0.03290039	5.77E-02	1375.43887	0.00046504	0.21670095	1,988	0.010%
T7 Other Port Class 8	Electricity	0	0	0	0	0	0.03600001	0.04707212	8.31E-02	0	0.009	0.01647524	2.55E-02	0	0	0	470	0.002%
T7 POAK Class 8	Diesel	0.01027911	1.2984531	0.06503691	0.01299459	0.0174648	0.03600001	0.09380232	1.47E-01	0.01670928	0.009	0.03283081	5.85E-02	1372.27115	0.00047744	0.21620188	6,410	0.033%
T7 POAK Class 8	Electricity	0	0	0	0	0	0.03600001	0.04706132	8.31E-02	0	0.009	0.01647146	2.55E-02	0	0	0	1,259	0.006%
T7 POAK Class 8	Natural Gas	0.0167608	0.17252782	4.97691357	0	0.00252429	0.03600001	0.09380232	1.32E-01	0.00232099	0.009	0.03283081	4.42E-02	1151.85156	1.17306642	0.23481248	14	0.000%
T7 Public Class 8	Diesel	0.03832255	2.79130452	0.16959946	0.01582657	0.01302325	0.03600001	0.10680577	1.56E-01	0.01245987	0.009	0.03738202	5.88E-02	1671.33765	0.00177998	0.26331993	10,722	0.054%
T7 Public Class 8	Electricity	0	0	0	0	0	0.03600001	0.05425694	9.03E-02	0	0.009	0.01898993	2.80E-02	0	0	0	4,716	0.024%
T7 Public Class 8	Natural Gas	0.02455703	0.31652779	8.33101697	0	0.00320577	0.03600001	0.10497811	1.44E-01	0.00294759	0.009	0.03674234	4.87E-02	1484.16534	1.71871365	0.30255681	80	0.000%
T7 Single Concrete/Transit Mix Class 8	Diesel	0.00872336	0.83069974	0.04438677	0.01386452	0.01414638	0.03600001	0.0881318	1.38E-01	0.01353441	0.009	0.03084613	5.34E-02	1464.13859	0.00040518	0.23067563	1,831	0.009%
T7 Single Concrete/Transit Mix Class 8	Electricity	0	0	0	0	0	0.03600001	0.04438002	8.04E-02	0	0.009	0.01553301	2.45E-02	0	0	0	2,011	0.010%
T7 Single Concrete/Transit Mix Class 8	Natural Gas	0.01524528	0.16574612	4.07094137	0	0.00225072	0.03600001	0.08812786	1.26E-01	0.00206945	0.009	0.03084475	4.19E-02	1127.04033	1.06699698	0.22975454	113	0.001%
T7 Single Dump Class 8	Diesel	0.01111939	1.18501995	0.06229165	0.01444519	0.01830659	0.03600001	0.08592572	1.40E-01	0.01751466	0.009	0.030074	5.66E-02	1525.46007	0.00051647	0.24033686	7,176	0.036%
T7 Single Dump Class 8	Electricity	0	0	0	0	0	0.03600001	0.04434463	8.03E-02	0	0.009	0.01552062	2.45E-02	0	0	0	4,280	0.022%
T7 Single Dump Class 8	Natural Gas	0.01522128	0.22136462	4.83168539	0	0.00212676	0.03600001	0.08606633	1.24E-01	0.00195547	0.009	0.03012321	4.11E-02	1166.85009	1.06531697	0.23787002	431	0.002%
T7 Single Other Class 8	Diesel	0.01155941	1.23537527	0.06467355	0.01456978	0.01910795	0.03600001	0.08509749	1.40E-01	0.01828135	0.009	0.02978412	5.71E-02	1538.61698	0.0005369	0.24240973	9,873	0.050%
T7 Single Other Class 8	Electricity	0	0	0	0	0	0.03600001	0.04435226	8.04E-02	0	0.009	0.01552329	2.45E-02	0	0	0	5,464	0.028%
T7 Single Other Class 8	Natural Gas	0.01521572	0.24053243	5.05812503	0	0.00208846	0.03600001	0.08485291	1.23E-01	0.00192026	0.009	0.02969852	4.06E-02	1179.48356	1.0649282	0.24044544	640	0.003%
T7 SWCV Class 8	Diesel	0.04285501	7.03211868	0.11551794	0.03815183	0.01142089	0.03600001	0.21000006	2.57E-01	0.01092683	0.009	0.07350002	9.34E-02	4028.95919	0.0019905	0.63476416	2,066	0.010%
T7 SWCV Class 8	Electricity	0	0	0	0	0	0.03600001	0.10500003	1.41E-01	0	0.009	0.03675001	4.58E-02	0	0	0	4,963	0.025%
T7 SWCV Class 8	Natural Gas	0.01971484	0.46430424	11.354172	0	0.00134594	0.03600001	0.21000006	2.47E-01	0.00123754	0.009	0.07350002	8.37E-02	1353.09566	0.8643645	0.2758374	10,259	0.052%
T7 Tractor Class 8	Diesel	0.01055562	1.22655584	0.05022589	0.01243295	0.02234185	0.03600001	0.08454952	1.43E-01	0.02137535	0.009	0.02959233	6.00E-02	1312.96086	0.00049028	0.20685752	17,252	0.088%
T7 Tractor Class 8	Electricity	0	0	0	0	0	0.03600001	0.04326145	7.93E-02	0	0.009	0.01514151	2.41E-02	0	0	0	2,940	0.015%
T7 Tractor Class 8	Natural Gas	0.01454457	0.21046573	4.41510178	0	0.0020506	0.03600001	0.08419169	1.22E-01	0.00188545	0.009	0.02946709	4.04E-02	1093.65615	1.01795508	0.22294896	1,556	0.008%
T7 Utility Class 8	Diesel	0.01138272	1.10896208	0.10632165	0.01496958	0.00733113	0.03600001	0.09974064	1.43E-01	0.00701398	0.009	0.03490922	5.09E-02	1580.83671	0.0005287	0.24906147	189	0.001%
T7 Utility Class 8	Electricity	0	0	0	0	0	0.03600001	0.05191179	8.79E-02	0	0.009	0.01816913	2.72E-02	0	0	0	100	0.001%
T7IS	Gasoline	0.47241493	2.63160568	31.7799214	0.01878825	0.00152359	0.02000001	0.09423691	1.16E-01	0.00140088	0.005	0.03298292	3.94E-02	1900.48717	0.10115389	0.11785006	135	0.001%
T7IS	Electricity	0	0	0	0	0	0.02000001	0.04849451	6.85E-02	0	0.005	0.01697308	2.20E-02	0	0	0	83	0.000%
UBUS	Gasoline	0.00345148	0.01665258	0.5797688	0.00840478	0.00130237	0.008	0.09100003	1.00E-01	0.00119748	0.002	0.03185001	3.50E-02	850.168129	0.00129465	0.00285104	4,001	0.020%
UBUS	Diesel	0.06718368	0.37172218	0.07641424	0.01112061	0.00706242	0.032096	0.11000003	1.49E-01	0.00675691	0.008024	0.03850001	5.33E-02	1173.6167	0.00312051	0.18490379	2,095	0.011%
UBUS	Electricity	0	0	0	0	0	0.03154412	0.05500002	8.65E-02	0	0.00788603	0.01925001	2.71E-02	0	0	0	28,184	0.143%
UBUS	Natural Gas	0.05992098	0.05757977	48.1350051	0	0.0002913	0.032096	0.11000003	1.42E-01	0.00027869	0.008024	0.03850001	4.68E-02	1286.07865	4.19378943	0.26217555	847	0.004%
																	19,698,386	100.000%

Source: EMFAC2021 (v1.0.2) Emission Rates
Region Type: County
Region: San Mateo
Calendar Year: 2040
Season: Annual
Vehicle Classification: EMFAC202x Categori
Units: miles/day for CVMT and EVMT, trips/

lbs/Mile 1.0E-06

Vehicle Category	Fuel	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM10_Total	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBW	PM2_5_Total	CO2(Pavley+AACC)_RUNEX	CH4_RUNEX	N2O_RUNEX	
All Other Buses	Diesel	2.942E-05	1.103E-03	1.792E-04	2.142E-05	8.038E-06	2.646E-05	1.017E-04	1.362E-04	7.691E-06	6.614E-06	3.560E-05	4.990E-05	2.262E+00	1.367E-06	3.563E-04	
All Other Buses	Natural Gas	2.680E-05	1.747E-04	7.536E-03	0.000E+00	3.813E-06	2.646E-05	1.017E-04	1.320E-04	3.506E-06	6.614E-06	3.560E-05	4.572E-05	1.982E+00	1.875E-03	4.041E-04	
LDA	Gasoline	6.285E-06	4.298E-05	9.488E-04	4.893E-06	1.208E-06	1.764E-05	1.502E-05	3.387E-05	1.111E-06	4.409E-06	5.257E-06	1.078E-05	4.949E-01	2.011E-06	6.446E-06	
LDA	Diesel	1.179E-05	5.498E-05	3.135E-04	3.872E-06	3.796E-06	1.764E-05	1.513E-05	3.657E-05	3.632E-06	4.409E-06	5.297E-06	1.334E-05	4.086E-01	5.478E-07	6.437E-05	
LDA	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.670E-06	2.731E-05	0.000E+00	4.409E-06	3.385E-06	7.794E-06	0.000E+00	0.000E+00	0.000E+00	
LDA	Plug-in Hybrid	2.506E-06	5.899E-06	3.708E-04	2.444E-06	5.053E-07	1.764E-05	8.626E-06	2.677E-05	4.646E-07	4.409E-06	3.019E-06	7.893E-06	2.472E-01	7.188E-07	8.838E-07	
LDT1	Gasoline	8.039E-06	5.200E-05	1.067E-03	5.691E-06	1.326E-06	1.764E-05	1.822E-05	3.719E-05	1.220E-06	4.409E-06	6.378E-06	1.201E-05	5.757E-01	2.421E-06	7.072E-06	
LDT1	Diesel	2.635E-05	5.865E-05	2.718E-04	7.032E-06	8.765E-06	1.764E-05	1.800E-05	4.440E-05	8.386E-06	4.409E-06	6.300E-06	1.909E-05	7.421E-01	1.224E-06	1.169E-04	
LDT1	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.676E-06	2.731E-05	0.000E+00	4.409E-06	3.387E-06	7.796E-06	0.000E+00	0.000E+00	0.000E+00	
LDT1	Plug-in Hybrid	2.478E-06	5.834E-06	3.667E-04	2.417E-06	4.469E-07	1.764E-05	8.642E-06	2.673E-05	4.109E-07	4.409E-06	3.025E-06	7.845E-06	2.444E-01	7.094E-07	8.701E-07	
LDT2	Gasoline	9.007E-06	5.276E-05	1.144E-03	5.895E-06	1.241E-06	1.764E-05	1.808E-05	3.695E-05	1.141E-06	4.409E-06	6.326E-06	1.188E-05	5.963E-01	2.751E-06	7.089E-06	
LDT2	Diesel	2.647E-05	6.000E-05	2.751E-04	5.236E-06	8.864E-06	1.764E-05	1.806E-05	4.456E-05	8.480E-06	4.409E-06	6.320E-06	1.921E-05	5.526E-01	1.230E-06	8.706E-05	
LDT2	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.681E-06	2.732E-05	0.000E+00	4.409E-06	3.388E-06	7.797E-06	0.000E+00	0.000E+00	0.000E+00	
LDT2	Plug-in Hybrid	2.491E-06	5.866E-06	3.686E-04	2.430E-06	4.747E-07	1.764E-05	8.643E-06	2.675E-05	4.364E-07	4.409E-06	3.025E-06	7.871E-06	2.458E-01	7.099E-07	8.667E-07	
LHD1	Gasoline	8.856E-06	4.172E-05	1.306E-03	1.641E-05	2.828E-06	1.764E-05	1.720E-04	1.924E-04	2.601E-06	4.409E-06	6.019E-05	6.720E-05	1.660E+00	2.515E-06	3.328E-06	
LHD1	Diesel	1.921E-04	5.677E-04	4.822E-04	1.258E-05	3.977E-05	2.646E-05	1.720E-04	2.382E-04	3.805E-05	6.614E-06	6.019E-05	1.048E-04	1.327E+00	8.921E-06	2.091E-04	
LHD1	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	8.598E-05	1.036E-04	0.000E+00	4.409E-06	3.009E-05	3.450E-05	0.000E+00	0.000E+00	0.000E+00	
LHD2	Gasoline	8.005E-06	4.935E-05	1.313E-03	1.847E-05	2.775E-06	1.764E-05	2.006E-04	2.210E-04	2.552E-06	4.409E-06	7.022E-05	7.718E-05	1.868E+00	2.326E-06	4.377E-06	
LHD2	Diesel	2.227E-04	6.803E-04	5.628E-04	1.464E-05	4.624E-05	2.646E-05	2.006E-04	2.733E-04	4.424E-05	6.614E-06	7.022E-05	1.211E-04	1.545E+00	1.034E-05	2.434E-04	
LHD2	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	1.003E-04	1.179E-04	0.000E+00	4.409E-06	3.511E-05	3.952E-05	0.000E+00	0.000E+00	0.000E+00	
MCY	Gasoline	1.649E-03	1.009E-03	2.063E-02	4.040E-06	4.729E-06	8.818E-06	2.646E-05	4.000E-05	4.409E-06	2.205E-06	9.259E-06	1.587E-05	4.086E-01	2.763E-04	7.646E-05	
MDV	Gasoline	9.307E-06	5.483E-05	1.168E-03	7.145E-06	1.251E-06	1.764E-05	1.830E-05	3.719E-05	1.151E-06	4.409E-06	6.405E-06	1.196E-05	7.227E-01	2.826E-06	7.245E-06	
MDV	Diesel	9.555E-06	2.118E-05	2.996E-04	6.832E-06	2.184E-06	1.764E-05	1.834E-05	3.816E-05	2.090E-06	4.409E-06	6.420E-06	1.292E-05	7.210E-01	4.438E-07	1.136E-04	
MDV	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E-05	9.692E-06	2.733E-05	0.000E+00	4.409E-06	3.392E-06	7.801E-06	0.000E+00	0.000E+00	0.000E+00	
MDV	Plug-in Hybrid	2.490E-06	5.862E-06	3.684E-04	2.428E-06	4.774E-07	1.764E-05	8.650E-06	2.676E-05	4.389E-07	4.409E-06	3.028E-06	7.876E-06	2.456E-01	7.118E-07	8.719E-07	
MH	Gasoline	2.575E-05	2.296E-04	3.526E-04	4.239E-05	3.287E-06	2.646E-05	9.925E-05	1.290E-04	3.023E-06	6.614E-06	3.474E-05	4.437E-05	4.288E+00	8.983E-06	2.726E-05	
MH	Diesel	1.735E-04	5.402E-03	4.991E-04	2.273E-05	4.350E-05	3.527E-05	9.873E-05	1.775E-04	4.162E-05	8.818E-06	3.456E-05	8.499E-05	2.399E+00	8.058E-06	3.780E-04	
Motor Coach	Diesel	2.350E-05	2.187E-03	8.383E-05	3.248E-05	5.382E-05	2.646E-05	1.780E-04	2.582E-04	5.150E-05	6.614E-06	6.229E-05	1.204E-04	3.429E+00	1.092E-06	5.403E-04	
OBUS	Gasoline	3.941E-05	2.622E-04	7.977E-04	3.367E-05	2.907E-06	2.646E-05	9.876E-05	1.281E-04	2.673E-06	6.614E-06	3.457E-05	4.385E-05	3.405E+00	9.144E-06	1.806E-05	
OBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.938E-05	7.584E-05	0.000E+00	6.614E-06	1.728E-05	2.390E-05	0.000E+00	0.000E+00	0.000E+00	
PTO	Diesel	3.741E-05	6.231E-03	4.560E-04	3.814E-05	1.000E-05	0.000E+00	0.000E+00	1.000E-05	9.567E-06	0.000E+00	0.000E+00	9.567E-06	4.027E+00	1.738E-06	6.345E-04	
PTO	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
SBUS	Gasoline	1.966E-05	1.941E-04	4.080E-04	1.565E-05	2.724E-06	1.764E-05	9.902E-05	1.194E-04	2.505E-06	4.409E-06	3.466E-05	4.157E-05	1.583E+00	4.509E-06	1.990E-05	
SBUS	Diesel	3.753E-05	1.653E-03	1.769E-04	2.224E-05	1.135E-05	2.646E-05	9.902E-05	1.368E-04	1.086E-05	6.614E-06	3.466E-05	5.213E-05	2.349E+00	1.743E-06	3.701E-04	
SBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.095E-05	4.951E-05	7.046E-05	0.000E+00	5.237E-06	1.733E-05	2.257E-05	0.000E+00	0.000E+00	0.000E+00	
SBUS	Natural Gas	8.869E-05	7.527E-04	1.924E-02	0.000E+00	8.100E-06	2.646E-05	9.902E-05	1.336E-04	7.448E-06	6.614E-06	3.466E-05	4.872E-05	2.535E+00	6.207E-03	5.167E-04	
T6 CAIRP Class 4	Diesel	1.246E-05	4.254E-04	6.299E-05	2.146E-05	1.246E-05	2.646E-05	9.329E-05	1.322E-04	1.192E-05	6.614E-06	3.265E-05	5.119E-05	2.266E+00	5.787E-07	3.570E-04	
T6 CAIRP Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.664E-05	7.310E-05	0.000E+00	6.614E-06	1.632E-05	2.294E-05	0.000E+00	0.000E+00	0.000E+00	
T6 CAIRP Class 5	Diesel	1.233E-05	4.291E-04	6.275E-05	2.148E-05	1.243E-05	2.646E-05	9.329E-05	1.322E-04	1.189E-05	6.614E-06	3.265E-05	5.115E-05	2.269E+00	5.725E-07	3.574E-04	
T6 CAIRP Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.664E-05	7.310E-05	0.000E+00	6.614E-06	1.632E-05	2.294E-05	0.000E+00	0.000E+00	0.000E+00	
T6 CAIRP Class 6	Diesel	1.222E-05	4.142E-04	6.221E-05	2.139E-05	1.230E-05	2.646E-05	9.329E-05	1.320E-04	1.177E-05	6.614E-06	3.265E-05	5.104E-05	2.259E+00	5.675E-07	3.559E-04	
T6 CAIRP Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.664E-05	7.310E-05	0.000E+00	6.614E-06	1.632E-05	2.294E-05	0.000E+00	0.000E+00	0.000E+00	
T6 CAIRP Class 7	Diesel	1.283E-05	4.476E-04	6.578E-05	1.888E-05	1.288E-05	2.646E-05	9.329E-05	1.326E-04	1.232E-05	6.614E-06	3.265E-05	5.158E-05	1.994E+00	5.959E-07	3.141E-04	
T6 CAIRP Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.664E-05	7.310E-05	0.000E+00	6.614E-06	1.632E-05	2.294E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Delivery Class 4	Diesel	1.986E-05	9.753E-04	1.385E-04	2.240E-05	6.768E-06	2.646E-05	1.049E-04	1.381E-04	6.475E-06	6.614E-06	3.670E-05	4.979E-05	2.366E+00	9.224E-07	3.727E-04	
T6 Instate Delivery Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.243E-05	7.888E-05	0.000E+00	6.614E-06	1.835E-05	2.496E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Delivery Class 4	Natural Gas	2.746E-05	1.358E-04	8.408E-03	0.000E+00	4.423E-06	2.646E-05	1.049E-04	1.357E-04	4.066E-06	6.614E-06	3.670E-05	4.738E-05	2.226E+00	1.922E-03	4.539E-04	
T6 Instate Delivery Class 5	Diesel	1.520E-05	9.169E-04	1.260E-04	2.247E-05	4.898E-06	2.646E-05	1.049E-04	1.362E-04	4.686E-06	6.614E-06	3.670E-05	4.800E-05	2.373E+00	7.058E-07	3.739E-04	
T6 Instate Delivery Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.243E-05	7.888E-05	0.000E+00	6.614E-06	1.835E-05	2.496E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Delivery Class 5	Natural Gas	2.745E-05	1.378E-04	8.403E-03	0.000E+00	4.411E-06	2.646E-05	1.049E-04	1.357E-04	4.056E-06	6.614E-06	3.670E-05	4.737E-05	2.221E+00	1.921E-03	4.528E-04	
T6 Instate Delivery Class 6	Diesel	1.550E-05	9.376E-04	1.276E-04	2.243E-05	5.066E-06	2.646E-05	1.049E-04	1.364E-04	4.847E-06	6.614E-06	3.670E-05	4.816E-05	2.369E+00	7.197E-07	3.732E-04	
T6 Instate Delivery Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.243E-05	7.888E-05	0.000E+00	6.614E-06	1.835E-05	2.496E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Delivery Class 6	Natural Gas	2.746E-05	1.362E-04	8.407E-03	0.000E+00	4.420E-06	2.646E-05	1.049E-04	1.357E-04	4.064E-06	6.614E-06	3.670E-05	4.738E-05	2.223E+00	1.922E-03	4.532E-04	
T6 Instate Delivery Class 7	Diesel	1.966E-05	1.661E-03	1.706E-04	2.316E-05	6.058E-06	2.646E-05	1.049E-04	1.374E-04	5.796E-06	6.614E-06	3.670E-05	4.911E-05	2.446E+00	9.130E-07	3.853E-04	
T6 Instate Delivery Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.243E-05	7.888E-05	0.000E+00	6.614E-06	1.835E-05	2.496E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Delivery Class 7	Natural Gas	2.578E-05	3.305E-04	7.971E-03	0.000E+00	3.318E-06	2.646E-05	1.049E-04	1.346E-04	3.050E-06	6.614E-06	3.670E-05	4.636E-05	2.320E+00	1.805E-03	4.729E-04	
T6 Instate Other Class 4	Diesel	1.577E-05	7.379E-04	1.059E-04	2.158E-05	8.626E-06	2.646E-05	9.891E-05	1.340E-04	8.252E-06	6.614E-06	3.462E-05	4.948E-05	2.279E+00	7.325E-07	3.590E-04	
T6 Instate Other Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.945E-05	7.591E-05	0.000E+00	6.614E-06	1.731E-05	2.392E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Other Class 4	Natural Gas	2.195E-05	1.162E-04	5.891E-03	0.000E+00	3.423E-06	2.646E-05	9.891E-05	1.288E-04	3.147E-06	6.614E-06	3.462E-05	4.438E-05	1.941E+00	1.536E-03	3.957E-04	
T6 Instate Other Class 5	Diesel	1.318E-05	6.741E-04	9.814E-05	2.165E-05	7.474E-06	2.646E-05	9.891E-05	1.328E-04	7.151E-06	6.614E-06	3.462E-05	4.838E-05	2.286E+00	6.124E-07	3.601E-04	
T6 Instate Other Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.945E-05	7.591E-05	0.000E+00	6.614E-06	1.731E-05	2.392E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Other Class 5	Natural Gas	2.194E-05	1.171E-04	5.892E-03	0.000E+00	3.417E-06	2.646E-05	9.891E-05	1.288E-04	3.142E-06	6.614E-06	3.462E-05	4.437E-05	1.936E+00	1.535E-03	3.947E-04	
T6 Instate Other Class 6	Diesel	1.375E-05	6.978E-04	1.001E-04	2.161E-05	7.718E-06	2.646E-05	9.891E-05	1.331E-04	7.384E-06	6.614E-06	3.462E-05	4.862E-05	2.282E+00	6.386E-07	3.596E-04	
T6 Instate Other Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.945E-05	7.591E-05	0.000E+00	6.614E-06	1.731E-05	2.392E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Other Class 6	Natural Gas	2.193E-05	1.174E-04	5.893E-03	0.000E+00	3.415E-06	2.646E-05	9.891E-05	1.288E-04	3.140E-06	6.614E-06	3.462E-05	4.437E-05	1.937E+00	1.535E-03	3.948E-04	
T6 Instate Other Class 7	Diesel	1.791E-05	1.202E-03	1.260E-04	2.190E-05	9.727E-06	2.646E-05	9.891E-05	1.351E-04	9.306E-06	6.614E-06	3.462E-05	5.054E-05	2.313E+00	8.319E-07	3.643E-04	

