

Appendix E

Energy Calculations

Construction Energy Use - Phase 1

Off-Road Construction Equipment Energy Use												
Phase	Equipment	Fuel	HP	Load Factor	Equipment Count	Hours/Day	Work Days	Gallons /HP-Hr	Gallons /Hour	Gallons /Day	Total Gallons	Total kBtu
Site Preparation	Rubber Tired Dozers	Diesel	367	0.4	3	8.0	43	0.0453607	6.65895	159.815	6,872.0	955,213
	Tractors/Loaders/Backhoes	Diesel	84	0.37	4	8.0	43	0.0564883	1.75566	56.181	2,415.8	335,794
	Off-Highway Trucks	Diesel	376	0.38	1	4.0	43	0.0501468	7.16498	28.660	1,232.4	171,300
Grading	Excavators	Diesel	36	0.38	2	8.0	42	0.0560979	0.76742	12.279	515.7	71,683
	Graders	Diesel	148	0.41	1	8.0	42	0.0538288	3.26633	26.131	1,097.5	152,551
	Rubber Tired Dozers	Diesel	367	0.4	1	8.0	42	0.0453607	6.65895	53.272	2,237.4	311,000
	Scrapers	Diesel	423	0.48	2	8.0	42	0.0476817	9.68129	154.901	6,505.8	904,310
	Tractors/Loaders/Backhoes	Diesel	84	0.37	2	8.0	42	0.0564883	1.75566	28.090	1,179.8	163,992
	Off-Highway Trucks	Diesel	376	0.38	1	4.0	42	0.0501468	7.16498	28.660	1,203.7	167,317
	Cranes	Diesel	367	0.29	1	7.0	219	0.0515293	5.48427	38.390	8,407.4	1,168,626
Building Construction	Forklifts	Diesel	82	0.2	3	8.0	219	0.0573234	0.94010	22.562	4,941.2	686,825
	Generator Sets	Diesel	14	0.74	1	8.0	219	0.0423218	0.43845	3.508	768.2	106,776
	Tractors/Loaders/Backhoes	Diesel	84	0.37	3	7.0	219	0.0564883	1.75566	36.869	8,074.3	1,122,322
	Welders	Diesel	46	0.45	1	8.0	219	0.0275827	0.57096	4.568	1,000.3	139,045
	Off-Highway Trucks	Diesel	376	0.38	1	4.0	219	0.0501468	7.16498	28.660	6,276.5	872,437
	Pavers	Diesel	81	0.41	2	8.0	23	0.0565364	1.87757	30.041	690.9	96,042
	Paving Equipment	Diesel	89	0.36	2	8.0	23	0.0595865	1.90915	30.546	702.6	97,657
Architectural Coating	Rollers	Diesel	36	0.38	2	8.0	23	0.0578510	0.79140	12.662	291.2	40,482
	Air Compressors	Diesel	37	0.48	1	6.0	66	0.0275827	0.48987	2.939	194.0	26,964
Underground Utilities	Excavators	Diesel	36	0.38	1	8.0	22	0.0560979	0.76742	6.139	135.1	18,774
Project Construction Off-Road Total											54,606.7	7,590,334

On-Road Construction Energy Use											
Phase	Trip Type (Fleet Mix)	Trips	Distance (miles)	Work Days	Total VMT	gallons diesel/VMT	Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total kBtu	
Site Preparation	Worker (LDA, LDT1, LDT2)	20	18.5	43	15910.0	6.25882E-05	1.00	0.036362994	578.54	71,877	
	Hauling (HHDT)	1.86	20	43	1599.6	0.162984246	260.71	0.000000100	0.00	36,239	
Grading	Worker (LDA, LDT1, LDT2)	22.5	18.5	42	17482.5	6.25882E-05	1.09	0.036362994	635.72	78,981	
	Hauling (HHDT)	0	20	42	0.0	0.162984246	0.00	0.000000100	-	-	
Building Construction	Worker (LDA, LDT1, LDT2)	144	18.5	347	924408.0	6.25882E-05	57.86	0.036362994	33,614.24	4,176,208	
	Vendor (HHDT, MHDT)	57.9	10.2	347	204931.3	0.137079162	28091.81	0.015410693	3,158.13	4,296,369	
	Hauling (HHDT)	0	20	347	0.0	0.162984246	0.00	0.000000100	-	-	
Paving	Worker (LDA, LDT1, LDT2)	15	18.5	23	6382.5	6.25882E-05	0.40	0.036362994	232.09	28,834	
	Hauling (HHDT)	86.6	20	23	39836.0	0.015410693	613.90	0.000000100	0.00	85,333	
Architectural Coating	Worker (LDA, LDT1, LDT2)	28.9	18.5	66	35286.9	6.25882E-05	2.21	0.036362994	1,283.14	159,416	
	Hauling (HHDT)	0	20	66	0.0	0.162984246	0.00	0.000000100	-	-	
Underground Utilities	Worker (LDA, LDT1, LDT2)	7.1662	18.5	22	2916.6	6.25882E-05	0.18	0.036362994	106.06	13,177	
Project Construction On-Road Total					1248753.4		29029.2		39607.9	8946433.4	

