

Appendix F Energy Worksheet

Appendices

This page intentionally left blank.

Energy Worksheet

This page intentionally left blank.

Operation-Related Annual Vehicle Fuel/Energy Usage Summary

Existing - Baseline Year 2020

Year	Full VMT Scenario											
	VMT	Gas Gallons	Miles/Gal	VMT	Diesel Gallons	Miles/Gal	VMT	CNG Gallons	Miles/Gal	VMT	Electricity kWh	Miles/kWh
Existing Baseline	3,687,441,808	148,001,638	24.91	224,263,378	19,896,581	11.27	5,115,903	1,576,272	3.25	41,450,939	13,850,850	2.99

Existing - Year 2045

Year	Full VMT Scenario											
	VMT	Gas Gallons	Miles/Gal	VMT	Diesel Gallons	Miles/Gal	VMT	CNG Gallons	Miles/Gal	VMT	Electricity kWh	Miles/kWh
Existing Year 2045	3,471,552,120	92,891,225	37.37	291,979,782	17,946,794	16.27	6,570,424	1,928,457	3.41	188,169,702	50,665,611	3.71

Proposed Project

Year	Full VMT Scenario											
	VMT	Gas Gallons	Miles/Gal	VMT	Diesel Gallons	Miles/Gal	VMT	CNG Gallons	Miles/Gal	VMT	Electricity kWh	Miles/kWh
Proposed Project	3,505,587,082	93,801,926	37.37	294,842,340	18,122,744	16.27	6,634,840	1,947,363	3.41	190,014,511	51,162,334	3.71

Net Change

Year	Full VMT Scenario											
	VMT	Gas Gallons	Miles/Gal	VMT	Diesel Gallons	Miles/Gal	VMT	CNG Gallons	Miles/Gal	VMT	Electricity kWh	Miles/kWh
From Existing Baseline	-181,854,726	-54,199,711	12.46	70,578,962	-1,773,837	5.00	1,518,937	371,092	0.16	148,563,572	37,311,485	0.72
From Existing 2045	34,034,962	910,702	0.00	2,862,558	175,950	0.00	64,416	18,907	0.00	1,844,808	496,724	0.00

Notes

* VMT based on VMT data provided by IBI Group.

** Fuel consumption rates based on data obtained from EMFAC2017 Web Database, Version 1.0.2. <https://www.arb.ca.gov/emfac/2017/>

****VMT per year based on a conversion of VMT x 347 days per year to account for less travel on weekend, consistent with CARB statewide GHG emissions inventory methodology. California Air Resources Board. 2008, October. Climate Change Proposed Scoping Plan: A Framework for Change.

Existing Baseline Year 2020: Full VMT

Vehicle type	Fleet percent	VMT
LDA	55.03%	2,178,266,322
LDT1	5.55%	219,776,692
LDT2	18.89%	747,522,572
MDV	12.81%	507,141,005
LHD1	2.51%	99,270,097
LHD2	0.63%	24,973,023
MHD	2.40%	95,090,699
HHD	1.31%	51,901,428
OBUS	0.05%	1,951,803
UBUS	0.12%	4,567,669
MCY	0.45%	17,689,702
SBUS	0.07%	2,687,820
MH	0.10%	4,114,598
All Other Buses	0.03%	1,217,803
Motor Coach	0.02%	755,930
PTO	0.03%	1,344,865
	100%	3,958,272,028

Vehicle type	Gas percent	Diesel percent	CNG percent	Electricity percent
LDA	97.46%	0.90%	0.00%	1.64%
LDT1	99.61%	0.02%	0.00%	0.37%
LDT2	98.87%	0.63%	0.00%	0.50%
MDV	97.61%	2.17%	0.00%	0.22%
LHD1	60.43%	39.57%	0.00%	0.00%
LHD2	40.22%	59.78%	0.00%	0.00%
MHD	19.10%	80.90%	0.00%	0.00%
HHD	0.08%	97.21%	2.71%	0.00%
OBUS	49.72%	50.28%	0.00%	0.00%
UBUS	18.82%	0.00%	81.18%	0.00%
MCY	100.00%	0.00%	0.00%	0.00%
SBUS	32.93%	67.07%	0.00%	0.00%
MH	69.88%	30.12%	0.00%	0.00%
All Other Buses	0.00%	100.00%	0.00%	0.00%
Motor Coach	0.00%	100.00%	0.00%	0.00%
PTO	0.00%	100.00%	0.00%	0.00%

<< Equal to T6 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)
 << Equal to T7 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)
 << OBUS (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)

