

Appendix E

Energy Modeling Data

Energy Calculations Summary

Operational Fuel Use Summary

Fuel Type	Fleet Mix (%)	Gallons per Mile	Annual VMT	Gallons
Gasoline	97.15%	0.04	532,303	19,224
Diesel	2.85%	0.10		1,452

Notes:

1. Fleet mix calculated from CalEEMod default values.
2. Gallons per mile calculated from EMFAC 2017.
3. Annual VMT obtained from CalEEMod output file.

Land Use	Natural Gas ¹ kBTU/year	Natural Gas ¹ therm/year	Electricity ² kWh/year	Diesel gallons/year
Government Office Building	2,205,230	0.022	4.24E+06	3,668
Total Natural Gas	2,205,230	0.022	4,239,580	3,668

btu/therm 1.00E-05

¹ No direct natural gas use. Output from CalEEMod.

² Electricity offset by 100% renewable energy.

Equipment	Amount	Usage Hours/yr	Horse Power	Load Factor	Average Daily Factor	Diesel Fuel Usage
Emergency Generator	1	500.00	335	0.73	0.6	3,668

Energy Calculations Summary

Construction Fuel Usage Summary

	Diesel	Gasoline	Diesel	
Construction Year	Off-road Equipment (gallons)	On-road (gallons)	On-road (gallons)	Combined
2020	39,717	1,614	8,327	
2021		17,828	16,489	
2022		17,276	8,086	
2023		15,500	7,690	
TOTAL	39,717	52,218	40,592	80,310

