

Appendix D

Air Quality, Greenhouse Gas, and Energy Modeling Data

**D1. Air Quality, Greenhouse
Gas, and Energy
Modeling Data**

WSGVAP
 Air Quality Assessment
 Operational Mobile Emissions

		Criteria Pollutant Emission Factors (lbs/mile)										Criteria Pollutant Emissions (lbs/day)											
		Year	Weekday Daily VMT	PM10 Road						PM2.5 Road				PM10 Road									
				VOC	NOx	CO	SOx	Dust	PM10	PM10 Total	Dust	PM2.5	PM2.5 Total	VOC	NOx	CO	SOx	Dust	PM10	PM10 Total	PM2.5 Road Dust	PM2.5	PM2.5 Total
No Project	Auto	2045	369,888,554	1.823E-04	9.123E-05	1.629E-03	5.372E-06	6.61E-04	3.812E-05	6.99E-04	1.62E-04	1.238E-05	1.75E-04	67,417.36	33,745.85	602,527.37	1,987.11	244,517.20	14,101.10	258,618.31	60,017.86	4,578.73	64,596.59
No Project	Light-heavy Truck	2045	6,761,809	1.562E-04	2.624E-04	1.336E-03	6.037E-06	6.61E-04	1.672E-04	8.28E-04	1.62E-04	6.180E-05	2.24E-04	1,056.44	1,774.53	9,036.05	40.82	4,469.94	1,130.76	5,600.69	1,097.17	417.88	1,515.05
No Project	Medium-heavy Truck	2045	5,255,030	4.494E-05	8.016E-04	5.276E-04	1.140E-05	6.61E-04	1.028E-04	7.64E-04	1.62E-04	3.590E-05	1.98E-04	236.17	4,212.65	2,772.72	59.89	3,473.87	540.06	4,013.93	852.68	188.67	1,041.34
No Project	Heavy-heavy Truck	2045	25,165,999	9.728E-05	3.211E-03	1.664E-03	2.145E-05	6.61E-04	2.872E-04	9.48E-04	1.62E-04	1.175E-04	2.80E-04	2,448.16	80,800.43	41,879.02	539.81	16,636.15	7,226.73	23,862.88	4,083.42	2,956.41	7,039.82
Totals		Totals											71,158	120,533	656,215	2,628			292,096			74,193	
Project	Auto	2045	370,216,134	1.823E-04	9.123E-05	1.629E-03	5.372E-06	6.61E-04	3.812E-05	6.992E-04	1.62E-04	1.238E-05	1.746E-04	67,477.07	33,775.74	603,060.98	1,988.87	244,733.75	14,113.59	258,847.34	60,071.01	4,582.79	64,653.80
Project	Light-heavy Truck	2045	6,773,824	1.562E-04	2.624E-04	1.336E-03	6.037E-06	6.61E-04	1.672E-04	8.283E-04	1.62E-04	6.180E-05	2.241E-04	1,058.32	1,777.68	9,052.11	40.89	4,477.88	1,132.77	5,610.65	1,099.12	418.62	1,517.74
Project	Medium-heavy Truck	2045	5,265,126	4.494E-05	8.016E-04	5.276E-04	1.140E-05	6.61E-04	1.028E-04	7.638E-04	1.62E-04	3.590E-05	1.982E-04	236.62	4,220.74	2,778.05	60.00	3,480.55	541.10	4,021.64	854.32	189.03	1,043.35
Project	Heavy-heavy Truck	2045	25,200,118	9.728E-05	3.211E-03	1.664E-03	2.145E-05	6.61E-04	2.872E-04	9.482E-04	1.62E-04	1.175E-04	2.797E-04	2,451.48	80,909.97	41,935.80	540.55	16,658.70	7,236.53	23,895.23	4,088.95	2,960.41	7,049.37
Totals		Totals											71,223	120,684	656,827	2,630			292,375			74,264	

Source: EMFAC2021; Fehr & Peers, 2024 (VMT data); Based on travel within SCAB

WSGVAP

Road Dust Emission Factors

Paved Road Dust Emission Factors (Assumes No Precipitation)

Formula: $EF_{Dust,P} = (k (sL)^{0.91} \times (W)^{1.02})$

Where:

- $EF_{Dust,P}$ = Paved Road Dust Emission Factor (having the same units as k)
- k = particle size multiplier
- sL = road surface silt loading (g/m²)
- W = average fleet vehicle weight (tons) (CARB uses 2.4 tons as a fleet average vehicle weight factor)

	Emission Factor (grams per VMT)	
	PM10	PM2.5
k	0.9979	0.2449
sL	0.1	0.1
W	2.4	2.4
$EF_{Dust,P}$	3.00E-01	7.36E-02