Notes:

1. Off-road equipment types and horsepower from CalEEMod defaults.
2. Off-road equipment count and hours from CalEEMod for the AQ/GHG report.
3. Off-road fuel consumption factors from CARB OFFROAD2021, for San Diego County, aggregate model years. <https://arb.ca.gov/emfac/emissions-inventory/>.
4. On-road fleet mix and trip distances from CalEEMod for the AQ/GHG report.
5. On-road fuel consumption factors weighted average for fleet mix from CARB EMFAC2021, for San Diego County, aggregate model years, aggregate speeds. <https://arb.ca.gov/emfac/emissions-inventory/>

Phase 1 Construction Energy Summary			
Source	Gallons Diesel	Gallons Gas	kBtu
Off-Road Construction Equipment	54,607	-	7,590,334
On-Road Construction Traffic	29,029	39,608	8,946,433
Project Construction Total	83,636	39,608	16,536,767

Construction Energy Use - Phase 2

Off-Road Construction Equipment Energy Use												
Phase	Equipment	Fuel	HP	Load Factor	Equipment Count	Hours/Day	Work Days	Gallons /HP-Hr	Gallons /Hour	Gallons /Day	Total Gallons	Total kBtu
Site Preparation	Rubber Tired Dozers	Diesel	367	0.4	3	8.0	64	0.0453607	6.65895	159.815	10,228.1	1,421,713
	Tractors/Loaders/Backhoes	Diesel	84	0.37	4	8.0	64	0.0564883	1.75566	56.181	3,595.6	499,786
	Off-Highway Trucks	Diesel	376	0.38	1	4.0	64	0.0501468	7.16498	28.660	1,834.2	254,959
Grading	Excavators	Diesel	36	0.38	2	8.0	43	0.0560979	0.76742	12.279	528.0	73,390
	Graders	Diesel	148	0.41	1	8.0	43	0.0538288	3.26633	26.131	1,123.6	156,183
	Rubber Tired Dozers	Diesel	367	0.4	1	8.0	43	0.0453607	6.65895	53.272	2,290.7	318,404
	Scrapers	Diesel	423	0.48	2	8.0	43	0.0476817	9.68129	154.901	6,660.7	925,841
	Tractors/Loaders/Backhoes	Diesel	84	0.37	2	8.0	43	0.0564883	1.75566	28.090	1,207.9	167,897
	Off-Highway Trucks	Diesel	376	0.38	1	4.0	43	0.0501468	7.16498	28.660	1,232.4	171,300
	Cranes	Diesel	367	0.29	1	7.0	305	0.0515293	5.48427	38.390	11,708.9	1,627,538
Building Construction	Forklifts	Diesel	82	0.2	3	8.0	305	0.0573234	0.94010	22.562	6,881.6	956,537
	Generator Sets	Diesel	14	0.74	1	8.0	305	0.0423218	0.43845	3.508	1,069.8	148,706
	Tractors/Loaders/Backhoes	Diesel	84	0.37	3	7.0	305	0.0564883	1.75566	36.869	11,245.0	1,563,051
	Welders	Diesel	46	0.45	1	8.0	305	0.0275827	0.57096	4.568	1,393.1	193,647
	Off-Highway Trucks	Diesel	376	0.38	1	1.0	305	0.0501468	7.16498	7.165	2,185.3	303,759
	Pavers	Diesel	81	0.42	2	8.0	44	0.0565364	1.92337	30.774	1,354.1	188,213
	Paving Equipment	Diesel	89	0.36	2	8.0	44	0.0595865	1.90915	30.546	1,344.0	186,822
Paving	Rollers	Diesel	36	0.38	2	8.0	44	0.0578510	0.79140	12.662	557.1	77,443
	Air Compressors	Diesel	37	0.48	1	6.0	126	0.0275827	0.48987	2.939	370.3	51,477
Underground Utilities	Excavators	Diesel	36	0.38	2	8.0	65	0.0560979	0.76742	12.279	798.1	110,938
Project Construction Off-Road Total											66,810.6	9,286,667