Total Gasoline	52,218	gallons
Total Diesel	80,310	gallons

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: SACRAMENTO

Calendar Year: 2024

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

Region	CalYr	VehClass	MdlYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Gasoline Fuel	Diesel Fuel Consumption			
									Consumption 1,000 gallons/day	Consumption 1,000 gallons/day			
SACRAMEI	2024	All Other Buses	Aggregate	Aggregated	DSL	437.2760982	23185.34538	3673.119225		0		2.490775991	
SACRAMEI	2024	LDA	Aggregate	Aggregated	GAS	621184.5373	21791121.19	2906212.223	656.5160125	0		0	
SACRAMEI	2024	LDA	Aggregate	Aggregated	DSL	6304.422337	224625.5875	29452.21692		0		4.193102239	
SACRAMEI	2024	LDA	Aggregate	Aggregated	ELEC	14401.50424	606697.2257	71494.39671		0		0	
SACRAMEI	2024	LDT1	Aggregate	Aggregated	GAS	66406.622237	2167045.803	302428.5847	76.58153967			0.00	
SACRAMEI	2024	LDT1	Aggregate	Aggregated	DSL	155.5559285	2531.091863	558.9087838		0		0.114799994	
SACRAMEI	2024	LDT1	Aggregate	Aggregated	ELEC	659.04866	28091.44558	3276.773077		0		0	
SACRAMEI	2024	LDT2	Aggregate	Aggregated	GAS	213508.8296	7147811.653	985234.2998	269.9971475			0.00	
SACRAMEI	2024	LDT2	Aggregate	Aggregated	DSL	1356.311823	52866.74641	6603.512714		0		1.338876831	
SACRAMEI	2024	LDT2	Aggregate	Aggregated	ELEC	2557.306168	79919.49172	12842.15287		0		0	
SACRAMEI	2024	LHD1	Aggregate	Aggregated	GAS	16148.68105	520461.6574	240591.2861	61.1965833			0.00	
SACRAMEI	2024	LHD1	Aggregate	Aggregated	DSL	14131.97513	472339.8454	177762.4691		0		25.62710815	
SACRAMEI	2024	LHD2	Aggregate	Aggregated	GAS	2236.898397	73166.69887	33326.45314	9.81533138			0.00	
SACRAMEI	2024	LHD2	Aggregate	Aggregated	DSL	4848.999904	165824.487	60994.31875		0		10.05130996	
SACRAMEI	2024	MCY	Aggregate	Aggregated	GAS	30709.38003	203163.0217	61418.76007	5.426202322			0.00	
SACRAMEI	2024	MDV	Aggregate	Aggregated	GAS	150017.7792	4701204.899	680651.5265	218.7063409			0.00	
SACRAMEI	2024	MDV	Aggregate	Aggregated	DSL	3405.597163	126439.0711	16336.56875		0		4.256688934	
SACRAMEI	2024	MDV	Aggregate	Aggregated	ELEC	1516.399991	48571.70556	7673.853607		0		0.00	
SACRAMEI	2024	MH	Aggregate	Aggregated	GAS	2880.979362	24624.58787	288.2131753	5.025871689			0.00	
SACRAMEI	2024	MH	Aggregate	Aggregated	DSL	1083.677135	9270.538143	108.3677135		0		0.928207266	
SACRAMEI	2024	Motor Coach	Aggregate	Aggregated	DSL	102.9100332	14328.07119	1502.486485		0		2.173678986	
SACRAMEI	2024	OBUS	Aggregate	Aggregated	GAS	544.9957027	22876.14392	10904.27402	4.765749036			0.00	
SACRAMEI	2024	PTO	Aggregate	Aggregated	DSL	0	23625.91986	0		0		4.308841426	
SACRAMEI	2024	SBUS	Aggregate	Aggregated	GAS	133.3686494	6358.180942	533.4745975	0.652551399			0.00	
SACRAMEI	2024	SBUS	Aggregate	Aggregated	DSL	1029.485742	32124.91948	11880.12273		0		3.986527652	
SACRAMEI	2024	T6 Ag	Aggregate	Aggregated	DSL	16.10352979	179.2582109	70.85553107		0		0.019732041	
SACRAMEI	2024	T6 CAIRP heavy	Aggregate	Aggregated	DSL	116.9446044	22282.86264	1707.391224		0		1.864209457	
SACRAMEI	2024	T6 CAIRP small	Aggregate	Aggregated	DSL	63.99178486	3260.986193	934.2800589		0		0.29340335	
SACRAMEI	2024	T6 instate construction he	Aggregate	Aggregated	DSL	209.8382818	13682.45728	948.6707136		0		1.585017446	
SACRAMEI	2024	T6 instate construction sm	Aggregate	Aggregated	DSL	1826.726911	100379.0573	8258.561341		0		11.53967137	
SACRAMEI	2024	T6 instate heavy	Aggregate	Aggregated	DSL	1456.552465	191517.8246	16808.4135		0		17.77432179	
SACRAMEI	2024	T6 instate small	Aggregate	Aggregated	DSL	5235.230028	261799.854	60413.82868		0		25.7678568	
SACRAMEI	2024	T6 OOS heavy	Aggregate	Aggregated	DSL	65.61671482	12461.81247	958.0040363		0		1.043501946	
SACRAMEI	2024	T6 OOS small	Aggregate	Aggregated	DSL	34.72335518	1749.967254	506.9609857		0		0.157897141	
SACRAMEI	2024	T6 Public	Aggregate	Aggregated	DSL	4474.525761	69974.64776	13572.72813		0		9.171783606	
SACRAMEI	2024	T6 utility	Aggregate	Aggregated	DSL	177.6332516	2965.810086	2042.782394		0		0.11794166	
SACRAMEI	2024	T6TS	Aggregate	Aggregated	GAS	2018.783503	94274.66572	40391.82033	19.47151244			0	
SACRAMEI	2024	T7 Ag	Aggregate	Aggregated	DSL	13.18975118	134.4552151	58.0349052		0		0.024165718	
SACRAMEI	2024	T7 CAIRP	Aggregate	Aggregated	DSL	863.3963588	157150.6132	12605.58684		0		22.05634038	
SACRAMEI	2024	T7 CAIRP construction	Aggregate	Aggregated	DSL	53.78117918	9828.227924	243.1426201		0		1.600844784	
SACRAMEI	2024	T7 NNOOS	Aggregate	Aggregated	DSL	988.6314135	191590.9645	14434.01864		0		25.39522394	
SACRAMEI	2024	T7 NNOOS	Aggregate	Aggregated	DSL	343.1323426	61746.26076	5009.732202		0		8.888327976	
SACRAMEI	2024	T7 other port	Aggregate	Aggregated	DSL	10.8033276	1833.126924	82.10528976		0		0.292232953	
SACRAMEI	2024	T7 POAK	Aggregate	Aggregated	DSL	47.00370881	5841.356676	357.228187		0		0.970784911	
SACRAMEI	2024	T7 Public	Aggregate	Aggregated	DSL	4778.459512	96763.96923	14494.6605		0		17.5821313	
SACRAMEI	2024	T7 Single	Aggregate	Aggregated	DSL	1593.656194	118984.8548	18390.57153		0		16.93029809	
SACRAMEI	2024	T7 single construction	Aggregate	Aggregated	DSL	348.8214209	24382.02577	1577.008082		0		4.217422641	
SACRAMEI	2024	T7 SWCV	Aggregate	Aggregated	DSL	546.2342301	22279.51565	2130.313497		0		8.699180054	
SACRAMEI	2024	T7 SWCV	Aggregate	Aggregated	NG	309.0260029	12594.21775	1205.201411	5.186920782			0	
SACRAMEI	2024	T7 tractor	Aggregate	Aggregated	DSL	893.5748116	117962.8427	11348.40011	14.88039404			14.88039404	
SACRAMEI	2024	T7 tractor construction	Aggregate	Aggregated	DSL	295.3811602	20113.02465	1335.406741	3.503040016			3.503040016	
SACRAMEI	2024	T7 utility	Aggregate	Aggregated	DSL	24.9522763	506.0709972	286.9511774	0.084222357			0.084222357	
SACRAMEI	2024	T7IS	Aggregate	Aggregated	GAS	3.817736141	401.5883168	76.38526471	0.086850297			0	
SACRAMEI	2024	UBUS	Aggregate	Aggregated	GAS	212.9381293	16076.65729	851.7525173	3.729263937			0	
SACRAMEI	2024	UBUS	Aggregate	Aggregated	DSL	2.065794713	131.9980556	8.263178853		0		0.015090483	
SACRAMEI	2024	UBUS	Aggregate	Aggregated	ELEC	0.002191142	0.046907578	0.00876457		0		0	
SACRAMEI	2024	UBUS	Aggregate	Aggregated	NG	453.559249	43389.71084	1814.236996	11.24372105			0	
TOTAL							40,244,516		1366.87		254.14	24.8	0.04
Total (Gas)							36,768,587					26.9	0.04
Total (Diesel)							2,656,665					10.5	0.10
Annual VMT													
532,303													
							Mix (%)	Miles	Gallons				
Gas							97.1%	517,125	19,224				
Diesel							2.9%	15,179	1,452				