Unpaved Road Dust Emission Factors (Assumes No Precipitation)

Formula: $EF_{Dust,U} = (k (s / 12)^1 \times (Sp / 30)^{0.5} / (M / 0.5)^{0.2}) - C$

- Where:
- $EF_{Dust,U}$ = Unpaved Road Dust Emission Factor (having the same units as k)
 - k = particle size multiplier
 - s = surface material silt content (%)
 - Sp = mean vehicle speed (mph)
 - M = surface material moisture content (%)
 - C = Emission Factor for 1980s vehicle fleet exhaust, brake wear, and tire wear

	Emission Factor (grams per VMT)	
	PM10	PM2.5
k	816.47	81.65
s	4.3%	4.3%
Sp	15	15
M	0.5%	0.5%
C	0.00047	0.00036
$EF_{Dust,U}$	5.20E+00	5.19E-01

Sources:

CalEEMod, Version 2022.1.

CARB, *Entrained Dust from Paved Road Travel: Emission Estimation Methodology Background Document* , (1997).

USEPA, *AP-42* , Fifth Edition, Volume I, Chapter 13.2.1 - Paved Roads, (2011).

ESA, 2023

**WSGVAP
GHG Assessment
Operational Mobile Emissions**

				GHG Emissions (metric tons/mile)				GHG Emissions (metric tons/year)				
		Year	Weekday Daily VMT	Annual VMT	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
No Project	Auto	2045	460,612,654	168,123,618,574	2.465E-04	5.860E-09	6.295E-09	2.486E-04	41,448,358.82	985.23	1,058.32	41,788,369.15
No Project	Light-heavy Truck	2045	9,274,295	3,385,117,679	2.825E-04	3.798E-09	2.613E-08	2.904E-04	956,382.45	12.86	88.44	983,059.05
No Project	Medium-heavy Truck	2045	7,183,653	2,622,033,230	5.500E-04	9.352E-09	7.533E-08	5.727E-04	1,442,191.24	24.52	197.51	1,501,662.99
No Project	Heavy-heavy Truck	2045	40,939,042	14,942,750,298	1.069E-03	4.578E-08	1.690E-07	1.121E-03	15,974,749.28	684.01	2,525.28	16,744,382.58
Totals		Totals										61,017,474
Project	Auto	2045	461,065,608	168,288,946,923	2.465E-04	5.860E-09	6.295E-09	2.486E-04	41,489,118.04	986.20	1,059.36	41,829,462.73
Project	Light-heavy Truck	2045	9,290,158	3,390,907,533	2.825E-04	3.798E-09	2.613E-08	2.904E-04	958,018.23	12.88	88.59	984,740.46
Project	Medium-heavy Truck	2045	7,193,984	2,625,804,234	5.500E-04	9.352E-09	7.533E-08	5.727E-04	1,444,265.40	24.56	197.80	1,503,822.68
Project	Heavy-heavy Truck	2045	40,968,094	14,953,354,404	1.069E-03	4.578E-08	1.690E-07	1.121E-03	15,986,085.74	684.49	2,527.07	16,756,265.21
Totals		Totals										61,074,291

Source: EMFAC2021; Fehr & Peers, 2024 (VMT data); Based on travel within SCAG Region

D2. Operational Mobile Source Energy Calculations

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Operational Energy Analysis - Project

Fuel Usage from VMT

Auto Daily VMT: 210,144,242 miles/day
 Light Duty Truck Daily VMT: 4,031,527 miles/day
 Medium Duty Truck Daily VMT: 3,043,167 miles/day
 Heavy Duty Truck Daily VMT: 15,262,079 miles/day

Auto Annual VMT³: 76,702,648,289 miles/year
 Light Duty Truck Annual VMT³: 1,471,507,461 miles/year
 Medium Duty Truck Annual VMT³: 1,110,756,133 miles/year
 Heavy Duty Truck Annual VMT³: 5,570,658,664 miles/year