On-Road Construction Energy Use												
Phase	Trip Type (Fleet Mix)	Trips	Distance (miles)	Work Days	Total VMT	gallons diesel/VMT	Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total kBtu		
Site Preparation	Worker (LDA, LDT1, LDT2)	20	18.5	64	23680.0	6.25882E-05	1.48	0.036362994	861.08	106,979		
	Hauling (HHDT)	1.56	20	64	1996.8	0.162984246	325.45	0.000000100	0.00	45,237		
Grading	Worker (LDA, LDT1, LDT2)	22.5	18.5	43	17898.8	6.25882E-05	1.12	0.036362994	650.85	80,861		
	Hauling (HHDT)	25	20	43	21500.0	0.162984246	3504.16	0.000000100	0.00	487,079		
Building Construction	Worker (LDA, LDT1, LDT2)	173	18.5	305	976152.5	6.25882E-05	61.10	0.036362994	35,495.83	4,409,975		
	Vendor (HHDT, MHDT)	27.9	10.2	305	86796.9	0.137079162	11898.05	0.015410693	1,337.60	1,819,691		
	Hauling (HHDT)	0	20	305	0.0	0.162984246	0.00	0.000000100	-	-		
Paving	Worker (LDA, LDT1, LDT2)	15	18.5	44	12210.0	6.25882E-05	0.76	0.036362994	443.99	55,161		
	Hauling (HHDT)	35.5	20	44	31240.0	0.015410693	481.43	0.000000100	0.00	66,919		
Architectural Coating	Worker (LDA, LDT1, LDT2)	34.6	18.5	126	80652.6	6.25882E-05	5.05	0.036362994	2,932.77	364,365		
	Hauling (HHDT)	0	20	126	0.0	0.162984246	0.00	0.000000100	-	-		
Underground Utilities	Worker (LDA, LDT1, LDT2)	5	18.5	65	6012.5	6.25882E-05	0.38	0.036362994	218.63	27,163		
Project Construction On-Road Total					1258140.1		16279.0		41940.8	7463430.7		

Notes:

- Off-road equipment types and horsepower from CalEEMod defaults.
- Off-road equipment count and hours from CalEEMod for the AQ/GHG report.
- Off-road fuel consumption factors from CARB OFFROAD2021, for San Diego County, aggregate model years. <https://arb.ca.gov/emfac/emissions-inventory/>.
- On-road fleet mix and trip distances from CalEEMod for the AQ/GHG report.
- On-road fuel consumption factors weighted average for fleet mix from CARB EMFAC2021, for San Diego County, aggregate model years, aggregate speeds. <https://arb.ca.gov/emfac/emissions-inventory/>
- 1 Gallon of diesel = 139 kBtu; 1 gallon of gasoline = 124 kBtu.

Phase 2 Construction Energy Summary			
Source	Gallons Diesel	Gallons Gas	kBtu
Off-Road Construction Equipment	66,811	-	9,286,667
On-Road Construction Traffic	16,279	41,941	7,463,431
Project Construction Total	83,090	41,941	16,750,097