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Government Office Building	0.566033	0.037143	0.208217	0.113428	0.016713	0.004955	0.018463	0.024036	0.001978	0.001883	0.005758	0.000618	0.000776

Gas 97.1%
Diesel 2.9%

2020-2023 Construction Offroad Equipment - Bateson

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of days	Average Daily Factor	Diesel Fuel Usage
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73	68	0.6	965
Demolition	Rubber Tired Dozers	1	8.00	247	0.40	68	0.6	1,612
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37	68	0.6	1,757
Building Modernization	Cranes	1	6.00	231	0.29	682	0.6	8,224
Building Modernization	Forklifts	1	6.00	89	0.20	682	0.6	2,185
Building Modernization	Generator Sets	1	8.00	84	0.74	682	0.6	10,174
Building Modernization	Tractors/Loaders/Backhoes	1	6.00	97	0.37	682	0.6	4,406
Building Modernization	Welders	3	8.00	46	0.46	682	0.6	10,165
Architectural Coating	Air Compressors	1	6.00	78	0.48	34	0.6	229
TOTAL								39,717

	Year	Start Date	End Date	Network Days
Demolition	2020	12/1/2020	12/31/2020	23
	2021	1/1/2021	3/4/2021	45
Building Construction	2021	3/5/2021	12/31/2021	216
	2022	1/1/2022	12/31/2022	260
	2023	1/1/2023	10/16/2023	206
Architectural Coating	2023	10/17/2023	12/1/2023	34

Trips and VMT

2020

Phase Name	Daily Worker Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Hauling Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	Total gallons of gasoline	Total gallons of diesel
Demolition	190	23	4370	0	2167	10.00	6.50	20.00	4370.00	0	43340	1,614	8,327
TOTAL												1,614	8,327

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

2021

Phase Name	Daily Worker Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Hauling Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	Total gallons of gasoline	Total gallons of diesel
Demolition	190	45	8550	0	2167	10.00	6.50	20.00	8550.00	0	43340	3,074	8,215
Building Construction	190	216	41040	48	2167	10.00	6.50	20.00	41040.00	312	43340	14,754	8,274
TOTAL												17,828	16,489

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

2022

Phase Name	Daily Worker Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Hauling Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	Total gallons of gasoline	Total gallons of diesel
Building Construction	190	260	49400	48	2167	10.00	6.50	20.00	49400.00	312	43340	17,276	8,086
TOTAL												17,276	8,086

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

2023

Phase Name	Daily Worker Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Hauling Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	Total gallons of gasoline	Total gallons of diesel
Building Construction	190	206	39140	48	2167	10.00	6.50	20.00	391,400.00	312.00	43340	13,304	7,690
Architectural Coating	190	34	6,460	0	0	10.00	6.50	20.00	64,600.00	0.00	0	2,196	0
TOTAL												15,500	7,690

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: SACRAMENTO

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

Region	CalYr	VehClass	MdYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
SACRAMENTO	2020	LDA	Aggregated	Aggregated	GAS	562308.3977	20379237.88	2622438.14	684.8956964	0.00	29.76	27.07	5.20
SACRAMENTO	2020	LDT1	Aggregated	Aggregated	GAS	62565.85469	2093109.763	283205.141	81.82020875	0.00	25.58		
SACRAMENTO	2020	LDT2	Aggregated	Aggregated	GAS	200448.9527	7002680.301	925793.383	301.8261924	0.00	23.20		
SACRAMENTO	2020	T7 tractor construction	Aggregated	Aggregated	DSL	245.8322004	17275.95781	1111.39782	0.00	3.319186621	5.20		

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: SACRAMENTO

Calendar Year: 2021

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

Region	CalYr	VehClass	MdYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
SACRAMENTO	2021	LDA	Aggregated	Aggregated	GAS	576916.8631	20787699.97	2693628.523	680.3867171	0.00	30.55		
SACRAMENTO	2021	LDT1	Aggregated	Aggregated	GAS	63439.28027	2114017.763	287695.6243	80.67265944	0.00	26.20	27.82	5.28
SACRAMENTO	2021	LDT2	Aggregated	Aggregated	GAS	203602.0528	7045516.111	940182.7893	294.1321023	0.00	23.95		
SACRAMENTO	2021	T7 tractor construction	Aggregated	Aggregated	DSL	258.7845228	17974.85613	1169.954766	0.00	3.407025315	5.28		

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: SACRAMENTO

Calendar Year: 2022

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

Region	CalYr	VehClass	MdlYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
SACRAMENTO	2022	LDA	Aggregated	Aggregated	GAS	591545.2621	21127372.04	2764927.853	673.142382	0.00	31.39		
SACRAMENTO	2022	LDT1	Aggregated	Aggregated	GAS	64366.14065	2129386.502	292380.935	79.27891431	0.00	26.86	28.59	5.40
SACRAMENTO	2022	LDT2	Aggregated	Aggregated	GAS	206880.8861	7073751.275	955128.7989	285.8595601	0.00	24.75		
SACRAMENTO	2022	T7 tractor construction	Aggregated	Aggregated	DSL	270.8028858	18680.66671	1224.289318	0.00	3.460572817	5.40		

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: SACRAMENTO

Calendar Year: 2023

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

Region	CaYr	VehClass	MdYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
SACRAMENTO	2023	LDA	Aggregated	Aggregated	GAS	606308.3182	21470907.57	2835871.38	665.4181032	0.00	32.27		
SACRAMENTO	2023	LDT1	Aggregated	Aggregated	GAS	65368.82489	2148247.633	297348.073	77.95506082	0.00	27.56	29.42	5.68
SACRAMENTO	2023	LDT2	Aggregated	Aggregated	GAS	210187.0401	7110545.533	970164.851	277.9033637	0.00	25.59		
SACRAMENTO	2023	T7 tractor construction	Aggregated	Aggregated	DSL	284.6932222	19393.38955	1287.08699	0.00	3.416629408	5.68		

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).