Fuel Type: ¹	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	
Auto Percent:	88.8%	0.3%	7.5%	0.0%	3.3%	100.0%
Light Duty Truck Percent:	28.5%	27.0%	44.4%	0.0%	0.0%	100.0%
Medium Duty Truck Percent:	5.7%	45.2%	48.3%	0.8%	0.0%	100.0%
Heavy Duty Truck Percent:	1.1%	75.1%	20.3%	3.6%	0.0%	100.0%
Auto Miles per Gallon Fuel:	31.69	28.16	-	0.00	68.05	
Light Duty Truck Miles per Gallon:	16.5	20.6	-	-	-	
Medium Duty Truck Miles per Gallon:	5.98	9.96	-	8.52	-	
Heavy Duty Truck Miles per Gallon:	9.19	7.50	-	6.68	-	
Auto Annual VMT by Fuel Type (miles):	68,150,130,931	243,611,778	5,772,544,799	-	2,536,360,781	
Light Duty Truck Annual VMT by Fuel Type (miles):	420,017,745	397,409,429	654,080,287	-	-	
Medium Duty Truck Annual VMT by Fuel Type (miles):	62,834,410	502,320,593	536,312,087	9,289,043	-	
Heavy Duty Truck Annual VMT by Fuel Type (miles):	59,542,296	4,182,651,339	1,129,222,295	199,242,733	-	
Auto Annual Fuel Usage (gallons):	2,150,550,503	8,650,194	-	-	37,273,124	
Light Duty Truck Annual Fuel Usage (gallons):	25,525,197	19,314,007	-	-	-	
Medium Duty Truck Annual Fuel Usage (gallons):	10,499,951	50,421,508	-	1,090,653	-	
Heavy Duty Truck Annual Fuel Usage (gallons):	6,480,332	557,879,174	-	29,827,568	-	
Medium Duty Truck Annual Natural Gas Use (kbtu):				139,488,953		
Heavy Duty Truck Annual Natural Gas Use (kbtu):				3,814,795,357		

	Fuel Consumption (gallons/year)	
	Gasoline	Diesel
Project Annual Total	2,230,329,105	636,264,883

Notes:

- California Air Resources Board, EMFAC2021 (South Coast Air Basin; Annual; 2045', Aggregate Fleet).
- Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
- Fehr & Peers, 2024. Based on travel within LA County

WSGVAP

Operational Energy Analysis - No Project

Fuel Usage from VMT

Auto Daily VMT: 209,901,503 miles/day
 Light Duty Truck Daily VMT: 4,020,191 miles/day
 Medium Duty Truck Daily VMT: 3,034,242 miles/day
 Heavy Duty Truck Daily VMT: 15,240,186 miles/day

Auto Annual VMT³: 76,614,048,666 miles/year
 Light Duty Truck Annual VMT³: 1,467,369,684 miles/year
 Medium Duty Truck Annual VMT³: 1,107,498,219 miles/year
 Heavy Duty Truck Annual VMT³: 5,562,667,959 miles/year

Fuel Type: ¹	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	
Auto Percent:	88.8%	0.3%	7.5%	0.0%	3.3%	100.0%
Light Duty Truck Percent:	28.5%	27.0%	44.4%	0.0%	0.0%	100.0%
Medium Duty Truck Percent:	5.7%	45.2%	48.3%	0.8%	0.0%	100.0%
Heavy Duty Truck Percent:	1.1%	75.1%	20.3%	3.6%	0.0%	100.0%
Auto Miles per Gallon Fuel:	31.69	28.16	-	0.00	68.05	
Light Duty Truck Miles per Gallon:	16.5	20.6	-	-	-	
Medium Duty Truck Miles per Gallon:	5.98	9.96	-	8.52	-	
Heavy Duty Truck Miles per Gallon:	9.19	7.50	-	6.68	-	
Auto Annual VMT by Fuel Type (miles):	68,071,410,365	243,330,381	5,765,876,903	-	2,533,431,017	
Light Duty Truck Annual VMT by Fuel Type (miles):	418,836,684	396,291,942	652,241,059	-	-	
Medium Duty Truck Annual VMT by Fuel Type (miles):	62,650,113	500,847,257	534,739,052	9,261,798	-	
Heavy Duty Truck Annual VMT by Fuel Type (miles):	59,456,887	4,176,651,630	1,127,602,508	198,956,934	-	
Auto Annual Fuel Usage (gallons):	2,148,066,391	8,640,202	-	-	37,230,069	
Light Duty Truck Annual Fuel Usage (gallons):	25,453,422	19,259,697	-	-	-	
Medium Duty Truck Annual Fuel Usage (gallons):	10,469,154	50,273,619	-	1,087,454	-	
Heavy Duty Truck Annual Fuel Usage (gallons):	6,471,036	557,078,937	-	29,784,783	-	
Medium Duty Truck Annual Natural Gas Use (kbtu):				139,079,824		
Heavy Duty Truck Annual Natural Gas Use (kbtu):				3,809,323,310		

	Fuel Consumption (gallons/year)	
	Gasoline	Diesel
No Project Annual Total:	2,227,690,071	635,252,455

Notes:

- California Air Resources Board, EMFAC2021 (South Coast Air Basin; Annual; 2045', Aggregate Fleet).
- Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
- Fehr & Peers, 2024. Based on travel within LA County