Vehicle type	Gasoline			Diesel			CNG			Electricity		
	VMT	mpg	Gallons	VMT	mpg	Gallons	VMT	mpg	Gallons	VMT	m/kWh	kWh
LDA	2,122,935,426	30.12	70,475,051	19,563,690	47.42	412,576	0	0	0	35,767,206	2.99	11,951,628
LDT1	218,913,939	25.99	8,421,863	47,790	24.32	1,965	0	0	0	814,963	2.99	272,320
LDT2	739,047,779	23.60	31,312,454	4,735,295	34.32	137,975	0	0	0	3,739,499	2.99	1,249,555
MDV	495,029,954	19.21	25,772,212	10,981,780	26.02	422,030	0	0	0	1,129,270	2.99	377,346
LHD1	59,990,618	10.48	5,723,693	39,279,479	21.02	1,868,989	0	0	0	0	0.00	0
LHD2	10,045,032	9.11	1,102,582	14,927,991	18.96	787,142	0	0	0	0	0.00	0
MHD	18,157,989	5.02	3,614,966	76,932,710	10.30	7,467,865	0	0	0	0	0.00	0
HHD	40,793	4.12	9,906	50,452,860	6.47	7,798,867	1,407,775	2.19	642,071	0	0.00	0
OBUS	970,450	5.00	194,025	981,353	8.58	114,373	0	0	0	0	0.00	0
UBUS	859,541	3.68	233,833	0	0.00	0	3,708,128	3.97	934,200	0	0.00	0
MCY	17,689,702	37.21	475,359	0	0.00	0	0	0	0	0	0.00	0
SBUS	885,149	9.01	98,230	1,802,671	7.33	245,941	0	0	0	0	0.00	0
MH	2,875,436	5.07	567,466	1,239,162	10.28	120,520	0	0	0	0	0.00	0
All Other Buses	0	0	0	1,217,803	9.98	122,070	0	0	0	0	0.00	0
Motor Coach	0	0	0	755,930	6.33	119,395	0	0	0	0	0.00	0
PTO	0	0	0	1,344,865	4.86	276,875	0	0	0	0	0.00	0
	3,687,441,808		148,001,638	224,263,378		19,896,581	5,115,903		1,576,272	41,450,939		13,850,850

Existing Year 2045: Full VMT

Vehicle type	Fleet percent	VMT
LDA	56.21%	2,224,789,893
LDT1	6.32%	250,259,751
LDT2	17.62%	697,383,002
MDV	11.31%	447,727,884
LHD1	2.48%	98,040,318
LHD2	0.73%	28,755,750
MHD	2.67%	105,638,199
HHD	1.75%	69,249,077
OBUS	0.04%	1,739,695
UBUS	0.12%	4,692,181
MCY	0.48%	18,846,443
SBUS	0.08%	3,053,067
MH	0.09%	3,617,743
All Other Buses	0.04%	1,647,979
Motor Coach	0.02%	928,316
PTO	0.05%	1,902,731
	100%	3,958,272,028

Vehicle type	Gas percent	Diesel percent	CNG percent	Electricity percent
LDA	92.54%	1.15%	0.00%	6.30%
LDT1	96.09%	0.01%	0.00%	3.90%
LDT2	95.84%	0.99%	0.00%	3.16%
MDV	93.03%	3.37%	0.00%	3.60%
LHD1	46.27%	53.73%	0.00%	0.00%
LHD2	28.00%	72.00%	0.00%	0.00%
MHD	8.89%	91.11%	0.00%	0.00%
HHD	0.12%	95.89%	3.99%	0.00%
OBUS	40.31%	59.69%	0.00%	0.00%
UBUS	18.82%	0.00%	81.18%	0.00%
MCY	100.00%	0.00%	0.00%	0.00%
SBUS	47.04%	52.96%	0.00%	0.00%
MH	68.78%	31.22%	0.00%	0.00%
All Other Buses	0.00%	100.00%	0.00%	0.00%
Motor Coach	0.00%	100.00%	0.00%	0.00%
PTO	0.00%	100.00%	0.00%	0.00%

<< Equal to T6 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)
 << Equal to T7 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)
 <<OBUS (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)