T6 Instate Other Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.945E-05	7.591E-05	0.000E+00	6.614E-06	1.731E-05	2.392E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Other Class 7	Natural Gas	2.058E-05	2.399E-04	6.037E-03	0.000E+00	2.712E-06	2.646E-05	9.891E-05	1.281E-04	2.493E-06	6.614E-06	3.462E-05	4.372E-05	1.991E+00	1.440E-03	4.059E-04	
T6 Instate Tractor Class 6	Diesel	1.484E-05	6.389E-04	9.993E-05	2.172E-05	8.082E-06	2.646E-05	9.891E-05	1.334E-04	7.732E-06	6.614E-06	3.462E-05	4.896E-05	2.294E+00	6.892E-07	3.614E-04	
T6 Instate Tractor Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.945E-05	7.591E-05	0.000E+00	6.614E-06	1.731E-05	2.392E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Tractor Class 6	Natural Gas	2.192E-05	1.183E-04	5.893E-03	0.000E+00	3.410E-06	2.646E-05	9.891E-05	1.288E-04	3.135E-06	6.614E-06	3.462E-05	4.437E-05	1.934E+00	1.534E-03	3.942E-04	
T6 Instate Tractor Class 7	Diesel	1.688E-05	1.304E-03	1.275E-04	2.023E-05	9.775E-06	2.646E-05	9.891E-05	1.351E-04	9.352E-06	6.614E-06	3.462E-05	5.058E-05	2.137E+00	7.840E-07	3.366E-04	
T6 Instate Tractor Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.945E-05	7.591E-05	0.000E+00	6.614E-06	1.731E-05	2.392E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Instate Tractor Class 7	Natural Gas	2.060E-05	2.365E-04	6.020E-03	0.000E+00	2.720E-06	2.646E-05	9.891E-05	1.281E-04	2.501E-06	6.614E-06	3.462E-05	4.373E-05	1.953E+00	1.442E-03	3.982E-04	
T6 OOS Class 4	Diesel	1.329E-05	5.378E-04	6.367E-05	2.003E-05	1.320E-05	2.646E-05	9.329E-05	1.329E-04	1.263E-05	6.614E-06	3.265E-05	5.189E-05	2.115E+00	6.173E-07	3.333E-04	
T6 OOS Class 5	Diesel	1.232E-05	5.221E-04	6.127E-05	2.006E-05	1.273E-05	2.646E-05	9.329E-05	1.325E-04	1.217E-05	6.614E-06	3.265E-05	5.144E-05	2.118E+00	5.720E-07	3.337E-04	
T6 OOS Class 6	Diesel	1.241E-05	5.082E-04	6.130E-05	1.995E-05	1.271E-05	2.646E-05	9.329E-05	1.325E-04	1.216E-05	6.614E-06	3.265E-05	5.142E-05	2.107E+00	5.763E-07	3.319E-04	
T6 OOS Class 7	Diesel	1.251E-05	5.199E-04	6.414E-05	1.808E-05	1.306E-05	2.646E-05	9.329E-05	1.328E-04	1.250E-05	6.614E-06	3.265E-05	5.176E-05	1.909E+00	5.809E-07	3.008E-04	
T6 Public Class 4	Diesel	5.077E-05	2.565E-03	1.742E-04	2.336E-05	1.557E-05	2.646E-05	1.018E-04	1.438E-04	1.489E-05	6.614E-06	3.562E-05	5.713E-05	2.467E+00	2.358E-06	3.886E-04	
T6 Public Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.089E-05	7.735E-05	0.000E+00	6.614E-06	1.781E-05	2.443E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Public Class 4	Natural Gas	2.777E-05	1.376E-04	6.740E-03	0.000E+00	3.911E-06	2.646E-05	1.018E-04	1.322E-04	3.596E-06	6.614E-06	3.562E-05	4.583E-05	2.181E+00	1.943E-03	4.446E-04	
T6 Public Class 5	Diesel	3.843E-05	1.801E-03	1.576E-04	2.333E-05	1.125E-05	2.646E-05	1.018E-04	1.395E-04	1.077E-05	6.614E-06	3.562E-05	5.300E-05	2.464E+00	1.785E-06	3.882E-04	
T6 Public Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.089E-05	7.735E-05	0.000E+00	6.614E-06	1.781E-05	2.443E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Public Class 5	Natural Gas	2.743E-05	1.937E-04	6.766E-03	0.000E+00	3.644E-06	2.646E-05	1.018E-04	1.319E-04	3.351E-06	6.614E-06	3.562E-05	4.559E-05	2.212E+00	1.920E-03	4.509E-04	
T6 Public Class 6	Diesel	4.213E-05	2.149E-03	1.606E-04	2.326E-05	1.311E-05	2.646E-05	1.018E-04	1.413E-04	1.254E-05	6.614E-06	3.562E-05	5.478E-05	2.456E+00	1.957E-06	3.870E-04	
T6 Public Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.089E-05	7.735E-05	0.000E+00	6.614E-06	1.781E-05	2.443E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Public Class 6	Natural Gas	2.766E-05	1.557E-04	6.751E-03	0.000E+00	3.825E-06	2.646E-05	1.018E-04	1.321E-04	3.517E-06	6.614E-06	3.562E-05	4.576E-05	2.182E+00	1.936E-03	4.448E-04	
T6 Public Class 7	Diesel	3.599E-05	1.889E-03	1.406E-04	2.301E-05	1.167E-05	2.646E-05	1.018E-04	1.399E-04	1.116E-05	6.614E-06	3.562E-05	5.340E-05	2.430E+00	1.672E-06	3.829E-04	
T6 Public Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.089E-05	7.735E-05	0.000E+00	6.614E-06	1.781E-05	2.443E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Public Class 7	Natural Gas	2.774E-05	1.417E-04	6.745E-03	0.000E+00	3.892E-06	2.646E-05	1.018E-04	1.321E-04	3.578E-06	6.614E-06	3.562E-05	4.582E-05	2.197E+00	1.942E-03	4.479E-04	
T6 Utility Class 5	Diesel	1.138E-05	4.441E-04	7.949E-05	2.146E-05	5.187E-06	2.646E-05	1.003E-04	1.319E-04	4.963E-06	6.614E-06	3.511E-05	4.668E-05	2.266E+00	5.287E-07	3.570E-04	
T6 Utility Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.015E-05	7.661E-05	0.000E+00	6.614E-06	1.755E-05	2.417E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Utility Class 5	Natural Gas	2.455E-05	1.193E-04	6.052E-03	0.000E+00	3.607E-06	2.646E-05	1.003E-04	1.304E-04	3.317E-06	6.614E-06	3.511E-05	4.504E-05	2.020E+00	1.718E-03	4.118E-04	
T6 Utility Class 6	Diesel	1.138E-05	4.303E-04	7.948E-05	2.145E-05	5.123E-06	2.646E-05	1.003E-04	1.319E-04	4.901E-06	6.614E-06	3.511E-05	4.662E-05	2.265E+00	5.286E-07	3.568E-04	
T6 Utility Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.015E-05	7.661E-05	0.000E+00	6.614E-06	1.755E-05	2.417E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Utility Class 6	Natural Gas	2.455E-05	1.193E-04	6.052E-03	0.000E+00	3.607E-06	2.646E-05	1.003E-04	1.304E-04	3.317E-06	6.614E-06	3.511E-05	4.504E-05	2.020E+00	1.718E-03	4.118E-04	
T6 Utility Class 7	Diesel	1.126E-05	4.190E-04	7.863E-05	2.144E-05	5.091E-06	2.646E-05	1.003E-04	1.318E-04	4.871E-06	6.614E-06	3.511E-05	4.659E-05	2.264E+00	5.230E-07	3.567E-04	
T6 Utility Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	5.015E-05	7.661E-05	0.000E+00	6.614E-06	1.755E-05	2.417E-05	0.000E+00	0.000E+00	0.000E+00	
T6 Utility Class 7	Natural Gas	2.455E-05	1.193E-04	6.052E-03	0.000E+00	3.607E-06	2.646E-05	1.003E-04	1.304E-04	3.317E-06	6.614E-06	3.511E-05	4.504E-05	2.020E+00	1.718E-03	4.119E-04	
T6TS	Gasoline	2.783E-05	1.810E-04	4.532E-04	3.403E-05	3.286E-06	2.646E-05	9.925E-05	1.290E-04	3.021E-06	6.614E-06	3.474E-05	4.437E-05	3.442E+00	7.109E-06	1.605E-05	
T6TS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.646E-05	4.962E-05	7.608E-05	0.000E+00	6.614E-06	1.737E-05	2.398E-05	0.000E+00	0.000E+00	0.000E+00	
T7 CAIRP Class 8	Diesel	2.536E-05	2.682E-03	8.605E-05	2.682E-05	6.653E-05	7.937E-05	1.799E-04	3.258E-04	6.365E-05	1.984E-05	6.295E-05	1.464E-04	2.832E+00	1.178E-06	4.462E-04	
T7 CAIRP Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	9.026E-05	1.696E-04	0.000E+00	1.984E-05	3.159E-05	5.143E-05	0.000E+00	0.000E+00	0.000E+00	
T7 CAIRP Class 8	Natural Gas	2.946E-05	3.381E-04	6.378E-03	0.000E+00	4.332E-06	7.937E-05	1.798E-04	2.635E-04	3.983E-06	1.984E-05	6.293E-05	8.675E-05	2.259E+00	2.062E-03	4.606E-04	
T7 NNOOS Class 8	Diesel	2.463E-05	2.936E-03	8.369E-05	2.570E-05	6.513E-05	7.937E-05	1.799E-04	3.244E-04	6.231E-05	1.984E-05	6.297E-05	1.451E-04	2.713E+00	1.144E-06	4.275E-04	
T7 NOOS Class 8	Diesel	2.540E-05	3.019E-03	8.612E-05	2.567E-05	6.895E-05	7.937E-05	1.799E-04	3.283E-04	6.597E-05	1.984E-05	6.298E-05	1.488E-04	2.711E+00	1.180E-06	4.272E-04	
T7 Other Port Class 8	Diesel	2.207E-05	2.714E-03	1.397E-04	2.871E-05	3.635E-05	7.937E-05	2.072E-04	3.229E-04	3.477E-05	1.984E-05	7.253E-05	1.271E-04	3.032E+00	1.025E-06	4.777E-04	
T7 Other Port Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	1.038E-04	1.831E-04	0.000E+00	1.984E-05	3.632E-05	5.616E-05	0.000E+00	0.000E+00	0.000E+00	
T7 POAK Class 8	Diesel	2.266E-05	2.863E-03	1.434E-04	2.865E-05	3.850E-05	7.937E-05	2.068E-04	3.247E-04	3.684E-05	1.984E-05	7.238E-05	1.291E-04	3.025E+00	1.053E-06	4.766E-04	
T7 POAK Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	1.038E-04	1.831E-04	0.000E+00	1.984E-05	3.631E-05	5.615E-05	0.000E+00	0.000E+00	0.000E+00	
T7 POAK Class 8	Natural Gas	3.695E-05	3.804E-04	1.097E-02	0.000E+00	5.565E-06	7.937E-05	2.068E-04	2.917E-04	5.117E-06	1.984E-05	7.238E-05	9.734E-05	2.539E+00	2.586E-03	5.177E-04	
T7 Public Class 8	Diesel	8.449E-05	6.154E-03	3.739E-04	3.489E-05	2.871E-05	7.937E-05	2.355E-04	3.435E-04	2.747E-05	1.984E-05	8.241E-05	1.297E-04	3.685E+00	3.924E-06	5.805E-04	
T7 Public Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	1.196E-04	1.990E-04	0.000E+00	1.984E-05	4.187E-05	6.171E-05	0.000E+00	0.000E+00	0.000E+00	
T7 Public Class 8	Natural Gas	5.414E-05	6.978E-04	1.837E-02	0.000E+00	7.067E-06	7.937E-05	2.314E-04	3.179E-04	6.498E-06	1.984E-05	8.100E-05	1.073E-04	3.272E+00	3.789E-03	6.670E-04	
T7 Single Concrete/Transit Mix Class 8	Diesel	1.923E-05	1.831E-03	9.786E-05	3.057E-05	3.119E-05	7.937E-05	1.943E-04	3.048E-04	2.984E-05	1.984E-05	6.800E-05	1.177E-04	3.228E+00	8.933E-07	5.085E-04	
T7 Single Concrete/Transit Mix Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	9.784E-05	1.772E-04	0.000E+00	1.984E-05	3.424E-05	5.409E-05	0.000E+00	0.000E+00	0.000E+00	
T7 Single Concrete/Transit Mix Class 8	Natural Gas	3.361E-05	3.654E-04	8.975E-03	0.000E+00	4.962E-06	7.937E-05	1.943E-04	2.786E-04	4.562E-06	1.984E-05	6.800E-05	9.240E-05	2.485E+00	2.352E-03	5.065E-04	
T7 Single Dump Class 8	Diesel	2.451E-05	2.612E-03	1.373E-04	3.185E-05	4.036E-05	7.937E-05	1.894E-04	3.092E-04	3.861E-05	1.984E-05	6.630E-05	1.248E-04	3.363E+00	1.139E-06	5.298E-04	
T7 Single Dump Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	9.776E-05	1.771E-04	0.000E+00	1.984E-05	3.422E-05	5.406E-05	0.000E+00	0.000E+00	0.000E+00	
T7 Single Dump Class 8	Natural Gas	3.356E-05	4.880E-04	1.065E-02	0.000E+00	4.689E-06	7.937E-05	1.897E-04	2.738E-04	4.311E-06	1.984E-05	6.641E-05	9.056E-05	2.572E+00	2.349E-03	5.244E-04	
T7 Single Other Class 8	Diesel	2.548E-05	2.724E-03	1.426E-04	3.212E-05	4.213E-05	7.937E-05	1.876E-04	3.091E-04	4.030E-05	1.984E-05	6.566E-05	1.258E-04	3.392E+00	1.184E-06	5.344E-04	
T7 Single Other Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	9.778E-05	1.771E-04	0.000E+00	1.984E-05	3.422E-05	5.406E-05	0.000E+00	0.000E+00	0.000E+00	
T7 Single Other Class 8	Natural Gas	3.354E-05	5.303E-04	1.115E-02	0.000E+00	4.604E-06	7.937E-05	1.871E-04	2.710E-04	4.233E-06	1.984E-05	6.547E-05	8.955E-05	2.600E+00	2.348E-03	5.301E-04	
T7 SWCV Class 8	Diesel	9.448E-05	1.550E-02	2.547E-04	8.411E-05	2.518E-05	7.937E-05	4.630E-04	5.675E-04	2.409E-05	1.984E-05	1.620E-04	2.060E-04	8.882E+00	4.388E-06	1.399E-03	
T7 SWCV Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	2.315E-04	3.108E-04	0.000E+00	1.984E-05	8.102E-05	1.009E-04	0.000E+00	0.000E+00	0.000E+00	
T7 SWCV Class 8	Natural Gas	4.346E-05	1.024E-03	2.503E-02	0.000E+00	2.967E-06	7.937E-05	4.630E-04	5.453E-04	2.728E-06	1.984E-05	1.620E-04	1.846E-04	2.983E+00	1.906E-03	6.081E-04	
T7 Tractor Class 8	Diesel	2.327E-05	2.704E-03	1.107E-04	2.741E-05	4.925E-05	7.937E-05	1.864E-04	3.150E-04	4.712E-05	1.984E-05	6.524E-05	1.322E-04	2.895E+00	1.081E-06	4.560E-04	
T7 Tractor Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	9.537E-05	1.747E-04	0.000E+00	1.984E-05	3.338E-05	5.322E-05	0.000E+00	0.000E+00	0.000E+00	
T7 Tractor Class 8	Natural Gas	3.206E-05	4.640E-04	9.734E-03	0.000E+00	4.521E-06	7.937E-05	1.856E-04	2.695E-04	4.157E-06	1.984E-05	6.496E-05	8.896E-05	2.411E+00	2.244E-03	4.915E-04	
T7 Utility Class 8	Diesel	2.509E-05	2.445E-03	2.344E-04	3.300E-05	1.616E-05	7.937E-05	2.199E-04	3.154E-04	1.546E-05	1.984E-05	7.696E-05	1.123E-04	3.485E+00	1.166E-06	5.491E-04	
T7 Utility Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.937E-05	1.144E-04	1.938E-04	0.000E+00	1.984E-05	4.006E-05	5.990E-05	0.000E+00	0.000E+00	0.000E+00	
T7IS	Gasoline	1.041E-03	5.802E-03	7.006E-02	4.142E-05	3.359E-06	4.409E-05	2.078E-04	2.552E-04	3.088E-06	1.102E-05	7.271E-05	8.683E-05	4.190E+00	2.230E-04	2.598E-04	
T7IS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.409E-05	1.069E-04	1.510E-04	0.000E+00	1.102E-05	3.742E-05	4.844E-05	0.000E+00	0.000E+00	0.000E+00	
UBUS	Gasoline	7.609E-06	3.671E-05	1.278E-03	1.853E-05	2.871E-06	1.764E-05	2.006E-04	2.211E-04	2.640E-06	4.409E-06	7.022E-05	7.727E-05	1.874E+00	2.854E-06	6.285E-06	
UBUS	Diesel	1.481E-04	8.195E-04	1.685E-04	2.452E-05	1.557E-05	7.076E-05	2.425E-04	3.288E-04	1.490E-05	1.769E-05	8.488E-05	1.175E-04	2.587E+00	6.879E-06	4.076E-04	
UBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.954E-05	1.213E-04	1.908E-04	0.000E+00	1.739E-05	4.244E-05	5.982E-05	0.000E+00	0.000E+00	0.000E+00	
UBUS	Natural Gas	1.321E-04	1.269E-04	1.061E-01	0.000E+00	6.422E-07	7.076E-05	2.425E-04	3.139E-04	6.144E-07	1.769E-05	8.488E-05	1.032E-04	2.835E+00	9.246E-03	5.780E-04	

Source: EMFAC2021 (v1.0.2) Emission Rates
Region Type: County
Region: San Mateo
Calendar Year: 2040
Season: Annual
Vehicle Classification: EMFAC202x Categori
Units: miles/day for CVMT and EVMT, trips/

		MTons/Mile														
Vehicle Category	Fuel	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM10_Total	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBW	PM2_5_Total	CO2(Pavley+AACC)_RUNEX	CH4_RUNEX	N2O_RUNEX
All Other Buses	Diesel	1.335E-08	5.002E-07	8.128E-08	9.714E-09	3.646E-09	1.200E-08	4.614E-08	6.178E-08	3.488E-09	3.000E-09	1.615E-08	2.264E-08	1.026E-03	6.199E-10	1.616E-07
All Other Buses	Natural Gas	1.215E-08	7.923E-08	3.418E-06	0.000E+00	1.730E-09	1.200E-08	4.614E-08	5.987E-08	1.590E-09	3.000E-09	1.615E-08	2.074E-08	8.992E-04	8.507E-07	1.833E-07
LDA	Gasoline	2.851E-09	1.950E-08	4.304E-07	2.219E-09	5.479E-10	8.000E-09	6.813E-09	1.536E-08	5.038E-10	2.000E-09	2.385E-09	4.888E-09	2.245E-04	9.123E-10	2.924E-09
LDA	Diesel	5.349E-09	2.494E-08	1.422E-07	1.756E-09	1.722E-09	8.000E-09	6.865E-09	1.659E-08	1.647E-09	2.000E-09	2.403E-09	6.050E-09	1.853E-04	2.485E-10	2.920E-08
LDA	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.386E-09	1.239E-08	0.000E+00	2.000E-09	1.535E-09	3.535E-09	0.000E+00	0.000E+00	0.000E+00
LDA	Plug-in Hybrid	1.137E-09	2.676E-09	1.682E-07	1.108E-09	2.292E-10	8.000E-09	3.913E-09	1.214E-08	2.107E-10	2.000E-09	1.369E-09	3.580E-09	1.121E-04	3.261E-10	4.009E-10
LDT1	Gasoline	3.646E-09	2.359E-08	4.840E-07	2.581E-09	6.017E-10	8.000E-09	8.266E-09	1.687E-08	5.532E-10	2.000E-09	2.893E-09	5.446E-09	2.611E-04	1.098E-09	3.208E-09
LDT1	Diesel	1.195E-08	2.660E-08	1.233E-07	3.190E-09	3.976E-09	8.000E-09	8.164E-09	2.014E-08	3.804E-09	2.000E-09	2.858E-09	8.661E-09	3.366E-04	5.552E-10	5.304E-08
LDT1	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.389E-09	1.239E-08	0.000E+00	2.000E-09	1.536E-09	3.536E-09	0.000E+00	0.000E+00	0.000E+00
LDT1	Plug-in Hybrid	1.124E-09	2.646E-09	1.663E-07	1.096E-09	2.027E-10	8.000E-09	3.920E-09	1.212E-08	1.864E-10	2.000E-09	1.372E-09	3.558E-09	1.109E-04	3.218E-10	3.947E-10
LDT2	Gasoline	4.086E-09	2.393E-08	5.189E-07	2.674E-09	5.628E-10	8.000E-09	8.199E-09	1.676E-08	5.174E-10	2.000E-09	2.870E-09	5.387E-09	2.705E-04	1.248E-09	3.215E-09
LDT2	Diesel	1.201E-08	2.721E-08	1.248E-07	2.375E-09	4.021E-09	8.000E-09	8.190E-09	2.021E-08	3.847E-09	2.000E-09	2.867E-09	8.713E-09	2.507E-04	5.578E-10	3.949E-08
LDT2	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.391E-09	1.239E-08	0.000E+00	2.000E-09	1.537E-09	3.537E-09	0.000E+00	0.000E+00	0.000E+00
LDT2	Plug-in Hybrid	1.130E-09	2.661E-09	1.672E-07	1.102E-09	2.153E-10	8.000E-09	3.920E-09	1.214E-08	1.980E-10	2.000E-09	1.372E-09	3.570E-09	1.115E-04	3.220E-10	3.931E-10
LHD1	Gasoline	4.017E-09	1.892E-08	5.925E-07	7.443E-09	1.283E-09	8.000E-09	7.800E-08	8.728E-08	1.180E-09	2.000E-09	2.730E-08	3.048E-08	7.529E-04	1.141E-09	1.510E-09
LHD1	Diesel	8.712E-08	2.575E-07	2.187E-07	5.705E-09	1.804E-08	1.200E-08	7.800E-08	1.080E-07	1.726E-08	3.000E-09	2.730E-08	4.756E-08	6.021E-04	4.046E-09	9.487E-08
LHD1	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	3.900E-08	4.700E-08	0.000E+00	2.000E-09	1.365E-08	1.565E-08	0.000E+00	0.000E+00	0.000E+00
LHD2	Gasoline	3.631E-09	2.239E-08	5.956E-07	8.378E-09	1.259E-09	8.000E-09	9.100E-08	1.003E-07	1.158E-09	2.000E-09	3.185E-08	3.501E-08	8.475E-04	1.055E-09	1.985E-09
LHD2	Diesel	1.010E-07	3.086E-07	2.553E-07	6.641E-09	2.098E-08	1.200E-08	9.100E-08	1.240E-07	2.007E-08	3.000E-09	3.185E-08	5.492E-08	7.008E-04	4.692E-09	1.104E-07
LHD2	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.550E-08	5.350E-08	0.000E+00	2.000E-09	1.593E-08	1.793E-08	0.000E+00	0.000E+00	0.000E+00
MCY	Gasoline	7.480E-07	4.579E-07	9.359E-06	1.832E-09	2.145E-09	4.000E-09	1.200E-08	1.814E-08	2.000E-09	1.000E-09	4.200E-09	7.200E-09	1.853E-04	1.253E-07	3.468E-08
MDV	Gasoline	4.221E-09	2.487E-08	5.299E-07	3.241E-09	5.676E-10	8.000E-09	8.301E-09	1.687E-08	5.219E-10	2.000E-09	2.905E-09	5.427E-09	3.278E-04	1.282E-09	3.286E-09
MDV	Diesel	4.334E-09	9.607E-09	1.359E-07	3.099E-09	9.908E-10	8.000E-09	8.320E-09	1.731E-08	9.479E-10	2.000E-09	2.912E-09	5.860E-09	3.271E-04	2.013E-10	5.153E-08
MDV	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.000E-09	4.396E-09	1.240E-08	0.000E+00	2.000E-09	1.539E-09	3.539E-09	0.000E+00	0.000E+00	0.000E+00
MDV	Plug-in Hybrid	1.129E-09	2.659E-09	1.671E-07	1.101E-09	2.165E-10	8.000E-09	3.924E-09	1.214E-08	1.991E-10	2.000E-09	1.373E-09	3.572E-09	1.114E-04	3.229E-10	3.955E-10
MH	Gasoline	1.168E-08	1.041E-07	1.600E-07	1.923E-08	1.491E-09	1.200E-08	4.502E-08	5.851E-08	1.371E-09	3.000E-09	1.576E-08	2.013E-08	1.945E-03	4.075E-09	1.236E-08
MH	Diesel	7.869E-08	2.450E-06	2.264E-07	1.031E-08	1.973E-08	1.600E-08	4.479E-08	8.052E-08	1.888E-08	4.000E-09	1.567E-08	3.855E-08	1.088E-03	3.655E-09	1.715E-07
Motor Coach	Diesel	1.066E-08	9.920E-07	3.803E-08	1.473E-08	2.441E-08	1.200E-08	8.072E-08	1.171E-07	2.336E-08	3.000E-09	2.825E-08	5.461E-08	1.556E-03	4.951E-10	2.451E-07
OBUS	Gasoline	1.788E-08	1.189E-07	3.618E-07	1.527E-08	1.319E-09	1.200E-08	4.480E-08	5.812E-08	1.213E-09	3.000E-09	1.568E-08	1.989E-08	1.545E-03	4.148E-09	8.192E-09
OBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.240E-08	3.440E-08	0.000E+00	3.000E-09	7.840E-09	1.084E-08	0.000E+00	0.000E+00	0.000E+00
PTO	Diesel	1.697E-08	2.826E-06	2.069E-07	1.730E-08	4.536E-09	0.000E+00	0.000E+00	4.536E-09	4.340E-09	0.000E+00	0.000E+00	4.340E-09	1.827E-03	7.882E-10	2.878E-07
PTO	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SBUS	Gasoline	8.916E-09	8.805E-08	1.850E-07	7.099E-09	1.236E-09	8.000E-09	4.492E-08	5.415E-08	1.136E-09	2.000E-09	1.572E-08	1.886E-08	7.180E-04	2.045E-09	9.026E-09
SBUS	Diesel	1.702E-08	7.496E-07	8.026E-08	1.009E-08	5.150E-09	1.200E-08	4.492E-08	6.207E-08	4.927E-09	3.000E-09	1.572E-08	2.365E-08	1.065E-03	7.906E-10	1.679E-07
SBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.502E-09	2.246E-08	3.196E-08	0.000E+00	2.376E-09	7.860E-09	1.024E-08	0.000E+00	0.000E+00	0.000E+00
SBUS	Natural Gas	4.023E-08	3.414E-07	8.726E-06	0.000E+00	3.674E-09	1.200E-08	4.492E-08	6.059E-08	3.378E-09	3.000E-09	1.572E-08	2.210E-08	1.150E-03	2.816E-06	2.344E-07
T6 CAIRP Class 4	Diesel	5.652E-09	1.930E-07	2.857E-08	9.733E-09	5.654E-09	1.200E-08	4.231E-08	5.997E-08	5.409E-09	3.000E-09	1.481E-08	2.322E-08	1.028E-03	2.625E-10	1.619E-07
T6 CAIRP Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.116E-08	3.316E-08	0.000E+00	3.000E-09	7.405E-09	1.040E-08	0.000E+00	0.000E+00	0.000E+00
T6 CAIRP Class 5	Diesel	5.591E-09	1.946E-07	2.847E-08	9.744E-09	5.637E-09	1.200E-08	4.231E-08	5.995E-08	5.393E-09	3.000E-09	1.481E-08	2.320E-08	1.029E-03	2.597E-10	1.621E-07
T6 CAIRP Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.116E-08	3.316E-08	0.000E+00	3.000E-09	7.405E-09	1.040E-08	0.000E+00	0.000E+00	0.000E+00
T6 CAIRP Class 6	Diesel	5.542E-09	1.879E-07	2.822E-08	9.704E-09	5.581E-09	1.200E-08	4.231E-08	5.990E-08	5.340E-09	3.000E-09	1.481E-08	2.315E-08	1.025E-03	2.574E-10	1.615E-07
T6 CAIRP Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.116E-08	3.316E-08	0.000E+00	3.000E-09	7.405E-09	1.040E-08	0.000E+00	0.000E+00	0.000E+00
T6 CAIRP Class 7	Diesel	5.820E-09	2.030E-07	2.984E-08	8.565E-09	5.840E-09	1.200E-08	4.231E-08	6.015E-08	5.588E-09	3.000E-09	1.481E-08	2.340E-08	9.044E-04	2.703E-10	1.425E-07
T6 CAIRP Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.116E-08	3.316E-08	0.000E+00	3.000E-09	7.405E-09	1.040E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Delivery Class 4	Diesel	9.008E-09	4.424E-07	6.282E-08	1.016E-08	3.070E-09	1.200E-08	4.756E-08	6.263E-08	2.937E-09	3.000E-09	1.665E-08	2.258E-08	1.073E-03	4.184E-10	1.691E-07
T6 Instate Delivery Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.378E-08	3.578E-08	0.000E+00	3.000E-09	8.324E-09	1.132E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Delivery Class 4	Natural Gas	1.246E-08	6.158E-08	3.814E-06	0.000E+00	2.006E-09	1.200E-08	4.756E-08	6.157E-08	1.845E-09	3.000E-09	1.665E-08	2.149E-08	1.010E-03	8.719E-07	2.059E-07
T6 Instate Delivery Class 5	Diesel	6.893E-09	4.159E-07	5.717E-08	1.019E-08	2.222E-09	1.200E-08	4.756E-08	6.178E-08	2.126E-09	3.000E-09	1.665E-08	2.177E-08	1.076E-03	3.202E-10	1.696E-07
T6 Instate Delivery Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.378E-08	3.578E-08	0.000E+00	3.000E-09	8.324E-09	1.132E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Delivery Class 5	Natural Gas	1.245E-08	6.249E-08	3.812E-06	0.000E+00	2.001E-09	1.200E-08	4.756E-08	6.156E-08	1.840E-09	3.000E-09	1.665E-08	2.149E-08	1.007E-03	8.713E-07	2.054E-07
T6 Instate Delivery Class 6	Diesel	7.029E-09	4.253E-07	5.790E-08	1.017E-08	2.298E-09	1.200E-08	4.756E-08	6.186E-08	2.199E-09	3.000E-09	1.665E-08	2.185E-08	1.074E-03	3.265E-10	1.693E-07
T6 Instate Delivery Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.378E-08	3.578E-08	0.000E+00	3.000E-09	8.324E-09	1.132E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Delivery Class 6	Natural Gas	1.246E-08	6.177E-08	3.813E-06	0.000E+00	2.005E-09	1.200E-08	4.756E-08	6.157E-08	1.843E-09	3.000E-09	1.665E-08	2.149E-08	1.008E-03	8.718E-07	2.056E-07
T6 Instate Delivery Class 7	Diesel	8.916E-09	7.536E-07	7.737E-08	1.051E-08	2.748E-09	1.200E-08	4.756E-08	6.231E-08	2.629E-09	3.000E-09	1.665E-08	2.228E-08	1.109E-03	4.141E-10	1.748E-07
T6 Instate Delivery Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.378E-08	3.578E-08	0.000E+00	3.000E-09	8.324E-09	1.132E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Delivery Class 7	Natural Gas	1.170E-08	1.499E-07	3.615E-06	0.000E+00	1.505E-09	1.200E-08	4.756E-08	6.107E-08	1.384E-09	3.000E-09	1.665E-08	2.103E-08	1.052E-03	8.186E-07	2.145E-07
T6 Instate Other Class 4	Diesel	7.154E-09	3.347E-07	4.802E-08	9.789E-09	3.913E-09	1.200E-08	4.486E-08	6.078E-08	3.743E-09	3.000E-09	1.570E-08	2.245E-08	1.034E-03	3.323E-10	1.629E-07
T6 Instate Other Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.243E-08	3.443E-08	0.000E+00	3.000E-09	7.851E-09	1.085E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Other Class 4	Natural Gas	9.955E-09	5.269E-08	2.672E-06	0.000E+00	1.552E-09	1.200E-08	4.486E-08	5.842E-08	1.427E-09	3.000E-09	1.570E-08	2.013E-08	8.805E-04	6.967E-07	1.795E-07
T6 Instate Other Class 5	Diesel	5.980E-09	3.058E-07	4.451E-08	9.819E-09	3.390E-09	1.200E-08	4.486E-08	6.025E-08	3.244E-09	3.000E-09	1.570E-08	2.195E-08	1.037E-03	2.778E-10	1.634E-07
T6 Instate Other Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.243E-08	3.443E-08	0.000E+00	3.000E-09	7.851E-09	1.085E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Other Class 5	Natural Gas	9.950E-09	5.313E-08	2.673E-06	0.000E+00	1.550E-09	1.200E-08	4.486E-08	5.841E-08	1.425E-09	3.000E-09	1.570E-08	2.013E-08	8.783E-04	6.964E-07	1.791E-07
T6 Instate Other Class 6	Diesel	6.236E-09	3.165E-07	4.538E-08	9.803E-09	3.501E-09	1.200E-08	4.486E-08	6.036E-08	3.349E-09	3.000E-09	1.570E-08	2.205E-08	1.035E-03	2.897E-10	1.631E-07
T6 Instate Other Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.243E-08	3.443E-08	0.000E+00	3.000E-09	7.851E-09	1.085E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Other Class 6	Natural Gas	9.949E-09	5.326E-08	2.673E-06	0.000E+00	1.549E-09	1.200E-08	4.486E-08	5.841E-08	1.424E-09	3.000E-09	1.570E-08	2.013E-08	8.785E-04	6.963E-07	1.791E-07
T6 Instate Other Class 7	Diesel	8.124E-09	5.453E-07	5.716E-08	9.933E-09	4.412E-09	1.200E-08	4.486E-08	6.128E-08	4.221E-09	3.000E-09	1.570E-08	2.292E-08	1.049E-03	3.774E-10	1.653E-07