Construction Energy Use - Phase 3

Off-Road Construction Equipment Energy Use												
Phase	Equipment	Fuel	HP	Load Factor	Equipment Count	Hours/Day	Work Days	Gallons /HP-Hr	Gallons /Hour	Gallons /Day	Total Gallons	Total kBtu
Grading	Graders	Diesel	148	0.41	1	8.0	5	0.0538288	3.26633	26.131	130.7	18,161
	Rubber Tired Dozers	Diesel	367	0.4	1	8.0	5	0.0453607	6.65895	53.272	266.4	37,024
	Tractors/Loaders/Backhoes	Diesel	84	0.37	1	8.0	5	0.0564883	1.75566	14.045	70.2	9,761
	Off-Highway Trucks	Diesel	376	0.38	1	1.0	5	0.0501468	7.16498	7.165	35.8	4,980
Paving	Pavers	Diesel	81	0.42	1	8.0	10	0.0565364	1.92337	15.387	153.9	21,388
	Paving Equipment	Diesel	89	0.36	1	8.0	10	0.0595865	1.90915	15.273	152.7	21,230
	Rollers	Diesel	36	0.38	1	8.0	10	0.0578510	0.79140	6.331	63.3	8,800
Architectural Coating	Air Compressors	Diesel	37	0.48	1	6.0	7	0.0275827	0.48987	2.939	20.6	2,860
Project Construction Off-Road Total											893.6	124,204

On-Road Construction Energy Use												
Phase	Trip Type (Fleet Mix)	Trips	Distance (miles)	Work Days	Total VMT	gallons diesel/VMT	Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total kBtu		
Grading	Worker (LDA, LDT1, LDT2)	10	18.5	43	7955.0	6.25882E-05	0.50	0.036362994	289.27	35,938		
	Hauling (HHDT)	0	20	43	0.0	0.162984246	0.00	0.000000100	-	-		
Paving	Worker (LDA, LDT1, LDT2)	7.5	18.5	44	6105.0	6.25882E-05	0.38	0.036362994	222.00	27,581		
	Hauling (HHDT)	0	20	44	0.0	0.015410693	0.00	0.000000100	-	-		
Architectural Coating	Worker (LDA, LDT1, LDT2)	6	18.5	126	13986.0	6.25882E-05	0.88	0.036362994	508.57	63,185		
	Hauling (HHDT)	0	20	126	0.0	0.162984246	0.00	0.000000100	-	-		
Project Construction On-Road Total					28046.0		1.8		1019.8	126703.7		

Notes:

1. Off-road equipment types and horsepower from CalEEMod defaults.
2. Off-road equipment count and hours from CalEEMod for the AQ/GHG report.
3. Off-road fuel consumption factors from CARB OFFROAD2021, for San Diego County, aggregate model years. <https://arb.ca.gov/emfac/emissions-inventory/>.
4. On-road fleet mix and trip distances from CalEEMod for the AQ/GHG report.
5. On-road fuel consumption factors weighted average for fleet mix from CARB EMFAC2021, for San Diego County, aggregate model years, aggregate speeds. <https://arb.ca.gov/emfac/emissions-inventory/>

Phase 3 Construction Energy Summary			
Source	Gallons Diesel	Gallons Gas	kBtu
Off-Road Construction Equipment	894	-	124,204
On-Road Construction Traffic	2	1,020	126,704
Project Construction Total	895	1,020	250,907

Total Construction Energy Use

Total Construction Energy Summary			
Source	Gallons Diesel	Gallons Gas	kBtu
Off-Road Construction Equipment	122,311	-	17,001,204
On-Road Construction Traffic	45,310	82,569	16,536,568
Project Construction Total	167,621	82,569	33,537,772

Annual Operational Energy Use

Project VMT
14,032,574.00

Project On-Road Project Operational Energy Use						
Category	Mix	Diesel Gallons/VMT	Diesel Gallons	Gasoline Gallons/VMT	Gasoline Gallons	kBtu
LDA	39.747867%	0.000034	187.8	0.0318295	177,533.6	22,040,270
LDT1	3.78731%	0.000002	1.1	0.0383589	20,386.1	2,528,035
LDT2	22.19398%	0.000103	322.0	0.0382863	119,238.3	14,830,309
MDV	13.17555%	0.000467	864.0	0.0466081	86,172.3	10,805,454
LHDT1	1.88384%	0.017711	4,681.8	0.0431001	11,393.6	2,063,578
LHDT2	3.61372%	0.036936	18,730.1	0.0271656	13,775.6	4,311,670
MHDT	2.63347%	0.085243	31,501.1	0.0420986	15,557.2	6,307,755
HHDT	5.30925%	0.155903	116,151.3	0.0000745	55.5	16,151,915
OBUS	0.07686%	0.077910	840.3	0.0843083	909.3	229,554
UBUS	0.02141%	0.175590	527.5	0.2151971	646.5	153,485
MCY	2.02780%	-	0.0	0.0239923	6,827.1	846,556
SBUS	0.05902%	0.043891	363.5	0.0734408	0.0	50,527
MH	0.24971%	0.030647	1,073.9	0.1434245	5,025.8	772,473
Annual Total			175,244.5		457,520.9	81,091,583