Vehicle type	Gasoline			Diesel			CNG			Electricity		
	VMT	mpg	Gallons	VMT	mpg	Gallons	VMT	mpg	Gallons	VMT	m/kWh	kWh
LDA	2,058,918,309	42.90	47,995,773	25,663,149	65.39	392,436	0	0	0	140,208,435	3.71	37,751,805
LDT1	240,466,745	36.95	6,507,698	33,177	34.48	962	0	0	0	9,759,828	3.71	2,627,881
LDT2	668,398,842	37.37	17,886,907	6,913,309	49.21	140,486	0	0	0	22,070,851	3.71	5,942,684
MDV	416,522,040	30.68	13,576,742	15,075,255	38.01	396,636	0	0	0	16,130,589	3.71	4,343,240
LHD1	45,359,047	13.18	3,442,181	52,681,271	26.89	1,959,034	0	0	0	0	0.00	0
LHD2	8,050,303	11.46	702,499	20,705,447	24.16	856,965	0	0	0	0	0.00	0
MHD	9,395,785	6.46	1,454,110	96,242,414	14.28	6,738,651	0	0	0	0	0.00	0
HHD	85,945	5.63	15,256	66,401,918	10.04	6,613,068	2,761,214	2.93	942,282	0	0.00	0
OBUS	701,238	6.47	108,357	1,038,456	11.49	90,382	0	0	0	0	0.00	0
UBUS	882,971	4.98	177,335	0	0.00	0	3,809,210	3.86	986,175	0	0.00	0
MCY	18,846,443	36.61	514,793	0	0.00	0	0	0	0	0	0.00	0
SBUS	1,436,238	11.04	130,129	1,616,828	10.50	153,959	0	0	0	0	0.00	0
MH	2,488,213	6.56	379,445	1,129,530	12.89	87,598	0	0	0	0	0.00	0
All Other Buses	0	0	0	1,647,979	13.08	125,946	0	0	0	0	0.00	0
Motor Coach	0	0	0	928,316	8.66	107,222	0	0	0	0	0.00	0
PTO	0	0	0	1,902,731	6.71	283,449	0	0	0	0	0.00	0
	3,471,552,120		92,891,225	291,979,782		17,946,794	6,570,424		1,928,457	188,169,702		50,665,611

Project Horizon Year 2045: Full VMT

Vehicle type	Fleet percent	VMT
LDA	56.21%	2,246,601,646
LDT1	6.32%	252,713,288
LDT2	17.62%	704,220,118
MDV	11.31%	452,117,391
LHD1	2.48%	99,001,501
LHD2	0.73%	29,037,670
MHD	2.67%	106,673,872
HHD	1.75%	69,927,992
OBUS	0.04%	1,756,751
UBUS	0.12%	4,738,183
MCY	0.48%	19,031,212
SBUS	0.08%	3,082,999
MH	0.09%	3,653,211
All Other Buses	0.04%	1,664,136
Motor Coach	0.02%	937,417
PTO	0.05%	1,921,386
	100.00%	3,997,078,773

Vehicle type	Gas percent	Diesel percent	CNG percent	Electricity percent
LDA	92.54%	1.15%	0.00%	6.30%
LDT1	96.09%	0.01%	0.00%	3.90%
LDT2	95.84%	0.99%	0.00%	3.16%
MDV	93.03%	3.37%	0.00%	3.60%
LHD1	46.27%	53.73%	0.00%	0.00%
LHD2	28.00%	72.00%	0.00%	0.00%
MHD	8.89%	91.11%	0.00%	0.00%
HHD	0.12%	95.89%	3.99%	0.00%
OBUS	40.31%	59.69%	0.00%	0.00%
UBUS	18.82%	0.00%	81.18%	0.00%
MCY	100.00%	0.00%	0.00%	0.00%
SBUS	47.04%	52.96%	0.00%	0.00%
MH	68.78%	31.22%	0.00%	0.00%
All Other Buses	0.00%	100.00%	0.00%	0.00%
Motor Coach	0.00%	100.00%	0.00%	0.00%
PTO	0.00%	100.00%	0.00%	0.00%

<< Equal to T6 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)
 << Equal to T7 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)
 << OBUS (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)

Vehicle type	Gasoline			Diesel			CNG			Electricity		
	VMT	mpg	Gallons	VMT	mpg	Gallons	VMT	mpg	Gallons	VMT	m/kWh	kWh
LDA	2,079,103,864	42.90	48,466,321	25,914,749	65.39	396,284	0	0	0	141,583,033	3.71	38,121,922
LDT1	242,824,272	36.95	6,571,499	33,503	34.48	972	0	0	0	9,855,513	3.71	2,653,645
LDT2	674,951,799	37.37	18,062,270	6,981,087	49.21	141,863	0	0	0	22,287,232	3.71	6,000,946
MDV	420,605,606	30.68	13,709,848	15,223,052	38.01	400,525	0	0	0	16,288,732	3.71	4,385,821
LHD1	45,803,745	13.18	3,475,928	53,197,756	26.89	1,978,240	0	0	0	0	0.00	0
LHD2	8,129,228	11.46	709,387	20,908,442	24.16	865,366	0	0	0	0	0.00	0
MHD	9,487,901	6.46	1,468,366	97,185,971	14.28	6,804,717	0	0	0	0	0.00	0
HHD	86,787	5.63	15,406	67,052,920	10.04	6,677,902	2,788,285	2.93	951,520	0	0.00	0
OBUS	708,113	6.47	109,419	1,048,637	11.49	91,268	0	0	0	0	0.00	0
UBUS	891,628	4.98	179,074	0	0.00	0	3,846,555	3.86	995,844	0	0.00	0
MCY	19,031,212	36.61	519,840	0	0.00	0	0	0	0	0	0.00	0
SBUS	1,450,319	11.04	131,405	1,632,680	10.50	155,468	0	0	0	0	0.00	0
MH	2,512,607	6.56	383,165	1,140,604	12.89	88,457	0	0	0	0	0.00	0
All Other Buses	0	0	0	1,664,136	13.08	127,181	0	0	0	0	0.00	0
Motor Coach	0	0	0	937,417	8.66	108,273	0	0	0	0	0.00	0
PTO	0	0	0	1,921,386	6.71	286,228	0	0	0	0	0.00	0
	3,505,587,082		93,801,926	294,842,340		18,122,744	6,634,840		1,947,363	190,014,511		51,162,334