T6 Instate Other Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.243E-08	3.443E-08	0.000E+00	3.000E-09	7.851E-09	1.085E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Other Class 7	Natural Gas	9.335E-09	1.088E-07	2.738E-06	0.000E+00	1.230E-09	1.200E-08	4.486E-08	5.809E-08	1.131E-09	3.000E-09	1.570E-08	1.983E-08	9.031E-04	6.534E-07	1.841E-07
T6 Instate Tractor Class 6	Diesel	6.730E-09	2.898E-07	4.533E-08	9.852E-09	3.666E-09	1.200E-08	4.486E-08	6.053E-08	3.507E-09	3.000E-09	1.570E-08	2.221E-08	1.040E-03	3.126E-10	1.639E-07
T6 Instate Tractor Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.243E-08	3.443E-08	0.000E+00	3.000E-09	7.851E-09	1.085E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Tractor Class 6	Natural Gas	9.944E-09	5.368E-08	2.673E-06	0.000E+00	1.547E-09	1.200E-08	4.486E-08	5.841E-08	1.422E-09	3.000E-09	1.570E-08	2.012E-08	8.771E-04	6.960E-07	1.788E-07
T6 Instate Tractor Class 7	Diesel	7.657E-09	5.913E-07	5.783E-08	9.178E-09	4.434E-09	1.200E-08	4.486E-08	6.130E-08	4.242E-09	3.000E-09	1.570E-08	2.294E-08	9.692E-04	3.556E-10	1.527E-07
T6 Instate Tractor Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.243E-08	3.443E-08	0.000E+00	3.000E-09	7.851E-09	1.085E-08	0.000E+00	0.000E+00	0.000E+00
T6 Instate Tractor Class 7	Natural Gas	9.345E-09	1.073E-07	2.731E-06	0.000E+00	1.234E-09	1.200E-08	4.486E-08	5.810E-08	1.135E-09	3.000E-09	1.570E-08	1.984E-08	8.860E-04	6.540E-07	1.806E-07
T6 OOS Class 4	Diesel	6.029E-09	2.440E-07	2.888E-08	9.086E-09	5.987E-09	1.200E-08	4.231E-08	6.030E-08	5.728E-09	3.000E-09	1.481E-08	2.354E-08	9.595E-04	2.800E-10	1.512E-07
T6 OOS Class 5	Diesel	5.586E-09	2.368E-07	2.779E-08	9.098E-09	5.772E-09	1.200E-08	4.231E-08	6.009E-08	5.522E-09	3.000E-09	1.481E-08	2.333E-08	9.608E-04	2.595E-10	1.514E-07
T6 OOS Class 6	Diesel	5.628E-09	2.305E-07	2.781E-08	9.049E-09	5.765E-09	1.200E-08	4.231E-08	6.008E-08	5.516E-09	3.000E-09	1.481E-08	2.333E-08	9.556E-04	2.614E-10	1.506E-07
T6 OOS Class 7	Diesel	5.673E-09	2.358E-07	2.909E-08	8.200E-09	5.926E-09	1.200E-08	4.231E-08	6.024E-08	5.669E-09	3.000E-09	1.481E-08	2.348E-08	8.660E-04	2.635E-10	1.364E-07
T6 Public Class 4	Diesel	2.303E-08	1.164E-06	7.902E-08	1.060E-08	7.061E-09	1.200E-08	4.617E-08	6.523E-08	6.756E-09	3.000E-09	1.616E-08	2.591E-08	1.119E-03	1.070E-09	1.763E-07
T6 Public Class 4	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.308E-08	3.508E-08	0.000E+00	3.000E-09	8.080E-09	1.108E-08	0.000E+00	0.000E+00	0.000E+00
T6 Public Class 4	Natural Gas	1.260E-08	6.243E-08	3.057E-06	0.000E+00	1.774E-09	1.200E-08	4.617E-08	5.994E-08	1.631E-09	3.000E-09	1.616E-08	2.079E-08	9.892E-04	8.815E-07	2.017E-07
T6 Public Class 5	Diesel	1.743E-08	8.169E-07	7.147E-08	1.058E-08	5.104E-09	1.200E-08	4.617E-08	6.327E-08	4.883E-09	3.000E-09	1.616E-08	2.404E-08	1.118E-03	8.097E-10	1.761E-07
T6 Public Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.308E-08	3.508E-08	0.000E+00	3.000E-09	8.080E-09	1.108E-08	0.000E+00	0.000E+00	0.000E+00
T6 Public Class 5	Natural Gas	1.244E-08	8.787E-08	3.069E-06	0.000E+00	1.653E-09	1.200E-08	4.617E-08	5.982E-08	1.520E-09	3.000E-09	1.616E-08	2.068E-08	1.003E-03	8.707E-07	2.045E-07
T6 Public Class 6	Diesel	1.911E-08	9.747E-07	7.283E-08	1.055E-08	5.944E-09	1.200E-08	4.617E-08	6.411E-08	5.687E-09	3.000E-09	1.616E-08	2.485E-08	1.114E-03	8.876E-10	1.755E-07
T6 Public Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.308E-08	3.508E-08	0.000E+00	3.000E-09	8.080E-09	1.108E-08	0.000E+00	0.000E+00	0.000E+00
T6 Public Class 6	Natural Gas	1.255E-08	7.060E-08	3.062E-06	0.000E+00	1.735E-09	1.200E-08	4.617E-08	5.990E-08	1.595E-09	3.000E-09	1.616E-08	2.075E-08	9.897E-04	8.781E-07	2.018E-07
T6 Public Class 7	Diesel	1.632E-08	8.568E-07	6.377E-08	1.044E-08	5.293E-09	1.200E-08	4.617E-08	6.346E-08	5.064E-09	3.000E-09	1.616E-08	2.422E-08	1.102E-03	7.583E-10	1.737E-07
T6 Public Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.308E-08	3.508E-08	0.000E+00	3.000E-09	8.080E-09	1.108E-08	0.000E+00	0.000E+00	0.000E+00
T6 Public Class 7	Natural Gas	1.258E-08	6.428E-08	3.060E-06	0.000E+00	1.765E-09	1.200E-08	4.617E-08	5.993E-08	1.623E-09	3.000E-09	1.616E-08	2.078E-08	9.966E-04	8.807E-07	2.032E-07
T6 Utility Class 5	Diesel	5.163E-09	2.014E-07	3.606E-08	9.732E-09	2.353E-09	1.200E-08	4.550E-08	5.985E-08	2.251E-09	3.000E-09	1.592E-08	2.117E-08	1.028E-03	2.398E-10	1.619E-07
T6 Utility Class 5	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.275E-08	3.475E-08	0.000E+00	3.000E-09	7.962E-09	1.096E-08	0.000E+00	0.000E+00	0.000E+00
T6 Utility Class 5	Natural Gas	1.114E-08	5.410E-08	2.745E-06	0.000E+00	1.636E-09	1.200E-08	4.550E-08	5.913E-08	1.505E-09	3.000E-09	1.592E-08	2.043E-08	9.162E-04	7.795E-07	1.868E-07
T6 Utility Class 6	Diesel	5.162E-09	1.952E-07	3.605E-08	9.729E-09	2.324E-09	1.200E-08	4.550E-08	5.982E-08	2.223E-09	3.000E-09	1.592E-08	2.115E-08	1.027E-03	2.398E-10	1.619E-07
T6 Utility Class 6	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.275E-08	3.475E-08	0.000E+00	3.000E-09	7.962E-09	1.096E-08	0.000E+00	0.000E+00	0.000E+00
T6 Utility Class 6	Natural Gas	1.114E-08	5.410E-08	2.745E-06	0.000E+00	1.636E-09	1.200E-08	4.550E-08	5.913E-08	1.505E-09	3.000E-09	1.592E-08	2.043E-08	9.164E-04	7.795E-07	1.868E-07
T6 Utility Class 7	Diesel	5.107E-09	1.901E-07	3.567E-08	9.725E-09	2.309E-09	1.200E-08	4.550E-08	5.981E-08	2.209E-09	3.000E-09	1.592E-08	2.113E-08	1.027E-03	2.372E-10	1.618E-07
T6 Utility Class 7	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.275E-08	3.475E-08	0.000E+00	3.000E-09	7.962E-09	1.096E-08	0.000E+00	0.000E+00	0.000E+00
T6 Utility Class 7	Natural Gas	1.114E-08	5.410E-08	2.745E-06	0.000E+00	1.636E-09	1.200E-08	4.550E-08	5.913E-08	1.505E-09	3.000E-09	1.592E-08	2.043E-08	9.164E-04	7.795E-07	1.868E-07
T6TS	Gasoline	1.262E-08	8.210E-08	2.056E-07	1.544E-08	1.490E-09	1.200E-08	4.502E-08	5.851E-08	1.370E-09	3.000E-09	1.576E-08	2.013E-08	1.561E-03	3.225E-09	7.280E-09
T6TS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E-08	2.251E-08	3.451E-08	0.000E+00	3.000E-09	7.878E-09	1.088E-08	0.000E+00	0.000E+00	0.000E+00
T7 CAIRP Class 8	Diesel	1.150E-08	1.217E-06	3.903E-08	1.216E-08	3.018E-08	3.600E-08	8.158E-08	1.478E-07	2.887E-08	9.000E-09	2.855E-08	6.643E-08	1.285E-03	5.343E-10	2.024E-07
T7 CAIRP Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	4.094E-08	7.694E-08	0.000E+00	9.000E-09	1.433E-08	2.333E-08	0.000E+00	0.000E+00	0.000E+00
T7 CAIRP Class 8	Natural Gas	1.336E-08	1.534E-07	2.893E-06	0.000E+00	1.965E-09	3.600E-08	8.155E-08	1.195E-07	1.807E-09	9.000E-09	2.854E-08	3.935E-08	1.025E-03	9.352E-07	2.089E-07
T7 NNOOS Class 8	Diesel	1.117E-08	1.332E-06	3.796E-08	1.166E-08	2.954E-08	3.600E-08	8.161E-08	1.472E-07	2.826E-08	9.000E-09	2.856E-08	6.583E-08	1.231E-03	5.190E-10	1.939E-07
T7 NOOS Class 8	Diesel	1.152E-08	1.369E-06	3.906E-08	1.165E-08	3.128E-08	3.600E-08	8.162E-08	1.489E-07	2.992E-08	9.000E-09	2.857E-08	6.749E-08	1.230E-03	5.351E-10	1.938E-07
T7 Other Port Class 8	Diesel	1.001E-08	1.231E-06	6.335E-08	1.302E-08	1.649E-08	3.600E-08	9.400E-08	1.465E-07	1.577E-08	9.000E-09	3.290E-08	5.767E-08	1.375E-03	4.650E-10	2.167E-07
T7 Other Port Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	4.707E-08	8.307E-08	0.000E+00	9.000E-09	1.648E-08	2.548E-08	0.000E+00	0.000E+00	0.000E+00
T7 POAK Class 8	Diesel	1.028E-08	1.298E-06	6.504E-08	1.299E-08	1.746E-08	3.600E-08	9.380E-08	1.473E-07	1.671E-08	9.000E-09	3.283E-08	5.854E-08	1.372E-03	4.774E-10	2.162E-07
T7 POAK Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	4.706E-08	8.306E-08	0.000E+00	9.000E-09	1.647E-08	2.547E-08	0.000E+00	0.000E+00	0.000E+00
T7 POAK Class 8	Natural Gas	1.676E-08	1.725E-07	4.977E-06	0.000E+00	2.524E-09	3.600E-08	9.380E-08	1.323E-07	2.321E-09	9.000E-09	3.283E-08	4.415E-08	1.152E-03	1.173E-06	2.348E-07
T7 Public Class 8	Diesel	3.832E-08	2.791E-06	1.696E-07	1.583E-08	1.302E-08	3.600E-08	1.068E-07	1.558E-07	1.246E-08	9.000E-09	3.738E-08	5.884E-08	1.671E-03	1.780E-09	2.633E-07
T7 Public Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	5.426E-08	9.026E-08	0.000E+00	9.000E-09	1.899E-08	2.799E-08	0.000E+00	0.000E+00	0.000E+00
T7 Public Class 8	Natural Gas	2.456E-08	3.165E-07	8.331E-06	0.000E+00	3.206E-09	3.600E-08	1.050E-07	1.442E-07	2.948E-09	9.000E-09	3.674E-08	4.869E-08	1.484E-03	1.719E-06	3.026E-07
T7 Single Concrete/Transit Mix Class 8	Diesel	8.723E-09	8.307E-07	4.439E-08	1.386E-08	1.415E-08	3.600E-08	8.813E-08	1.383E-07	1.353E-08	9.000E-09	3.085E-08	5.338E-08	1.464E-03	4.052E-10	2.307E-07
T7 Single Concrete/Transit Mix Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	4.438E-08	8.038E-08	0.000E+00	9.000E-09	1.553E-08	2.453E-08	0.000E+00	0.000E+00	0.000E+00
T7 Single Concrete/Transit Mix Class 8	Natural Gas	1.525E-08	1.657E-07	4.071E-06	0.000E+00	2.251E-09	3.600E-08	8.813E-08	1.264E-07	2.069E-09	9.000E-09	3.084E-08	4.191E-08	1.127E-03	1.067E-06	2.298E-07
T7 Single Dump Class 8	Diesel	1.112E-08	1.185E-06	6.229E-08	1.445E-08	1.831E-08	3.600E-08	8.593E-08	1.402E-07	1.751E-08	9.000E-09	3.007E-08	5.659E-08	1.525E-03	5.165E-10	2.403E-07
T7 Single Dump Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	4.434E-08	8.034E-08	0.000E+00	9.000E-09	1.552E-08	2.452E-08	0.000E+00	0.000E+00	0.000E+00
T7 Single Dump Class 8	Natural Gas	1.522E-08	2.214E-07	4.832E-06	0.000E+00	2.127E-09	3.600E-08	8.607E-08	1.242E-07	1.955E-09	9.000E-09	3.012E-08	4.108E-08	1.167E-03	1.065E-06	2.379E-07
T7 Single Other Class 8	Diesel	1.156E-08	1.235E-06	6.467E-08	1.457E-08	1.911E-08	3.600E-08	8.510E-08	1.402E-07	1.828E-08	9.000E-09	2.978E-08	5.707E-08	1.539E-03	5.369E-10	2.424E-07
T7 Single Other Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	4.435E-08	8.035E-08	0.000E+00	9.000E-09	1.552E-08	2.452E-08	0.000E+00	0.000E+00	0.000E+00
T7 Single Other Class 8	Natural Gas	1.522E-08	2.405E-07	5.058E-06	0.000E+00	2.088E-09	3.600E-08	8.485E-08	1.229E-07	1.920E-09	9.000E-09	2.970E-08	4.062E-08	1.179E-03	1.065E-06	2.404E-07
T7 SWCV Class 8	Diesel	4.286E-08	7.032E-06	1.155E-07	3.815E-08	1.142E-08	3.600E-08	2.100E-07	2.574E-07	1.093E-08	9.000E-09	7.350E-08	9.343E-08	4.029E-03	1.991E-09	6.348E-07
T7 SWCV Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	1.050E-07	1.410E-07	0.000E+00	9.000E-09	3.675E-08	4.575E-08	0.000E+00	0.000E+00	0.000E+00
T7 SWCV Class 8	Natural Gas	1.971E-08	4.643E-07	1.135E-05	0.000E+00	1.346E-09	3.600E-08	2.100E-07	2.473E-07	1.238E-09	9.000E-09	7.350E-08	8.374E-08	1.353E-03	8.644E-07	2.758E-07
T7 Tractor Class 8	Diesel	1.056E-08	1.227E-06	5.023E-08	1.243E-08	2.234E-08	3.600E-08	8.455E-08	1.429E-07	2.138E-08	9.000E-09	2.959E-08	5.997E-08	1.313E-03	4.903E-10	2.069E-07
T7 Tractor Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	4.326E-08	7.926E-08	0.000E+00	9.000E-09	1.514E-08	2.414E-08	0.000E+00	0.000E+00	0.000E+00
T7 Tractor Class 8	Natural Gas	1.454E-08	2.105E-07	4.415E-06	0.000E+00	2.051E-09	3.600E-08	8.419E-08	1.222E-07	1.885E-09	9.000E-09	2.947E-08	4.035E-08	1.094E-03	1.018E-06	2.229E-07
T7 Utility Class 8	Diesel	1.138E-08	1.109E-06	1.063E-07	1.497E-08	7.331E-09	3.600E-08	9.974E-08	1.431E-07	7.014E-09	9.000E-09	3.491E-08	5.092E-08	1.581E-03	5.287E-10	2.491E-07
T7 Utility Class 8	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.600E-08	5.191E-08	8.791E-08	0.000E+00	9.000E-09	1.817E-08	2.717E-08	0.000E+00	0.000E+00	0.000E+00
T7IS	Gasoline	4.724E-07	2.632E-06	3.178E-05	1.879E-08	1.524E-09	2.000E-08	9.424E-08	1.158E-07	1.401E-09	5.000E-09	3.298E-08	3.938E-08	1.900E-03	1.012E-07	1.179E-07
T7IS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-08	4.849E-08	6.849E-08	0.000E+00	5.000E-09	1.697E-08	2.197E-08	0.000E+00	0.000E+00	0.000E+00
UBUS	Gasoline	3.451E-09	1.665E-08	5.798E-07	8.405E-09	1.302E-09	8.000E-09	9.100E-08	1.003E-07	1.197E-09	2.000E-09	3.185E-08	3.505E-08	8.502E-04	1.295E-09	2.851E-09
UBUS	Diesel	6.718E-08	3.717E-07	7.641E-08	1.112E-08	7.062E-09	3.210E-08	1.100E-07	1.492E-07	6.757E-09	8.024E-09	3.850E-08	5.328E-08	1.174E-03	3.121E-09	1.849E-07
UBUS	Electricity	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.154E-08	5.500E-08	8.654E-08	0.000E+00	7.886E-09	1.925E-08	2.714E-08	0.000E+00	0.000E+00	0.000E+00
UBUS	Natural Gas	5.992E-08	5.758E-08	4.814E-05	0.000E+00	2.913E-10	3.210E-08	1.100E-07	1.424E-07	2.787E-10	8.024E-09	3.850E-08	4.680E-08	1.286E-03	4.194E-06	2.622E-07

City Limits - With CAP	2019	2030	2040	2045
Residential built environment	114,620	74,750	36,430	390
Commercial/ industrial built environment	83,660	62,080	46,240	28,700
On-road transportation	276,560	134,800	40,730	12,020
Off-road equipment	14,400	20,100	19,480	20,470
Rail	4,440	1,670	1,880	2,000
Solid waste generation	21,910	13,310	13,040	12,580
Landfill	4,180	4,470	3,660	3,310
Water and wastewater	1,660	1,820	2,020	2,150
Land use and sequestration	-1,050	-1,050	-1,050	-1,050
Total	**520,380**	**311,950**	**162,430**	**80,570**
Point sources	*18,090*	*18,090*	*18,090*	*18,090*

SOI - CAP	2019	2030	2040	2045
Residential built environment	3,700	2,510	1,700	920
Commercial/ industrial built environment	1,480	1,160	880	590
On-road transportation	7,720	3,360	1,090	460
Off-road equipment	180	320	260	270
Rail	110	30	30	30
Solid waste generation	610	330	280	250
Landfill	0	0	0	0
Water and wastewater	50	50	40	40
Land use and sequestration	-270	-270	-270	-270
Total	**13,580**	**7,490**	**4,010**	**2,290**
Point sources	*0*	*0*	*0*	*0*

adapted to ensure that they are appropriate for San Mateo and meet the CEQA requirements for community-wide plans as well as individual development projects. These targets are:

- 2030: Reduce emissions to 40 percent below 1990 levels (49 percent below baseline 2005 levels), equal to 339,880 $MTCO_2e$.
- 2045: Reduce emissions to 85 percent below 1990 levels (87 percent below baseline 2005 levels), equal to 84,970 $MTCO_2e$.

Existing and Planned Accomplishments

The forecast represents a "worst case" scenario if no action is taken to reduce GHG emissions. However, San Mateo, along with regional and State agencies, have already taken actions to reduce GHG emissions below their 2019 limit and to close the gap to the City's GHG reduction targets. The 2020 CAP identifies the GHG reductions from these existing and planned accomplishments. **Table ES-1** shows the reductions from these accomplishments and San Mateo's projected future emissions affect taking these accomplishments into account.

Table ES-1: Reductions from Existing and Planned Accomplishments

	2030	2040	2045
Forecasted Emissions	605,420 $MTCO_2e$	696,810 $MTCO_2e$	750,400 $MTCO_2e$
Reductions from State existing and planned accomplishments	-72,900 $MTCO_2e$	-147,970 $MTCO_2e$	-196,140 $MTCO_2e$
Reductions from local and regional existing and planned accomplishments	-23,980 $MTCO_2e$	-18,360 $MTCO_2e$	-4,950 $MTCO_2e$
Emissions with existing and planned accomplishments	508,380 $MTCO_2e$	530,510 $MTCO_2e$	549,320 $MTCO_2e$

Reduction Measures

The 2020 CAP builds on the GHG reduction measures in the 2015 CAP, as well as the existing and planned accomplishments, to provide an updated suite of GHG reduction measures that meet the City's targets. These measures are informed by several sources, including discussions with City staff, feedback from public engagement efforts, and direction from the Sustainability and Infrastructure Commission. The 2020 CAP contains 29 GHG reduction measures, all of which also provide additional community benefits such as financial savings and improvements to public health. **Table ES-2** shows these measures and the GHG reductions they allow.

Table ES-2: Reductions by Measure

Measure	2030	2040	2045
BE 1: All-electric new construction	-21,070	-38,450	-47,250
BE 2: All-electric existing buildings	-102,210	-184,610	-221,260
RE 1: Peninsula Clean Energy	-160	-170	0
RE 2: Renewable energy systems for new and existing residences	-70	-160	0
RE 3: Renewable energy systems for new and existing nonresidential buildings	-60	-90	0
EE 1: Residential energy efficiency retrofits	-6,160	-7,020	-6,790
EE 2: Nonresidential energy efficiency retrofits	-3,800	-8,860	-13,380
EE 3: Residential tree planting	Less than -10	Less than -10	0
ME 1: Energy efficiency for new municipal buildings	Supportive (no measurable GHG reductions)		
ME 2: Energy efficiency at existing municipal buildings	-10	-30	-40
ME 3: All-electric municipal buildings	-130	-200	-270
CF 1: Electric vehicle charging infrastructure	-24,420	-49,390	-69,780
CF 2: Electric vehicle education and outreach	-4,910	-8,030	-12,360
CF 3: Clean city fleet	-130	-200	-270
CF 4: Clean fuel and vehicle emissions	-4,210	-16,920	-26,360
ST 1: Bicycle mode share	-80	-170	-180
ST 2: Pedestrian mode share	-110	-120	-130
ST 3: Micromobility and shared mobility	Supportive (no measurable GHG reductions)		
ST 4: Public transit service	-3,610	-5,660	-6,910
ST 5: Commuter programs	Less than -10	-70	-160
ST 6: Transportation Demand Management	-2,010	-7,950	-13,410
ST 7: Transit-oriented development	-10,200	-18,920	-23,700

EXECUTIVE SUMMARY

Measure	2030	2040	2045
SW 1: Composting program	-1,030	-1,710	-1,850
SW 2: Expanded recycling service	-6,070	-7,730	-8,820
SW 3: Waste awareness and source reduction	-2,080	-4,050	-5,590
WW 1: Water efficiency retrofits for existing buildings	-170	-300	-360
WW 2: Water-efficient landscaping	Less than -10	-10	0
WW 3: Water efficiency in new construction	Less than -10	-10	-20
OR 1: Alternative fuel lawn and garden equipment	-3,660	-7,130	-9,890
Total	**-196,360**	**-367,960**	**-468,780**

Note: Due to rounding, totals may not equal the sum of the component parts.

When the 2020 CAP is fully implemented, it is projected to reduce GHG emissions to meet or exceed San Mateo's reduction targets:

- Projected 2030 emissions with the CAP are 311,990 $MTCO_2e$, below the reduction target of 339,880 $MTCO_2e$.
- Projected 2045 emissions with the CAP are 80,550 $MTCO_2e$, below the City's reduction target of 84,970 $MTCO_2e$

use leakage refers to the unintentional release of methane from the final use of natural gas, such as from pipelines, storage facilities, and appliances.

2019 Inventory

The project team prepared a 2019 GHG inventory to provide the most up-to-date available measurement of how San Mateo's GHG emissions have changed over time, including since the 2015 CAP. This inventory uses the same methods as the updated prior inventories, ensuring that all four inventories in the 2020 CAP are consistent with each other.

Inventory Results

The community-wide inventories in the 2020 CAP include the following sectors, consistent with guidance in the US Community Protocol:

- **On-road transportation:** on-road vehicle trips on local roads and State highways within the city limits.
- **Commercial/industrial built environment**: electricity and natural gas used in nonresidential settings (e.g., industrial, commercial), including direct access electricity.
- **Residential built environment**: electricity and natural gas used in residential settings.
- **Off-road equipment**: the use of portable equipment and vehicles that do not travel on roads (e.g., construction or lawn and garden equipment).
- **Solid waste generation**: material produced by the community that is deposited in landfills which decompose and produce methane.
- **Landfills**: emissions that occur in the inventory year as a result of waste-in-place at a landfill that is within the community boundary or operated by the City.
- **Rail**: emissions resulting from Caltrain trips generated by passengers at three stations: San Mateo, Hayward Park, and Hillsdale, as well as emissions from freight trains.
- **Water and wastewater**: energy used to treat and pump water used and wastewater created, along with emissions from the processing of wastewater.
- **Land use and sequestration**: emissions resulting from development of previously undeveloped land and sinks (negative emissions) from carbon sequestration of open space and urban trees.
- **Point sources**: stationary source emissions resulting from fossil fuel combustion within the county as reported by BAAQMD. These emissions are included as an informational item and are not counted as part of the City's total emissions based on guidance from BAAQMD as they are not under the jurisdiction of the City.

Greenhouse Gas Inventories, Forecasts, and Reduction Targets

Table 2 shows the number of residents in San Mateo for the inventory years.

Table 2: San Mateo Population (2005 – 2019)

Indicator	2005 Value	2010 Value	2015 Value	2017 Value	2019 Value	Percentage Change, 2005–2019	Source
Population	93,400	97,110	101,610	103,470	104,599	12%	CA Dept. of Finance, ABAG

In the baseline year of 2005, the GHG emissions from the covered activities totaled 666,410 $MTCO_2e$, as shown in **Table 3** and **Figure 5**. The sector with the largest portion of emissions was on-road transportation, which produced 282,370 $MTCO_2e$, or 42 percent of all community emissions. The next largest sector, commercial/industrial built environment, produced 169,000 $MTCO_2e$, 25 percent of the total. The residential built environment was the third largest sector with 25 percent of total emissions (163,770 $MTCO_2e$) followed by solid waste generation (22,180 or 3 percent), the off-road equipment (15,900 $MTCO_2e$ or 2 percent), and landfill (7,370 $MTCO_2e$ or 1 percent) sectors. Rail emissions totaled 4,350 $MTCO_2e$ (1 percent) and water and wastewater emissions totaled 2,520 $MTCO_2e$ (less than 1 percent of total emissions). Finally, land use and sequestration were responsible for a reduction in emissions of 1,050 $MTCO_2e$, equivalent to removing 1 percent of total emissions.

Table 3: San Mateo 2005 Community-Wide GHG Emissions

Sector	$MTCO_2e$ (Absolute)	Percentage
On-road transportation	282,370	42%
Commercial/industrial built environment	169,000	25%
Residential built environment	163,770	25%
Solid waste generation	22,180	3%
Off-road equipment	15,900	2%
Landfill	7,370	1%
Rail	4,350	1%
Water and wastewater	2,520	0%
Land use and sequestration	-1,050	-1%
Total	**666,410**	**100%**
Informational Items		
Point sources	7,390	1%

Note: Due to rounding, totals may not equal the sum of the component parts.

Greenhouse Gas Inventories, Forecasts, and Reduction Targets

Table 4: San Mateo 2005-2019 Community-Wide Emissions (Absolute)

Sector	2005 ($MTCO_2e$)	2010 ($MTCO_2e$)	2015 ($MTCO_2e$)	2017 ($MTCO_2e$)	2019 ($MTCO_2e$)	Percentage Change, 2005 to 2019
On-road transportation	282,370	287,550	280,570	269,110	276,560	-2%
Commercial/industrial built environment	169,000	151,200	137,350	101,720	83,660	-50%
Residential built environment	163,770	165,800	131,660	118,980	114,630	-30%
Off-road equipment	15,900	17,840	14,960	14,940	14,400	-9%
Solid waste generation	22,180	16,580	15,860	17,890	21,910	-1%
Landfill	7,370	6,670	6,030	5,800	4,180	-43%
Rail	4,350	4,480	4,410	4,520	4,440	2%
Water and wastewater	2,520	2,380	2,220	1,810	1,670	-34%
Land use and sequestration	-1050	-1,050	-1,050	-1,040	-1040	-1%
Total	666,410	651,450	592,010	533,730	520,410	-22%
Informational Item						
Point sources	7,390	7,390	11,610	14,230	18,090	145%

Note: Due to rounding, totals may not equal the sum of the component parts.

Greenhouse Gas Inventories, Forecasts, and Reduction Targets

Table 5: San Mateo 2005and 2019 Community Emissions (Per-Capita)

	2005	2019
$MTCO_2e$ per-capita	7.14	4.98

Greenhouse Gas Emissions Forecast

A forecast of future GHG emissions helps to ensure consistency with the guidelines for a Qualified GHG Reduction Strategy put forward by BAAQMD, as described in **Chapter 1**. A forecast allows elected officials, City staff, and community members to identify the amount of reductions necessary in order to achieve future GHG reduction targets and can help support long-range community planning efforts. The CAP update includes a forecast for the calendar years 2030 2040, and 2045.

A GHG emissions forecast estimates how emissions would grow over time if no action is taken at the federal, State, or local level to reduce them. A set of indicators determines the extent of growth that could occur and how resulting emissions may change. An emissions forecast was prepared for San Mateo using the best available information regarding indicators and growth rates. The forecast relies on growth assumptions from the buildout projections in the Strive San Mateo General Plan 2040. Activity data rates in the forecast, such as household energy use, vehicle miles travelled, or per person waste disposal, are based on the 2019 emissions inventory.

Table 6 presents data from 2019 and projections for the years 2030, 2040, and 2045.

Table 6: San Mateo 2019, 2030, 2040, and 2045 Growth Indicators

Indicator	2019 Value	2030 Value	2040 Value	2045 Value	Percentage Change, 2019–2045
Population	104,599	129,210	156,585	172,370	65%
Households	39,771	49,260	59,843	65,960	66%
Jobs	61,232	69,400	77,760	82,310	34%
Service population[1]	165,831	198,610	234,345	254,680	54%

[1] *Service population is the sum of the residential population and the number of jobs.*

CHAPTER 2

Each indicator is used to project future emissions for the following sectors:

- Population: off-road equipment (lawn and garden equipment, pleasure crafts, portable equipment, and recreational equipment).
- Households: Residential built environment.
- Jobs: Commercial/industrial built environment, off-road equipment (industrial equipment and light commercial equipment).
- Service population: On-road transportation, rail (Caltrain), off-road equipment (construction and mining equipment, transportation refrigeration units), solid waste generation, water and wastewater.

Emissions from direct access electricity, point sources, and freight trains are held constant, and are not projected to change over time. Construction and mining emissions, part of the off-road equipment sector, are forecasted by the change in service population. Landfill emissions are based on decomposition rates provided by CARB and are not forecasted by an indicator. Land use and sequestration emissions are based on the acreage of forested land, developed land, and urban areas, as projected by the Strive San Mateo General Plan 2040.

The project team applied these indicators to forecast future GHG emissions. Relative to 2019 emissions, San Mateo's GHG emissions are expected to rise by more than 44 percent by 2045 if no action is taken. The forecast assumes that each person in San Mateo will continue to contribute the same amount of GHGs to the community's total, so that the amount of GHGs increase as the demographics of the community change. **Tables 7** and **8** show San Mateo's forecasted community-wide GHG emissions

Greenhouse Gas Inventories, Forecasts, and Reduction Targets

Table 7: San Mateo Community-Wide BAU GHG Emissions Sector Totals (Absolute)

Sector	2019 ($MTCO_2e$)	2030 ($MTCO_2e$)	2040 ($MTCO_2e$)	2045 ($MTCO_2e$)	Percentage Change, 2019–2045
On-road transportation	276,560	308,930	351,730	375,310	36%
Commercial/industrial built environment	83,660	93,710	104,010	109,610	31%
Residential built environment	114,630	141,960	172,460	190,110	66%
Off-road equipment	14,400	23,770	26,620	30,360	111%
Solid waste generation	21,910	26,240	30,960	33,650	54%
Landfill	4,180	4,470	3,660	3,310	-21%
Rail	4,440	5,220	6,080	6,560	48%
Water and wastewater	1,670	1,990	2,340	2,540	53%
Land use and sequestration	-1,040	-1,050	-1,050	-1,050	0%
Total	**520,400**	**605,240**	**696,810**	**750,400**	**44%**
Percentage Change from 2005	-22%	-9%	5%	13%	
Informational Item					
Point sources	18,090	18,090	18,090	18,090	0%

Note: Due to rounding, totals may not equal the sum of the component parts.

CHAPTER 2

GHG EMISSIONS REDUCTION TARGETS

The California Environmental Quality Act (CEQA) Guidelines Section 15183.5(b) requires that a Qualified GHG Reduction Strategy contain a goal for substantive GHG reductions, although the guidelines do not set a specific level for what these goals should be. In the Climate Change Scoping Plan (Scoping Plan), the State provides its statewide GHG reduction targets and guidance for local communities. The CAP uses 2005 as a baseline year for measuring progress towards emission targets. In the 2015 CAP, the City adopted a GHG reduction target of 15 percent below the baseline 2005 GHG emission levels by 2020. The City chose this reduction target to remain consistent with the state-recommended target at the time, which was a reduction of 15 percent below existing levels by 2020, which is the local equivalent of the state's own adopted reduction target of reducing emissions to 1990 levels. Although "existing emission levels" was not formally defined by the Scoping Plan, agencies throughout California have often interpreted it as referring to emissions occurring between 2005 and 2008. San Mateo's GHG reduction strategies have used 2005 emissions as the "existing" levels and the State targets to inform the 2030 and 2045 targets listed below.

These statewide targets are:

- 2030: Reduce emissions 40 percent below 1990 levels, codified into law by SB 32 (2016)
- 2045: Reduce emissions 85 percent below 1990 levels and achieve carbon neutrality, codified into law by AB 1279 (2022).

Based on the results of the quantification process to identify the GHG reduction potential from the 2020 CAP (see Chapter 3), the City determined that the statewide targets for 2030 and 2045 were appropriate for San Mateo. To ensure that the CAP can continue to serve as a Qualified GHG Reduction Strategy, San Mateo has set its 2030 and 2045 targets to align with the State's targets. In the quantification of the CAP measures, 2040 is used as an interim benchmark as it aligns with the horizon of Strive San Mateo General Plan 2040 and tracks progress towards the 2045 target. These targets are meant to serve as ceilings for future GHG emissions. As discussed in the following chapter, the City has the potential to achieve greater GHG reductions, decreasing emissions below these levels.

Previous versions of the Scoping Plan have recommended per-capita targets for community-wide plans, such as a CAP. The 2020 CAP used per-capita targets as recommended by the most recently adopted version of the Scoping Plan at the time it was written. With the adoption of AB 1279 and the 2022 Scoping Plan, State guidance recommends that local governments use "absolute" GHG reduction targets consistent with statewide GHG reduction goals. This version of the CAP uses absolute GHG reduction targets.

Greenhouse Gas Inventories, Forecasts, and Reduction Targets

Qualified GHG Reduction Strategies

These revised targets help ensure that the 2020 CAP will continue to serve as San Mateo's Qualified GHG Reduction Strategy, which allows developments that are consistent with the CAP to streamline their environmental review. As noted in Chapter 1, the requirements for a Qualified GHG Reduction Strategy are:

- Quantify emissions, both existing and projected over a time period, from activities in a defined area.
- Establish a level, based on substantial evidence, below which the contribution of emissions from activities covered by the plan would not be cumulatively considerable.
- Identify and analyze the emissions resulting from specific actions or categories of actions anticipated within the geographic area.
- Specify measures or a group of persons that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specific levels.
- Adopt the GHG reduction strategy in a public process following environmental review.

Chapter 3

Strategies to Achieve the Targets

To understand the level of action necessary to achieve the City's reduction targets this updated CAP analyzes existing, planned, and future actions. By first looking at these accomplishments, the City can understand progress achieved and outstanding opportunities. Existing and current efforts provide a foundation for this CAP. New measures can further close the gap and guide future programs. Together, these efforts serve as the City's multipronged strategy to achieve reduction targets.

Table 8 shows the GHG emission levels that are expected to result when this CAP is fully implemented, based on the results of the analyses in this chapter, along with the GHG reduction targets.

Table 8: San Mateo Emissions with 2020 CAP Implementation (2030 – 2045)

	2030	2045
Projected Emission level	311,990 $MTCO_2e$	80,550 $MTCO_2e$
Target	339,880 $MTCO_2e$	84,970 $MTCO_2e$
Target achieved?	Yes	Yes
Gap to target	-27,890 $MTCO_2e$	-4,420 $MTCO_2e$

The CAP achieves these reductions by accounting for the GHG reductions from existing and planned State, regional, and local activities, along with the reduction measures in the CAP itself. **Table 9** shows the reduction levels achieved by the individual measures in the CAP. More details about the measures and all other reductions are given below.

CHAPTER 3

Table 9: Reductions from CAP Measures (2030 – 2045)

Measure	2030	2040	2045
BE 1: All-electric new construction	-21,070	-38,450	-47,250
BE 2: All-electric existing buildings	-102,210	-184,610	-221,260
RE 1: Peninsula Clean Energy	-160	-170	0
RE 2: Renewable energy systems for new and existing residences	-70	-160	0
RE 3: Renewable energy systems for new and existing nonresidential buildings	-60	-90	0
EE 1: Residential energy efficiency retrofits	-6,160	-7,020	-6,790
EE 2: Nonresidential energy efficiency retrofits	-3,800	-8,860	-13,380
EE 3: Residential tree planting	Less than -10	Less than -10	Less than-10
ME 1: Energy efficiency for new municipal buildings	Supportive (no measurable GHG reductions)		
ME 2: Energy efficiency at existing municipal buildings	-10	-30	-40
ME 3: All-electric municipal buildings	-130	-200	-270
CF 1: Electric vehicle charging infrastructure	-24,420	-49,390	-69,780
CF 2: Electric vehicle education and outreach	-4,910	-8,030	-12,360
CF 3: Clean city fleet	-130	-200	-270
CF 4: Clean fuel and vehicle emissions	-4,210	-16,920	-26,360
ST 1: Bicycle mode share	-80	-170	-180
ST 2: Pedestrian mode share	-110	-120	-130
ST 3: Micromobility and shared mobility	Supportive (no measurable GHG reductions)		
ST 4: Public transit service	-3,610	-5,660	-6,910
ST 5: Commuter programs	Less than -10	-70	-160
ST 6: Transportation Demand Management	-2,010	-7,950	-13,410
ST 7: Transit-oriented development	-10,200	-18,920	-23,700
SW 1: Composting program	-1,030	-1,710	-1,850

Measure	2030	2040	2045
SW 2: Expanded recycling service	-6,070	-7,730	-8,820
SW 3: Waste awareness and source reduction	-2,080	-4,050	-5,590
WW 1: Water efficiency retrofits for existing buildings	-170	-300	-360
WW 2: Water-efficient landscaping	Less than -10	-10	0
WW 3: Water efficiency in new construction	Less than -10	-10	-20
OR 1: Alternative fuel lawn and garden equipment	-3,660	-7,130	-9,890
Total	**-196,360**	**-367,960**	**-468,780**

Note: Due to rounding, totals may not equal the sum of the component parts.

Existing and Planned Accomplishments

Both State and local efforts have achieved additional progress toward the reduction target, reducing the outstanding gap of emissions to achieve the City's reduction targets described in the previous chapter.