Project Electricity and Natural Gas			
Type	Source	kWhr	kBtu
Natural Gas	Hot Water, Heating	-	277,088
Electricity	Buildings, Lighting	10,267,624	35,034,591
Total		10,267,624	35,311,679

Project Water and Wastewater Energy Use							
Indoor (Mgal)	Outdoor (Mgal)	Supply (kWhr/Mgal)	Treat Water (kWhr/Mgal)	Distribute (kWhr/Mgal)	Treat Wastewater (kWhr/Mgal)	kWhr	kBtu
15.50933	5.61289	9,727	111	1,272	1,911	245,394	837,320

Project Transport Refrigeration Units (TRUs)				
Horsepower	Gallons per HP hour	Hours/day	Quantity	Total
40	0.04232	4	2.2	135.9375773

Project Total		
Energy Type	Quantity	kBtu
Gasoline (Gallons)	457,521	56,732,595
Diesel (Gallons)	175,380	24,377,883
Natural Gas (kBtu)	277,088	277,088
Electricity (kWhr)	10,513,018	35,871,911
Total		117,259,477

Notes:

1. VMT, electricity, natural gas, and water use from project CalEEMod annual output.
2. Fleet mix from CalEEMod default for San Diego County
3. Fuel consumption factors weighted average for fleet mix from CARB EMFAC22021, for San Diego County, aggregate model years for 2029, aggregate speeds.
4. Water electricity intensity factors from CalEEMod default for San Diego County.
5. 1 Gallon of diesel = 139 kBtu; 1 gallon of gasoline = 124 kBtu; 1 kWhr = 3.412142 kBtu.

Source: EMFAC2021 (v1.0.2) Emissions Inventory

Region Type: County

Region: Los Angeles

Calendar Year: 2025, 2028

Season: Annual

Vehicle Classification: EMFAC2007 Categories

Units: miles/year for CVMT and EVMT, trips/year for Trips, kWh/year for Energy Consumption, tons/year for Emissions, 1000 gallons/year for Fuel Consumption

2025 Construction Fleet Fuel Consumption								
Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	Fuel Consumption (1000 Gal.)	Gallons/VMT
Worker (LDA, LDT1, LDT2)								
Los Angeles	2025	LDA	Aggregate	Aggregate	Diesel	85632098	2100.294449	
Los Angeles	2025	LDT1	Aggregate	Aggregate	Diesel	755037.92	32.67896484	
Los Angeles	2025	LDT2	Aggregate	Aggregate	Diesel	78976810	2450.269959	
					Diesel Total	165363946	4583.243372	6.25882E-05
Los Angeles	2025	LDA	Aggregate	Aggregate	Gasoline	4.581E+10	1546599.468	
Los Angeles	2025	LDT1	Aggregate	Aggregate	Gasoline	3.972E+09	160884.9298	
Los Angeles	2025	LDT2	Aggregate	Aggregate	Gasoline	2.329E+10	955325.4151	
					Gas Total	7.306E+10	2662809.813	0.036362994
					Total VMT	7.323E+10		
Vendor (HHDT, MHDT)								
Los Angeles	2025	HHDT	Aggregate	Aggregate	Diesel	2.174E+09	354395.8443	
Los Angeles	2025	MHDT	Aggregate	Aggregate	Diesel	814222776	90927.29379	
					Diesel total	2.988E+09	445323.1381	0.137079162
Los Angeles	2025	HHDT	Aggregate	Aggregate	Gasoline	899706.14	216.9321942	
Los Angeles	2025	MHDT	Aggregate	Aggregate	Gasoline	260016140	49847.1185	
					Gas Total	260915846	50064.0507	0.015410693
					Total VMT	3.249E+09		
Hauling (HHDT)								
Los Angeles	2025	HHDT	Aggregate	Aggregate	Diesel	2.174E+09	354395.8443	0.162984246
Los Angeles	2025	HHDT	Aggregate	Aggregate	Gasoline	899706.14	216.9321942	9.97656E-08
					Total VMT	2.174E+09		