EMFAC Fuel Usage: Year 2020

Vehicle type	Gasoline			Diesel			Natural Gas			Electricity
	VMT/day	Gallons/day	Miles/gallon	VMT/day	Gallons/day	Miles/gallon	VMT/day	Gallons/day	Miles/gallon	VMT/day
All other buses	0	0	0.00	28,077	2,814	9.98	0	0	0.00	0
LDA	48,945,590	1,624,846	30.12	451,053	9,512	47.42	0	0	0.00	824,635
LDT1	5,047,196	194,171	25.99	1,102	45	24.32	0	0	0.00	18,789
LDT2	17,039,204	721,928	23.60	109,175	3,181	34.32	0	0	0.00	86,216
LHD1	1,383,121	131,963	10.48	905,613	43,091	21.02	0	0	0.00	0
LHD2	231,594	25,421	9.11	344,174	18,148	18.96	0	0	0.00	0
MCY	407,847	10,960	37.21	0	0	0.00	0	0	0.00	0
MDV	11,413,222	594,194	19.21	253,192	9,730	26.02	0	0	0.00	26,036
MH	66,295	13,083	5.07	28,570	2,779	10.28	0	0	0.00	0
Motor coach	0	0	0.00	17,428	2,753	6.33	0	0	0.00	0
OBUS	45,000	8,997	5.00	0	0	0.00	0	0	0.00	0
PTO	0	0	0.00	31,007	6,384	4.86	0	0	0.00	0
SBUS	20,408	2,265	9.01	41,562	5,670	7.33	0	0	0.00	0
T6	418,644	83,345	5.02	1,773,731	172,176	10.30	0	0	0.00	0
T7	941	228	4.12	1,163,222	179,808	6.47	32,457	14,803	2.19	0
UBUS	19,817	5,391	3.68	0	0	0.00	85,493	21,539	3.97	0
Total	85,038,879	3,416,793	24.89	5,147,905	456,091	11.29	117,950	36,342	3.25	955,677



EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: Sub-Area

Region: Orange (SC)

Calendar Year: 2020

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption. Note 'day' in the unit is operation day.

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	Fuel_Consumption
Orange (SC)	2020	All Other Buses	Aggregated	Aggregated	DSL	481.2016837	28077.19843	4042.094143	2.814388095
Orange (SC)	2020	LDA	Aggregated	Aggregated	GAS	1247860.077	48945590.41	5912594.532	1624.845919
Orange (SC)	2020	LDA	Aggregated	Aggregated	DSL	11164.90346	451052.9772	53022.62326	9.512191554
Orange (SC)	2020	LDA	Aggregated	Aggregated	ELEC	21148.18246	824635.0752	105742.2469	0
Orange (SC)	2020	LDT1	Aggregated	Aggregated	GAS	134019.271	5047196.379	619698.5138	194.1712644
Orange (SC)	2020	LDT1	Aggregated	Aggregated	DSL	55.81897815	1101.830055	186.0090014	0.045307405
Orange (SC)	2020	LDT1	Aggregated	Aggregated	ELEC	490.3524677	18789.48359	2431.492246	0
Orange (SC)	2020	LDT2	Aggregated	Aggregated	GAS	447357.5819	17039204.03	2097730.136	721.9280003
Orange (SC)	2020	LDT2	Aggregated	Aggregated	DSL	2427.17569	109175.1539	12027.12038	3.181091028
Orange (SC)	2020	LDT2	Aggregated	Aggregated	ELEC	2543.998796	86216.46483	12903.12737	0
Orange (SC)	2020	LHD1	Aggregated	Aggregated	GAS	36819.26046	1383120.831	548552.1202	131.9632743
Orange (SC)	2020	LHD1	Aggregated	Aggregated	DSL	21629.92474	905612.7101	272077.2427	43.09068986
Orange (SC)	2020	LHD2	Aggregated	Aggregated	GAS	6427.4198	231594.4301	95758.97816	25.42072092
Orange (SC)	2020	LHD2	Aggregated	Aggregated	DSL	8343.636776	344174.0824	104952.4543	18.14803591