As mentioned in Chapter 2, the GHG emissions forecast is based on the results of the 2019 inventory and assumes that per-capita activity remains constant, so that changes in projected emissions are based on expected changes in San Mateo's demographics. This approach means that any action taken through 2019 to reduce GHG emissions is already taken into consideration for the forecast. For example, if homes installed solar energy systems in 2018, the effect of that action (lower residential electricity use) will already show up in the 2019 inventory, and by extension will be carried through into the forecast.

State Existing and Planned Accomplishments

Since passing AB 32, the State has enacted regulations and programs to reduce GHG emissions. Although statewide in scope, these actions affect several sources of San Mateo's emissions, and so the local benefits of these State efforts can be "credited" to San Mateo even in cases where the community has not needed to take any action. This CAP includes the local benefits from five State policies:

- **Renewables Portfolio Standard:** The Renewables Portfolio Standard (RPS) was first established in 2002 and has been amended multiple times, most recently by SB 100 in 2018. It requires all electricity providers in the State to obtain at least 33% of their electricity from eligible renewable resources by the end of 2020, 60% of their electricity from eligible renewable resources by the end of 2030, and all of their electricity from carbon-free (although not necessarily eligible renewable) resources by the end of 2045.

Table 10: San Mateo Community-Wide GHG Emissions Reductions from State Programs

Policy	2030 Emissions ($MTCO_2e$)	2040 Emissions ($MTCO_2e$)	2045 Emissions ($MTCO_2e$)
Forecasted emissions	605,240	696,810	750,400
Clean Car Standards	-55,030	-95,730	-109,680
Renewables Portfolio Standard	-4,720	-15,330	-39,860
Title 24	-9,380	-32,480	-41,790
SB 1383	-3,760	-4,430	-4,820
Total reductions from existing State programs	-72,890	-147,970	-196,150
Emissions with existing State programs	**532,340**	**548,840**	**554,260**

Note: Due to rounding, totals may not equal the sum of the component parts.

There are other programs that reduce GHG emissions that State agencies have adopted or are planning to put into effect. These are not included in this section because of uncertainty about how these programs will be applied. In many cases, State programs may be implemented by local actions, and reductions associated with these programs are included in the local reduction measures discussed later in this chapter.

Existing and Planned Local and Regional Accomplishments

The City of San Mateo has a successful history of developing and implementing sustainability policies. The City's adopted plans, along with leadership from community members and businesses have been partially responsible for the decline in GHG emissions since 2005. Several policies are currently in place that are expected to further reduce San Mateo's GHG emissions. Some of these accomplishments were established before the City adopted its first CAP in 2015, while others were implemented in response to the 2015 CAP.

Collectively, San Mateo's existing and planned local and regional accomplishments are expected to reduce emissions by 23,990 $MTCO_2e$ in 2030, 18,360 $MTCO_2e$ in 2040, and 4,950 $MTCO_2e$ in 2045, in addition to the reductions achieved by State accomplishments. **Table 11** shows the reductions from each local and regional accomplishment.

Table 11: Emissions Reductions from Local and Regional Programs

Policy	2030 GHG Emissions ($MTCO_2e$)	2040 GHG Emissions ($MTCO_2e$)	2045 GHG Emissions ($MTCO_2e$)
Emissions with Existing State Programs	**532,340**	**548,840**	**554,260**
Peninsula Clean Energy	-20,000	-13,750	0
Energy efficiency retrofits	-30	-30	-30
Solar energy installations	-20	-10	0
Municipal energy retrofits	-160	-160	-160
Public access EV chargers	0	0	0
Transportation Demand Management	-220	-200	-190
Caltrain electrification (planned)	-3,560	-4,200	-4,560
Total reductions from existing and planned local and regional programs	-23,990	-18,330	-4,940
Emissions with existing and planned local and regional programs	**508,380**	**530,510**	**549,320**

Note: Due to rounding, totals may not equal the sum of the component parts.

Existing and planned local, regional, and State accomplishments reduce San Mateo's forecasted GHG emissions by a significant amount. **Table 12** shows the benefit of these accomplishments relative to San Mateo's baseline.

Table 12: Emissions with Existing and Planned Efforts

Policy	2030	2040	2045
2005 (baseline) emissions ($MTCO_2e$)	666,430	666,430	666,430
Emissions with existing and planned programs ($MTCO_2e$)	508,380	530,510	549,320
Percent below baseline emissions	-24%	-20%	-18%

City of San Mateo
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Technical Appendix: Methods and Assumptions

GHG Reduction Measure Quantification

This appendix summarizes data sources, assumptions, and performance metrics used to calculate greenhouse gas emissions reductions for the City of San Mateo Climate Action Plan. The sources and metrics are organized by measure and rely on four primary types of data and research: (1) San Mateo's GHG emissions inventory and forecast, (2) government agency tools and reports, (3) case studies in similar jurisdictions, and (4) scholarly research.

Further, the quantification approaches are consistent with guidance provided by the Bay Area Air Quality Management District (BAAQMD) for development of a Qualified GHG Reduction Strategy. The baseline GHG inventory and forecast serve as the foundation for the quantification of the City's GHG reduction measures. Activity data from the inventory form the basis of measure quantification, including vehicle miles traveled (VMT), kilowatt-hours (kWh) of electricity or therms of natural gas consumed, and tons of waste disposed. Activity data were combined with the performance targets and indicators identified by the City and consultants. The activity data and performance targets and indicators were used throughout the quantification process to calculate the

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emissions reduction benefit of each measure. This approach ensures that San Mateo's GHG emissions reductions are tied to the baseline and to future activities occurring within the City.

Emissions Factors

Table 1-1 lists the emissions factors used to quantify emissions reductions in the CAP. These emission factors reflect the GHG reductions from existing and planned accomplishments, as well as PCE, to the extent feasible. They do not reflect the average emission factors with full implementation of this CAP.

Table 1-1: Emissions Coefficients for CAP Measures

Source	2005	2019	2030	2040	2045	Source
$MTCO_2e$ per mile driven (with Pavley)	0.000464	0.000392	0.000312	0.000277	0.000269	EMFAC 2021
$MTCO_2e$ per Caltrain passenger mile	0.004371	0.002506	0.000629	0.000627	0.000626	Caltrain, US Community Protocol
$MTCO_2e$ per kWh (PCE)	-	0.000045	0.000000	0.000000	0.000000	PCE, US EPA
$MTCO_2e$ per kWh (PG&E)	0.000223	0.000002	0.000002	0.000001	0.000000	PG&E, US EPA
$MTCO_2e$ per kWh (direct access)	0.000057	0.000212	0.000152	0.000095	0.000000	CEC, US EPA
$MTCO_2e$ per kWh (weighted community average)	0.000160	0.000054	0.000010	0.000006	0.000000	PCE, PG&E, CEC, US EPA
$MTCO_2e$ per therm	0.005292	0.005319	0.005319	0.005319	0.005319	US Community Protocol
$MTCO_2e$ per ton of waste	0.207521	0.253266	0.236134	0.236134	0. 236134	CARB Landfill Emissions Tool v1.3

These emissions coefficients were calculated as follows, using data from the GHG inventory and forecast:

- **$MTCO_2e$ per mile driven:** Divide the emissions from on-road transportation by the number of on-road vehicle miles traveled.

- **$MTCO_2e$ per passenger mile**: For Caltrain, divide the emissions from Caltrain activities related to San Mateo by the number of passenger miles attributed to San Mateo.
- **$MTCO_2e$ per kWh:** Divide the sum of the emissions for residential and commercial electricity use by the sum of the kWh for these two sources, for each electricity provider.
- **$MTCO_2e$ per therm:** Divide the sum of the emissions from residential and commercial natural gas by the sum of the therms used by these two sources.
- **$MTCO_2e$ per ton of waste:** Divide the sum of the emissions from landfilled waste and waste in place by the sum of the tons of waste in these sources.

TECHNICAL DATA FOR EXISTING AND PLANNED LOCAL AND REGIONAL ACTIVITIES

Data sources, methods, and assumptions for the quantification of the existing and planned local and regional activities are provided below. Note that some existing and planned local activities may not have assumptions and/or performance metrics. The GHG reductions shown for existing and planned local and regional activities are only in addition to any reductions achieved by existing or planned State efforts.

Peninsula Clean Energy

GHG Reduction

	2030	2040	2045
Emissions reduction ($MTCO_2e$)	20,000	13,750	0

Performance Indicators

	2030	2040	2045
Electricity supplied by PCE (kWh)	495,153,490	487,569,650	501,096,050
PCE electricity supplied to ECO100 customers (kWh)	27,614,500	27,614,500	27,614,500

GHG Method

For overall electricity supplied by PCE, the project team identified the current fraction of community electricity supplied by PCE and applied this ratio to future projections of electricity use. The team subtracted the amount of PCE-supplied electricity in 2020 from this future projection to obtain the increase in PCE electricity supplies,

then multiplied this value by an emissions factor that reflects PCE's future energy procurement plans. For ECO100, the project team identified how much electricity is served to ECO100 and applied an emissions factor that reflects the community's weighted average of electricity sources to determine the overall amount of averted emissions.

GHG Sources

California Energy Commission. 2023. *2019 Power Content Label: Peninsula Clean Energy*. https://www.energy.ca.gov/filebrowser/download/3244.

Doubrovskaia, M. 2023. Peninsula Clean Energy. Personal communication to A. Chow, City of San Mateo. April 19.

Technical Appendix: Methods and Assumptions

Energy-efficiency retrofits

Activity and GHG Reductions

	2030	2040	2045
Electricity savings (kWh)	136,470	136,470	136,470
Natural gas savings (therms)	5,910	5,910	5,910
Emissions reduction ($MTCO_2e$)	30	30	30

GHG Method

The project team collected data on the savings from energy efficiency retrofits, as reported by the San Mateo County Energy Watch and BayREN. The team then multiplied these values by the appropriate emissions factor in order to calculate GHG reductions.

GHG Sources

City of San Mateo. 2021. *Climate Action Plan Progress Report*. https://sanmateo.primegov.com/Portal/viewer?id=4766&type=2

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Solar energy installation

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	5,695,620	5,695,620	5,695,620
Emissions reduction ($MTCO_2e$)	20	10	0

GHG Method

The project team obtained data on the number and generation potential of new solar energy installations in San Mateo. The team then used a National Renewables Energy Laboratory tool to determine how much electricity can be produced in San Mateo, on average, per kilowatt of generation potential, and calculated the total electricity generated annually from these installations. The project team applied a weighted average community electricity emissions factor to this total to determine GHG reductions.

GHG Sources

California Solar Initiative. 2023. "California Distributed Generation Statistics." https://www.californiadgstats.ca.gov/downloads/

City of San Mateo. 2022. *Climate Action Plan Progress Report*. https://sanmateo.primegov.com/Portal/viewer?id=6472&type=2

National Renewable Energy Laboratory. n.d. "PVWatts Calculator." https://pvwatts.nrel.gov/.

Municipal energy-efficiency retrofits

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	1,831,170	1,831,170	1,831,170
Natural gas savings (therms)	22,870	22,870	22,870
Emissions reduction ($MTCO_2e$)	160	160	160

GHG Method

The project team reviewed the results of the energy efficiency analysis provided by PG&E, which identifies anticipated electricity and natural gas savings from implementing the SST retrofits. The team applied the appropriate electricity and natural gas emissions factor to determine the overall GHG reduction.

GHG Sources

City of San Mateo. 2021. *Climate Action Plan Progress Report*. https://sanmateo.primegov.com/Portal/viewer?id=4766&type=2

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Public-access EV chargers

GHG Reduction

	2030	2040	2045
Emissions reduction ($MTCO_2e$)	Less than 10	Less than 10	Less than 10

Performance Indicators

	2030	2040	2045
Net increase in EV VMT	258,720	258,720	258,720
Net increase in electricity use (kWh)	87,960	87,960	87,960

GHG Method

The project team collected information on the number of public EV chargers in San Mateo and used factors about the average charging use of public EV chargers to estimate how many VMT of EV use the public chargers in the community support annually. The project team then estimated the electricity use from these EV chargers. Next, the team applied the appropriate emissions factors to the VMT and electricity use figures and took the difference between the two as the net reduction in GHG emissions.

GHG Sources

Chow, A. 2023. City of San Mateo. Personal communication to E. Krispi, PlaceWorks. April 14.

ICLEI – Local Governments for Sustainability. n.d. Climate and Air Pollution Planning Assistant v 1.5.

US Environmental Protection Agency. n.d. "Interactive Version of the Electric Vehicle Label." https://www.epa.gov/fueleconomy/interactive-version-electric-vehicle-label.

Transportation Demand Management

Activity and GHG Reduction

	2030	2040	2045
Transportation savings (VMT)	725,620	700,370	687,710
Emissions reduction ($MTCO_2e$)	190	170	160

GHG Method

The project team obtained information from the San Mateo Rail Corridor Area Transportation Management Agency to identify the mandatory reductions in trip generation as a result of existing and under-construction developments subject to TDM provisions and combined this information with results from the inventory and forecast to estimate the decrease in VMT resulting from TDM. The project team applied the community-wide VMT emissions coefficient to this figure to determine the GHG reductions.

GHG Sources

Lim, L. 2019. City of San Mateo. Personal communication to A. Chow, City of San Mateo. January 3.

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Additional Bicycle Lanes

Activity and GHG Reduction

	2030	2040	2045
VMT savings	97,990	111,570	119,050
Emissions reduction ($MTCO_2e$)	30	30	30

Performance Indicators

	2030	2040	2045
Additional bicycle lanes (miles)	6.4	6.4	6.4

GHG Method

The project team reviewed the Bicycle Master Plan showing the increase in bicycle lanes planned for 2020 along with the number of bicycle lanes that have been constructed since the 2019 inventory. The team used this information and the proposed methodology from the California Air Pollution Control Officers Association to calculate the percentage increase in VMT associated with an increase in bicycle lanes and applied the VMT emissions factor for personal vehicles to determine the GHG reductions associated with this existing accomplishment.

GHG Sources

California Air Pollution Control Officers Association. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity."

Chow, A. 2023. City of San Mateo. Personal communication to E. Krispi, PlaceWorks. April 14

U.S. Census Bureau. 2023. 2014 – 2019 American Community Survey 5-Year Estimates, B08006: Sex of Workers by Means of Transportation to Work [data table].

Caltrain electrification

Activity and GHG Reduction

	2030	2040	2045
Electricity use increase (kWh)	11,852,700	11,852,700	11,852,700
Emissions reduction ($MTCO_2e$)	3,560	4,200	4,560

GHG Method

The project team reviewed information from the Caltrain electrification project EIR to estimate decreases in diesel use and increases in electricity use from electrification. The team combined these data with information from the inventory to scale these changes in activity data specifically to San Mateo. The team applied the Caltrain emissions factors from the inventory to determine net GHG reductions from electrification.

GHG Sources

Peninsula Corridor Joint Powers Board. 2014. *Peninsula Corridor Electrification Project Draft Environmental Impact Report.* http://www.caltrain.com/projectsplans/CaltrainModernization/Modernization/PeninsulaCorridorElectrificationProject/PCEP_DEIR_2014.html.

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TECHNICAL DATA FOR QUANTIFIED MEASURES

Data sources, methods, and assumptions for the quantification of CAP measures are provided below.

BE 1 All-electric new construction

Assumptions

	2030	2040	2045
Cumulative % of residential construction influenced by energy efficiency reach code:	90%	95%	95%
Cumulative % of office commercial construction influenced by energy efficiency reach code:	85%	90%	95%
Cumulative % of non-office commercial construction influenced by energy efficiency reach code:	40%	60%	90%
Cumulative % new non-residential buildings that are office space:	59%	64%	64%

Activity and GHG reductions

	2030	2040	2045
Electricity savings (kWh)	-8,588,290	-15,674,440	-19,303,790
Natural gas savings (therms)	3,099,740	5,653,260	6,936,870
Emissions reduction ($MTCO_2e$)	21,070	38,450	47,250

Performance indicators

	2030	2040	2045
Number of all-electric new construction residential housing units	8,280 new construction residential housing units built all-electric.	19,360 new construction residential housing units built all-electric.	25,500 new construction residential housing units built all-electric.
Square feet of all-electric new construction non-residential buildings	837,280 square feet of new construction non-residential buildings built all-electric.	2,264,130 square feet of new construction non-residential buildings built all-electric.	3,424,010 square feet of new construction non-residential buildings built all-electric.

GHG Method

The project team obtained data from Strive San Mateo General Plan 2040 Land Use Element on projected buildout of nonresidential buildings in San Mateo and data from Association of Bay Area Governments (ABAG) Plan Bay Area on projected buildout of households in San Mateo out to 2045, and used these data to estimate the number of new buildings that would be impacted by an all-electric new construction reach code. The team identified the average amount of natural gas used per household are per nonresidential square foot and data on the equivalent amount of electricity that would be required in an all-electric version of similar buildings, and applied this information to the projected number of new buildings built in order to estimate the projected reduction in natural gas consumption and the projected increase in electricity consumption resulting from the policy. The team then applied the emission factor for avoided natural gas consumption to estimate the emissions reduction associated with reduced natural gas consumption, and the emission factor for electricity use to estimate the emissions increase associated with increased electricity consumption. The net resulting emissions is the estimated emissions avoided from the policy.

GHG Sources

California Energy Commission. 2006. "California Commercial End-Use Survey." https://ww2.energy.ca.gov/ceus/2006_enduse.html

California Energy Commission. 2009. "2009 California Residential Appliance Saturation Study." https://ww2.energy.ca.gov/appliances/rass/previous_rass.html

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BE 2 All-electric existing buildings

Assumptions

	2030	2040	2045
Cumulative percent of commercial buildings that are office space	59%	64%	64%
Cumulative percent of residential gas equipment reaching end of life replaced with electric due to panel incentive	35%	40%	50%
Cumulative percent of residential electrical panel upgrades resulting in EV purchase	50%	35%	20%
Cumulative percent of office gas equipment reaching end of life replaced with electric due to panel incentive	70%	75%	90%
Cumulative percent of office electrical panel upgrades resulting in EV charging installation	40%	30%	20%
Cumulative percent of EV purchases replacing gasoline vehicle	98%	97%	96%
Cumulative percent of EV purchases replacing diesel vehicle	3%	3%	4%

Activity and GHG reductions

	2030	2040	2045
Electricity savings (kWh)	-80,105,780	-125,747,100	-133,624,540
Natural gas savings (therms)	5,002,490	11,459,340	17,775,000
Emissions reduction ($MTCO_2e$)	102,210	184,610	221,260

Performance indicators

	2030	2040	2045
Existing residential gas to electric HVAC conversions	9,890 existing residential gas HVAC systems replaced with electric HVAC systems.	22,620 existing residential gas HVAC systems replaced with electric HVAC systems.	35,340 existing residential gas HVAC systems replaced with electric HVAC systems.
Existing residential gas to electric water heating conversions	14,840 existing residential gas water heaters replaced with electric HVAC systems.	33,920 existing residential gas water heaters replaced with electric HVAC systems.	53,000 existing residential gas water heaters replaced with electric HVAC systems.
Existing residential gas to electric clothes drying conversions	7,420 existing residential gas clothes dryers replaced with electric clothes dryers.	16,960 existing residential gas clothes dryers replaced with electric clothes dryers.	26,500 existing residential gas clothes dryers replaced with electric clothes dryers.
Existing residential gas to electric cooking conversions	5,940 existing residential gas ranges and ovens replaced with electric ranges and ovens.	13,570 existing residential gas ranges and ovens replaced with electric ranges and ovens.	21,200 existing residential gas ranges and ovens replaced with electric ranges and ovens.
Existing residential electrical panel upgrades	19,050 existing residential electrical panels upgraded.	43,530 existing residential electrical panels upgraded.	68,020 existing residential electrical panels upgraded.
Square feet of existing offices receiving gas to electric HVAC conversions	5,523,120 square feet of existing office buildings replace existing gas HVAC systems with electric HVAC systems.	12,778,100 square feet of existing office buildings replace existing gas HVAC systems with electric HVAC systems.	19,167,150 square feet of existing office buildings replace existing gas HVAC systems with electric HVAC systems.
Square feet of existing offices receiving gas to electric water heating conversions	8,284,680 square feet of existing office buildings replace existing gas water heaters with electric water heaters.	19,167,150 square feet of existing office buildings replace existing gas water heaters with electric water heaters.	28,750,730 square feet of existing office buildings replace existing gas water heaters with electric water heaters.

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	2030	2040	2045
Square feet of existing offices receiving gas to electric cooking conversions	6,627,740 square feet of existing office buildings replace existing gas ranges and ovens with electric ranges and ovens.	15,333,720 square feet of existing office buildings replace existing gas ranges and ovens with electric ranges and ovens.	23,000,580 square feet of existing office buildings replace existing gas ranges and ovens with electric ranges and ovens.
Square feet of existing offices receiving electrical panel upgrades	10,217,770 square feet of existing office buildings electrical panels upgraded.	23,639,490 square feet of existing office buildings electrical panels upgraded.	35,459,230 square feet of existing office buildings electrical panels upgraded.
Number of electric vehicles purchased/leased to replace internal combustion engine (ICE) vehicles	16,750 electric vehicles purchased or leased by residents or commuters to replace internal combustion engine vehicles.	27,780 electric vehicles purchased or leased by residents or commuters to replace internal combustion engine vehicles.	26,150 electric vehicles purchased or leased by residents or commuters to replace internal combustion engine vehicles.
Existing office parking spaces with EV charging:	8,170 EV charging ports installed at existing office buildings.	14,180 EV charging ports installed at existing office buildings.	14,180 EV charging ports installed at existing office buildings.
Existing residential parking spaces with EV charging:	9,520 EV charging ports installed at existing residential buildings.	15,240 EV charging ports installed at existing residential buildings.	13,600 EV charging ports installed at existing residential buildings.

GHG Method

The project team used data from Strive San Mateo General Plan 2040 Land Use Element on projected buildout of residential and nonresidential buildings in San Mateo and data from Association of Bay Area Governments (ABAG) Plan Bay Area on projected buildout of households in San Mateo out to 2045 to estimate the number of existing buildings that would be impacted by a policy aimed at providing incentives to encourage residents and businesses to upgrade electric panels and adopt all-electric technologies. The team identified the percent of natural gas equipment (e.g., water heaters) that would be replaced at end of life if this policy existed, using the average life of natural gas equipment to estimate the number of each type of equipment type that would be replaced per year. Next, the project team consulted reports on the average amount of natural gas consumed by each type of equipment to estimate the natural gas consumption avoided through electrification of natural gas

equipment. The team used data on energy factors by equipment type to estimate the resulting increase in electricity use resulting from the replacement of natural gas equipment with electric equipment. The team also identified performance indicators for the percent of EV chargers that would be installed as a result of this policy and the resulting number of EVs that would be purchased due to accessibility of charging. The team used data on the average VMT by a passenger vehicle, average efficiency of gasoline vehicles, average efficiency of diesel vehicles, and average efficiency of electric vehicles to estimate the resulting gasoline and diesel consumption avoided and increase in electricity use resulting from the replacement of gasoline and diesel vehicles with electric vehicles. Last, the team applied the appropriate emission factors for natural gas consumption, electricity use, gasoline consumption, and diesel consumption to estimate the emissions reduction associated with a reduction in natural gas consumption, gasoline consumption, and diesel consumption and the increase in emissions associated with an increase in electricity consumption. The net resulting emissions is the estimated emissions avoided from the policy.

GHG Sources

California Energy Commission. 2006. "California Commercial End-Use Survey." https://ww2.energy.ca.gov/ceus/2006_enduse.html

California Energy Commission. 2009. "2009 California Residential Appliance Saturation Study." https://ww2.energy.ca.gov/appliances/rass/previous_rass.html

RSMeans. 2019 RSMeans Online, 2019 [software package].

ASHRAE, 2017. "ASHRAE Technical FAQ". https://www.ashrae.org/technical-resources/technical-faqs.

US Department of Energy. 2019. www.fueleconomy.gov. https://www.fueleconomy.gov/.

California Air Resources Board. 2022. "EMFAC2021 Web Database". https://arb.ca.gov/emfac/.

National Renewable Energy Laboratory. 2018. "CEC EV Infrastructure Projection Tool (EVI-Pro)." https://afdc.energy.gov/evi-pro-lite.

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RE I Peninsula Clean Energy

GHG Assumptions

	2030	2040	2045
Percent of residents enrolling in PCE	98%	99%	99.5%
Percent of businesses enrolling in PCE	98%	99%	99.5%
Percent of direct access customers switching to PCE	2%	4%	5%

GHG Reductions

	2030	2040	2045
Emissions reduction ($MTCO_2e$)	160	170	0

Performance Indicators

	2030	2040	2045
PCE opt-out rate	1.0%	1.0%	0.5%
kWh supplied by ECO 100	32,959,210	43,792,410	55,425,750

GHG Method

The project team identified the amount of electricity from San Mateo customers projected to switch from PG&E to PCE service, and PCE customers upgrading to ECO100. The team next applied the difference in PG&E and PCE emissions factors for both regular and ECO100 service to identify the decrease in GHG emissions.

GHG Sources

California Energy Commission. 2018. *2017 Power Content Label: Peninsula Clean Energy*. https://ww2.energy.ca.gov/pcl/labels/2017_labels/PCE_2017_PCL.pdf.

City of San Mateo. 2020. *2020 Climate Action Plan Annual Progress Report*. https://www.cityofsanmateo.org/3962/CAP-Progress-Updates.

TECHNICAL APPENDIX: METHODS AND ASSUMPTIONS

RE 2 Renewable energy systems for new and existing residences

GHG Assumptions

	2030	2040	2045
Percent of existing homes installing solar energy systems	15%	25%	30%
Percent of existing homes with solar energy systems installing battery storage systems	20%	35%	50%
Percent of new homes installing battery storage systems	25%	40%	60%

GHG Reduction

	2030	2040	2045
Emissions reduction ($MTCO_2e$)	70	160	0

Performance Indicators

	2030	2040	2045
Number of homes built before 2018 with solar panels	4,960	8,540	10,530
Number of total homes (existing and new) with battery energy systems	1,500	12,040	22,710

GHG Method

For solar energy systems, the project team identified the number of existing homes in San Mateo that could be projected to have a solar energy system. Using data from the National Renewable Energy Laboratory, the team identified how much electricity these solar energy systems could generate annually and applied the community-wide electricity factor to identify electricity savings. For battery systems, the team identified the number of new and existing homes installing solar energy systems and determined the number of these homes that could install a battery energy system. Assuming that battery systems fully charge and discharge once a day, the team identified how much additional renewable energy storage capacity would be enabled by the batteries. The project team then again applied the community-wide electricity factor to identify electricity savings.

GHG Sources

National Renewable Energy Laboratory. n.d. "PVWatts Calculator." https://pvwatts.nrel.gov/.

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Regional Climate Action Planning Suite. 2019. RICAPS Menu of Measures version 4.1 [data table].

RE 3 Renewable energy systems for new and existing nonresidential buildings

GHG Assumptions

	2030	2040	2045
Percent of existing businesses installing solar energy systems	6%	10%	15%
Percent of existing businesses with solar energy systems installing battery storage systems	15%	25%	40%

GHG reductions

	2030	2040	2045
Emissions reduction ($MTCO_2e$)	60	90	0

Performance indicators

	2030	2040	2045
Number of businesses built before 2018 with solar panels	180	340	550
Number of existing businesses with battery energy systems	40	100	240

GHG Method

The project team identified the number of existing businesses in San Mateo that could be projected to have a solar energy system. Using data from the National Renewable Energy Laboratory, the team identified how much electricity these solar energy systems could generate annually and applied the community-wide electricity factor to identify electricity savings. Next, the team identified the number of existing businesses installing solar energy systems and determined the number of these businesses that could install a battery energy system. Assuming that battery systems fully charge and discharge once a day, the team identified how much additional renewable energy storage capacity would be enabled by the batteries. The project team then again applied the community-wide electricity factor to identify electricity savings.

GHG Sources

National Renewable Energy Laboratory. n.d. "PVWatts Calculator." https://pvwatts.nrel.gov/.

Regional Climate Action Planning Suite. 2019. RICAPS Menu of Measures version 4.1 [data table].

EE 1 Residential energy efficiency retrofits

Assumptions

	2030	2040	2045
Percent of existing homes conducting standard retrofits (not including fuel-switched homes)	15%	18%	20%
Percent of existing homes retrofitting to current Title 24 standards (not including fuel-switched homes)	20%	25%	30%

Activity and GHG reductions

	2030	2040	2045
Electricity savings (kWh)	9,137,050	7,303,020	6,039,130
Natural gas savings (therms)	903,660	1,030,250	996,860
Emissions reduction ($MTCO_2e$)	6,160	7,020	6,790

Performance indicators

	2030	2040	2045
Number of homes retrofitted	2,290 single-family homes and 1,840 multifamily homes undergoing standard retrofits, and 3,060 single-family homes and 2,450 multifamily homes being upgraded to current Title 24 standards	2,540 single-family homes and 2,040 multifamily homes undergoing standard retrofits, and 3,530 single-family homes and 2,830 multifamily homes being upgraded to current Title 24 standards	2,350 single-family homes and 1,890 multifamily homes undergoing standard retrofits, and 3,530 single-family homes and 2,830 multifamily homes being upgraded to current Title 24 standards

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GHG Method

The project team looked at reports from retrofit programs throughout California to identify the typical electricity and natural gas savings from single-family and multi-family home retrofits and applied these savings to the energy use patterns of residences in San Mateo. The team next reviewed current and projected future Title 24 standards against the current energy performance of San Mateo homes and projections of future San Mateo Title 24 retrofits to determine the typical electricity and natural gas savings. The team then applied the appropriate emissions factors to the energy savings estimates to determine GHG reductions.

GHG Sources

California Energy Commission. 2014. Impact Evaluation of the California Comprehensive Residential Retrofit Programs.

EE 2 Nonresidential energy efficiency retrofits

Assumptions

	2030	2040	2045
Percent of existing businesses conducting standard retrofits (not including fuel-switched businesses)	25%	35%	10%
Percent of existing businesses retrofitting to current Title 24 standards (not including fuel-switched businesses)	15%	40%	75%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	22,252,780	60,968,630	93,592,880
Natural gas savings (therms)	535,400	1,266,570	1,964,000
Emissions reduction ($MTCO_2e$)	3,800	8,860	13,380

Performance Indicators

	2030	2040	2045
Number of businesses retrofitted	590 businesses undergoing standard retrofits, and 360 businesses upgraded to current Title 24 standards.	740 businesses undergoing standard retrofits, and 840 businesses upgraded to current Title 24 standards.	170 businesses undergoing standard retrofits, and 1,300 businesses upgraded to current Title 24 standards.

GHG Method

The project team looked at reports of the energy savings from different types of nonresidential energy efficiency retrofits to identify the typical electricity and natural gas savings from these activities and applied these savings to the energy use patterns of San Mateo businesses. The team next reviewed current and projected future Title 24 standards against the current energy performance of San Mateo businesses and projections of future San Mateo Title 24 retrofits to determine the typical electricity and natural gas savings. The team then applied the appropriate emissions factors to the energy savings estimates to determine GHG reductions.

APPENDIX 1

GHG Sources

Pacific Northwest National Laboratory. 2011. Advanced Energy Retrofit Guides: Office Buildings. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf.

Pacific Northwest National Laboratory. 2011. Advanced Energy Retrofit Guides: Retail Buildings. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20814.pdf.

EE 3 Residential tree planting

Assumptions

	2030	2040	2045
Percent of households with shade trees	10%	25%	35%

Activity and GHG reduction

	2030	2040	2045
Electricity savings (kWh)	793,560	1,889,740	2,837,540
Emissions reduction ($MTCO_2e$)	Less than 10	Less than 10	0

Performance Indicators

	2030	2040	2045
Number of households with shade trees	4,240	13,130	22,330

GHG Method

The GHG inventory and reports from PG&E were used to identify per business energy use in San Mateo, while data from the Pacific Northwest National Laboratory, the California Energy Commission, and academic studies were used to determine reductions per home. These results were combined with participation rates to calculate total reductions in energy use from this measure. The outcome was then combined with emissions factors from the inventory to determine GHG reductions.

GHG Sources

The project team reviewed studies about the typical electricity savings from reduced air conditioning demand associated with tree planting. The team then applied this information to projections of future participation and the energy use patterns in San Mateo to identify total electricity reduction. Next, the team converted this to GHG emission savings using the appropriate emissions factors.

APPENDIX 1

ME 1 Energy efficiency for new municipal buildings

GHG Assumptions, Reductions, and Performance Indicators

This measure is supportive due to the lack of information about future municipal construction. There are no assumptions, activity or GHG reductions, or performance indicators for supportive measures.

GHG Method

Supportive measures do not produce direct, measurable GHG reductions, so no calculations were made.

GHG Sources

Supportive measures do not produce direct, measurable GHG reductions. There are no sources for GHG reduction calculations for supportive measures.