2028 Operational Fleet Fuel Consumption								
Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	Consumption (1000 Gal.)	Gallons/VMT
LDA								
Los Angeles	2028	LDA	Aggregate	Aggregate	Diesel	62910887	1467.713	3.36754E-05
Los Angeles	2028	LDA	Aggregate	Aggregate	Gasoline	4.35E+10	1387261	0.031829462
					Total VMT	4.36E+10		
LDT1								
Los Angeles	2028	LDT1	Aggregate	Aggregate	Diesel	202950.7	8.137444	2.14377E-06
Los Angeles	2028	LDT1	Aggregate	Aggregate	Gasoline	3.8E+09	145604.5	0.038358885
					Total VMT	3.8E+09		
LDT2								
Los Angeles	2028	LDT2	Aggregate	Aggregate	Diesel	85983722	2523.702	0.000103392
Los Angeles	2028	LDT2	Aggregate	Aggregate	Gasoline	2.43E+10	934536	0.038286291
					Total VMT	2.44E+10		
MDV								
Los Angeles	2028	MDV	Aggregate	Aggregate	Diesel	1.54E+08	6279.224	0.000467289
Los Angeles	2028	MDV	Aggregate	Aggregate	Gasoline	1.33E+10	626299.1	0.046608115
					Total VMT	1.34E+10		
LHDT1								
Los Angeles	2028	LHDT1	Aggregate	Aggregate	Diesel	9.58E+08	45912.73	0.01771057
Los Angeles	2028	LHDT1	Aggregate	Aggregate	Gasoline	1.63E+09	111732.3	0.043100093
					Total VMT	2.59E+09		
LHDT2								
Los Angeles	2028	LHDT2	Aggregate	Aggregate	Diesel	4.33E+08	24410.27	0.036935961
Los Angeles	2028	LHDT2	Aggregate	Aggregate	Gasoline	2.28E+08	17953.26	0.02716565
					Total VMT	6.61E+08		
MHDT								
Los Angeles	2028	MHDT	Aggregate	Aggregate	Diesel	8.17E+08	90062.44	0.0852434
Los Angeles	2028	MHDT	Aggregate	Aggregate	Gasoline	2.39E+08	44478.53	0.042098582
					Total VMT	1.06E+09		
HHDT								
Los Angeles	2028	HHDT	Aggregate	Aggregate	Diesel	2.27E+09	353660.3	0.155902691
Los Angeles	2028	HHDT	Aggregate	Aggregate	Gasoline	752420	169.099	7.45432E-05
					Total VMT	2.27E+09		
OBUS								
Los Angeles	2028	OBUS	Aggregate	Aggregate	Diesel	49975153	6967.189	0.077909959
Los Angeles	2028	OBUS	Aggregate	Aggregate	Gasoline	39451009	7539.365	0.084308267
					Total VMT	89426162		
SBUS								
Los Angeles	2028	SBUS	Aggregate	Aggregate	Diesel	11250904	1503.232	0.043890535
Los Angeles	2028	SBUS	Aggregate	Aggregate	Gasoline	22998679	2515.316	0.073440793
					Total VMT	34249582		
MCY								
Los Angeles	2028	MCY	Aggregate	Aggregate	Gasoline	3.66E+08	8781.232	0.023992305
UBUS								
Los Angeles	2028	UBUS	Aggregate	Aggregate	Diesel	475148.7	83.43149	0.175590256
Los Angeles	2028	UBUS	Aggregate	Aggregate	Gasoline	9955276	2142.347	0.215197101
					Total VMT	10430425		
MH								
Los Angeles	2028	MH	Aggregate	Aggregate	Diesel	21491576	2156.574	0.03064732
Los Angeles	2028	MH	Aggregate	Aggregate	Gasoline	48875883	10092.42	0.14342448
					Total VMT	70367459		