Orange (SC)	2020 MCY	Aggregated	Aggregated	GAS	55868.87126	407847.0245	111737.7425	10.9596883
Orange (SC)	2020 MDV	Aggregated	Aggregated	GAS	312579.7151	11413222.04	1449101.786	594.1942936
Orange (SC)	2020 MDV	Aggregated	Aggregated	DSL	6028.951683	253191.7258	29628.60119	9.730157513
Orange (SC)	2020 MDV	Aggregated	Aggregated	ELEC	735.8961127	26036.03016	3783.732455	0
Orange (SC)	2020 MH	Aggregated	Aggregated	GAS	7043.392017	66294.96462	704.6209374	13.08327083
Orange (SC)	2020 MH	Aggregated	Aggregated	DSL	2901.594303	28569.64554	290.1594303	2.778662443
Orange (SC)	2020 Motor Coach	Aggregated	Aggregated	DSL	136.4898537	17428.42872	1992.751864	2.752736362
Orange (SC)	2020 OBUS	Aggregated	Aggregated	GAS	995.681945	45000.03288	19921.60436	8.996982408
Orange (SC)	2020 PTO	Aggregated	Aggregated	DSL	0	31006.68851	0	6.383529602
Orange (SC)	2020 SBUS	Aggregated	Aggregated	GAS	477.5371807	20407.65759	1910.148723	2.264752129
Orange (SC)	2020 SBUS	Aggregated	Aggregated	DSL	1330.411773	41561.69254	15352.76741	5.670310587
Orange (SC)	2020 T6 Ag	Aggregated	Aggregated	DSL	1.07	8.275469859	4.708	0.001066262
Orange (SC)	2020 T6 CAIRP heavy	Aggregated	Aggregated	DSL	88.66874812	17668.64125	1294.563723	1.577008329
Orange (SC)	2020 T6 CAIRP small	Aggregated	Aggregated	DSL	45.34272879	2389.999147	662.0038403	0.226832642
Orange (SC)	2020 T6 instate construction heavy	Aggregated	Aggregated	DSL	396.2486598	26940.21685	1791.424785	2.743247107
Orange (SC)	2020 T6 instate construction small	Aggregated	Aggregated	DSL	2797.82418	142828.4512	12648.85434	14.31071495
Orange (SC)	2020 T6 instate heavy	Aggregated	Aggregated	DSL	4232.18802	597325.6124	48838.86298	55.593513
Orange (SC)	2020 T6 instate small	Aggregated	Aggregated	DSL	18616.48143	955904.6099	214831.6146	94.35518326
Orange (SC)	2020 T6 OOS heavy	Aggregated	Aggregated	DSL	50.42051047	10072.46003	736.1394529	0.898555975
Orange (SC)	2020 T6 OOS small	Aggregated	Aggregated	DSL	26.8094145	1405.945609	391.4174517	0.133395337
Orange (SC)	2020 T6 Public	Aggregated	Aggregated	DSL	896.5189033	13585.52472	2719.440671	1.739272559
Orange (SC)	2020 T6 utility	Aggregated	Aggregated	DSL	335.5972108	5601.520977	3859.367924	0.597456493
Orange (SC)	2020 T6TS	Aggregated	Aggregated	GAS	7554.979106	418643.6762	151160.022	83.34527002
Orange (SC)	2020 T7 Ag	Aggregated	Aggregated	DSL	1	8.027370796	4.4	0.001553111
Orange (SC)	2020 T7 CAIRP	Aggregated	Aggregated	DSL	936.2960241	169499.5167	13669.92195	24.91503552
Orange (SC)	2020 T7 CAIRP construction	Aggregated	Aggregated	DSL	105.2121264	19351.39179	475.659933	2.689514666
Orange (SC)	2020 T7 NNOOS	Aggregated	Aggregated	DSL	1023.780474	206641.313	14947.19492	29.39860655
Orange (SC)	2020 T7 NOOS	Aggregated	Aggregated	DSL	368.0303383	66594.15025	5373.242939	10.02337714
Orange (SC)	2020 T7 POLA	Aggregated	Aggregated	DSL	1274.10332	155914.1289	9683.185233	25.79021242
Orange (SC)	2020 T7 Public	Aggregated	Aggregated	DSL	1031.473951	20897.43447	3128.804315	3.707980098
Orange (SC)	2020 T7 Single	Aggregated	Aggregated	DSL	2158.378481	156155.881	24907.38842	23.85165432
Orange (SC)	2020 T7 single construction	Aggregated	Aggregated	DSL	680.6801442	48007.24372	3077.328467	7.411667011
Orange (SC)	2020 T7 SWCV	Aggregated	Aggregated	DSL	366.6327907	14980.0218	1429.867884	7.333542571
Orange (SC)	2020 T7 SWCV	Aggregated	Aggregated	NG	797.4174081	32457.1177	3109.927892	14.80335493
Orange (SC)	2020 T7 tractor	Aggregated	Aggregated	DSL	1919.762893	264239.798	24380.98875	38.33414036
Orange (SC)	2020 T7 tractor construction	Aggregated	Aggregated	DSL	563.5221687	39601.74947	2547.661815	6.132328946
Orange (SC)	2020 T7 utility	Aggregated	Aggregated	DSL	65.59670634	1331.254316	754.3621229	0.218093255
Orange (SC)	2020 T7IS	Aggregated	Aggregated	GAS	10.17819751	940.5118702	203.6453757	0.228390326
Orange (SC)	2020 UBUS	Aggregated	Aggregated	GAS	209.7645784	19817.2437	839.0583135	5.391173952
Orange (SC)	2020 UBUS	Aggregated	Aggregated	DSL	0	0	0	0
Orange (SC)	2020 UBUS	Aggregated	Aggregated	NG	738.1509692	85493.1979	2952.603877	21.53856767

EMFAC Fuel Usage: Year 2045

Vehicle type	Gasoline			Diesel			Natural Gas			Electricity
	VMT/day	Gallons/day	Miles/gallon	VMT/day	Gallons/day	Miles/gallon	VMT/day	Gallons/day	Miles/gallon	VMT/day
All other buses	0	0	0.00	42,508	3,249	13.08	0	0	0.00	0
LDA	53,107,647	1,238,001	42.90	661,954	10,122	65.39	0	0	0.00	3,616,530
LDT1	6,202,589	167,859	36.95	856	25	34.48	0	0	0.00	251,745
LDT2	17,240,650	461,374	37.37	178,322	3,624	49.21	0	0	0.00	569,295
LHD1	1,169,989	88,787	13.18	1,358,858	50,531	26.89	0	0	0.00	0
LHD2	207,649	18,120	11.46	534,075	22,105	24.16	0	0	0.00	0
MCY	486,124	13,279	36.61	0	0	0.00	0	0	0.00	0
MDV	10,743,751	350,198	30.68	388,850	10,231	38.01	0	0	0.00	416,072
MH	64,181	9,787	6.56	29,135	2,259	12.89	0	0	0.00	0
Motor coach	0	0	0.00	23,945	2,766	8.66	0	0	0.00	0
OBUS	44,874	6,934	6.47	0	0	0.00	0	0	0.00	0
PTO	0	0	0.00	49,079	7,311	6.71	0	0	0.00	0
SBUS	37,046	3,357	11.04	41,704	3,971	10.50	0	0	0.00	0
T6	242,354	37,507	6.46	2,482,473	173,816	14.28	0	0	0.00	0
T7	2,217	394	5.63	1,712,768	170,577	10.04	71,223	24,305	2.93	0
UBUS	22,775	4,574	4.98	0	0	0.00	98,255	25,437	3.86	0
Total	89,571,847	2,400,171	37.32	7,504,528	460,588	16.29	169,477	49,743	3.41	4,853,641



EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: Sub-Area

Region: Orange (SC)

Calendar Year: 2045

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption. Note 'day' in the unit is operation day.

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	Fuel_Consumption
Orange (SC)	2045	All Other Buses	Aggregated	Aggregated	DSL	818.3493021	42507.89751	6874.134138	3.248647956
Orange (SC)	2045	LDA	Aggregated	Aggregated	GAS	1636194.504	53107647.21	7711235.754	1238.000825
Orange (SC)	2045	LDA	Aggregated	Aggregated	DSL	20249.77724	661954.1192	95726.782	10.12248623
Orange (SC)	2045	LDA	Aggregated	Aggregated	ELEC	107201.6929	3616530.129	508992.1903	0
Orange (SC)	2045	LDT1	Aggregated	Aggregated	GAS	203050.6572	6202588.527	931544.7599	167.8592685
Orange (SC)	2045	LDT1	Aggregated	Aggregated	DSL	27.49576857	855.7776777	127.4386435	0.024820205
Orange (SC)	2045	LDT1	Aggregated	Aggregated	ELEC	7805.199848	251744.5689	36492.5545	0
Orange (SC)	2045	LDT2	Aggregated	Aggregated	GAS	543994.5324	17240649.99	2532417.189	461.3740928
Orange (SC)	2045	LDT2	Aggregated	Aggregated	DSL	5562.678232	178321.5884	26072.26861	3.623683049
Orange (SC)	2045	LDT2	Aggregated	Aggregated	ELEC	24807.64973	569294.539	117101.2432	0
Orange (SC)	2045	LHD1	Aggregated	Aggregated	GAS	36156.57729	1169989.23	538679.1284	88.78745874
Orange (SC)	2045	LHD1	Aggregated	Aggregated	DSL	42936.83556	1358858.366	540091.3768	50.53123896
Orange (SC)	2045	LHD2	Aggregated	Aggregated	GAS	6724.123408	207649.1575	100179.4198	18.12023428
Orange (SC)	2045	LHD2	Aggregated	Aggregated	DSL	17568.0703	534075.3782	220984.2237	22.10451024

Orange (SC)	2045 MCY	Aggregated	Aggregated	GAS	88830.95641	486124.3002	177661.9128	13.278552
Orange (SC)	2045 MDV	Aggregated	Aggregated	GAS	349758.5501	10743750.96	1614120.932	350.1978763
Orange (SC)	2045 MDV	Aggregated	Aggregated	DSL	12471.899	388850.4635	58097.45105	10.2308234
Orange (SC)	2045 MDV	Aggregated	Aggregated	ELEC	18242.6852	416071.6903	85925.7018	0
Orange (SC)	2045 MH	Aggregated	Aggregated	GAS	7034.7461	64180.84958	703.7559999	9.787379628
Orange (SC)	2045 MH	Aggregated	Aggregated	DSL	3666.748524	29135.04654	366.6748524	2.259491538
Orange (SC)	2045 Motor Coach	Aggregated	Aggregated	DSL	191.6045363	23944.93064	2797.426231	2.765668758
Orange (SC)	2045 OBUS	Aggregated	Aggregated	GAS	1230.496706	44873.60704	24619.7781	6.933946691
Orange (SC)	2045 PTO	Aggregated	Aggregated	DSL	0	49078.97011	0	7.311279784
Orange (SC)	2045 SBUS	Aggregated	Aggregated	GAS	1034.566392	37046.26844	4138.265569	3.356535149
Orange (SC)	2045 SBUS	Aggregated	Aggregated	DSL	1313.474593	41704.39765	15157.31469	3.97120875
Orange (SC)	2045 T6 CAIRP heavy	Aggregated	Aggregated	DSL	151.6117831	24739.70225	2213.532033	1.574897241
Orange (SC)	2045 T6 CAIRP small	Aggregated	Aggregated	DSL	77.32875483	3249.911743	1128.999821	0.232127663
Orange (SC)	2045 T6 instate construction heavy	Aggregated	Aggregated	DSL	374.3960544	25067.48408	1692.630006	1.909392646
Orange (SC)	2045 T6 instate construction small	Aggregated	Aggregated	DSL	2687.483284	132899.8183	12150.00744	9.564885549
Orange (SC)	2045 T6 instate heavy	Aggregated	Aggregated	DSL	9653.871186	973552.1842	111404.335	65.10501027
Orange (SC)	2045 T6 instate small	Aggregated	Aggregated	DSL	28791.47359	1287713.62	332249.6135	92.7506813
Orange (SC)	2045 T6 OOS heavy	Aggregated	Aggregated	DSL	85.31694752	14016.41424	1245.627434	0.892046638
Orange (SC)	2045 T6 OOS small	Aggregated	Aggregated	DSL	47.5100307	1967.829648	693.6464482	0.140834373
Orange (SC)	2045 T6 Public	Aggregated	Aggregated	DSL	810.1383561	12560.15941	2457.419678	1.123344315
Orange (SC)	2045 T6 utility	Aggregated	Aggregated	DSL	402.4400938	6705.41012	4628.061079	0.523254404
Orange (SC)	2045 T6TS	Aggregated	Aggregated	GAS	5946.324567	242354.4684	118974.0619	37.50724359
Orange (SC)	2045 T7 Ag	Aggregated	Aggregated	DSL	1.153447948	3.727198184	5.075170971	0.000825644
Orange (SC)	2045 T7 CAIRP	Aggregated	Aggregated	DSL	1117.357567	23247.48666	16313.42048	22.45263832
Orange (SC)	2045 T7 CAIRP construction	Aggregated	Aggregated	DSL	103.1096509	18006.19157	466.1547227	1.774774016
Orange (SC)	2045 T7 NNOOS	Aggregated	Aggregated	DSL	1739.696845	283420.9407	25399.57393	28.90977627
Orange (SC)	2045 T7 NOOS	Aggregated	Aggregated	DSL	444.0093396	91341.91531	6482.536359	9.040158647
Orange (SC)	2045 T7 POLA	Aggregated	Aggregated	DSL	1892.379198	394088.7622	14382.0819	38.7175325
Orange (SC)	2045 T7 Public	Aggregated	Aggregated	DSL	1180.837213	23922.76883	3581.872875	2.785239921
Orange (SC)	2045 T7 Single	Aggregated	Aggregated	DSL	3056.670196	247171.5035	35273.55027	26.44915825
Orange (SC)	2045 T7 single construction	Aggregated	Aggregated	DSL	585.6235719	44670.0494	2647.5814	4.725313295
Orange (SC)	2045 T7 SWCV	Aggregated	Aggregated	DSL	27.99965973	1144.02073	109.1986729	0.556569617
Orange (SC)	2045 T7 SWCV	Aggregated	Aggregated	NG	1746.830476	71222.63589	6812.638855	24.30516728
Orange (SC)	2045 T7 tractor	Aggregated	Aggregated	DSL	2714.449827	338075.7044	34473.51281	31.16293497
Orange (SC)	2045 T7 tractor construction	Aggregated	Aggregated	DSL	496.4153679	36848.85796	2244.274578	3.826351357
Orange (SC)	2045 T7 utility	Aggregated	Aggregated	DSL	78.8520692	1598.818533	906.7987958	0.175900282
Orange (SC)	2045 T7IS	Aggregated	Aggregated	GAS	21.48676659	2216.850881	429.9072258	0.393525037
Orange (SC)	2045 UBUS	Aggregated	Aggregated	GAS	241.0757015	22775.32253	964.302806	4.574174268
Orange (SC)	2045 UBUS	Aggregated	Aggregated	DSL	0	0	0	0
Orange (SC)	2045 UBUS	Aggregated	Aggregated	NG	848.333232	98254.59007	3393.332928	25.43736412

Electric Vehicle Energy Consumption Assumptions

Appendix C: Evidence Used to Define the Average Number of KWH Required to Displace a Gallong of Gasoline

Table A 3: Evidence from U.S. Department of Energy and U.S. Environmental Protection Agency's fuel economy website^[32]

Vehicle	Model year	Electric consumption	Gasoline fuel economy	Number of kWh that are equivalent to 1 gallon
Ford Fusion Energi & Ford C-Max Energi	2013	0.34 kWh per mile	43 mpg	14.6
Chevrolet Volt	2013	0.35 kWh per mile	37 mpg	12.9
Chevrolet Volt	2012	0.36 kWh per mile	37 mpg	13.3
Fisker Karma	2012	0.62 kWh per mile	20 mpg	12.4
Toyota Prius	2013	0.29 kWh per mile & 0.2 gal	50 mpg	13.1
Average for five models	-	-	-	13.3 +/- 0.8

Table A 5: Average power consumption per mile traveled over time for different PEV categories

Year range	2012- 2020	2020-2030	2030-2040	2040-2050	2050
Efficiency improvement per year	0.3%	0.8%	0.9%	0.9%	
Year	2012	2020	2030	2040	2050
Relative energy efficiency	1.000	0.976	0.901	0.823	0.752

https://www.fhwa.dot.gov/environment/climate_change/mitigation/publications_and_tools/ev_deployment/page08.cfm

Electric Consumption Estimated Average

Vehicle	Electric Consumption (kWh/mi)	One Gal Equivalent
Ford Fusion & Ford C-Max MY 2013	0.34	14.6
Chevy Volt MY 2013	0.35	12.9
Chevy Volt MY 2012	0.36	13.3
Estimated Average	0.34	13.3

Forecasted Consumption

Year	Electric Consumption (kWh/mi)
2013	0.34
2014	0.34
2015	0.34
2016	0.34
2017	0.34
2018	0.34
2019	0.34
2020	0.33
2021	0.33
2022	0.33
2023	0.33
2024	0.32
2025	0.32
2026	0.32
2027	0.32
2028	0.31
2029	0.31
2030	0.31
2031	0.31
2032	0.30
2033	0.30
2034	0.30
2035	0.29
2036	0.29
2037	0.29
2038	0.29
2039	0.28
2040	0.28
2041	0.28
2042	0.28
2043	0.27
2044	0.27
2045	0.27

Quantification Workbook

Global warming potentials

	CO ₂	CH ₄	N ₂ O
AR2	1	21	310
AR4	1	25	298
AR5	1	28	265

CO ₂ to CO ₂ e	1.05263158	<< Use only for on-road vehicle calculations
Grams to metric tons	1,000,000	
MWh to kWh	1000	<< Also GWh to MWh
GWh to kWh	1,000,000	
Metric tons to pounds	2,204.6	
Metric tons to kg	1,000	<< Also kg to grams
kg to pounds	2.20462	
Acre foot to gallons	325,851.428	
Acre to square foot	43,560	
Year to months	12	
Year to days	365	<< Use except in circumstances below
Year to days	347	<< Use only for transportation emissions
Year to days	365.25	<< Use only for water and wastewater emissions
Ton to pounds	2,000	
Mile to feet	5,280	
Square mile to acres	640	
Million gallons to gallons	1,000,000	