ME 2 Energy efficiency at existing municipal buildings

Assumptions

	2030	2040	2045
Percent of existing municipal square footage retrofitted	10%	25%	35%

Note that these retrofits go beyond those included as part of the Sustainable Solutions Turnkey program, as those are already accounted for as a planned action.

Activity and GHG Reductions

	2030	2040	2045
Electricity savings (kWh)	67,260	168,140	235,400
Natural gas savings (therms)	1,860	4,640	6,500
Emissions reduction ($MTCO_2e$)	10	30	40

Performance Indicators

	2030	2040	2045
Square footage of retrofitted municipal buildings	9,440	23,610	33,050

GHG Method

The project team looked at the typical energy efficiency savings that can be achieved with retrofits to office buildings and applied this reduction to the projected amount of retrofitted City square footage to calculate the total electricity and natural gas savings. The team then used the appropriate emission factors to identify the GHG reductions from these retrofits.

GHG Sources

City of San Mateo. 2007. *City of San Mateo Greenhouse Gas Emissions Inventory Report*. https://www.cityofsanmateo.org/DocumentCenter/View/5262/APPENDIX-S-October24-2007?bidId=

Pacific Northwest National Laboratory. 2011. Advanced Energy Retrofit Guides: Office Buildings. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf.

APPENDIX 1

ME 3 All-electric municipal buildings

Assumptions

	2030	2040	2045
Cumulative building area of existing municipal building/s electrified (square feet):	40,000	60,000	80,000
Cumulative number of police stations & fire stations electrified:	0	0	1
Cumulative building area of new municipal building/s electrified (square feet):	40,000	60,000	80,000

Activity and GHG Reductions

	2030	2040	2045
Electricity savings (kWh)	-157,380	-236,070	-314,760
Natural gas savings (therms)	19,760	29,640	39,520
Emissions reduction ($MTCO_2e$)	130	200	270

Performance Indicators

	2030	2040	2045
Square feet of existing municipal building/s electrified:	40,000 square feet of existing municipal buildings retrofitted to all-electric.	60,000 square feet of existing municipal buildings retrofitted to all-electric.	80,000 square feet of existing municipal buildings retrofitted to all-electric.
Number of police stations & fire stations electrified:	0 existing police stations or fire stations retrofitted to all-electric.	0 existing police stations or fire stations retrofitted to all-electric.	1 existing police stations or fire stations retrofitted to all-electric.
Square feet of new municipal building/s electrified:	40,000 square feet of new municipal buildings built all-electric.	60,000 square feet of new municipal buildings built all-electric.	80,000 square feet of new municipal buildings built all-electric.

TECHNICAL APPENDIX: METHODS AND ASSUMPTIONS

GHG Method

The project team to inputs from City staff to project the total square footage of new municipal construction that is built all-electric and existing municipal construction that is retrofitted to be all-electric. The team estimated annual gas use associated with the existing municipal buildings to be retrofitted and the newly constructed municipal buildings (assuming they were built with natural gas equipment), based on energy use intensity information from the California Energy Commission Commercial End-Use Survey. The team used this estimate on "business as usual" natural gas consumption for these buildings to calculate the natural gas consumption avoided from retrofitting to all-electric or building to all-electric. The team looked at data on the average amount of natural gas consumed by each type of equipment to estimate the natural gas consumption avoided through electrification of natural gas equipment and used data on energy factors by equipment type was used to estimate the resulting increase in electricity use resulting from the replacement of natural gas equipment with electric equipment. The team applied emission factors for natural gas consumption and electricity use to estimate the emissions reduction associated with a reduction in natural gas consumption and the increase in emissions associated with an increase in electricity use and took the net resulting emissions as the estimated emissions avoided from the policy.

GHG Sources

California Energy Commission. 2009. "2009 California Residential Appliance Saturation Study." https://ww2.energy.ca.gov/appliances/rass/previous_rass.html

APPENDIX 1

CF 1 Electric vehicle charging infrastructure

Assumptions

	2030	2040	2045
Cumulative average square feet of new commercial building space per parking spot	300	300	300
Target percent of new workplace parking to have EV charger installed	20%	20%	25%
Target percent of new multi-unit dwelling residents with EV charger access	15%	25%	30%
Target percent of new single-family homes to have EV charger outlet installed	15%	25%	35%
Cumulative percent commercial buildings that are office space with parking	59%	64%	64%
Cumulative average square feet of existing commercial building space per parking spot	600	600	600
Target percent of existing workplace parking to have EV charger installed	7%	8%	10%
Target percent of existing multi-unit dwelling residents with access to EV charging	7%	8%	10%
Cumulative target additional public parking spaces with EV charging	38	55	60
Cumulative percent of EV purchases that replace a gasoline vehicle	98%	97%	96%
Cumulative percent of EV purchases that replace a diesel vehicle	2%	3%	4%
Target percent of heavy-duty vehicle converted to EV	5%	20%	25%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	-22,561,870	-36,502,430	-51,974,960
Emissions reduction ($MTCO_2e$)	24,420	49,390	69,780

Performance Indicators

	2030	2040	2045
New non-residential parking spaces with EV charging	1,570 EV charging ports installed at new non-residential buildings.	3,160 EV charging ports installed at new non-residential buildings.	5,010 EV charging ports installed at new non-residential buildings.
New multi-unit dwelling residential parking spaces with EV charging	810 EV charging ports installed at new multi-family residential buildings.	3,380 EV charging ports installed at new multi-family residential buildings.	5,290 EV charging ports installed at new multi-family residential buildings.
New single-family residential parking spaces with EV charger outlet	680 EV charging outlets installed at new single-family residential buildings.	1,970 EV charging outlets installed at new single-family residential buildings.	3,600 EV charging outlets installed at new single-family residential buildings.
Existing non-residential parking spaces with EV charging	1,540 EV charging ports installed at existing non-residential buildings.	2,100 EV charging ports installed at existing non-residential buildings.	2,770 EV charging ports installed at existing non-residential buildings.
Existing multi-unit dwelling residential parking spaces with EV charging	1,850 EV charging ports installed at existing multi-family residential buildings.	2,570 EV charging ports installed at existing multi-family residential buildings.	3,530 EV charging ports installed at existing multi-family residential buildings.
Existing additional public parking spaces with EV charging	38 EV charging ports installed at existing public locations.	60 EV charging ports installed at existing public locations.	60 EV charging ports installed at existing public locations.
Number of light-duty electric vehicles purchased or leased	5510 light-duty electric vehicles purchased or leased	10,840 light-duty electric vehicles purchased or leased.	16,110 light-duty electric vehicles purchased or leased

APPENDIX 1

GHG Method

The project team relied on data from the Strive San Mateo General Plan 2040 Land Use Element for the projected buildout of nonresidential buildings in San Mateo, along with data from Association of Bay Area Governments (ABAG) Plan Bay Area on projected buildout of households in San Mateo out to 2050, to estimate the number of new buildings that would be impacted by an electric vehicle charging infrastructure new construction reach code. The team used permit data from the U.S. Department of Housing and Urban Development to estimate the percent of new residential units that will be single family or duplex vs. 3+ unit multifamily. Using assumptions regarding the building square footage per new development parking space, the team identified the total number of parking spaces associated with multi-family residential and commercial development, assuming an increasing percentage of new development parking spaces will be required to be built electric vehicle (EV) capable to accommodate electric vehicle supply equipment (EVSE). The team looked at how the deployment of EVSE in new development is projected to increase the rate at which residents and employees will replace gasoline vehicles with EVs, and estimated how the increased adoption of EVs is likely to decrease the VMT (and associated gasoline and diesel consumption) from gasoline and diesel vehicles and increase the VMT (and associated electricity use) from EVs. The team then applied emission factors for avoided gasoline and diesel consumption, and increased electricity use, and took the difference as the net reduction in GHG emissions.

GHG Sources

California Air Resources Board. 2022. "EMFAC2021 Web Database."

NREL, 2018. "CEC EV Infrastructure Projection Tool (EVI-Pro)."

U.S. Census Bureau. 2017. "American Community Survey."

U.S. Department of Energy. 2019. "www.fueleconomy.gov."

U.S. Department of Housing and Urban Development. 2019. "State of the Cities Data Systems."

U.S. Department of Transportation Federal Highway Administration. 2016. "Average miles driven per year by state."

CF 2 Electric vehicle education and outreach

Assumptions

	2030	2040	2045
Target percent of total community Transportation Network Company (TNC) VMT from electric vehicles	30%	45%	60%
Target percent total community VMT from electric vehicles	30%	60%	70%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	-4,334,040	-6,786,810	-10,211,980
Emissions reduction ($MTCO_2e$)	4,910	8,030	12,360

Performance Indicators

	2030	2040	2045
Annual additional VMT travelled by EV TNCs	17,528,180 vehicle miles travelled by internal combustion engine transportation network companies vehicles replaced with electric vehicles.	30,375,160 vehicle miles travelled by internal combustion engine transportation network companies vehicles replaced with electric vehicles.	45,704,900 vehicle miles travelled by internal combustion engine transportation network companies vehicles replaced with electric vehicles.

GHG Method

The projected team relied on forecasted total community VMT from passenger vehicles and estimates from the City of San Francisco on the percent of total community VMT from Transportation Network Companies (TNCs) to estimate the total annual VMT from TNCs in City of San Mateo. The team assumed that the policy or program aimed at regulating or incentivizing TNCs to increase adoption of EVs will results in a specific percent of TNCs being EVs by a given target year, and then estimated how the increased adoption of TNC EVs will decrease the VMT (and associated gasoline consumption) associated with gasoline vehicles and increase the VMT (and

associated electricity consumption) associated with EVs. The team applied the emission factor for avoided gasoline consumption, and an emissions factor for increased electricity use. The difference between the two results is the net GHG reduction from this measure.

GHG Sources

California Air Resources Board, 2022. "EMFAC2021 Web Database."

San Francisco County Transportation Authority. 2017. "TNCs Today: A Profile of San Francisco Transportation Network Company Activity."

US Department of Energy. 2019. www.fueleconomy.gov.

CF 3 Clean City fleet

GHG Assumptions

	2030	2040	2045
Percent of City vehicles replaced with EVs	25%	45%	60%
Percent of City vehicles fueled by biomethane	15%	20%	25%

Activity and GHG Reductions

	2030	2040	2045
Electricity savings (kWh)	-105,540	-212,500	-319,750
Emissions reduction ($MTCO_2e$)	130	200	270

Performance Indicators

	2030	2040	2045
Fleet EV VMT	610,020	1,250,360	1,779,020
Fleet biomethane VMT	366,010	555,720	741,260

GHG Method

The projected team looked at State projections for regional increases in electric and natural gas (including biomethane) vehicles and applied these proportions to the City municipal fleet. The team then took the local projections for increases in electric and natural gas vehicles in the municipal fleet and identified the increase in electric and natural gas VMT resulting from local policies. The team then adjusted the natural gas VMT to account for the different energy density of natural gas and gasoline/diesel and calculated the increase in electricity resulting from greater municipal EV adoption. Lastly, the team applied emission factors, taking the net difference between decreased VMT emissions from electric and natural gas vehicle adoption and increased electricity use as the overall GHG benefit.

APPENDIX 1

GHG Sources

City of San Mateo. 2007. *City of San Mateo Greenhouse Gas Emissions Inventory Report*. https://www.cityofsanmateo.org/DocumentCenter/View/5262/APPENDIX-S-October24-2007?bidId=

ICLEI Local Governments for Sustainability USA. 2012. *US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions*. http://www.icleiusa.org/tools/ghgprotocol/community-protocol.

Gable, C., and Gable, S. 2019. "Gasoline Gallon Equivalents (GGE)." https://www.thoughtco.com/fuel-energy-comparisons-85636.

CF 4 Clean fuel

GHG Assumptions

	2030	2040	2045
Target % total community VMT from hydrogen vehicles	8%	30%	45%

Activity and GHG Reductions

	2030	2040	2045
Electricity savings (kWh)	-2,186,300	-8,413,180	-13,430,770
Emissions reduction ($MTCO_2e$)	4,210	16,920	26,360

Performance Indicators

	2030	2040	2045
Number of heavy-duty hydrogen vehicles purchased or leased	260 hydrogen fuel heavy-duty cell vehicles purchased or leased .	1,110 hydrogen fuel cell heavy-duty vehicles purchased or leased .	1,770 hydrogen fuel cell heavy-duty vehicles purchased or leased .

GHG Method

The project team estimated how the deployment of hydrogen fueling stations will increase the rate at which residents and employees will replace heavy-duty gasoline and diesel vehicles with hydrogen fuel cell vehicles (FCVs). The team analyzed how the increased adoption of FCVs is likely to decrease the VMT (and associated gasoline consumption) associated with heavy-duty gasoline diesel vehicles and increase the VMT (and associated hydrogen consumption) associated with FCVs. The team used data from the U.S. Department of Energy on the efficiency of the electrolysis process to estimate the amount of electricity required to produce hydrogen. The team then applied an emission factor for avoided gasoline and diesel consumption to estimate the emissions reduction associated with reduced gasoline and diesel consumption, and an emission factor for electricity consumption to estimate the emissions increase associated with increased electricity use. The net resulting emissions is the estimated emissions avoided from the policy.

APPENDIX 1

GHG Sources

California Air Resources Board, 2022. "EMFAC2021 Web Database."

California Air Resources Board, 2023. "Final 2022 Scoping Plan – AB 32 GHG Inventory Sectors Modeling Data Spreadsheet." https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents.

US Department of Energy, 2019. www.fueleconomy.gov.

U.S. Department of Energy, 2019. "DOE Technical Targets for Hydrogen Production from Electrolysis."

TECHNICAL APPENDIX: METHODS AND ASSUMPTIONS

ST 1 Bicycle mode share

GHG Assumptions

	2020	2030	2050
Additional miles of bike lanes	22	45.2	45.2

Activity and GHG Reduction

	2020	2030	2050
Travel savings (VMT)	300,960	704,120	751,370
Emissions reduction ($MTCO_2e$)	80	170	180

Performance Indicators

	2020	2030	2050
Total miles of bike lanes	78	101	101

GHG Method

The project team identified projected increase in bike lanes from implementation of the Bicycle Master Plan. Based on the proposed additional miles of bike lanes in San Mateo, the team followed the recommendations of the California Air Pollution Control Officer's Association to estimate the projected decrease in VMT as a result. The team then applied the appropriate emissions factors to calculate the GHG reduction.

GHG Sources

California Air Pollution Control Officers Association. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity."

City of San Mateo. 2019. *City of San Mateo Bicycle Master Plan*. https://www.cityofsanmateo.org/3944/Bicycle-Master-Plan-Update.

APPENDIX 1

ST 2 Pedestrian mode share

GHG Assumptions

It is assumed that all new development occurs in infill areas (areas with existing development)

Activity and GHG Reduction

	2020	2030	2050
Travel savings (VMT)	436,590	497,160	530,520
Emissions reduction ($MTCO_2e$)	110	120	130

Performance Indicators

There are no performance indicators associated with this measure.

GHG Method

Using the Pedestrian Master Plan, the project team identified the existing and planned miles of sidewalks and pedestrian pathways in San Mateo. The team applied a method recommended by the California Air Pollution Control Officers Association to determine the VMT reduction, and then applied the appropriate emissions factor to calculate GHG reductions.

GHG Sources

California Air Pollution Control Officers Association. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity."

City of San Mateo. 2012. "Citywide Pedestrian Master Plan." https://www.cityofsanmateo.org/2218/Pedestrian-Master-Plan

ST 3 Micromobility and shared mobility

GHG assumptions, activity and GHG reductions, and performance indicators.

This is a supportive measure, due to the lack of sufficient data or a feasible method of quantification that would avoid double-counting reductions with other measures. As a result, there are no assumptions, activity or GHG reductions, and performance indicators associated with this measure.

GHG Method

Supportive measures do not produce direct, measurable GHG reductions, so no calculations were made.

GHG Sources

Supportive measures do not produce direct, measurable GHG reductions. There are no sources for GHG reduction calculations for supportive measures.

APPENDIX 1

ST 4 Public transit service

GHG Assumptions

	2030	2040	2045
Bus coverage	15%	20%	20%
Percent increase in Caltrain service	25%	40%	50%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	-10,253,31	-23,468,340	-31,189,470
Travel savings (VMT)	13,770,100	23,451,790	29,098,510
Emissions reduction ($MTCO_2e$)	3,610	5,660	6,910

Performance Indicators

	2030	2040	2045
Bus commute share	15%	20%	20%
Average Caltrain daily ridership in San Mateo	8,070	12,900	15,720

GHG Method

For increases in the bus coverage network, the project team made an assumption regarding the percentage increase in bus network miles. Using methods from the California Air Pollution Control District, the project team determined the VMT reduction that would occur given this increase in network coverage, and then applied the appropriate GHG emissions factor. For an increase in Caltrain service frequency, the project team reviewed Caltrain's existing business plan and projected increases in service under the "Moderate Growth" scenario, then applied this increase to San Mateo. Using factors from the inventory and existing/planned activity calculations, the team determined the VMT reduction from increased Caltrain service as well as the increase in electricity use due to Caltrain becoming a mostly electric system. The team applied the appropriate emissions factors to the difference in VMT to calculate a reduction in emissions.

TECHNICAL APPENDIX: METHODS AND ASSUMPTIONS

GHG Sources

California Air Pollution Control Officers Association. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity."

Caltrain. 2020. *Caltrain Business Plan Summary Report.* https://www.caltrain.com/media/24042/download?inline.

Caltrain. 2019. *Caltrain Business Plan: Developing a Long-Range Vision for Caltrain*. https://caltrain2040.org/wp-content/uploads/CBP_CIA_R2_Booklet_SanMateo-2.pdf.

U.S. Census Bureau. 2023. 2014 – 2019 American Community Survey 5-Year Estimates, B08006: Sex of Workers by Means of Transportation to Work [data table].

APPENDIX 1

ST 5 Commuter programs

GHG Assumptions

	2030	2040	2045
Percent of existing employers (pre-2006) participating in TDM	5%	20%	30%
Average trip reduction from voluntary TDM participation, beyond other CAP measures	8%	30%	40%

Activity and GHG Reduction

	2030	2040	2045
Travel savings (VMT)	15,290	278,640	669,000
Emissions reduction ($MTCO_2e$)	Less than 10	70	160

Performance Indicators

	2030	2040	2045
Existing (pre-2006) businesses participating in TDM efforts	130	540	810

GHG Method

The project team identified the amount of commute-related VMT from personal vehicles associated with existing businesses and applied the projected metrics from voluntary participation in Transportation Demand Management (TDM) programs to determine the total VMT reduction from implementation of this measure. The team then used the appropriate emissions factors to calculate GHG reductions. It is assumed that these TDM standards would go beyond trip reductions associated with other measures in the CAP, as the goal of TDM efforts is to reduce trip generation below the level that would otherwise occur if the TDM requirement was not in place.

GHG Sources

California Air Pollution Control Officers Association. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity."

ST 6 Transportation Demand Management

GHG Assumptions

	2030	2040	2045
Percent of new developments subject to TDM rules	90%	90%	90%
Average trip reduction from new development subject to TDM rules, beyond other CAP measures	10%	15%	20%

Activity and GHG Reduction

	2030	2040	2045
Travel savings (VMT)	7,646,580	32,944,170	56,484,350
Emissions reduction ($MTCO_2e$)	2,010	7,950	13,410

Performance Indicators

	2030	2040	2045
Service population in new development (2018 and later) subject to the TDM ordinance	29,940	65,680	86,010

GHG Method

The project team determined the number of new people and jobs in developments that would be subject to TDM rules, excluding those already identified through the existing and planned activities assessment. Using projections of future TDM standards, the project team determined the amount of VMT that would be reduced by future TDM requirements, then converted this reduction to a decrease in GHG emissions. It is assumed that these TDM standards would go beyond trip reductions associated with other measures in the CAP, as the goal of TDM efforts is to reduce trip generation below the level that would otherwise occur if the TDM requirement was not in place.

GHG Sources

California Air Pollution Control Officers Association. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity."

APPENDIX 1

ST 7 Transit-oriented development

GHG Assumptions

	2030	2040	2045
Percent of new units in areas supporting transit-oriented development	95%	95%	95%
Percent of new nonresidential square footage in areas supporting transit-oriented development	90%	90%	90%

Activity and GHG Reduction

	2030	2040	2045
Travel savings (VMT)	38,865,630	78,398,130	99,833,910
Emissions reduction ($MTCO_2e$)	10,200	18,920	23,700

Performance Indicators

	2030	2040	2045
New development in TOD zones	9,610 households and 7,350 employees	20,330 households and 14,880 employees	26,520 households and 18,970 employees

GHG Method

The project team identified the anticipated development in areas that support transit-oriented development and used geospatial analysis to obtain a reasonable estimate of the new growth potential in these areas. The team then used resources from the California Air Pollution Control Officers Association to determine the VMT reduction associated with transit-oriented development in these areas, then applied the appropriate emissions factors to calculate GHG reductions.

GHG Sources

California Air Pollution Control Officers Association. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity."

City of San Mateo. 2018. Area plans [GIS file].

City of San Mateo. 2018. SMRoadCenterline [GIS file].

Metropolitan Transportation Commission. 2017. Major_Transit_Stops_2017 [GIS file].

Technical Appendix: Methods and Assumptions

SW 1 Composting program

GHG Assumptions

	2030	2040	2045
Residential composting participation rate	90%	93%	95%
Nonresidential composting participation rate	85%	88%	90%

Activity and GHG Reduction

	2030	2040	2045
Waste savings (tons)	2,350	3,900	4,220
Emissions reduction ($MTCO_2e$)	1,030	1,710	1,850

Performance Indicators

	2030	2040	2045
Composting participation levels	47,270 households and 3,890 businesses	59,020 households and 4,510 businesses	66,800 households and 4,880 businesses

GHG Method

The project team reviewed the number of future projected residences and nonresidential buildings participating in the community's composting program, removing the currently participating customers to only focus on growth in the composting program. The team used results of a statewide waste characterization study to estimate the total amount of organic waste generated by the participants and combined this information with technical factors for waste decomposition by materials to identify the total reduction in GHG emissions.

GHG Sources

California Air Resources Board. 2010. *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories version 1.1.* https://ww3.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

California Air Resources Board. 2011. Landfill Emissions Tool version 1.3. https://ww3.arb.ca.gov/cc/landfills/landfills.htm

California Department of Resources Recycling and Recovery. 2020. *2018 Disposal-Facility-Based Characterization of Solid Waste in California*. https://www2.calrecycle.ca.gov/Publications/Details/1546.

City of San Mateo. 2022. *2022 Climate Action Plan Annual Progress Report.* https://www.cityofsanmateo.org/3962/CAP-Progress-Updates

APPENDIX 1

SW 2 Expanded recycling service

GHG Assumptions

	2030	2040	2045
Target diversion rate	85%	88%	90%

Activity and GHG Reduction

	2030	2040	2045
Waste savings (tons)	9,860	12,570	14,330
Emissions reduction ($MTCO_2e$)	6,070	7,730	8,820

Performance Indicators

	2030	2040	2045
Total tons of recyclables recovered (curbside bins only)	22,450	27,420	30,480

GHG Method

The project team looked at projections of how San Mateo's diversion rate from curbside recycling may increase in future years and used statewide waste characterization studies to identify the amounts of various material types that could be recovered from this increase. The team then applied the results of technical studies about waste decomposition to determine the total GHG reductions that would result from increased waste collection.

GHG Sources

California Air Resources Board. 2010. *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories version 1.1*. https://ww3.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

California Air Resources Board. 2011. Landfill Emissions Tool version 1.3. https://ww3.arb.ca.gov/cc/landfills/landfills.htm

California Department of Resources Recycling and Recovery. 2020. *2018 Disposal-Facility-Based Characterization of Solid Waste in California*. https://www2.calrecycle.ca.gov/Publications/Details/1666.

Chow, A. 2023. City of San Mateo. Personal communication to E. Krispi, PlaceWorks. April 24.

SW 3 Waste awareness and source reduction

GHG Assumptions

	2030	2040	2045
Decrease in non-organic and non-recyclable waste tonnage	5%	20%	50%

Activity and GHG Reduction

	2030	2040	2045
Waste savings (tons)	15,420	30,110	41,510
Emissions reduction ($MTCO_2e$)	2,080	4,050	5,590

Performance Indicators

	2030	2040	2045
Decrease in non-organic and non-recyclable waste tonnage sent to landfills	15,420	30,110	41,510

GHG Method

The project team looked at statewide waste characterization studies to determine the amount of materials being produced in San Mateo that could not be recycled or composted (including construction and demolition wastes) and used technical studies about waste characterization to determine the GHG emissions associated with a ton of this waste material. The project team then examined projections about waste awareness potential to identify how much of this waste could be reduced in future years and combined these two outcomes to determine the total GHG savings.

GHG Sources

California Air Resources Board. 2010. *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories version 1.1.* https://ww3.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

California Air Resources Board. 2011. Landfill Emissions Tool version 1.3. https://ww3.arb.ca.gov/cc/landfills/landfills.htm

California Department of Resources Recycling and Recovery. 2020. *2018 Disposal-Facility-Based Characterization of Solid Waste in California*. https://www2.calrecycle.ca.gov/Publications/Details/1666.

APPENDIX 1

WW 1 Water-efficiency retrofits for existing buildings

GHG Assumptions

	2030	2040	2045
Percent of existing homes retrofitting water fixtures	50%	70%	80%
Percent of existing businesses retrofitting water fixtures	40%	70%	80%
Percent of existing homes with greywater systems	5%	15%	20%
Percent of existing businesses with greywater systems	3%	10%	15%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	411,310	777,100	914,320
Water savings (millions of gallons)	160	280	340
Emissions reduction ($MTCO_2e$)	170	300	360

Performance Indicators

	2030	2040	2045
Number of water efficiency retrofits	19,890 existing homes and 1,610 existing businesses with water efficiency retrofits.	27,840 existing homes and 2,820 existing businesses with water efficiency retrofits.	31,820 existing homes and 3,230 existing businesses with water efficiency retrofits.
Number of greywater system installations as part of retrofit activities	2,120 homes and 120 businesses with greywater systems installed.	6,360 homes and 400 businesses with greywater systems installed.	8,480 homes and 610 businesses with greywater systems installed.

GHG Method

Working on the assumption that half of greywater systems are laundry-to-landscaping, and that the other half uses greywater from additional sources such as wash basins and showers, the project team identified the water savings resulting from greywater systems for an individual home or business. The project team then used the

water savings to determine the decrease in electricity use and direct process emissions associated with this effort per building, and then applied the projections of greywater installations at existing San Mateo buildings as part of retrofit activities to identify the total water, electricity, and direct process emissions. The team applied the appropriate electricity emissions coefficients to identify the additional GHG savings.

GHG Sources

Alliance for Water Efficiency. 2009. *Making Every Drop Work: Increasing Water Efficiency in California's Commercial, Industrial, and Institutional (CII) Sector*. https://www.allianceforwaterefficiency.org/resources/publications/making-every-drop-work-increasing-water-efficiency-california%E2%80%99s-commercial.

California Department of Water Resources. 2013. *California Water Plan 2013 Update, Volume 3, Chapter 3: Water Use Efficiency*. http://toolbox.calwep.org/wiki/California_Water_Plan_2013_Update_(selections)#tab=Vol__3_Ch__3_-_Water_Use_Efficiency.

California Department of Water Resources. 2017. *Making Water Conservation a California Way of Life: Implementing Executive Order B-37-16*. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/County-Drought-Planning/Files/Making-Water-Conservation-a-CA-Way-of-Life-EO-B-37-16.pdf.

APPENDIX 1

WW 2 Water-efficient landscaping

GHG Assumptions

	2030	2040	2045
Reduction in total outdoor water use	10%	20%	25%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	374,760	827,380	1,086,620
Water savings (millions of gallons)	260	570	750
Emissions reduction ($MTCO_2e$)	Less than 10	10	0

GHG Method

The team estimated the total water use that occurs outdoors in San Mateo and determined the amount that would be reduced based on assumed participation levels. The project team then used the water savings to determine the decrease in electricity use associated with this effort and applied the appropriate electricity emissions coefficients to identify the GHG savings.

GHG Sources

There are no sources for this measure beyond the inventory and forecast.

WW 3 Water efficiency in new construction

GHG Assumptions

	2030	2040	2045
Percent of new homes installing greywater systems	8%	20%	25%
Percent of new businesses installing greywater systems	5%	15%	20%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	7,620	40,580	66,320
Water savings (millions of gallons)	10	30	50
Emissions reduction ($MTCO_2e$)	Less than 10	10	10

Performance Indicators

	2030	2040	2045
Number of new homes with greywater systems	810	4,280	6,980
Number of new businesses with greywater systems	30	160	280

GHG Method

Working on the assumption that half of greywater systems are laundry-to-landscaping, and that the other half uses greywater from additional sources such as wash basins and showers, the project team identified the water savings resulting from greywater systems for an individual home or business. The project team then used the water savings to determine the decrease in electricity use and direct process emissions associated with this effort per building, and then applied the projections of greywater installations at new San Mateo buildings to identify the total water, electricity, and direct process emissions. The team applied the appropriate electricity emissions coefficients to identify the additional GHG savings.

APPENDIX 1

GHG Sources

Alliance for Water Efficiency. 2009. *Making Every Drop Work: Increasing Water Efficiency in California's Commercial, Industrial, and Institutional (CII) Sector*. https://www.allianceforwaterefficiency.org/resources/publications/making-every-drop-work-increasing-water-efficiency-california%E2%80%99s-commercial.

California Department of Water Resources. 2013. *California Water Plan 2013 Update, Volume 3, Chapter 3: Water Use Efficiency*. http://toolbox.calwep.org/wiki/California_Water_Plan_2013_Update_(selections)#tab=Vol__3_Ch__3_-_Water_Use_Efficiency.

California Department of Water Resources. 2017. *Making Water Conservation a California Way of Life: Implementing Executive Order B-37-16*. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/County-Drought-Planning/Files/Making-Water-Conservation-a-CA-Way-of-Life-EO-B-37-16.pdf.

OR 1 Alternative fuel off-road equipment

GHG Assumptions

	2030	2040	2045
Percent of landscaping equipment that uses electricity	20%	45%	60%
Percent of other off-road equipment that uses electricity	15%	25%	30%

Activity and GHG Reduction

	2030	2040	2045
Electricity savings (kWh)	-2,201,600	-4,633,000	-6,091,990
Emissions reduction ($MTCO_2e$)	3,660	7,130	9,890

GHG Method

The team used data from the California Air Resources Board and the inventory to identify the reduction in direct emissions per percent of landscaping equipment and non-landscaping off-road equipment converted to electricity traded in. The team then estimated the decrease in gasoline and diesel fuel resulting from this effort and used information about energy density to determine the increase in electricity needs. The team estimated the GHG increase from greater electricity needs and subtracted this from the emission reduction from decreased fuel use to determine the net GHG reduction.

GHG Sources

Alternative Fuels Data Center. 2014. *Alternative Fuels Data Center – Fuel Properties Comparison*. https://afdc.energy.gov/fuels/fuel_comparison_chart.pdf/

California Air Resources Board. 2022. "EMFAC2021 Web Database."

We Can Model Regional Emissions, But Are the Results Meaningful for CEQA?

Authors: AEP Climate Change Committee (Michael Hendrix, Dave Mitchell, Haseeb Qureshi, Jennifer Reed, Brian Schuster, Nicole Vermilion, and Rich Walters)

On December 24, 2018, the California Supreme Court, *Sierra Club v. County of Fresno (Friant Ranch, L.P.] (2018) 6 Cal.5th 502, Case No. S219783 (Friant Ranch*), held that simply identifying that a project exceeds an emissions threshold is not sufficient to identify a project's significant effect on the environment relative to the health effects of project emissions. The Court found that an EIR should make a reasonable effort to substantively connect a project's criteria pollutant emissions to likely health consequences, or explain why it is not currently feasible to provide such an analysis. In 2019, there were several CEQA documents that included health effects modeling to provide additional analysis for projects with criteria air pollutant emissions that exceed a significance threshold. While it is technically possible to conduct this modeling, we argue that this additional layer of quantitative analysis may not always provide decision-makers and the public with additional meaningful information. It is the air districts that are best suited to provide frameworks for how to identify health effects of regional criteria pollutant emissions under CEQA.

Introduction

Significance thresholds for regional criteria pollutants used by California air districts and lead agencies represent the maximum emissions from a project that are not expected to cause or contribute to an exceedance of the most stringent applicable national or state ambient air quality standard (AAQS). By analyzing the project's emissions against these thresholds, the CEQA document assesses whether these emissions directly contribute to any regional or local exceedances of the applicable AAQS and exposure levels. The basis of the ruling in Friant Ranch was that the EIR did not provide a meaningful analysis of the adverse health effects that would be associated with the project's criteria pollutant emissions, which were identified as being far above the relevant thresholds. The discussion of the adverse health effects in the EIR was general in nature and did not connect the levels of the pollutants that would be emitted by the project to adverse health effects.

The process of correlating project-related criteria pollutant emissions to health-based consequences is called a health impact assessment (HIA). An HIA involves two steps: 1) running a regional photochemical grid model (PGM) to estimate the small increases in concentrations of ozone and particulate matter (PM) in the region as a result of a project's emissions of criteria and precursor pollutants; and 2) running the U.S. EPA Benefits Mapping and Analysis Program (BenMAP) to estimate the resulting health impacts from these increases in concentrations of ozone and PM.

Limitations of Regional-Scale Dispersion Models

It is technically feasible to conduct regional-scale criteria pollutant modeling for a development project. Particulate matter (PM) can be divided into two categories: directly emitted PM and secondary PM. Secondary PM, is formed via complex chemical reactions in the atmosphere between precursor chemicals such as sulfur oxides (SO_x) and NO_x, Ozone (O_3) is a secondary pollutant formed from the oxidation of reactive organic gases (ROGs) and nitrogen oxides (NOx) in the presence of sunlight. Rates of ozone formation are a function of a variety of complex physical factors, including the presence of sunlight and precursor pollutants, natural topography, nearby structures that cause building downwash, atmospheric stability, and wind patterns.. Secondary formation of PM and ozone can occur far from the original emissions source from regional transport due to wind and topography (e.g. low-level jet stream). As such, modeling concentrations of secondary PM and ozone require photochemical grid models (PGMs), such as CMAQ and CAMx. These models have a much larger "grid" system and much lower resolution than localized dispersion modeling (e.g., AERMOD). For example, common grid cells in PGMs are 4x4 kilometers, while AERMOD can identify concentrations at the meter-level.

Photochemical modeling also depends on all emission sources in the entire domain. Low resolution and spatial averaging produces "noise" and model uncertainty that can exceed a project's specific emissions. Additionally, regional-scale models are highly contingent upon background concentrations. Factors such as meteorology and topography greatly affect the certainty levels of predicted concentrations at receptor points. As a result, there are statistical ranges of uncertainty through all the modeling steps. Due to these factors, it is difficult to predict ground-level secondary PM and ozone concentrations associated with relatively small emission sources with a high degree of certainty. While it is possible to use a regional-scale model to predict these regional concentrations, when a project's emissions are less than the regional model's resolution, the resultant ambient air quality concentrations will be within the margin of uncertainty. In CEQA terms, this would fit the definition of "speculative". Only when the scale of emissions would result in changes in ambient air quality beyond the model margin of uncertainty would the results not be "speculative" as defined by CEQA.

Identifying Health Effects due to Ambient Air Quality Changes

BenMap is a model developed by the USEPA to understand the health effects from changes in ozone and PM concentrations. If there is an acceptable level of confidence that the results provided by the regional dispersion modeling are valid, then these concentrations can be translated into health outcomes using BenMap. The health outcomes in BenMap are based on changes in ambient air concentrations and the population exposed to these changes. Data provided by this analysis may indicate increased number of workdays lost to illness, hospital admissions (respiratory), emergency room visits (asthma), or mortality, among other health effects. These are called "health incidences."

Translating the incremental increase in PM and ozone concentrations to specific health effects is also subject to uncertainty. For example, regional models assign the same toxicity to PM regardless of the source of PM (such as road dust as exhaust), and thus potentially overpredict adverse health effects of PM. BenMap also assumes that health effects can occur at any concentration, including small incremental concentrations, and assumes that impacts seen at large concentration differences can be linearly scaled down to small increases in concentration, with no consideration of potential thresholds below which health impacts may not occur. Additionally, BenMap is used for assessing impacts over large areas and populations and was not intended to be used for individual projects. For health incidences, the number of hospitalizations or increase in morbidity predicted by BenMap is greatly affected by the population characteristics.[1] Small increases in emissions in an area with a high population have a much greater affect than large increases in emissions over an area with a small population. As a result, the same amount of emissions generated in an urban area could result in greater health consequences than if the same emissions occurred on the urban periphery, where fewer people may be affected. This will also depend on other factors including meteorology and photochemistry, as discussed above. Emissions in areas with conditions that favor high air dispersion or unfavorable ozone formation will likely have relatively lower effects on ambient air quality and health outcomes.

While BenMap provides additional statistical information about health consequences requested by the Court in the Friant Ranch decision, this information is only meaningful when presented with the full health context of the region or locality at hand. For example, if the BenMap analysis says that the project would result in two additional hospital admissions, this result alone is not useful unless one identifies how many hospital admissions are caused by poor air quality now (without the project) and how many hospital admissions occur

[1] BenMap assigns prevalence rate for asthma and other health effects based on indicators such as gender, race, age, ethnicity, etc. The BenMap user manual specifically states that there are a wide range of variables that can be included in the health effect function. The health effect function was developed based on epidemiological studies, and specifically states that "there are a number of issues that arise when deriving and choosing between health effect functions that go well beyond this user manual. Hence, it is important to have a trained health researcher assist in developing the impact function data file."

overall (due to air quality and other causes). Because health is not solely influenced by ambient air quality, and has many factors that are highly variable across geographies and populations, there is an added level of uncertainty in using a generalized identification of health effects due to air quality conditions overlaid onto a specific diverse set of health conditions and other factors. Regardless of the uncertainty levels, if regional health effects are identified for a project, then the CEQA analysis needs to provide a full health baseline for decision-makers and the public to be able to understand the marginal change due to project criteria pollutant emissions. Given the margin of uncertainty at each step in the process (regional scale modeling, existing ambient air quality effects on health, population health conditions vulnerability, and marginal health effects of air pollution), the identification of marginal health effects due to individual projects using regional air quality modelling and tools such as BenMap are likely to be within the level of uncertainty and thus defined as "speculative" per CEQA.

The Role of Air Districts

Regional, community, multiscale air quality modeling conducted by the air districts for each individual air basin or locality within the air basin would be the most appropriate indictor of health effects for projects. The AQMPs provide a forecast of regional emissions based on regional dispersion modeling for all sources within the air basin. Regional-scale models attempt to account for all emissions sources within an air basin.

The regional scale model requires inputs such as existing and future regional sources of pollutants and global meteorological data, which are generally not accessible by CEQA practitioners. Modeling of future years should consider future concentrations of air pollutants based on regional growth projections and existing programs, rules, and regulations adopted by Federal, State, and local air districts. In general, air pollution in California is decreasing as a result of Federal and State laws. Based on the air quality management plans (AQMPs) required for air districts in a nonattainment area, air quality in the air basins are anticipated to improve despite an increase in population and employment growth. Air districts are charged with assessing programs, rules, and regulations so that the increase in population and employment does not conflict with the mandate to achieve the AAQS. Because emissions forecasting and health outcomes based on the regional growth projections to achieve the AAQS is under the purview of the air districts, it should also fall on the air districts to identify the potential health outcomes associated with individual project's criteria pollutant emissions.

The South Coast Air Quality Management District (South Coast AQMD) and the Sacramento Metropolitan Air Quality Management District (Sacramento Metropolitan AQMD) are exploring concepts for project-level analysis in light of Friant Ranch to assist local lead agencies.

» South Coast AQMD is looking at the largest land use development project they have had in the air basin and doing a sensitivity analysis (using CAMx for photochemical grid modeling and BenMap for health outcomes) to see how locating a very large project in different parts of the air basin (Los Angeles, Inland Empire, v. Orange County) would affect the health incidence.

» Sacramento Metropolitan AQMD is also looking at a screening process. Rather than looking at the upper end (i.e., largest project in the air basin), Sacramento Metropolitan AQMD is starting at the smallest project that exceeds the regional significance threshold and running CAMx and BenMap at different locations in the air basin to see how it affects regional health incidences.

Guidance from Air Districts would be the most effective way to incorporate meaningful information concerning regional health effects of project criteria pollutants in CEQA analyses, including guidance as to when modelling is and is not useful and meaningful, how modelling should be conducted, and how to best present additional information to inform decision-makers and the public about a project's impacts.

So…until air districts do their part, what should we do?

PROJECTS WITH CRITERIA POLLUTANT EMISSIONS BELOW AIR DISTRICT THRESHOLDS

The Friant Ranch ruling was about providing disclosure of health effects of project emissions that were well over the significance thresholds. Since the air district thresholds are tied to a level the air districts find to not have a significant effect on ambient air quality, there should be no need to discuss the health effects of criteria pollutant emissions that are less than the significance thresholds.

PROJECTS WITH CRITERIA POLLUTANT EMISSIONS ABOVE AIR DISTRICT THRESHOLDS

Pursuant to Section 15125 of the CEQA Guidelines, the environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant. For CEQA, the health effects associated with buildout of a project would occur at the project's horizon year. Because CEQA requires an analysis of the change from existing conditions, the change in effects would be associated with changes in ambient air quality and associated health outcomes between existing conditions and the project's horizon year. Therefore, in order to show how a project affects health outcomes in an air basin, the CEQA documents will need to qualitatively or quantitatively address: (1) existing ambient criteria pollutant concentrations, health incidences due to existing air quality, and health incidences overall; 2) future (without project) ambient criteria pollutant concentrations and health incidences, and 3) future (with project) ambient criteria pollutant concentrations and health incidences.

Projects with significant criteria pollutant emissions could use regional modelling and BenMap to identify health effects of project emissions, but it is likely that many (or most) projects that are not regionally substantial in scale will be shown to have minimal regional changes in PM and ozone concentrations and therefore minimal changes in associated health effects. In addition, many projects may have emissions that are less than the uncertainty level of regional air quality models and BenMap health effects modeling; in these cases, quantitative results will not be meaningful. Thus, absent better direction from air districts, CEQA lead agencies will have to determine on a case by case basis whether a qualitative discussion of health effects will suffice, or whether regional modeling, despite its limitations, should be conducted for the project.

Where a project has substantial criteria pollutant emissions when considered on a regional scale, and there is reason to believe that the modeling of ambient air quality and regional health effects would produce non-speculative results when considering modeling uncertainties, then CEQA lead agencies should use regional modelling.

Conclusion

The purpose of CEQA is to inform the public as to the potential for a project to result in one or more significant adverse effects on the environment (including health effects). A CEQA document must provide an understandable and clear environmental analysis and provide an adequate basis for decision making and public disclosure. Regional dispersion modeling of criteria pollutants and secondary pollutants like PM and ozone can provide additional information, but that information may be within the margin of modelling uncertainty and/or may not be meaningful for the public and decision-makers unless a full health context is presented in the CEQA document. Simply providing health outcomes based on use of a regional-scale model and BenMap may not satisfy the goal to provide decision-makers and the public with information that would assist in weighting the environmental consequences of a project. A CEQA document must provide an analysis that is understandable for decision making and public disclosure. Regional scale modeling may provide a technical method for this type of analysis, but it does not necessarily provide a meaningful way to connect the magnitude of a project's criteria pollutant emissions to health effects without speculation.

In order to accurately connect the dots, we urge California air districts to provide more guidance on how to identify and describe the health effects of exceeding regional criteria pollutant thresholds. The air districts are the primary agency responsible for ensuring that the air basins attain the AAQS and ensure the health and welfare of its residents relative to air quality. Because emissions forecasting and health outcomes are based on the regional growth projections to achieve the AAQS is under the purview of the air districts, it should fall on the air districts to identify the potential health outcomes associated with exceeding the CEQA thresholds for projects. The air districts should provide lead agencies with a consistent, reliable, and meaningful analytical approach to correlate specific health effects that may result from a project's criteria pollutant emissions.

Glossary

AAQS – Ambient Air Quality Standards

BenMap – Benefits Mapping and Analysis Program

CAMx – Comprehensive Air Quality Model with extensions

CMAQ – Community Multiscale Air Quality

NOx – Nitrogen Oxides

PM – Particulate Matter

SOx – Sulfur Oxides

State – California

USEPA – United States Environmental Protection Agency

S219783

IN THE SUPREME COURT OF C ALIFORNIA

SIERRA CLUB, REVIVE THE SAN JOAQUIN, and
LEAGUE OF WOMEN VOTERS OF FRESNO,

Plaintiffs and Appellants,

v.

COUNTY OF FRESNO,

Defendant and Respondent,

and,

FRIANT RANCH, L.P.,

Real Party in Interest and Respondent.

After a Published Decision by the Court of Appeal, filed May 27, 2014
Fifth Appellate District Case No. F066798

Appeal from the Superior Court of California, County of Fresno
Case No. 11CECG00726
Honorable Rosendo A. Pena, Jr.

APPLICATION OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FOR LEAVE TO FILE BRIEF OF *AMICUS CURIAE* IN SUPPORT OF NEITHER PARTY AND *[PROPOSED]* BRIEF OF *AMICUS CURIAE*

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TO THE HONORABLE CHIEF JUSTICE AND JUSTICES OF THE SUPREME COURT:

APPLICATION FOR LEAVE TO FILE *AMICUS CURIAE* BRIEF

Pursuant to Rule 8.520(f) of the California Rules of Court, the South Coast Air Quality Management District (SCAQMD) respectfully requests leave to file the attached *amicus curiae* brief. Because SCAQMD's position differs from that of either party, we request leave to submit this amicus brief in support of neither party.

HOW THIS BRIEF WILL ASSIST THE COURT

SCAQMD's proposed amicus brief takes a position on two of the issues in this case. In both instances, its position differs from that of either party. The issues are:

1) Does the California Environmental Quality Act (CEQA) require an environmental impact report (EIR) to correlate a project's air pollution emissions with specific levels of health impacts?
2) What is the proper standard of review for determining whether an EIR provides sufficient information on the health impacts caused by a project's emission of air pollutants?

This brief will assist the Court by discussing the practical realities of correlating identified air quality impacts with specific health outcomes. In short, CEQA requires agencies to provide detailed information about a project's air quality impacts that is sufficient for the public and decisionmakers to adequately evaluate the project and meaningfully understand its impacts. However, the level of analysis is governed by a rule of reason; CEQA only requires agencies to conduct analysis if it is reasonably feasible to do so.

With regard to health-related air quality impacts, an analysis that correlates a project's air pollution emissions with specific levels of health impacts will be feasible in some cases but not others. Whether it is feasible depends on a variety of factors, including the nature of the project and the nature of the analysis under consideration. The feasibility of analysis may also change over time as air districts and others develop new tools for measuring projects' air quality related health impacts. Because SCAQMD has among the most sophisticated air quality modeling and health impact evaluation capability of any of the air districts in the State, it is uniquely situated to express an opinion on the extent to which the Court should hold that CEQA requires lead agencies to correlate air quality impacts with specific health outcomes.

SCAQMD can also offer a unique perspective on the question of the appropriate standard of review. SCAQMD submits that the proper standard of review for determining whether an EIR is sufficient as an informational document is more nuanced than argued by either party. In our view, this is a mixed question of fact and law. It includes determining whether additional analysis is feasible, which is primarily a factual question that should be reviewed under the substantial evidence standard. However, it also involves determining whether the omission of a particular analysis renders an EIR insufficient to serve CEQA's purpose as a meaningful, informational document. If a lead agency has not determined that a requested analysis is infeasible, it is the court's role to determine whether the EIR nevertheless meets CEQA's purposes, and courts should not defer to the lead agency's conclusions regarding the legal sufficiency of an EIR's analysis. The ultimate question of whether an EIR's analysis is "sufficient" to serve CEQA's informational purposes is predominately a question of law that courts should review de novo.

This brief will explain the rationale for these arguments and may assist the Court in reaching a conclusion that accords proper respect to a lead agency's factual conclusions while maintaining judicial authority over the ultimate question of what level of analysis CEQA requires.

STATEMENT OF INTEREST OF *AMICUS CURIAE*

The SCAQMD is the regional agency primarily responsible for air pollution control in the South Coast Air Basin, which consists of all of Orange County and the non-desert portions of the Los Angeles, Riverside, and San Bernardino Counties. (Health & Saf. Code § 40410; Cal. Code Regs., tit. 17, § 60104.) The SCAQMD participates in the CEQA process in several ways. Sometimes it acts as a lead agency that prepares CEQA documents for projects. Other times it acts as a responsible agency when it has permit authority over some part of a project that is undergoing CEQA review by a different lead agency. Finally, SCAQMD also acts as a commenting agency for CEQA documents that it receives because it is a public agency with jurisdiction by law over natural resources affected by the project.

In all of these capacities, SCAQMD will be affected by the decision in this case. SCAQMD sometimes submits comments requesting that a lead agency perform an additional type of air quality or health impacts analysis. On the other hand, SCAQMD sometimes determines that a particular type of health impact analysis is not feasible or would not produce reliable and informative results. Thus, SCAQMD will be affected by the Court's resolution of the extent to which CEQA requires EIRs to correlate emissions and health impacts, and its resolution of the proper standard of review.

CERTIFICATION REGARDING AUTHORSHIP AND FUNDING

No party or counsel in the pending case authored the proposed amicus curiae brief in whole or in part, or made any monetary contribution intended to fund the preparation or submission of the brief. No person or entity other than the proposed *Amicus Curiae* made any monetary contribution intended to fund the preparation or submission of the brief.

Respectfully submitted,

DATED: April 3, 2015

SOUTH COAST AIR QUALITY
MANAGEMENT DISTRICT
KURT R. WIESE, GENERAL COUNSEL
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SOUTH COAST AIR QUALITY
MANAGEMENT DISTICT

BRIEF OF AMICUS CURIAE

SUMMARY OF ARGUMENT

The South Coast Air Quality Management District (SCAQMD) submits that this Court should not try to establish a hard-and-fast rule concerning whether lead agencies are required to correlate emissions of air pollutants with specific health consequences in their environmental impact reports (EIR). The level of detail required in EIRs is governed by a few, core CEQA (California Environmental Quality Act) principles. As this Court has stated, "[a]n EIR must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." (*Laurel Heights Improvement Assn. v. Regents of the Univ of Cal.* (1988) 47 Cal.3d 376, 405 ["*Laurel Heights I*"]) Accordingly, "an agency must use its best efforts to find out and disclose all that it reasonably can." (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 428 (quoting CEQA Guidelines § 15144)[1].). However, "[a]nalysis of environmental effects need not be exhaustive, but will be judged in light of what is reasonably feasible." (*Association of Irritated Residents v. County of Madera* (2003) 107 Cal.App.4th 1383, 1390; CEQA Guidelines §§ 15151, 15204(a).)

With regard to analysis of air quality related health impacts, EIRs must generally quantify a project's pollutant emissions, but in some cases it is not feasible to correlate these emissions to specific, quantifiable health impacts (e.g., premature mortality; hospital admissions). In such cases, a general description of the adverse health impacts resulting from the pollutants at issue may be sufficient. In other cases, due to the magnitude

[1] The CEQA Guidelines are found at Cal. Code Regs., tit. 14 §§ 15000, *et seq.*

or nature of the pollution emissions, as well as the specificity of the project involved, it may be feasible to quantify health impacts. Or there may be a less exacting, but still meaningful analysis of health impacts that can feasibly be performed. In these instances, agencies should disclose those impacts.

SCAQMD also submits that whether or not an EIR complies with CEQA's informational mandates by providing sufficient, feasible analysis is a mixed question of fact and law. Pertinent here, the question of whether an EIR's discussion of health impacts from air pollution is sufficient to allow the public to understand and consider meaningfully the issues involves two inquiries: (1) Is it feasible to provide the information or analysis that a commenter is requesting or a petitioner is arguing should be required?; and (2) Even if it is feasible, is the agency relying on other policy or legal considerations to justify not preparing the requested analysis? The first question of whether an analysis is feasible is primarily a question of fact that should be judged by the substantial evidence standard. The second inquiry involves evaluating CEQA's information disclosure purposes against the asserted reasons to not perform the requested analysis. For example, an agency might believe that its EIR meets CEQA's informational disclosure standards even without a particular analysis, and therefore choose not to conduct that analysis. SCAQMD submits that this is more of a legal question, which should be reviewed de novo as a question of law.

ARGUMENT

I. RELEVANT FACTUAL AND LEGAL FRAMEWORK.

A. Air Quality Regulatory Background

The South Coast Air Quality Management District (SCAQMD) is one of the local and regional air pollution control districts and air quality

management districts in California. The SCAQMD is the regional air pollution agency for the South Coast Air Basin, which consists of all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. (Health & Saf. Code § 40410, 17 Cal. Code Reg. § 60104.) The SCAQMD also includes the Coachella Valley in Riverside County (Palm Springs area to the Salton Sea). (SCAQMD, *Final 2012 AQMP (Feb. 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "chapter 7" hyperlink; pp 7-1, 7-3 (last visited Apr. 1, 2015).) The SCAQMD's jurisdiction includes over 16 million residents and has the worst or nearly the worst air pollution levels in the country for ozone and fine particulate matter. (SCAQMD, *Final 2012 AQMP (Feb. 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "Executive Summary" hyperlink p. ES-1 (last visited Apr. 1, 2015).)

Under California law, the local and regional districts are primarily responsible for controlling air pollution from all sources except motor vehicles. (Health & Saf. Code § 40000.) The California Air Resources Board (CARB), part of the California Environmental Protection Agency, is primarily responsible for controlling pollution from motor vehicles. (*Id.*) The air districts must adopt rules to achieve and maintain the state and federal ambient air quality standards within their jurisdictions. (Health & Saf. Code § 40001.)

The federal Clean Air Act (CAA) requires the United States Environmental Protection Agency (EPA) to identify pollutants that are widely distributed and pose a threat to human health, developing a so-called "criteria" document. (42 U.S.C. § 7408; CAA § 108.) These pollutants are frequently called "criteria pollutants." EPA must then establish "national ambient air quality standards" at levels "requisite to protect public health",

allowing "an adequate margin of safety." (42 U.S.C. § 7409; CAA § 109.) EPA has set standards for six identified pollutants: ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter (PM), and lead. (U.S. EPA, National Ambient Air Quality Standards (NAAQS), http://www.epa.gov/air/criteria.html (last updated Oct. 21, 2014).)[2]

Under the Clean Air Act, EPA sets emission standards for motor vehicles and "nonroad engines" (mobile farm and construction equipment, marine vessels, locomotives, aircraft, etc.). (42 U.S.C. §§ 7521, 7547; CAA §§ 202, 213.) California is the only state allowed to establish emission standards for motor vehicles and most nonroad sources; however, it may only do so with EPA's approval. (42 U.S.C. §§ 7543(b), 7543(e); CAA §§ 209(b), 209(c).) Sources such as manufacturing facilities, power plants and refineries that are not mobile are often referred to as "stationary sources." The Clean Air Act charges state and local agencies with the primary responsibility to attain the national ambient air quality standards. (42 U.S.C. § 7401(a)(3); CAA § 101(a)(3).) Each state must adopt and implement a plan including enforceable measures to achieve and maintain the national ambient air quality standards. (42 U.S.C. § 7410; CAA § 110.) The SCAQMD and CARB jointly prepare portion of the plan for the South Coast Air Basin and submit it for approval by EPA. (Health & Saf. Code §§ 40460, et seq.)

The Clean Air Act also requires state and local agencies to adopt a permit program requiring, among other things, that new or modified "major" stationary sources use technology to achieve the "lowest achievable emission rate," and to control minor stationary sources as

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[2] Particulate matter (PM) is further divided into two categories: fine particulate or $PM_{2.5}$ (particles with a diameter of less than or equal to 2.5 microns) and coarse particulate (PM_{10}) (particles with a diameter of 10 microns or less). (U.S. EPA, Particulate Matter (PM), http://www.epa.gov/airquality/particlepollution/ (last visited Apr. 1, 2015).)

needed to help attain the standards. (42 U.S.C. §§ 7502(c)(5), 7503(a)(2), 7410(a)(2)(C); CAA §§ 172(c)(5), 173(a)(2), 110(a)(2)(C).) The air districts implement these permit programs in California. (Health & Saf. Code §§ 42300, et seq.)

The Clean Air Act also sets out a regulatory structure for over 100 so-called "hazardous air pollutants" calling for EPA to establish "maximum achievable control technology" (MACT) for sources of these pollutants. (42 U.S.C. § 7412(d)(2); CAA § 112(d)(2).) California refers to these pollutants as "toxic air contaminants" (TACs) which are subject to two state-required programs. The first program requires "air toxics control measures" for specific categories of sources. (Health & Saf. Code § 39666.) The other program requires larger stationary sources and sources identified by air districts to prepare "health risk assessments" for impacts of toxic air contaminants. (Health & Saf. Code §§ 44320(b), 44322, 44360.) If the health risk exceeds levels identified by the district as "significant," the facility must implement a "risk reduction plan" to bring its risk levels below "significant" levels. Air districts may adopt additional more stringent requirements than those required by state law, including requirements for toxic air contaminants. (Health & Saf. Code § 41508; *Western Oil & Gas Assn. v. Monterey Bay Unified APCD* (1989) 49 Cal.3d 408, 414.) For example, SCAQMD has adopted a rule requiring new or modified sources to keep their risks below specified levels and use best available control technology (BACT) for toxics. (SCAQMD, *Rule 1401-New Source Review of Toxic Air Contaminants*, http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xiv; then follow "Rule 1401" hyperlink (last visited Apr. 1, 2015).)

B. The SCAQMD's Role Under CEQA

The California Environmental Quality Act (CEQA) requires public agencies to perform an environmental review and appropriate analysis for projects that they implement or approve. (Pub. Resources Code § 21080(a).) The agency with primary approval authority for a particular project is generally the "lead agency" that prepares the appropriate CEQA document. (CEQA Guidelines §§ 15050, 15051.) Other agencies having a subsequent approval authority over all or part of a project are called "responsible" agencies that must determine whether the CEQA document is adequate for their use. (CEQA Guidelines §§ 15096(c), 15381.) Lead agencies must also consult with and circulate their environmental impact reports to "trustee agencies" and agencies "with jurisdiction by law" including "authority over resources which may be affected by the project." (Pub. Resources Code §§ 21104(a), 21153; CEQA Guidelines §§ 15086(a)(3), 15073(c).) The SCAQMD has a role in all these aspects of CEQA.

Fulfilling its responsibilities to implement its air quality plan and adopt rules to attain the national ambient air quality standards, SCAQMD adopts a dozen or more rules each year to require pollution reductions from a wide variety of sources. The SCAQMD staff evaluates each rule for any adverse environmental impact and prepares the appropriate CEQA document. Although most rules reduce air emissions, they may have secondary environmental impacts such as use of water or energy or disposal of waste—e.g., spent catalyst from control equipment.[3]

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[3] The SCAQMD's CEQA program for its rules is a "Certified Regulatory Program" under which it prepares a "functionally equivalent" document in lieu of a negative declaration or EIR. (Pub. Resources Code § 21080.5, CEQA Guidelines § 15251(l).)

The SCAQMD also approves a large number of permits every year to construct new, modified, or replacement facilities that emit regulated air pollutants. The majority of these air pollutant sources have already been included in an earlier CEQA evaluation for a larger project, are currently being evaluated by a local government as lead agency, or qualify for an exemption. However, the SCAQMD sometimes acts as lead agency for major projects where the local government does not have a discretionary approval. In such cases, SCAQMD prepares and certifies a negative declaration or environmental impact report (EIR) as appropriate.[4] SCAQMD evaluates perhaps a dozen such permit projects under CEQA each year. SCAQMD is often also a "responsible agency" for many projects since it must issue a permit for part of the projects (e.g., a boiler used to provide heat in a commercial building). For permit projects evaluated by another lead agency under CEQA, SCAQMD has the right to determine that the CEQA document is inadequate for its purposes as a responsible agency, but it may not do so because its permit program already requires all permitted sources to use the best available air pollution control technology. (SCAQMD, *Rule 1303(a)(1) – Requirements*, http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xiii; then follow "Rule 1303" hyperlink (last visited Apr. 1, 2015).)

Finally, SCAQMD receives as many as 60 or more CEQA documents each month (around 500 per year) in its role as commenting agency or an agency with "jurisdiction by law" over air quality—a natural resource affected by the project. (Pub. Resources Code §§ 21104(a), 21153; CEQA Guidelines § 15366(a)(3).) The SCAQMD staff provides comments on as many as 25 or 30 such documents each month.

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[4] The SCAQMD's permit projects are not included in its Certified Regulatory Program, and are evaluated under the traditional local government CEQA analysis. (Pub. Resources Code §§ 21150-21154.)

(SCAQMD Governing Board Agenda, Apr. 3, 2015, Agenda Item 16, Attachment A, http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=governing-board-meeting-agenda-april-3-2015; then follow "16. Lead Agency Projects and Environmental Documents Received by SCAQMD" hyperlink (last visited Apr. 1, 2015).) Of course, SCAQMD focuses its commenting efforts on the more significant projects.

Typically, SCAQMD comments on the adequacy of air quality analysis, appropriateness of assumptions and methodology, and completeness of the recommended air quality mitigation measures. Staff may comment on the need to prepare a health risk assessment detailing the projected cancer and noncancer risks from toxic air contaminants resulting from the project, particularly the impacts of diesel particulate matter, which CARB has identified as a toxic air contaminant based on its carcinogenic effects. (California Air Resources Board, Resolution 98-35, Aug. 27, 1998, http://www.arb.ca.gov/regact/diesltac/diesltac.htm; then follow Resolution 98-35 hyperlink (last visited Apr. 1, 2015).) Because SCAQMD already requires new or modified stationary sources of toxic air contaminants to use the best available control technology for toxics and to keep their risks below specified levels, (SCAQMD Rule 1401, supra, note 15), the greatest opportunity to further mitigate toxic impacts through the CEQA process is by reducing emissions—particularly diesel emissions—from vehicles.

II. THIS COURT SHOULD NOT SET A HARD-AND-FAST RULE CONCERNING THE EXTENT TO WHICH AN EIR MUST CORRELATE A PROJECT'S EMISSION OF POLLUTANTS WITH RESULTING HEALTH IMPACTS.

Numerous cases hold that courts do not review the correctness of an EIR's conclusions but rather its sufficiency as an informative document. (*Laurel Heights 1, supra*, 47 Cal.3d at p. 392; *Citizens of Goleta Valley v.*

Bd. of Supervisors (1990) 52 Cal.3d 553, 569; *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1197.)

As stated by the Court of Appeal in this case, where an EIR has addressed a topic, but the petitioner claims that the information provided about that topic is insufficient, courts must "draw[] a line that divides *sufficient* discussions from those that are *insufficient*." (*Sierra Club v. County of Fresno* (2014) 226 Cal.App.4th 704 (superseded by grant of review) 172 Cal.Rptr.3d 271, 290.) The Court of Appeal readily admitted that "[t]he terms themselves – sufficient and insufficient – provide little, if any, guidance as to where the line should be drawn. They are simply labels applied once the court has completed its analysis." (*Id.*)

The CEQA Guidelines, however, provide guidance regarding what constitutes a sufficient discussion of impacts. Section 15151 states that "the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible." Case law reflects this: "Analysis of environmental effects need not be exhaustive, but will be judged in light of what was reasonably feasible." (*Association of Irritated Residents v. County of Madera, supra,* 107 Cal.App.4th at p. 1390; see also CEQA Guidelines § 15204(a).)

Applying this test, this Court cannot realistically establish a hard-and-fast rule that an analysis correlating air pollution impacts of a project to quantified resulting health impacts is always required, or indeed that it is never required. Simply put, in some cases such an analysis will be "feasible"; in some cases it will not.

For example, air pollution control districts often require a proposed new source of toxic air contaminants to prepare a "health risk assessment" before issuing a permit to construct. District rules often limit the allowable cancer risk the new source may cause to the "maximally exposed individual" (worker and residence exposures). (*See, e.g.*, SCAQMD Rule 1401(c)(8); 1401(d)(1), *supra* note 15.) In order to perform this analysis, it

is necessary to have data regarding the sources and types of air toxic contaminants, location of emission points, velocity of emissions, the meteorology and topography of the area, and the location of receptors (worker and residence). (SCAQMD, *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588), pp. 11-16*; (last visited Apr. 1, 2015) http://www.aqmd.gov/home/library/documents-support-material; "Guidelines" hyperlink; AB2588; then follow AB2588 Risk Assessment Guidelines hyperlink.)

Thus, it is feasible to determine the health risk posed by a new gas station locating at an intersection in a mixed use area, where receptor locations are known. On the other hand, it may not be feasible to perform a health risk assessment for airborne toxics that will be emitted by a generic industrial building that was built on "speculation" (i.e., without knowing the future tenant(s)). Even where a health risk assessment can be prepared, however, the resulting maximum health risk value is only a calculation of risk—it does not necessarily mean anyone will contract cancer as a result of the project.

In order to find the "cancer burden" or expected additional cases of cancer resulting from the project, it is also necessary to know the numbers and location of individuals living within the "zone of impact" of the project: i.e., those living in areas where the projected cancer risk from the project exceeds one in a million. (SCAQMD, Health Risk Assessment Summary form, http://www.aqmd.gov/home/forms ; filter by "AB2588" category; then "Health Risk Assessment" hyperlink (last visited Apr. 1, 2015).) The affected population is divided into bands of those exposed to at least 1 in a million risk, those exposed to at least 10 in a million risk, etc. up to those exposed at the highest levels. (*Id.*) This data allows agencies to calculate an approximate number of additional cancer cases expected from

the project. However, it is not possible to predict which particular individuals will be affected.

For the so-called criteria pollutants[5], such as ozone, it may be more difficult to quantify health impacts. Ozone is formed in the atmosphere from the chemical reaction of the nitrogen oxides (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. (U.S. EPA, Ground Level Ozone, http://www.epa.gov/airquality/ozonepollution/ (last updated Mar. 25, 2015).) It takes time and the influence of meteorological conditions for these reactions to occur, so ozone may be formed at a distance downwind from the sources. (U.S. EPA, *Guideline on Ozone Monitoring Site Selection* (Aug. 1998) EPA-454/R-98-002 § 5.1.2, http://www.epa.gov/ttnamti1/archive/cpreldoc.html (last visited Apr. 1, 2015).) NO_x and VOC are known as "precursors" of ozone.

Scientifically, health effects from ozone are correlated with increases in the ambient level of ozone in the air a person breathes. (U.S. EPA, *Health Effects of Ozone in the General Population,* Figure 9, http://www.epa.gov/apti/ozonehealth/population.html#levels (last visited Apr. 1, 2015).) However, it takes a large amount of additional precursor emissions to cause a modeled increase in ambient ozone levels over an entire region. For example, the SCAQMD's 2012 AQMP showed that reducing NO_x by 432 tons per day (157,680 tons/year) and reducing VOC by 187 tons per day (68,255 tons/year) would reduce ozone levels at the SCAQMD's monitor site with the highest levels by only 9 parts per billion. (South Coast Air Quality Management District, *Final 2012 AQMP (February 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "Appendix V: Modeling & Attainment Demonstrations" hyperlink,

[5] See discussion of types of pollutants, supra, Part I.A.

pp. v-4-2, v-7-4, v-7-24.) SCAQMD staff does not currently know of a way to accurately quantify ozone-related health impacts caused by NO_x or VOC emissions from relatively small projects.

On the other hand, this type of analysis may be feasible for projects on a regional scale with very high emissions of NO_x and VOCs, where impacts are regional. For example, in 2011 the SCAQMD performed a health impact analysis in its CEQA document for proposed Rule 1315, which authorized various newly-permitted sources to use offsets from the districts "internal bank" of emission reductions. This CEQA analysis accounted for essentially *all* the increases in emissions due to new or modified sources in the District between 2010 and 2030.[6] The SCAQMD was able to correlate this very large emissions increase (e.g., 6,620 pounds per day NO_x (1,208 tons per year), 89,180 pounds per day VOC (16,275 tons per year)) to expected health outcomes from ozone and particulate matter (e.g., 20 premature deaths per year and 89,947 school absences in the year 2030 due to ozone).[7] (SCAQMD Governing Board Agenda, February 4, 2011, Agenda Item 26, *Assessment for: Re-adoption of Proposed Rule 1315 – Federal New Source Review Tracking System* (see hyperlink in fn 6*)* at p. 4.1-35, Table 4.1-29.)

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[6] (SCAQMD Governing Board Agenda, February 4, 2011, Agenda Item 26, Attachment G, *Assessment for: Re-adoption of Proposed Rule 1315 – Federal New Source Review Tracking System, Vol. 1, p.4.0-6,* http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=governing-board-meeting-agenda-february-4-2011; the follow "26. Adopt Proposed Rule 1315 – Federal New Source Review Tracking System" (last visited April 1, 2015).)

[7] The SCAQMD was able to establish the location of future NO_x and VOC emissions by assuming that new projects would be built in the same locations and proportions as existing stationary sources. This CEQA document was upheld by the Los Angeles County Superior Court in *Natural Res. Def. Council v SCAQMD*, Los Angeles Superior Court No. BS110792).

However, a project emitting only 10 tons per year of NO_x or VOC is small enough that its regional impact on ambient ozone levels may not be detected in the regional air quality models that are currently used to determine ozone levels. Thus, in this case it would not be feasible to directly correlate project emissions of VOC or NO_x with specific health impacts from ozone. This is in part because ozone formation is not linearly related to emissions. Ozone impacts vary depending on the location of the emissions, the location of other precursor emissions, meteorology and seasonal impacts, and because ozone is formed some time later and downwind from the actual emission. (EPA Guideline on Ozone Monitoring Site Selection (Aug. 1998) EPA-454/R-98-002, § 5.1.2; https://www.epa.gov/ttnamti1/archive/cpreldoc.html; then search "Guideline on Ozone Monitoring Site Selection" click on pdf) (last viewed Apr. 1, 2015).)

SCAQMD has set its CEQA "significance" threshold for NO_x and VOC at 10 tons per year (expressed as 55 lb/day). (SCAQMD, *Air Quality Analysis Handbook*, http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook; then follow "SCAQMD Air Quality Significance Thresholds" hyperlink (last visited Apr. 1, 2015).) This is because the federal Clean Air Act defines a "major" stationary source for "extreme" ozone nonattainment areas such as SCAQMD as one emitting 10 tons/year. (42 U.S.C. §§ 7511a(e), 7511a(f); CAA §§ 182(e), 182(f).) Under the Clean Air Act, such sources are subject to enhanced control requirements (42 U.S.C. §§ 7502(c)(5), 7503; CAA §§ 172(c)(5), 173), so SCAQMD decided this was an appropriate threshold for making a CEQA "significance" finding and requiring feasible mitigation. Essentially, SCAQMD takes the position that a source that emits 10 tons/year of NO_x or VOC would contribute cumulatively to ozone formation. Therefore, lead agencies that use SCAQMD's thresholds of significance may determine

that many projects have "significant" air quality impacts and must apply all feasible mitigation measures, yet will not be able to precisely correlate the project to quantifiable health impacts, unless the emissions are sufficiently high to use a regional modeling program.

In the case of particulate matter ($PM_{2.5}$)[8], another "criteria" pollutant, SCAQMD staff is aware of two possible methods of analysis. SCAQMD used regional modeling to predict expected health impacts from its proposed Rule 1315, as mentioned above. Also, the California Air Resources Board (CARB) has developed a methodology that can predict expected mortality (premature deaths) from large amounts of $PM_{2.5}$. (California Air Resources Board, *Health Impacts Analysis: PM Premature Death Relationship*, http://www.arb.ca.gov/research/health/pm-mort/pm-mort_arch.htm (last reviewed Jan. 19, 2012).) SCAQMD used the CARB methodology to predict impacts from three very large power plants (e.g., 731-1837 lbs/day). (Final Environmental Assessment for Rule 1315, *supra*, pp 4.0-12, 4.1-13, 4.1-37 (e.g., 125 premature deaths in the entire SCAQMD in 2030), 4.1-39 (0.05 to 1.77 annual premature deaths from power plants.) Again, this project involved large amounts of additional $PM_{2.5}$ in the District, up to 2.82 tons/day (5,650 lbs/day of $PM_{2.5}$, or, or 1029 tons/year. (*Id.* at table 4.1-4, p. 4.1-10.)

However, the primary author of the CARB methodology has reported that this $PM_{2.5}$ health impact methodology is not suited for small projects and may yield unreliable results due to various uncertainties. [9] (SCAQMD, *Final Subsequent Mitigated Negative Declaration for: Warren*

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[8] SCAQMD has not attained the latest annual or 24-hour national ambient air quality standards for "$PM_{2.5}$" or particulate matter less than 2.5 microns in diameter.

[9] Among these uncertainties are the representativeness of the population used in the methodology, and the specific source of PM and the corresponding health impacts. (*Id.* at p. 2-24.)

E&P, Inc. WTU Central Facility, New Equipment Project (certified July 19, 2011), http://www.aqmd.gov/home/library/documents-support-material/lead-agency-permit-projects/permit-project-documents---year-2011; then follow "Final Subsequent Mitigated Negative Declaration for Warren E&P Inc. WTU Central Facility, New Equipment Project" hyperlink, pp. 2-22, 2-23 (last visited Apr. 1, 2015).) Therefore, when SCAQMD prepared a CEQA document for the expansion of an existing oil production facility, with very small $PM_{2.5}$ increases (3.8 lb/day) and a very small affected population, staff elected not to use the CARB methodology for using estimated $PM_{2.5}$ emissions to derive a projected premature mortality number and explained why it would be inappropriate to do so. (*Id.* at pp 2-22 to 2-24.) SCAQMD staff concluded that use of this methodology for such a small source could result in unreliable findings and would not provide meaningful information. (*Id.* at pp. 2-23, 2-25.) This CEQA document was not challenged in court.

In the above case, while it may have been technically possible to plug the data into the methodology, the results would not have been reliable or meaningful. SCAQMD believes that an agency should not be required to perform analyses that do not produce reliable or meaningful results. This Court has already held that an agency may decline to use even the "normal" "existing conditions" CEQA baseline where to do so would be misleading or without informational value. (*Neighbors for Smart Rail v. Exposition Metro Line* (2013) 57 Cal.4th 439, 448, 457.) The same should be true for a decision that a particular study or analysis would not provide reliable or meaningful results.[10]

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[10] Whether a particular study would result in "informational value" is a part of deciding whether it is "feasible." CEQA defines "feasible" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and

Therefore, it is not possible to set a hard-and-fast rule on whether a correlation of air quality impacts with specific quantifiable health impacts is required in all cases. Instead, the result turns on whether such an analysis is reasonably feasible in the particular case.[11] Moreover, what is reasonably feasible may change over time as scientists and regulatory agencies continually seek to improve their ability to predict health impacts. For example, CARB staff has been directed by its Governing Board to reassess and improve the methodology for estimating premature deaths. (California Air Resources Board, *Health Impacts Analysis: PM Mortality Relationship*, http://www.arb.ca.gov/research/health/pm-mort/pm-mort.htm (last reviewed Dec. 29, 2010).) This factor also counsels against setting any hard-and-fast rule in this case.

III. THE QUESTION OF WHETHER AN EIR CONTAINS SUFFICIENT ANALYSIS TO MEET CEQA'S REQUIREMENTS IS A MIXED QUESTION OF FACT AND LAW GOVERNED BY TWO DIFFERENT STANDARDS OF REVIEW.

A. Standard of Review for Feasibility Determination and Sufficiency as an Informative Document

A second issue in this case is whether courts should review an EIR's informational sufficiency under the "substantial evidence" test as argued by Friant Ranch or the "independent judgment" test as argued by Sierra Club.

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technological factors." (Pub. Resources Code § 21061.1.) A study cannot be "accomplished in a *successful* manner" if it produces unreliable or misleading results.

[11] In this case, the lead agency did not have an opportunity to determine whether the requested analysis was feasible because the comment was non-specific. Therefore, SCAQMD suggests that this Court, after resolving the legal issues in the case, direct the Court of Appeal to remand the case to the lead agency for a determination of whether the requested analysis is feasible. Because Fresno County, the lead agency, did not seek review in this Court, it seems likely that the County has concluded that at least some level of correlation of air pollution with health impacts is feasible.

As this Court has explained, "a reviewing court must adjust its scrutiny to the nature of the alleged defect, depending on whether the claim is predominantly one of improper procedure or a dispute over the facts." (*Vineyard Area Citizens v. City of Rancho Cordova, supra,* 40 Cal.4th at 435.) For questions regarding compliance with proper procedure or other legal questions, courts review an agency's action de novo under the "independent judgment" test. (*Id.*) On the other hand, courts review factual disputes only for substantial evidence, thereby "accord[ing] greater deference to the agency's substantive factual conclusions." (*Id.*)

Here, Friant Ranch and Sierra Club agree that the case involves the question of whether an EIR includes sufficient information regarding a project's impacts. However, they disagree on the proper standard of review for answering this question: Sierra Club contends that courts use the independent judgment standard to determine whether an EIR's analysis is sufficient to meet CEQA's informational purposes,[12] while Friant Ranch contends that the substantial evidence standard applies to this question.

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[12] Sierra Club acknowledges that courts use the substantial evidence standard when reviewing predicate factual issues, but argues that courts ultimately decide as a matter of law what CEQA requires. (Answering Brief, pp. 14, 23.)

SCAQMD submits that the issue is more nuanced than either party contends. We submit that, whether a CEQA document includes sufficient analysis to satisfy CEQA's informational mandates is a mixed question of fact and law,[13] containing two levels of inquiry that should be judged by different standards.[14]

The state CEQA Guidelines set forth standards for the adequacy of environmental analysis. Guidelines Section 15151 states:

> An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good-faith effort at full disclosure.

In this case, the basic question is whether the underlying analysis of air quality impacts made the EIR "sufficient" as an informative document. However, whether the EIR's analysis was sufficient is judged in light of what was reasonably feasible. This represents a mixed question of fact and law that is governed by two different standards of review.

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[13] Friant Ranch actually states that the claim that an EIR lacks sufficient relevant information is, "most properly thought of as raising mixed questions of fact and law." (Opening Brief, p. 27.) However, the remainder of its argument claims that the court should apply the substantial evidence standard of review to all aspects of the issue.

[14] Mixed questions of fact and law issues may implicate predominantly factual subordinate questions that are reviewed under the substantial evidence test even though the ultimate question may be reviewed by the independent judgment test. *Crocker National Bank v. City and County of San Francisco* (1989) 49 Cal.3d 881, 888-889.

SCAQMD submits that an EIR's sufficiency as an informational document is ultimately a legal question that courts should determine using their independent judgment. This Court's language in *Laurel Heights I* supports this position. As this Court explained: "The court does not pass upon the correctness of the EIR's environmental conclusions, but only upon its *sufficiency as an informative document.*" (*Laurel Heights I, supra,* 47 Cal.3d at 392-393) (emphasis added.) As described above, the Court in *Vineyard Area Citizens v. City of Rancho Cordova, supra,* 40 Cal.4th at 431, also used its independent judgment to determine what level of analysis CEQA requires for water supply impacts. The Court did not defer to the lead agency's opinion regarding the law's requirements; rather, it determined for itself what level of analysis was necessary to meet "[t]he law's informational demands." (*Id.* at p. 432.) Further, existing case law also holds that where an agency fails to comply with CEQA's information disclosure requirements, the agency has "failed to proceed in the manner required by law." (*Save Our Peninsula Comm. v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 118.)

However, whether an EIR satisfies CEQA's requirements depends in part on whether it was reasonably feasible for an agency to conduct additional or more thorough analysis. EIRs must contain "a detailed statement" of a project's impacts (Pub. Res. Code § 21061), and an agency must "use its best efforts to find out and disclose all that it reasonably can." (CEQA Guidelines § 15144.) Nevertheless, "the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible." (CEQA Guidelines § 15151.)

SCAQMD submits that the question of whether additional analysis or a particular study suggested by a commenter is "feasible" is generally a question of fact. Courts have already held that whether a particular alternative is "feasible" is reviewed by the substantial evidence test.

(*Uphold Our Heritage v. Town of Woodside* (2007) 147 Cal.App.4th 587, 598-99; *Center for Biological Diversity v. County of San Bernardino* (2010) 185 Cal.App.4th 866, 883.) Thus, if a lead agency determines that a particular study or analysis is infeasible, that decision should generally be judged by the substantial evidence standard. However, SCAQMD urges this Court to hold that lead agencies must explain the basis of any determination that a particular analysis is infeasible in the EIR itself. An EIR must discuss information, including issues related to the feasibility of particular analyses "in sufficient detail to enable meaningful participation and criticism by the public. '[W]hatever is required to be considered in an EIR must be in that formal report; what any official might have known from other writings or oral presentations cannot supply what is lacking in the report.'" (*Laurel Heights I, supra*, 47 Cal.3d at p. 405 (quoting *Santiago County Water District v. County of Orange* (1981) 118 Cal.App.3d 818, 831) (discussing analysis of alternatives).) The evidence on which the determination is based should also be summarized in the EIR itself, with appropriate citations to reference materials if necessary. Otherwise commenting agencies such as SCAQMD would be forced to guess where the lead agency's evidence might be located, thus thwarting effective public participation.

Moreover, if a lead agency determines that a particular study or analysis would not result in reliable or useful information and for that reason is not feasible, that determination should be judged by the substantial evidence test. (See *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority*, *supra*, 57 Cal.4th 439, 448, 457:

whether "existing conditions" baseline would be misleading or uninformative judged by substantial evidence standard.[15])

If the lead agency's determination that a particular analysis or study is not feasible is supported by substantial evidence, then the agency has not violated CEQA's information disclosure provisions, since it would be infeasible to provide additional information. This Court's decisions provide precedent for such a result. For example, this Court determined that the issue of whether the EIR should have included a more detailed discussion of future herbicide use was resolved because substantial evidence supported the agency's finding that "the precise parameters of future herbicide use could not be predicted." *Ebbetts Pass Forest Watch v. California Dept. of Forestry & Fire Protection* (2008) 43 Cal.4th 936, 955.

Of course, SCAQMD expects that courts will continue to hold lead agencies to their obligations to consult with, and not to ignore or misrepresent, the views of sister agencies having special expertise in the area of air quality. (*Berkeley Keep Jets Over the Bay v. Board of Port Commissioners* (2007) 91 Cal.App.4th 1344, 1364 n.11.) In some cases, information provided by such expert agencies may establish that the purported evidence relied on by the lead agency is not in fact "substantial". (*Id.* at pp. 1369-1371.)

In sum, courts retain ultimate responsibility to determine what CEQA requires. However, the law does not require exhaustive analysis, but only what is reasonably feasible. Agencies deserve deference for their factual determinations regarding what type of analysis is reasonably feasible. On the other hand, if a commenter requests more information, and the lead agency declines to provide it but does *not* determine that the

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[15] The substantial evidence standard recognizes that the courts "have neither the resources nor the scientific expertise" to weigh conflicting evidence on technical issues. (*Laurel Heights I, supra,* 47 Cal.3d 376, 393.)

requested study or analysis would be infeasible, misleading or uninformative, the question becomes whether the omission of that analysis renders the EIR inadequate to satisfy CEQA's informational purposes. (*Id.* at pp. 1370-71.) Again, this is predominantly a question of law and should be judged by the de novo or independent judgment standard of review. Of course, this Court has recognized that a "project opponent or reviewing court can always imagine some additional study or analysis that might provide helpful information. It is not for them to design the EIR. That further study...might be helpful does not make it necessary." (*Laurel Heights I, supra,* 47 Cal.3d 376, 415 – see also CEQA Guidelines § 15204(a) [CEQA "does not require a lead agency to conduct every test. . . recommended or demanded by commenters."].) Courts, then, must adjudicate whether an omission of particular information renders an EIR inadequate to serve CEQA's informational purposes.[16]

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[16] We recognize that there is case law stating that the substantial evidence standard applies to "challenges to the scope of an EIR's analysis of a topic" as well as the methodology used and the accuracy of the data relied on in the document "because these types of challenges involve factual questions." (*Bakersfield Citizens for Local Control v. City of Bakersfield, supra,* 124 Cal.App.4th 1184, 1198, and cases relied on therein.) However, we interpret this language to refer to situations where the question of the scope of the analysis really is factual—that is, where it involves whether further analysis is feasible, as discussed above. This interpretation is supported by the fact that the *Bakersfield* court expressly rejected an argument that a claimed "omission of information from the EIR should be treated as inquiries whether there is substantial evidence supporting the decision approving the project. " *Bakersfield, supra,* 124 Cal.App.4th at p. 1208. And the *Bakersfield* court ultimately decided that the lead agency must analyze the connection between the identified air pollution impacts and resulting health impacts, even though the EIR already included some discussion of air-pollution-related respiratory illnesses. *Bakersfield, supra,* 124 Cal.App.4th at p. 1220. Therefore, the court must not have interpreted this question as one of the "scope of the analysis" to be judged by the substantial evidence standard.

B. Friant Ranch's Rationale for Rejecting the Independent Judgment Standard of Review is Unsupported by Case Law.

In its brief, Friant Ranch makes a distinction between cases where a required CEQA topic is not discussed at all (to be reviewed by independent judgment as a failure to proceed in the manner required by law) and cases where a topic is discussed, but the commenter claims the information provided is insufficient (to be judged by the substantial evidence test). (Opening Brief, pp. 13-17.) The Court of Appeal recognized these two types of cases, but concluded that both raised questions of law. (*Sierra Club v. County of Fresno* (2014) 226 Cal.App.4th 704 (superseded by grant of review) 172 Cal.Rptr.3d 271, 290.) We believe the distinction drawn by Friant Ranch is unduly narrow, and inconsistent with cases which have concluded that CEQA documents are insufficient. In many instances, CEQA's requirements are stated broadly, and the courts must interpret the law to determine what level of analysis satisfies CEQA's mandate for providing meaningful information, even though the EIR discusses the issue to some extent.

For example, the CEQA Guidelines require discussion of the existing environmental baseline. In *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 954-955, the lead agency had discussed the environmental baseline by describing historic month-end water levels in the affected lakes. However, the court held that this was not an adequate baseline discussion because it failed to discuss the timing and amounts of past actual water releases, to allow comparison with the proposed project. The court evidently applied the independent judgment test to its decision, even though the agency discussed the issue to some extent.

Likewise, in *Vineyard Area Citizens* (2007) 40 Cal.4th 412, this Court addressed the question of whether an EIR's analysis of water supply impacts complied with CEQA. The parties agreed that the EIR was required to analyze the effects of providing water to the development project, "and that in order to do so the EIR had, in some manner, to identify the planned sources of that water." (*Vineyard Area Citizens, supra,* at p. 428.) However, the parties disagreed as to the level of detail required for this analysis and "what level of uncertainty regarding the availability of water supplies can be tolerated in an EIR . . . ." (*Id.*) In other words, the EIR had analyzed water supply impacts for the project, but the petitioner claimed that the analysis was insufficient.

This Court noted that neither CEQA's statutory language or the CEQA Guidelines specifically addressed the question of how precisely an EIR must discuss water supply impacts. (*Id.*) However, it explained that CEQA "states that '[w]hile foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can.'" (*Id.*, [Guidelines § 15144].) The Court used this general principle, along with prior precedent, to elucidate four "principles for analytical adequacy" that are necessary in order to satisfy "CEQA's informational purposes." (*Vineyard Area Citizens, supra,* at p. 430.) The Court did not defer to the agency's determination that the EIR's analysis of water supply impacts was sufficient. Rather, this Court used its independent judgment to determine for itself the level of analysis required to satisfy CEQA's fundamental purposes. (*Vineyard Area Citizens, supra*, at p. 441: an EIR does not serve its purposes where it neglects to explain likely sources of water and "... leaves long term water supply considerations to later stages of the project.")

Similarly, the CEQA Guidelines require an analysis of noise impacts of the project. (Appendix G, "Environmental Checklist Form."[17]) In *Gray v. County of Madera* (2008) 167 Cal.App.4th 1099, 1123, the court held that the lead agency's noise impact analysis was inadequate even though it had addressed the issue and concluded that the increase would not be noticeable. If the court had been using the substantial evidence standard, it likely would have upheld this discussion.

Therefore, we do not agree that the issue can be resolved on the basis suggested by Friant Ranch, which would apply the substantial evidence standard to *every* challenge to an analysis that addresses a required CEQA topic. This interpretation would subvert the courts' proper role in interpreting CEQA and determining what the law requires.

Nor do we agree that the Court of Appeal in this case violated CEQA's prohibition on courts interpreting its provisions "in a manner which imposes procedural or substantive requirements beyond those explicitly stated in this division or in the state guidelines." (Pub. Resources Code § 21083.1.) CEQA requires an EIR to describe *all* significant impacts of the project on the environment. (Pub. Resources Code § 21100(b)(2); *Vineyard Area Citizens, supra,* at p. 428.) Human beings are part of the environment, so CEQA requires EIRs to discuss a project's significant impacts on human health. However, except in certain particular circumstances,[18] neither the CEQA statute nor Guidelines specify the precise level of analysis that agencies must undertake to satisfy the law's requirements. (see, e.g., CEQA Guidelines § 15126.2(a) [EIRs must describe "health and safety problems caused by {a project's} physical changes"].) Accordingly, courts must interpret CEQA as a whole to

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[17] Association of Environmental Professionals, 2015 CEQA Statute and Guidelines (2015) p.287.

[18] E.g., Pub. Resources Code § 21151.8(C)(3)(B)(iii) (requiring specific type of health risk analysis for siting schools).

determine whether a particular EIR is sufficient as an informational document. A court determining whether an EIR's discussion of human health impacts is legally sufficient does not constitute imposing a new substantive requirement.[19] Under Friant Ranch's theory, the above-referenced cases holding a CEQA analysis inadequate would have violated the law. This is not a reasonable interpretation.

IV. COURTS MUST SCRUPULOUSLY ENFORCE THE REQUIREMENTS THAT LEAD AGENCIES CONSULT WITH AND OBTAIN COMMENTS FROM AIR DISTRICTS

Courts must "scrupulously enforce" CEQA's legislatively mandated requirements. (*Vineyard Area Citizens, supra*, 40 Cal.4th 412, 435.) Case law has firmly established that lead agencies must consult with the relevant air pollution control district before conducting an initial study, and must provide the districts with notice of the intention to adopt a negative declaration (or EIR). (*Schenck v. County of Sonoma* (2011) 198 Cal.App.4th 949, 958.) As *Schenck* held, neither publishing the notice nor providing it to the State Clearinghouse was a sufficient substitute for sending notice directly to the air district. (*Id.*) Rather, courts "must be satisfied that [administrative] agencies have fully complied with the procedural requirements of CEQA, since only in this way can the important public purposes of CEQA be protected from subversion." *Schenck,* 198 Cal.App.4th at p. 959 (citations omitted).[20]

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[19] We submit that Public Resources Code Section 21083.1 was intended to prevent courts from, for example, holding that an agency must analyze economic impacts of a project where there are no resulting environmental impacts (see CEQA Guidelines § 15131) , or imposing new procedural requirements, such as imposing additional public notice requirements not set forth in CEQA or the Guidelines.

[20] Lead agencies must consult air districts, as public agencies with jurisdiction by law over resources affected by the project, *before* releasing an EIR. (Pub. Resources Code §§ 21104(a); 21153.) Moreover, air

Lead agencies should be aware, therefore, that failure to properly seek and consider input from the relevant air district constitutes legal error which may jeopardize their project approvals. For example, the court in *Fall River Wild Trout Foundation v. County of Shasta,* (1999) 70 Cal.App.4th 482, 492 held that the failure to give notice to a trustee agency (Department of Fish and Game) was prejudicial error requiring reversal. The court explained that the lack of notice prevented the Department from providing any response to the CEQA document. (*Id.* at p. 492.) It therefore prevented relevant information from being presented to the lead agency, which was prejudicial error because it precluded informed decision-making. (*Id.*)[21]

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districts should be considered "state agencies" for purposes of the requirement to consult with "trustee agencies" as set forth in Public Resources Code § 20180.3(a). This Court has long ago held that the districts are not mere "local agencies" whose regulations are superseded by those of a state agency regarding matters of statewide concern, but rather have concurrent jurisdiction over such issues. (*Orange County Air Pollution Control District v. Public Util. Com.* (1971) 4 Cal.3d 945, 951, 954.) Since air pollution is a matter of statewide concern, *Id* at 952, air districts should be entitled to trustee agency status in order to ensure that this vital concern is adequately protected during the CEQA process.

[21] In *Schenck,* the court concluded that failure to give notice to the air district was not prejudicial, but this was partly because the trial court had already corrected the error before the case arrived at the Court of Appeal. The trial court issued a writ of mandate requiring the lead agency to give notice to the air district. The air district responded by concurring with the lead agency that air impacts were not significant. (*Schenck,* 198 Cal.App.4th 949, 960.) We disagree with the *Schenck* court that the failure to give notice to the air district would not have been prejudicial (even in the absence of the trial court writ) merely because the lead agency purported to follow the air district's published CEQA guidelines for significance. (*Id.*, 198 Cal.App.4th at p. 960.) In the first place, absent notice to the air district, it is uncertain whether the lead agency properly followed those guidelines. Moreover, it is not realistic to expect that an air district's published guidelines would necessarily fully address all possible air-quality related issues that can arise with a CEQA project, or that those

Similarly, lead agencies must obtain additional information requested by expert agencies, including those with jurisdiction by law, if that information is necessary to determine a project's impacts. (*Sierra Club v. State Bd. Of Forestry* (1994) 7 Cal.4th 1215, 1236-37.) Approving a project without obtaining that information constitutes a failure to proceed in the manner prescribed by CEQA. (*Id.* at p. 1236.)

Moreover, a lead agency can save significant time and money by consulting with the air district early in the process. For example, the lead agency can learn what the air district recommends as an appropriate analysis on the facts of its case, including what kinds of health impacts analysis may be available, and what models are appropriate for use. This saves the lead agency from the need to do its analysis all over again and possibly needing to recirculate the document after errors are corrected, if new significant impacts are identified. (CEQA Guidelines § 15088.5(a).) At the same time, the air district's expert input can help the lead agency properly determine whether another commenter's request for additional analysis or studies is reasonable or feasible. Finally, the air district can provide input on what mitigation measures would be feasible and effective.

Therefore, we suggest that this Court provide guidance to lead agencies reminding them of the importance of consulting with the relevant air districts regarding these issues. Otherwise, their feasibility decisions may be vulnerable to air district evidence that establishes that there is no substantial evidence to support the lead agency decision not to provide specific analysis. (*See Berkeley Keep Jets Over the Bay, supra,* 91 Cal.App.4th 1344, 1369-1371.)

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guidelines would necessarily be continually modified to reflect new developments. Therefore we believe that, had the trial court not already ordered the lead agency to obtain the air district's views, the failure to give notice would have been prejudicial, as in *Fall River, supra,* 70 Cal.App.4th 482, 492.

CONCLUSION

The SCAQMD respectfully requests this Court *not* to establish a hard-and-fast rule concerning whether CEQA requires a lead agency to correlate identified air quality impacts of a project with resulting health outcomes. Moreover, the question of whether an EIR is "sufficient as an informational document" is a mixed question of fact and law containing two levels of inquiry. Whether a particular proposed analysis is feasible is predominantly a question of fact to be judged by the substantial evidence standard of review. Where the requested analysis is feasible, but the lead agency relies on legal or policy reasons not to provide it, the question of whether the EIR is nevertheless sufficient as an informational document is predominantly a question of law to be judged by the independent judgment standard of review.

Respectfully submitted,

DATED: April 3, 2015

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
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CERTIFICATE OF WORD COUNT

Pursuant to Rule 8.520(c)(1) of the California Rules of Court, I hereby certify that this brief contains 8,476 words, including footnotes, but excluding the Application, Table of Contents, Table of Authorities, Certificate of Service, this Certificate of Word Count, and signature blocks. I have relied on the word count of the Microsoft Word Vista program used to prepare this Certificate.

DATED: April 3, 2015 Respectfully submitted,

Barbara Baird

Barbara Baird

PROOF OF SERVICE

I am employed in the County of Los Angeles, California. I am over the age of 18 years and not a party to the within action. My business address is 21865 Copley Drive, Diamond Bar, California 91765.

On April 3, 2015 I served true copies of the following document(s) described as **APPLICATION OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FOR LEAVE TO FILE BRIEF OF *AMICUS CURIAE* IN SUPPORT OF NEITHER PARTY AND *[PROPOSED]* BRIEF OF *AMICUS CURIAE*** by placing a true copy of the foregoing document(s) in a sealed envelope addressed as set forth on the attached service list as follows:

BY MAIL: I enclosed the document(s) in a sealed envelope or package addressed to the persons at the addresses listed in the Service List and placed the envelope for collection and mailing following our ordinary business practices. I am readily familiar with this District's practice for collection and processing of correspondence for mailing. Under that practice, the correspondence would be deposited with the United States Postal Service, with postage thereon fully prepaid at Diamond Bar, California, in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on April 3, 2015 at Diamond Bar, California.

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CASE NO. S219783

IN THE SUPREME COURT OF CALIFORNIA

SIERRA CLUB, REVIVE THE SAN JOAQUIN, and
LEAGUE OF WOMEN VOTERS OF FRESNO,
Plaintiffs and Appellants

v.

COUNTY OF FRESNO,
Defendant and Respondent

FRIANT RANCH, L.P.,
Real Party in Interest and Respondent

After a Decision by the Court of Appeal, filed May 27, 2014
Fifth Appellate District Case No. F066798

Appeal from the Superior Court of California, County of Fresno
Case No. 11CECG00726

APPLICATION FOR LEAVE TO FILE AMICUS CURIAE BRIEF OF SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT IN SUPPORT OF DEFENDANT AND RESPONDENT, COUNTY OF FRESNO AND REAL PARTY IN INTEREST AND RESPONDENT, FRIANT RANCH, L.P.

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APPLICATION

Pursuant to California Rules of Court 8.520(f)(1), proposed Amicus Curiae San Joaquin Valley Unified Air Pollution Control District hereby requests permission from the Chief Justice to file an amicus brief in support of Defendant and Respondent, County of Fresno, and Defendant and Real Parties in Interest Friant Ranch, L.P. Pursuant to Rule 8.520(f)(5) of the California Rules of Court, the proposed amicus curiae brief is combined with this Application. The brief addresses the following issue certified by this Court for review:

> Is an EIR adequate when it identifies the health impacts of air pollution and quantifies a project's expected emissions, or does CEQA further require the EIR to *correlate* a project's air quality emissions to specific health impacts?

As of the date of this filing, the deadline for the final reply brief on the merits was March 5, 2015. Accordingly, under Rule 8.520(f)(2), this application and brief are timely.

1. Background and Interest of San Joaquin Valley Unified Air Pollution Control District

The San Joaquin Valley Unified Air Pollution Control District ("Air District") regulates air quality in the eight counties comprising the San Joaquin Valley ("Central Valley"): Kern, Tulare, Madera, Fresno, Merced, San Joaquin, Stanislaus, and Kings, and is primarily responsible for attaining air quality standards within its jurisdiction. After billions of dollars of investment by Central Valley businesses, pioneering air quality regulations, and consistent efforts by residents, the Central Valley air basin has made historic improvements in air quality.

The Central Valley's geographical, topographical and meteorological features create exceptionally challenging air quality

conditions. For example, it receives air pollution transported from the San Francisco Bay Area and northern Central Valley communities, and the southern portion of the Central Valley includes three mountain ranges (Sierra, Tehachapi, and Coastal) that, under some meteorological conditions, effectively trap air pollution. Central Valley air pollution is only a fraction of what the Bay Area and Los Angeles produce, but these natural conditions result in air quality conditions that are only marginally better than Los Angeles, even though about ten times more pollution is emitted in the Los Angeles region. Bay Area air quality is much better than the Central Valley's, even though the Bay Area produces about six times more pollution. The Central Valley also receives air pollution transported from the Bay Area and northern counties in the Central Valley, including Sacramento, and transboundary anthropogenic ozone from as far away as China.

Notwithstanding these challenges, the Central Valley has reduced emissions at the same or better rate than other areas in California and has achieved unparalleled milestones in protecting public health and the environment:

- In the last decade, the Central Valley became the first air basin classified by the federal government under the Clean Air Act as a "serious nonattainment" area to come into attainment of health-based National Ambient Air Quality Standard ("NAAQS") for coarse particulate matter (PM10), an achievement made even more notable given the Valley's extensive agricultural sector. Unhealthy levels of particulate matter can cause and exacerbate a range of chronic and acute illnesses.
- In 2013, the Central Valley became the first air basin in the country to improve from a federal designation of "extreme" nonattainment to

actually attain (and quality for an attainment designation) of the 1-hour ozone NAAQS; ozone creates "smog" and, like PM10, causes adverse health impacts.

- The Central Valley also is in full attainment of federal standards for lead, nitrogen dioxide, sulfur dioxide, and carbon monoxide.
- The Central Valley continues to make progress toward compliance with its last two attainment standards, with the number of exceedences for the 8-hour ozone NAAQS reduced by 74% (for the 1997 standard) and 38% (for the 2008 standard) since 1991, and for the small particulate matter (PM2.5) NAAQS reduced by 85% (for the 1997 standard) and 61% (for the 2006 standard).

Sustained improvement in Central Valley air quality requires a rigorous and comprehensive regulatory framework that includes prohibitions (e.g., on wood-burning fireplaces in new residences), mandates (e.g., requiring the installation of best available pollution reduction technologies on new and modified equipment and industrial operations), innovations (e.g., fees assessed against residential development to fund pollution reduction actions to "offset" vehicular emissions associated with new residences), incentive programs (e.g., funding replacements of older, more polluting heavy duty trucks and school buses)[1], ongoing planning for continued air quality improvements, and enforcement of Air District permits and regulations.

The Air District is also an expert air quality agency for the eight counties and cities in the San Joaquin Valley. In that capacity, the Air District has developed air quality emission guidelines for use by the Central

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[1] San Joaquin's incentive program has been so successful that through 2012, it has awarded over $ 432 million in incentive funds and has achieved 93,349 tons of lifetime emissions reductions. *See* SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT, 2012 PM2.5 PLAN, 6-6 (2012) *available at* http://www.valleyair.org/Workshops/postings/2012/12-20-12PM25/FinalVersion/06%20Chapter%206%20Incentives.pdf.

Valley counties and cities that implement the California Environment Quality Act (CEQA).[2] In its guidance, the Air District has distinguished between toxic air contaminants and criteria air pollutants.[3] Recognizing this distinction, the Air District's CEQA Guidance has adopted distinct thresholds of significance for *criteria* pollutants (i.e., ozone, PM2.5 and their respective precursor pollutants) based upon scientific and factual data which demonstrates the level that can be accommodated on a cumulative basis in the San Joaquin Valley without affecting the attainment of the applicable NAAQS.[4] For *toxic air* pollutants, the District has adopted different thresholds of significance which scientific and factual data demonstrates has the potential to expose sensitive receptors (i.e., children, the elderly) to levels which may result in localized health impacts.[5]

The Air District's CEQA Guidance was followed by the County of Fresno in its environment review of the Friant Ranch project, for which the Air District also served as a commenting agency. The Court of Appeal's holding, however, requiring correlation between the project's criteria

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[2] *See, e.g.*, SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT, PLANNING DIVISION, GUIDE FOR ASSESSING AND MITIGATING AIR QUALITY IMPACTS (2015), *available at* http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf ("CEQA Guidance").

[3] Toxic air contaminants, also known as hazardous air pollutants, are those pollutants that are known or suspected to cause cancer or other serious health effects, such as birth defects. There are currently 189 toxic air contaminants regulated by the United States Environmental Protection Agency ("EPA") and the states pursuant to the Clean Air Act. 42 U.S.C. § 7412. Common TACs include benzene, perchloroethylene and asbestos. *Id.* at 7412(b).

In contrast, there are only six (6) criteria air pollutants: ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead. Although criteria air pollutants can also be harmful to human health, they are distinguishable from toxic air contaminants and are regulated separately. For instance, while criteria pollutants are regulated by numerous sections throughout Title I of the Clean Air Act, the regulation of toxic air contaminants occurs solely under section 112 of the Act. Compare 42 U.S.C. §§ 7407 – 7411 & 7501 – 7515 with 42 U.S.C. § 7411.

[4] See, e.g., CEQA Guidance at http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf, pp. 64-66, 80.

[5] See, e.g., CEQA Guidance at http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf, pp. 66, 99-101.

pollutants and local health impacts, departs from the Air District's Guidance and approved methodology for assessing criteria pollutants. A close reading of the administrative record that gave rise to this issue demonstrates that the Court's holding is based on a misunderstanding of the distinction between toxic air contaminants (for which a local health risk assessment is feasible and routinely performed) and criteria air pollutants (for which a local health risk assessment is not feasible and would result in speculative results).[6] The Air District has a direct interest in ensuring the lawfulness and consistent application of its CEQA Guidance, and will explain how the Court of Appeal departed from the Air District's long-standing CEQA Guidance in addressing criteria pollutants and toxic air contaminants in this amicus brief.

2. How the Proposed Amicus Curiae Brief Will Assist the Court

As counsel for the proposed amicus curiae, we have reviewed the briefs filed in this action. In addition to serving as a "commentary agency" for CEQA purposes over the Friant Ranch project, the Air District has a strong interest in assuring that CEQA is used for its intended purpose, and believes that this Court would benefit from additional briefing explaining the distinction between criteria pollutants and toxic air contaminants and the different methodologies employed by local air pollution control agencies such as the Air District to analyze these two categories of air pollutants under CEQA. The Air District will also explain how the Court of Appeal's opinion is based upon a fundamental misunderstanding of these two different approaches by requiring the County of Fresno to correlate the project's *criteria* pollution emissions with *local* health impacts. In doing

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[6] CEQA does not require speculation. *See, e.g., Laurel Heights Improvement Ass'n v. Regents of Univ. of Cal.*, 6 Cal. 4th 1112, 1137 (1993) (upholding EIR that failed to evaluate cumulative toxic air emission increases given absence of any acceptable means for doing so).

so, the Air District will provide helpful analysis to support its position that at least insofar as criteria pollutants are concerned, CEQA does not require an EIR to correlate a project's air quality emissions to specific health impacts, because such an analysis is not reasonably feasible.

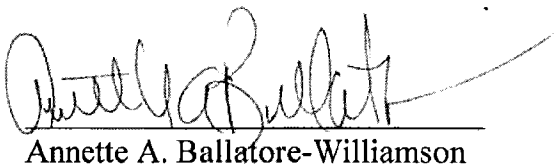
Rule 8.520 Disclosure

Pursuant to Cal. R. 8.520(f)(4), neither the Plaintiffs nor the Defendant or Real Party In Interest or their respective counsel authored this brief in whole or in part. Neither the Plaintiffs nor the Defendant or Real Party in Interest or their respective counsel made any monetary contribution towards or in support of the preparation of this brief.

CONCLUSION

On behalf of the San Joaquin Valley Unified Air Pollution Control District, we respectfully request that this Court accept the filing of the attached brief.

Dated: April 2, 2015



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SAN JOAQUIN VALLEY UNIFIED
AIR POLLUTION CONTROL
DISTRICT

CASE NO. S219783

IN THE SUPREME COURT OF CALIFORNIA

SIERRA CLUB, REVIVE THE SAN JOAQUIN, and
LEAGUE OF WOMEN VOTERS OF FRESNO,
Plaintiffs and Appellants

v.

COUNTY OF FRESNO,
Defendant and Respondent

FRIANT RANCH, L.P.,
Real Party in Interest and Respondent

After a Decision by the Court of Appeal, filed May 27, 2014
Fifth Appellate District Case No. F066798

Appeal from the Superior Court of California, County of Fresno
Case No. 11CECG00726

AMICUS CURIAE BRIEF OF SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT IN SUPPORT OF DEFENDANT AND RESPONDENT, COUNTY OF FRESNO AND REAL PARTY IN INTEREST AND RESPONDENT, FRIANT RANCH, L.P.

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I. INTRODUCTION.

The San Joaquin Valley Unified Air Pollution Control District ("Air District") respectfully submits that the Court of Appeal erred when it held that the air quality analysis contained in the Environmental Impact Report ("EIR") for the Friant Ranch development project was inadequate under the California Environmental Quality Act ("CEQA") because it did not include an analysis of the correlation between the project's criteria air pollutants and the potential adverse human health impacts. A close reading of the portion of the administrative record that gave rise to this issue demonstrates that the Court's holding is based on a misunderstanding of the distinction between toxic air contaminants and criteria air pollutants.

Toxic air contaminants, also known as hazardous air pollutants, are those pollutants that are known or suspected to cause cancer or other serious health effects, such as birth defects. There are currently 189 toxic air contaminants (hereinafter referred to as "TACs") regulated by the United States Environmental Protection Agency ("EPA") and the states pursuant to the Clean Air Act. 42 U.S.C. § 7412. Common TACs include benzene, perchloroethylene and asbestos. *Id.* at 7412(b).

In contrast, there are only six (6) criteria air pollutants: ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead. Although criteria air pollutants can also be harmful to human health,

they are distinguishable from TACs and are regulated separately. For instance, while criteria pollutants are regulated by numerous sections throughout Title I of the Clean Air Act, the regulation of TACs occurs solely under section 112 of the Act. *Compare* 42 U.S.C. §§ 7407 – 7411 & 7501 – 7515 *with* 42 U.S.C. § 7411.

The most relevant difference between criteria pollutants and TACs for purposes of this case is the manner in which human health impacts are accounted for. While it is common practice to analyze the correlation between an individual facility's TAC emissions and the expected localized human health impacts, such is not the case for criteria pollutants. Instead, the human health impacts associated with criteria air pollutants are analyzed and taken into consideration when EPA sets the national ambient air quality standard ("NAAQS") for each criteria pollutant. 42 U.S.C. § 7409(b)(1). The health impact of a particular criteria pollutant is analyzed on a regional and not a facility level based on how close the area is to complying with (attaining) the NAAQS. Accordingly, while the type of individual facility / health impact analysis that the Court of Appeal has required is a customary practice for TACs, it is not feasible to conduct a similar analysis for criteria air pollutants because currently available computer modeling tools are not equipped for this task.

It is clear from a reading of both the administrative record and the Court of Appeal's decision that the Court did not have the expertise to fully

appreciate the difference between TACs and criteria air pollutants. As a result, the Court has ordered the County of Fresno to conduct an analysis that is not practicable and not likely yield valid information. The Air District respectfully requests that this portion of the Court of Appeal's decision be reversed.

II. THE COURT OF APPEAL ERRED IN FINDING THE FRIANT RANCH EIR INADEQUATE FOR FAILING TO ANALYZE THE SPECIFIC HUMAN HEALTH IMPACTS ASSOCIATED CRITERIA AIR POLLUTANTS.

Although the Air District does not take lightly the amount of air emissions at issue in this case, it submits that the Court of Appeal got it wrong when it required Fresno County to revise the Friant Ranch EIR to include an analysis correlating the criteria air pollutant emissions associated with the project with specific, localized health-impacts. The type of analysis the Court of Appeal has required will not yield reliable information because currently available modeling tools are not well suited for this task. Further, in reviewing this issue de novo, the Court of Appeal failed to appreciate that it lacked the scientific expertise to appreciate the significant differences between a health risk assessment commonly performed for toxic air contaminants and a similar type of analysis it felt should have been conducted for criteria air pollutants.

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A. Currently Available Modeling Tools are not Equipped to Provide a Meaningful Analysis of the Correlation between an Individual Development Project's Air Emissions and Specific Human Health Impacts.

In order to appreciate the problematic nature of the Court of Appeals' decision requiring a health risk type analysis for criteria air pollutants, it is important to understand how the relevant criteria pollutants (ozone and particulate matter) are formed, dispersed and regulated.

Ground level ozone (smog) is not directly emitted into the air, but is formed when precursor pollutants such as oxides of nitrogen (NOx) and volatile organic compounds (VOCs) are emitted into the atmosphere and undergo complex chemical reactions in the process of sunlight.[1] Once formed, ozone can be transported long distances by wind.[2] Because of the complexity of ozone formation, a specific tonnage amount of NOx or VOCs emitted in a particular area does not equate to a particular concentration of ozone in that area. In fact, even rural areas that have relatively low tonnages of emissions of NOx or VOCs can have high levels of ozone concentration simply due to wind transport.[3] Conversely, the San Francisco Bay Area has six times more NOx and VOC emissions per square mile than the San Joaquin Valley, but experiences lower

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[1] *See* United States Environmental Protection Agency, *Ground-level Ozone: Basic Information*, available at: http://www.epa.gov/airquality/ozonepollution/basic.html (visited March 10, 2015).
[2] *Id.*
[3] *Id.*

concentrations of ozone (and better air quality) simply because sea breezes disperse the emissions.[4]

Particulate matter ("PM") can be divided into two categories: directly emitted PM and secondary PM.[5] While directly emitted PM can have a localized impact, the tonnage emitted does not always equate to the local PM concentration because it can be transported long distances by wind.[6] Secondary PM, like ozone, is formed via complex chemical reactions in the atmosphere between precursor chemicals such as sulfur dioxides (SOx) and NOx.[7] Because of the complexity of secondary PM formation, the tonnage of PM-forming precursor emissions in an area does not necessarily result in an equivalent concentration of secondary PM in that area.

The disconnect between the *tonnage* of precursor pollutants (NOx, SOx and VOCs) and the *concentration* of ozone or PM formed is important because it is not necessarily the tonnage of precursor pollutants that causes human health effects, but the concentration of resulting ozone or PM. Indeed, the national ambient air quality standards ("NAAQS"), which are statutorily required to be set by the United States Environmental Protection

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[4] *San Joaquin Valley Air Pollution Control District 2007 Ozone Plan*, Executive Summary p. ES-6, available at: http://www.valleyair.org/Air_Quality_Plans/docs/AQ_Ozone_2007_Adopted/03%20Executive%20Summary.pdf (visited March 10, 2015).

[5] United States Environmental Protection Agency, *Particulate Matter: Basic Information*, available at: http://www.epa.gov/airquality/particlepollution/basic.html (visited March 10, 2015).

[6] *Id.*

[7] *Id.*

Agency ("EPA") at levels that are "requisite to protect the public health," 42 U.S.C. § 7409(b)(1), are established as concentrations of ozone or particulate matter and not as tonnages of their precursor pollutants.[8]

Attainment of a particular NAAQS occurs when the concentration of the relevant pollutant remains below a set threshold on a consistent basis throughout a particular region. For example, the San Joaquin Valley attained the 1-hour ozone NAAQS when ozone concentrations remained at or below 0.124 parts per million Valley-wide on 3 or fewer days over a 3-year period.[9] Because the NAAQS are focused on achieving a particular concentration of pollution region-wide, the Air District's tools and plans for attaining the NAAQS are regional in nature.

For instance, the computer models used to simulate and predict an attainment date for the ozone or particulate matter NAAQS in the San Joaquin Valley are based on regional inputs, such as regional inventories of precursor pollutants (NOx, SOx and VOCs) and the atmospheric chemistry and meteorology of the Valley.[10] At a very basic level, the models simulate future ozone or PM levels based on predicted changes in precursor

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[8] See, e.g., United States Environmental Protection Agency, *Table of National Ambient Air Quality Standards*, available at: http://www.epa.gov/air/criteria.html#3 (visited March 10, 2015).

[9] *San Joaquin Valley Unified Air Pollution Control District 2013 Plan for the Revoked 1-Hour Ozone Standard*, Ch. 2 p. 2-16, available at: http://www.valleyair.org/Air_Quality_Plans/OzoneOneHourPlan2013/02Chapter2ScienceTrendsModeling.pdf (visited March 10, 2015).

[10] *Id.* at Ch. 2 p. 2-19 (visited March 12, 2015); *San Joaquin Valley Unified Air Pollution Control District 2008 PM2.5 Plan*, Appendix F, pp. F-2 – F-5, available at: http://www.valleyair.org/Air_Quality_Plans/docs/AQ_Final_Adopted_PM2.5/20%20Appendix%20F.pdf (visited March 19, 2015).

emissions Valley wide.[11] Because the NAAQS are set levels necessary to protect human health, the closer a region is to attaining a particular NAAQS, the lower the human health impact is from that pollutant.

The goal of these modeling exercises is not to determine whether the emissions generated by a particular factory or development project will affect the date that the Valley attains the NAAQS. Rather, the Air District's modeling and planning strategy is regional in nature and based on the extent to which *all* of the emission-generating sources in the Valley (current and future) must be controlled in order to reach attainment.[12]

Accordingly, the Air District has based its thresholds of significance for CEQA purposes on the levels that scientific and factual data demonstrate that the Valley can accommodate without affecting the attainment date for the NAAQS.[13] The Air District has tied its CEQA significance thresholds to the level at which stationary pollution sources permitted by the Air District must "offset" their emissions.[14] This "offset"

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[11] *Id.*

[12] Although the Air District does have a dispersion modeling tool used during its air permitting process that is used to predict whether a particular project's directly emitted PM will either cause an exceedance of the PM NAAQS or contribute to an existing exceedance, this model bases the prediction on a worst case scenario of emissions and meteorology and has no provision for predicting any associated human health impacts. Further, this analysis is only performed for stationary sources (factories, oil refineries, etc.) that are required to obtain a New Source Review permit from the Air District and not for development projects such as Friant Ranch over which the Air District has no preconstruction permitting authority. *See* San Joaquin Valley Unified Air Pollution Control District Rule 2201 §§ 2.0; 3.3.9; 4.14.1, available at: http://www.valleyair.org/rules/currntrules/Rule2201041l.pdf (visited March 19, 2015).

[13] *San Joaquin Valley Unified Air Pollution Control District Guide to Assessing and Mitigating Air Quality Impacts*, (March 19, 2015) p. 22, available at: http://www.valleyair.org/transportation/CEQA%20Rules/GAMAQI%20Jan%202002%20Rev.pdf (visited March 30, 2015).

[14] *Id.* at pp. 22, 25.

level allows for growth while keeping the cumulative effects of all new sources at a level that will not impede attainment of the NAAQS.[15] In the Valley, these thresholds are 15 tons per year of PM, and 10 tons of NOx or VOC per year. *Sierra Club*, *supra*, 172 Cal.Rptr.3d at 303; AR 4554. Thus, the CEQA air quality analysis for criteria pollutants is not really a localized, project-level impact analysis but one of regional, "cumulative impacts."

Accordingly, the significance thresholds applied in the Friant Ranch EIR (15 tons per year of PM and 10 tons of NOx or VOCs) are not intended to be indicative of any localized human health impact that the project may have. While the health effects of air pollution are of primary concern to the Air District (indeed, the NAAQS are established to protect human health), the Air District is simply not equipped to analyze whether and to what extent the criteria pollutant emissions of an individual CEQA project directly impact human health in a particular area. This is true even for projects with relatively high levels of emissions of criteria pollutant precursor emissions.

For instance, according to the EIR, the Friant Ranch project is estimated to emit 109.52 tons per year of ROG (VOC), 102.19 tons per year of NOx, and 117.38 tons per year of PM. Although these levels well

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[15] [15] *San Joaquin Valley Unified Air Pollution Control District Environmental Review Guidelines* (Aug. 2000) p. 4-11, available at: http://www.valleyair.org/transportation/CEQA%20Rules/ERG%20Adopted%20_August%202000_.pdf (visited March 12, 2015).

exceed the Air District's CEQA significance thresholds, this does not mean that one can easily determine the concentration of ozone or PM that will be created at or near the Friant Ranch site on a particular day or month of the year, or what specific health impacts will occur. Meteorology, the presence of sunlight, and other complex chemical factors all combine to determine the ultimate concentration and location of ozone or PM. This is especially true for a project like Friant Ranch where most of the criteria pollutant emissions derive not from a single "point source," but from area wide sources (consumer products, paint, etc.) or mobile sources (cars and trucks) driving to, from and around the site.

In addition, it would be extremely difficult to model the impact on NAAQS attainment that the emissions from the Friant Ranch project may have. As discussed above, the currently available modeling tools are equipped to model the impact of *all* emission sources in the Valley on attainment. According to the most recent EPA-approved emission inventory, the NOx inventory for the Valley is for the year 2014 is 458.2 tons per day, or 167,243 tons per year and the VOC (or ROG) inventory is 361.7 tons per day, or 132,020.5 tons per year.[16] Running the photochemical grid model used for predicting ozone attainment with the

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[16] *San Joaquin Valley Unified Air Pollution Control District 2007 Ozone Plan*, Appendix B pp. B-6, B-9,
available at:
http://www.valleyair.org/Air_Quality_Plans/docs/AQ_Ozone_2007_Adopted/19%20Appendix%20B%20April%202007.pdf (visited March 12, 2015).

emissions solely from the Friant Ranch project (which equate to less than one-tenth of one percent of the total NOx and VOC in the Valley) is not likely to yield valid information given the relative scale involved.

Finally, even once a model is developed to accurately ascertain local increases in concentrations of photochemical pollutants like ozone and some particulates, it remains impossible, using today's models, to correlate that increase in concentration to a specific health impact. The reason is the same: such models are designed to determine regional, population-wide health impacts, and simply are not accurate when applied at the local level.

For these reasons, it is not the norm for CEQA practitioners, including the Air District, to conduct an analysis of the localized health impacts associated with a project's criteria air pollutant emissions as part of the EIR process. When the accepted scientific method precludes a certain type of analysis, "the court cannot impose a legal standard to the contrary." *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 717 n. 8. However, that is exactly what the Court of Appeal has done in this case. Its decision upends the way CEQA air quality analysis of criteria pollutants occurs and should be reversed.

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B. The Court of Appeal Improperly Extrapolated a Request for a Health Risk Assessment for Toxic Air Contaminants into a Requirement that the EIR contain an Analysis of Localized Health Impacts Associated with Criteria Air Pollutants.

The Court of Appeal's error in requiring the new health impact analysis for criteria air pollutants clearly stems from a misunderstanding of terms of art commonly used in the air pollution field. More specifically, the Court of Appeal (and Appellants Sierra Club et al.) appear to have confused the health risk analysis ("HRA") performed to determine the health impacts associated with a project's toxic air contaminants ("TACs"), with an analysis correlating a project's criteria air pollutants (ozone, PM and the like) with specific localized health impacts.

The first type of analysis, the HRA, is commonly performed during the Air District's stationary source permitting process for projects that emit TACs and is, thus, incorporated into the CEQA review process. An HRA is a comprehensive analysis to evaluate and predict the dispersion of TACs emitted by a project and the potential for exposure of human populations. It also assesses and quantifies both the individual and population-wide health risks associated with those levels of exposure. There is no similar analysis conducted for criteria air pollutants. Thus, the second type of analysis (required by the Court of Appeal), is not currently part of the Air District's process because, as outlined above, the health risks associated

with exposure to criteria pollutants are evaluated on a regional level based on the region's attainment of the NAAQS.

The root of this confusion between the types of analyses conducted for TACs versus criteria air pollutants appears to stem from a comment that was presented to Fresno County by the City of Fresno during the administrative process.

In its comments on the draft EIR, the City of Fresno (the only party to raise this issue) stated:

> [t]he EIR must disclose the human health related effects of the Project's air pollution impacts. (CEQA Guidelines section 15126.2(a).) The EIR fails completely in this area. The EIR should be revised to disclose and determine the significance of TAC impacts, and of human health risks due to exposure to Project-related air emissions.

(AR 4602.)

In determining that the issue regarding the correlation between the Friant Ranch project's criteria air pollutants and adverse health impacts was adequately exhausted at the administrative level, the Court of Appeal improperly read the first two sentences of the City of Fresno's comment in isolation rather than in the context of the entire comment. *See Sierra Club v. County of Fresno* (2014) 172 Cal.Rptr.3d 271, 306. Although the comment first speaks generally in terms of "human health related effects" and "air pollution," it requests only that the EIR be revised to disclose "the significance of TACs" and the "human health risks due to exposure."

The language of this request in the third sentence of the comment is significant because, to an air pollution practitioner, the language would only have indicated only that a HRA for TACs was requested, and not a separate analysis of the health impacts associated with the project's criteria air pollutants. Fresno County clearly read the comment as a request to perform an HRA for TACs and limited its response accordingly. (AR 4602.)[17] The Air District submits that it would have read the City's comment in the same manner as the County because the City's use of the terms "human health risks" and "TACs" signal that an HRA for TACs is being requested. Indeed, the Air District was also concerned that an HRA be conducted, but understood that it was not possible to conduct such an analysis until the project entered the phase where detailed site specific information, such as the types of emission sources and the proximity of the sources to sensitive receptors became available. (AR 4553.)[18] The City of Fresno was apparently satisfied with the County's discussion of human health risks, as it did not raise the issue again when it commented on the final EIR. (AR 8944 – 8960.)

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[17] Appellants do not challenge the manner in which the County addressed TACs in the EIR. (Appellants' Answer Brief p. 28 fn. 7.)

[18] Appellants rely on the testimony of Air District employee, Dan Barber, as support for their position that the County should have conducted an analysis correlating the project's criteria air pollutant emissions with localized health impacts. (Appellants Answer Brief pp. 10-11; 28.) However, Mr. Barber's testimony simply reinforces the Air District's concern that a risk assessment (HRA) be conducted once the actual details of the project become available. (AR 8863.) As to criteria air pollutants, Mr. Barber's comments are aimed at the Air District's concern about the amount of emissions and the fact that the emissions will make it "more difficult for Fresno County and the Valley to reach attainment which means that the health of Valley residents maybe [sic] adversely impacted." Mr. Barber says nothing about conducting a separate analysis of the localized health impacts the project's emissions may have.

The Court of Appeal's holding, which incorrectly extrapolates a request for an HRA for TACs into a new analysis of the localized health impacts of the project's criteria air pollutants, highlights two additional errors in the Court's decision.

First, the Court of Appeal's holding illustrates why the Court should have applied the deferential substantial evidence standard of review to the issue of whether the EIR's air quality analysis was sufficient. The regulation of air pollution is a technical and complex field and the Court of Appeal lacked the expertise to fully appreciate the difference between TACs and criteria air pollutants and tools available for analyzing each type of pollutant.

Second, it illustrates that the Court likely got it wrong when it held that the issue regarding the criteria pollutant / localized health impact analysis was properly exhausted during the administrative process. In order to preserve an issue for the court, '[t]he "exact issue" must have been presented to the administrative agency....' [Citation.] *Citizens for Responsible Equitable Environmental Development v. City of San Diego*, (2011) 196 Cal.App.4th 515, 527 129 Cal.Rptr.3d 512, 521; *Sierra Club v. City of Orange* (2008) 163 Cal.App.4th 523, 535, 78 Cal.Rptr.3d 1, 13. "'[T]he objections must be sufficiently specific so that the agency has the

opportunity to evaluate and respond to them.' [Citation.]" *Sierra Club v. City of Orange*,163 Cal.App.4th at 536.[19]

As discussed above, the City's comment, while specific enough to request a commonly performed HRA for TACs, provided the County with no notice that it should perform a new type of analysis correlating criteria pollutant tonnages to specific human health effects. Although the parties have not directly addressed the issue of failure to exhaust administrative remedies in their briefs, the Air District submits that the Court should consider how it affects the issues briefed by the parties since "[e]xhaustion of administrative remedies is a jurisdictional prerequisite to maintenance of a CEQA action." *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1199, 22 Cal.Rptr.3d 203.

III. CONCLUSION

For all of the foregoing reasons, the Air District respectfully requests that the portion of the Court of Appeal's decision requiring an analysis correlating the localized human health impacts associated with an individual project's criteria air pollutant emissions be reversed.

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[19] *Sierra Club v. City of Orange*, is illustrative here. In that case, the plaintiffs challenged an EIR approved for a large planned community on the basis that the EIR improperly broke up the various environmental impacts by separate project components or "piecemealed" the analysis in violation of CEQA. In evaluating the defense that the plaintiffs had failed to adequately raise the issue at the administrative level, the Court held that comments such as *"the use of a single document for both a project-level and a program-level EIR [is] 'confusing',"* and *"[t]he lead agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project,"* were too vague to fairly raise the argument of piecemealing before the agency. *Sierra Club v. City of Orange*, 163 Cal.App.4th at 537.

correlating the localized human health impacts associated with an individual project's criteria air pollutant emissions be reversed.

Respectfully submitted,

Dated: April 2, 2015

Catherine T. Redmond
Attorney for Proposed Amicus Curiae

SAN JOAQUIN VALLEY
UNIFIED
AIR POLLUTION CONTROL
DISTRICT

CERTIFICATE OF WORD COUNT

Pursuant to Rule 8.204 of the California Rules of Court, I hereby certify that this document, based on the Word County feature of the Microsoft Word software program used to compose and print this document, contains, exclusive of caption, tables, certificate of word count, signature block and certificate of service, 3806 words.

Dated: April 2, 2015

Annette A. Ballatore-Williamson
District Counsel (SBN 192176)

Sierra Club et al, v. County of Fresno, et al
Supreme Court of California Case No.: S219783
Fifth District Court of Appeal Case No.: F066798
Fresno County Superior Court Case No.: 11CECG00726

PROOF OF SERVICE

I am over the age of 18 years and not a p[arty to the above-captioned action; that my business address is San Joaquin Valley Unified Air Pollution Control District located at 1990 E. Gettysburg Avenue, Fresno, California 93726.

On April 2, 2015, I served the document described below:

APPLICATION FOR LEAVE TO FILE AMICUS CURIAE BRIEF OF SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT IN SUPPORT OF DEFENDANT AND RESPONDENT, COUNTY OF FRESNO

On all parties to this action at the following addresses and in the following manner:

PLEASE SEE ATTACHED SERVICE LIST

(XX) **(BY MAIL)** I caused a true copy of each document(s) to be laced in a sealed envelope with first-class postage affixed and placed the envelope for collection. Mail is collected daily at my office and placed in a United State Postal Service collection box for pick-up and delivery that same day.

( ) **(BY ELECTRONIC MAIL)** I caused a true and correct scanned image (.PDF file) copy to be transmitted via electronic mail transfer system in place at the San Joaquin Valley Unified Air Pollution Control District ("District"), originating from the undersigned at 1990 E. Gettysburg Avenue, Fresno, CA, to the address(es) indicated below.

( ) **(BY OVERNIGHT MAIL)** I caused a true and correct copy to be delivered via Federal Express to the following person(s) or their representative at the address(es) listed below.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that I executed this document on April 2, 2015, at Fresno, California.

Esthela Soto

SERVICE LIST

Sierra Club et al, v. County of Fresno, et al
Supreme Court of California Case No.: S219783
Fifth District Court of Appeal Case No.: F066798
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