Model Output: OFFROAD2021 (v1.0.4) Emissions Inventory

Region Type: County

Region: San Diego

Calendar Year: 2025

Scenario: All Adopted Rules - Exhaust

Vehicle Classification: OFFROAD2021 Equipment Types

Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horsepower-hours

Region	CalYr	VehClass	MdYr	HP_Bin	Fuel	Fuel_gpy	Total_Activity_hpy	Total_Population	Horsepower_Hours_hhpy	Gallons/hp-hour
Los Angeles	2025	Construction and Mining - Cranes	Aggregate	600	Diesel	288288.57	45885.10197	176.4783919	5594650.45	0.05152933
Los Angeles	2025	Construction and Mining - Excavators	Aggregate	50	Diesel	385908.62	385908.6203	1079.403289	6879204.648	0.05609785
Los Angeles	2025	Construction and Mining - Graders	Aggregate	175	Diesel	157571.08	157571.0776	151.42424	2927263.235	0.05382880
Los Angeles	2025	Construction and Mining - Off-Highway Trucks	Aggregate	600	Diesel	1311154	1311153.998	190.8481335	26146296.1	0.05014684
Los Angeles	2025	Construction and Mining - Pavers	Aggregate	100	Diesel	33129.661	33129.66103	38.28000331	585988.6358	0.05653635
Los Angeles	2025	Construction and Mining - Paving Equipment	Aggregate	100	Diesel	18846.235	18846.23479	23.84537796	316283.5563	0.05958651
Los Angeles	2025	Construction and Mining - Rollers	Aggregate	50	Diesel	150203.49	150203.4907	540.2494345	2596383.405	0.05785104
Los Angeles	2025	Construction and Mining - Rubber Tired Dozers	Aggregate	600	Diesel	134037.42	134037.4205	35.38098743	2954924.182	0.04536070
Los Angeles	2025	Construction and Mining - Scrapers	Aggregate	600	Diesel	1449462.5	1449462.471	448.0768221	30398731.82	0.04768168
Los Angeles	2025	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	100	Diesel	1603119.8	1603119.8	1829.624664	28379691.94	0.05648827
Los Angeles	2025	Industrial - Forklifts	Aggregate	100	Diesel	525738.08	525738.0839	1331.878162	9171440.684	0.05732339
Los Angeles	2025	Light Commercial - Misc - Air Compressors	Aggregate	50	Diesel	234465.05	234465.05	282.28	8500452.15	0.02758266
Los Angeles	2025	Light Commercial - Misc - Generator Sets	Aggregate	50	Diesel	645904	462476.9	1369.91	15261737.7	0.04232179
Los Angeles	2025	Light Commercial - Misc - Welders	Aggregate	50	Diesel	1076089.3	1076089.35	1410.64	41672276.3	0.02582267

2022 Title 24 Solar Calculation

Minimum PV Capacity Required by Title 24 Part 6

Factors for Climate Zone 9				
A, residential	0.613			
B, residential	1.36			
A, non-residential	3.13			
CF	19.17%			
Use	DU	Conditioned Floor Area (SF)	kW	kWh/year
Multi-family residential, apartments	154	191,424	231	387,178
Multi-family residential, duplexes and triplexes	76	114,278	126	211,465
Office, unleased tenant space (clubhouse)	-	9,630	30	50,613
Office (industrial office space)	-	38,600	121	202,873
Total				852,128

Notes:

- Calculations based on 2022 Title 24 Part 6 Building Energy Efficiency Standards.
- Factors are from 2022 Title 24 Tables 140.10-A and 170.2-T for Azusa (CEC climate zone 9) where CFA is the conditioned floor area and A is the PV capacity factor and B is the dwelling unit factor.
- CF is the capacity factor which accounts for climate, daylight hours, panel pitch and orientation, and transmission loss, from National Renewable Energy Laboratory PVWatts Calculator, for project site coordinates and solar panel orientation of 180 degree azimuth, 30 degree tilt.
- Residential solar power output requirement is calculated by 2022 Title 24 Equation 140.110-A:

$$\text{kW} = (\text{CFA} \times \text{A}) / 1000 + (\text{DU} \times \text{B}) / 1000.$$
- Non-residential solar power output requirement is calculated by 2022 Title 24 Equation 170.2-C:

$$\text{kW} = (\text{CFA} \times \text{A}) / 1000.$$
- Annual solar energy generated is calculated by: