

Appendix D  
**Energy Calculation Worksheets**



# **Fourth & Central EIR**

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## **Appendix D**

### **Energy Calculations**

# **Construction Energy Worksheets**

**Fourth & Central  
Construction Energy Analysis**

**Annual Fuel Summary**

<b>Heavy-Duty Construction Equipment</b>	
1,703,923	Total Project Consumption
365,412	Annual Consumption
<b>Haul Trucks</b>	
663,590	Total Project Consumption
142,309	Annual Consumption
<b>Vendor Trucks</b>	
837,221	Total Project Consumption
179,545	Annual Consumption
<b>Workers</b>	
1,773,866	Total Project Consumption
380,412	Annual Consumption
1,500,811	Project Consumption of diesel for Haul Trucks and Vendors
321,854	Annual Consumption
3,204,734	Total Gallons Diesel
1,773,866	Total Gallons Gasoline

4.66 Estimated Project Construction Duration (years)

687,267 Annual Average Gallons Diesel  
380,412 Annual Average Gallons Gasoline

Los Angeles County			Percent of Annual Project Compared to Los Angeles County	
Source	Fuel Type	Gallons		
Workers	Gasoline	3,559,000,000		0.0107%
Off-Road/Vendor/Haul Trucks	Diesel	563,300,000		0.1220%

Notes:

1 Gasoline and diesel amounts from CEC, 2019. Available: <https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting>

**Annual Electricity Summary**

Temporary Construction Trailer - Electricity and Off-Road Equipment	1,086,141 kWh/year
Water Conveyance for Dust Control	6,258 kWh/year
<b>Total</b>	<b>1,092,399 kWh/year</b>
	85,399,000   Total SCE, 2019
	0.0013% Project percentage of SCE

Fourth & Central  
 Construction Energy  
 Construction Water Energy Estimates

Park Zone	Source	Acreage/Day	Number of Days	Total Construction Water Use (Mgal)	Electricity Demand from Water Conveyance (MWh)	Annual Electricity Demand from Water Conveyance (MWh)
Lower South	Demolition	0.5	133	0.200	1.4	0.3
Lower South	Site Preparation	1.5	78	0.351	2.4	0.5
Lower South	Grading	0.5	623	0.935	6.4	1.4
Lower South	Foundations	3.5	2	0.021	0.1	0.0
Upper South	Demolition	0.5	133	0.200	1.4	0.3
Upper South	Site Preparation	1.5	78	0.351	2.4	0.5
Upper South	Grading	0.5	517	0.776	5.3	1.1
Upper South	Foundations	1	2	0.006	0.0	0.0
North	Demolition	0.5	107	0.161	1.1	0.2
North	Site Preparation	1	78	0.234	1.6	0.3
North	Foundations	1	2	0.006	0.0	0.0
North	Grading	1	244	0.732	5.0	1.1
West	Site Preparation	0.5	52	0.078	0.5	0.1
West	Demolition	1.5	52	0.234	1.6	0.3
West	Foundations	1.5	1	0.005	0.0	0.0
<b>Total</b>				<b>4.287</b>	<b>29.2</b>	<b>6.3</b>

CalEEMod Water Electricity Factors	Electricity Intensity Factor To Supply (kWh/Mgal)	Electricity Intensity Factor To Treat (kWh/Mgal)	Electricity Intensity Factor To Distribute (kWh/Mgal)	Electricity Intensity Factor For Wastewater Treatment (kWh/Mgal)
	3044	725	1537	1501

Sources and Assumptions:

CalEEMod Appendix G, Table G-32

-Electricity Intensity Factors - California Emissions Estimator Model (CalEEMod).

-Estimated construction water use assumed to be generally equivalent to landscape irrigation, based on a factor of 20.94 gallons per year per square foot of landscaped area within the Los Angeles area (Mediterranean climate), which assumes high water demand landscaping materials and an irrigation system efficiency of 85%. Factor is therefore  $(20.94 \text{ GAL/SF/year}) \times (43,560 \text{ SF/acre}) / (365 \text{ days/year}) / (0.85) = 2,940 \text{ gallons/acre/day}$ , rounded up to 3,000 gallons/acre/day.

(U.S. Department of Energy, Energy Efficiency & Renewable Energy, Federal Energy Management Program. "Guidelines for Estimating Unmetered Landscaping Water Use." July 2010. Page 12, Table 4 - Annual Irrigation Factor – Landscaped Areas with High Water Requirements).

**Fourth & Central  
Construction Energy Analysis**

**Temporary Construction Traile**

<b>Land Use</b>	<b>Square Feet</b>	<b>Energy Use per year (kWh)</b>
General Office	2,000	40,936

Note: Energy use per sf is derived from CalEEMod User Guide, Appendix G, Table G-28 fo

**Fourth & Central  
Construction Energy Analysis  
Off-Road Equipment**

**Equipment ≤ 100 hp**  
pounds diesel fuel/hp-hr (lb/hp-hr):<sup>1</sup> 0.408 lb/hp-hr  
diesel density (lb/gal):<sup>1</sup> 7.11 lb/gal  
diesel gallons/hp-hr: 0.0574 gal/hp-hr  
Total hp-hr: 16,065,185 hp-hr  
Total diesel gallons: 922,027 gal

**Equipment > 100 hp**  
pounds diesel fuel/hp-hr (lb/hp-hr):<sup>1</sup> 0.367 lb/hp-hr  
diesel density (lb/gal):<sup>1</sup> 7.11 lb/gal  
diesel gallons/hp-hr: 0.0516 gal/hp-hr  
Total hp-hr: 15,145,561 hp-hr  
Total diesel gallons: 781,896 gal

**Total diesel gallons (off-road equipment): 1,703,923 gal**

[1. OFFROAD2017 Emission Factor Documentation](#)

Project Area	Construction Phase	Equipment	Fuel Type	Number	Hours/Day	HP	Load	Days	Total hp-hr
Lower South	Demolition	Concrete/Industrial Saws	Diesel	2	8	33	0.73	133	51,264
Lower South	Demolition	Excavators	Diesel	2	8	36	0.38	133	29,111
Lower South	Demolition	Air Compressors	Diesel	1	8	37	0.48	133	18,897
Lower South	Demolition	Aerial Lifts	Diesel	1	8	46	0.31	133	15,173
Lower South	Demolition	Crawler Tractors	Diesel	1	8	87	0.43	133	39,804
Lower South	Demolition	Crushing/Proc. Equipment	Diesel	2	8	85	0.78	133	141,086
Lower South	Demolition	Off-Highway Trucks	Diesel	1	8	376	0.38	133	152,024
Lower South	Demolition	Rough Terrain Forklifts	Diesel	1	8	96	0.4	133	40,858
Lower South	Demolition	Rubber Tired Loaders	Diesel	2	8	150	0.36	133	114,912
Lower South	Demolition	Signal Boards	Diesel	2	8	6	0.82	133	10,470
Lower South	Demolition	Sweepers/Scrubbers	Diesel	1	8	36	0.46	133	17,620
Lower South	Site Preparation	Rubber Tired Dozers	Diesel	3	8	367	0.4	78	274,810
Lower South	Site Preparation	Tractors/Loaders/Backhoes	Diesel	4	8	84	0.37	78	77,576
Lower South	Grading	Excavators	Diesel	2	8	36	0.38	623	136,362
Lower South	Grading	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	623	154,903
Lower South	Grading	Crawler Tractors	Diesel	1	8	87	0.43	623	186,451
Lower South	Grading	Off-Highway Trucks	Diesel	1	8	376	0.38	623	712,114
Lower South	Grading	Rough Terrain Forklifts	Diesel	1	8	96	0.4	623	191,386
Lower South	Grading	Rubber Tired Loaders	Diesel	2	8	150	0.36	623	538,272
Lower South	Grading	Signal Boards	Diesel	2	8	6	0.82	623	49,043
Lower South	Grading	Sweepers/Scrubbers	Diesel	1	8	36	0.46	623	82,535
Lower South	Building Construction-6	Forklifts	Diesel	2	8	82	0.2	650	170,560
Lower South	Building Construction-6	Tractors/Loaders/Backhoes	Diesel	3	8	84	0.37	650	484,848
Lower South	Building Construction-6	Aerial Lifts	Diesel	2	8	46	0.31	650	148,304
Lower South	Building Construction-6	Concrete/Industrial Saws	Diesel	5	8	33	0.73	650	626,340
Lower South	Building Construction-6	Graders	Diesel	2	8	148	0.41	650	631,072
Lower South	Building Construction-6	Off-Highway Trucks	Diesel	1	8	376	0.38	650	742,976
Lower South	Building Construction-6	Pumps	Diesel	2	8	11	0.74	650	84,656
Lower South	Building Construction-6	Signal Boards	Diesel	2	8	6	0.82	650	51,168
Lower South	Parking Garage Construction	Forklifts	Diesel	1	8	82	0.2	45	5,904
Lower South	Parking Garage Construction	Aerial Lifts	Diesel	2	8	46	0.31	45	10,267
Lower South	Parking Garage Construction	Concrete/Industrial Saws	Diesel	1	8	33	0.73	45	8,672
Lower South	Parking Garage Construction	Off-Highway Trucks	Diesel	1	8	376	0.38	45	51,437
Lower South	Parking Garage Construction	Pumps	Diesel	1	8	11	0.74	45	2,930
Lower South	Parking Garage Construction	Rollers	Diesel	2	8	36	0.38	45	9,850
Lower South	Parking Garage Construction	Rough Terrain Forklifts	Diesel	1	8	96	0.4	45	13,824
Lower South	Parking Garage Construction	Signal Boards	Diesel	2	8	6	0.82	45	3,542
Lower South	Parking Garage Construction	Welders	Diesel	2	8	46	0.45	45	14,904
Lower South	Building Construction-7	Forklifts	Diesel	1	8	82	0.2	650	85,280
Lower South	Building Construction-7	Welders	Diesel	2	8	46	0.45	650	215,280
Lower South	Building Construction-7	Aerial Lifts	Diesel	2	8	46	0.31	650	148,304
Lower South	Building Construction-7	Concrete/Industrial Saws	Diesel	1	8	33	0.73	650	125,268
Lower South	Building Construction-7	Off-Highway Trucks	Diesel	1	8	376	0.38	650	742,976
Lower South	Building Construction-7	Pumps	Diesel	1	8	11	0.74	650	42,328
Lower South	Building Construction-7	Rollers	Diesel	2	8	36	0.38	650	142,272
Lower South	Building Construction-7	Rough Terrain Forklifts	Diesel	1	8	96	0.4	650	199,680
Lower South	Building Construction-7	Signal Boards	Diesel	2	8	6	0.82	650	51,168
Lower South	Building Construction-8	Forklifts	Diesel	1	8	82	0.2	544	71,373
Lower South	Building Construction-8	Welders	Diesel	2	8	46	0.45	544	180,173
Lower South	Building Construction-8	Concrete/Industrial Saws	Diesel	1	8	33	0.73	544	104,840
Lower South	Building Construction-8	Off-Highway Trucks	Diesel	1	8	376	0.38	544	621,814
Lower South	Building Construction-8	Pumps	Diesel	1	8	11	0.74	544	35,425
Lower South	Building Construction-8	Rollers	Diesel	2	8	36	0.38	544	119,071
Lower South	Building Construction-8	Rough Terrain Forklifts	Diesel	1	8	96	0.4	544	167,117
Lower South	Building Construction-8	Signal Boards	Diesel	2	8	6	0.82	544	42,824
Lower South	Building Construction-8	Aerial Lifts	Diesel	2	8	46	0.31	544	124,119
Lower South	Building Construction-9	Forklifts	Diesel	2	8	82	0.2	677	177,645
Lower South	Building Construction-9	Tractors/Loaders/Backhoes	Diesel	2	8	84	0.37	677	336,659
Lower South	Building Construction-9	Aerial Lifts	Diesel	2	8	46	0.31	677	154,464
Lower South	Building Construction-9	Concrete/Industrial Saws	Diesel	2	8	33	0.73	677	260,943
Lower South	Building Construction-9	Off-Highway Trucks	Diesel	2	8	376	0.38	677	1,547,676
Lower South	Building Construction-9	Pumps	Diesel	2	8	11	0.74	677	88,172
Lower South	Building Construction-9	Rollers	Diesel	2	8	36	0.38	677	148,182
Lower South	Building Construction-9	Rough Terrain Forklifts	Diesel	2	8	96	0.4	677	415,949
Lower South	Building Construction-9	Signal Boards	Diesel	2	8	6	0.82	677	53,293
Lower South	Foundations	Forklifts	Diesel	2	10	82	0.2	2	656
Lower South	Foundations	Tractors/Loaders/Backhoes	Diesel	3	10	84	0.37	2	1,865
Lower South	Foundations	Bore/Drill Rigs	Diesel	3	10	83	0.5	2	2,490
Lower South	Foundations	Concrete/Industrial Saws	Diesel	3	10	33	0.73	2	1,445
Lower South	Foundations	Plate Compactors	Diesel	3	10	8	0.43	2	206
Lower South	Foundations	Crawler Tractors	Diesel	3	10	87	0.43	2	2,245
Lower South	Foundations	Excavators	Diesel	5	10	36	0.38	2	1,368
Lower South	Foundations	Graders	Diesel	4	10	148	0.41	2	4,854
Lower South	Foundations	Off-Highway Trucks	Diesel	3	10	376	0.38	2	8,573
Lower South	Foundations	Pumps	Diesel	3	22	11	0.74	2	1,074
Lower South	Foundations	Rollers	Diesel	3	10	36	0.38	2	821
Lower South	Foundations	Rough Terrain Forklifts	Diesel	3	10	96	0.4	2	2,304
Lower South	Foundations	Signal Boards	Diesel	2	10	6	0.82	2	197
Lower South	Paving	Cement and Mortar Mixers	Diesel	1	8	10	0.56	287	12,858
Lower South	Paving	Pavers	Diesel	1	8	81	0.42	287	78,110
Lower South	Paving	Paving Equipment	Diesel	2	8	89	0.36	287	147,128
Lower South	Paving	Concrete/Industrial Saws	Diesel	1	8	33	0.73	287	55,311
Lower South	Paving	Off-Highway Trucks	Diesel	1	8	376	0.38	287	328,052
Lower South	Paving	Pumps	Diesel	1	8	11	0.74	287	18,689
Lower South	Paving	Rough Terrain Forklifts	Diesel	1	8	96	0.4	287	88,166
Lower South	Paving	Signal Boards	Diesel	1	8	6	0.82	287	11,296
Lower South	Architectural Coating-6	Air Compressors	Diesel	1	8	37	0.48	600	85,248



Lower South	Architectural Coating-7	Air Compressors	Diesel	1	8	37	0.48	0	-
Lower South	Architectural Coating-8	Air Compressors	Diesel	1	8	37	0.48	544	77,292
Lower South	Architectural Coating-9	Air Compressors	Diesel	1	8	37	0.48	600	85,248
Upper South	Demolition	Concrete/Industrial Saws	Diesel	2	8	33	0.73	133	51,264
Upper South	Demolition	Crushing/Proc. Equipment	Diesel	2	8	85	0.78	133	141,086
Upper South	Demolition	Rubber Tired Loaders	Diesel	2	8	150	0.36	133	114,912
Upper South	Demolition	Air Compressors	Diesel	1	8	37	0.48	133	18,897
Upper South	Demolition	Aerial Lifts	Diesel	1	8	46	0.31	133	15,173
Upper South	Demolition	Crawler Tractors	Diesel	1	8	87	0.43	133	39,804
Upper South	Demolition	Excavators	Diesel	2	8	36	0.38	133	29,111
Upper South	Demolition	Off-Highway Trucks	Diesel	1	8	376	0.38	133	152,024
Upper South	Demolition	Rough Terrain Forklifts	Diesel	1	8	96	0.4	133	40,858
Upper South	Demolition	Signal Boards	Diesel	2	8	6	0.82	133	10,470
Upper South	Demolition	Sweepers/Scrubbers	Diesel	1	8	36	0.46	133	17,620
Upper South	Site Preparation	Graders	Diesel	1	8	148	0.41	78	37,864
Upper South	Site Preparation	Scrapers	Diesel	1	8	423	0.48	78	126,697
Upper South	Site Preparation	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	78	19,394
Upper South	Grading	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	517	128,547
Upper South	Grading	Signal Boards	Diesel	2	8	6	0.82	517	40,698
Upper South	Grading	Crawler Tractors	Diesel	1	8	87	0.43	517	154,728
Upper South	Grading	Excavators	Diesel	2	8	36	0.38	517	113,161
Upper South	Grading	Off-Highway Trucks	Diesel	1	8	376	0.38	517	590,952
Upper South	Grading	Rough Terrain Forklifts	Diesel	1	8	96	0.4	517	158,822
Upper South	Grading	Rubber Tired Loaders	Diesel	2	8	150	0.36	517	446,688
Upper South	Grading	Sweepers/Scrubbers	Diesel	1	8	36	0.46	517	68,492
Upper South	Building Construction-3	Aerial Lifts	Diesel	2	8	46	0.31	378	86,244
Upper South	Building Construction-3	Concrete/Industrial Saws	Diesel	1	8	33	0.73	378	72,848
Upper South	Building Construction-3	Forklifts	Diesel	1	8	82	0.2	378	49,594
Upper South	Building Construction-3	Off-Highway Trucks	Diesel	1	8	376	0.38	378	432,069
Upper South	Building Construction-3	Pumps	Diesel	1	8	11	0.74	378	24,615
Upper South	Building Construction-3	Rollers	Diesel	2	8	36	0.38	378	82,737
Upper South	Building Construction-3	Rough Terrain Forklifts	Diesel	1	8	96	0.4	378	116,122
Upper South	Building Construction-3	Signal Boards	Diesel	2	8	6	0.82	378	29,756
Upper South	Building Construction-3	Welders	Diesel	2	8	46	0.45	378	125,194
Upper South	Parking Garage Construction	Aerial Lifts	Diesel	1	8	46	0.31	28	3,194
Upper South	Parking Garage Construction	Concrete/Industrial Saws	Diesel	1	8	33	0.73	28	5,396
Upper South	Parking Garage Construction	Forklifts	Diesel	1	8	82	0.2	28	3,674
Upper South	Parking Garage Construction	Off-Highway Trucks	Diesel	1	8	376	0.38	28	32,005
Upper South	Parking Garage Construction	Pumps	Diesel	2	8	11	0.74	28	3,647
Upper South	Parking Garage Construction	Rollers	Diesel	2	8	36	0.38	28	6,129
Upper South	Parking Garage Construction	Rough Terrain Forklifts	Diesel	1	8	96	0.4	28	8,602
Upper South	Parking Garage Construction	Signal Boards	Diesel	2	8	6	0.82	28	2,204
Upper South	Foundations	Forklifts	Diesel	1	10	82	0.2	2	328
Upper South	Foundations	Tractors/Loaders/Backhoes	Diesel	1	10	84	0.37	2	622
Upper South	Foundations	Signal Boards	Diesel	2	10	6	0.82	2	197
Upper South	Foundations	Bore/Drill Rigs	Diesel	3	10	83	0.5	2	2,490
Upper South	Foundations	Concrete/Industrial Saws	Diesel	3	10	33	0.73	2	1,445
Upper South	Foundations	Graders	Diesel	2	10	148	0.41	2	2,427
Upper South	Foundations	Pumps	Diesel	2	22	11	0.74	2	716
Upper South	Foundations	Rollers	Diesel	3	10	36	0.38	2	821
Upper South	Foundations	Rough Terrain Forklifts	Diesel	1	10	96	0.4	2	768
Upper South	Foundations	Cranes	Diesel	2	10	367	0.29	2	4,257
Upper South	Building Construction-4	Forklifts	Diesel	1	8	82	0.2	565	74,128
Upper South	Building Construction-4	Welders	Diesel	2	8	46	0.45	565	187,128
Upper South	Building Construction-4	Aerial Lifts	Diesel	2	8	46	0.31	565	128,910
Upper South	Building Construction-4	Concrete/Industrial Saws	Diesel	1	8	33	0.73	565	108,887
Upper South	Building Construction-4	Off-Highway Trucks	Diesel	1	8	376	0.38	565	645,818
Upper South	Building Construction-4	Pumps	Diesel	1	8	11	0.74	565	36,793
Upper South	Building Construction-4	Rollers	Diesel	2	8	36	0.38	565	123,667
Upper South	Building Construction-4	Rough Terrain Forklifts	Diesel	1	8	96	0.4	565	173,568
Upper South	Building Construction-4	Signal Boards	Diesel	2	8	6	0.82	565	44,477
Upper South	Building Construction-5	Forklifts	Diesel	1	8	82	0.2	703	92,234
Upper South	Building Construction-5	Pumps	Diesel	2	8	11	0.74	703	91,559
Upper South	Building Construction-5	Rollers	Diesel	2	8	36	0.38	703	153,873
Upper South	Building Construction-5	Aerial Lifts	Diesel	1	8	46	0.31	703	80,198
Upper South	Building Construction-5	Concrete/Industrial Saws	Diesel	1	8	33	0.73	703	135,482
Upper South	Building Construction-5	Off-Highway Trucks	Diesel	1	8	376	0.38	703	803,557
Upper South	Building Construction-5	Rough Terrain Forklifts	Diesel	1	8	96	0.4	703	215,962
Upper South	Building Construction-5	Signal Boards	Diesel	2	8	6	0.82	703	55,340
Upper South	Paving	Cement and Mortar Mixers	Diesel	1	8	10	0.56	184	8,243
Upper South	Paving	Pavers	Diesel	1	8	81	0.42	184	50,077
Upper South	Paving	Paving Equipment	Diesel	2	8	89	0.36	184	94,326
Upper South	Paving	Concrete/Industrial Saws	Diesel	1	8	33	0.73	184	35,460
Upper South	Paving	Off-Highway Trucks	Diesel	1	8	376	0.38	184	210,319
Upper South	Paving	Pumps	Diesel	1	8	11	0.74	184	11,982
Upper South	Paving	Rough Terrain Forklifts	Diesel	1	8	96	0.4	184	56,525
Upper South	Paving	Signal Boards	Diesel	1	8	6	0.82	184	7,242
Upper South	Architectural Coating-3	Air Compressors	Diesel	1	8	37	0.48	210	29,837
Upper South	Architectural Coating-4	Air Compressors	Diesel	1	8	37	0.48	210	29,837
Upper South	Architectural Coating-5	Air Compressors	Diesel	1	8	37	0.48	210	29,837

North	Demolition	Concrete/Industrial Saws	Diesel	2	8	33	0.73	107	41,242
North	Demolition	Air Compressors	Diesel	1	8	37	0.48	107	15,203
North	Demolition	Aerial Lifts	Diesel	1	8	46	0.31	107	12,207
North	Demolition	Crawler Tractors	Diesel	1	8	87	0.43	107	32,023
North	Demolition	Crushing/Proc. Equipment	Diesel	2	8	85	0.78	107	113,506
North	Demolition	Excavators	Diesel	2	8	36	0.38	107	23,420
North	Demolition	Off-Highway Trucks	Diesel	1	8	376	0.38	107	122,305
North	Demolition	Rough Terrain Forklifts	Diesel	1	8	96	0.4	107	32,870
North	Demolition	Rubber Tired Loaders	Diesel	2	8	150	0.36	107	92,448
North	Demolition	Signal Boards	Diesel	2	8	6	0.82	107	8,423
North	Demolition	Sweepers/Scrubbers	Diesel	1	8	36	0.46	107	14,175
North	Site Preparation	Graders	Diesel	1	8	148	0.41	78	37,864
North	Site Preparation	Rubber Tired Dozers	Diesel	1	8	367	0.4	78	91,603
North	Site Preparation	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	78	19,394
North	Grading	Rubber Tired Dozers	Diesel	1	8	367	0.4	244	286,554
North	Grading	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	244	60,668
North	Grading	Plate Compactors	Diesel	1	8	8	0.43	244	6,715
North	Grading	Crawler Tractors	Diesel	1	8	87	0.43	244	73,024
North	Grading	Excavators	Diesel	2	8	36	0.38	244	53,407
North	Grading	Off-Highway Trucks	Diesel	1	8	376	0.38	244	278,902
North	Grading	Rough Terrain Forklifts	Diesel	1	8	96	0.4	244	74,957
North	Grading	Rubber Tired Loaders	Diesel	1	8	150	0.36	244	105,408
North	Grading	Signal Boards	Diesel	2	8	6	0.82	244	19,208
North	Grading	Sweepers/Scrubbers	Diesel	1	8	36	0.46	244	32,325
North	Building Construction-1	Forklifts	Diesel	2	8	82	0.2	379	99,450
North	Building Construction-1	Tractors/Loaders/Backhoes	Diesel	2	8	84	0.37	379	188,469
North	Building Construction-1	Aerial Lifts	Diesel	2	8	46	0.31	379	86,473
North	Building Construction-1	Concrete/Industrial Saws	Diesel	2	8	33	0.73	379	146,082
North	Building Construction-1	Off-Highway Trucks	Diesel	2	8	376	0.38	379	866,424
North	Building Construction-1	Pumps	Diesel	2	8	11	0.74	379	49,361
North	Building Construction-1	Rollers	Diesel	2	8	36	0.38	379	82,956
North	Building Construction-1	Rough Terrain Forklifts	Diesel	2	8	96	0.4	379	232,858
North	Building Construction-1	Signal Boards	Diesel	2	8	6	0.82	379	29,835
North	Foundations	Welders	Diesel	1	10	46	0.45	2	414
North	Foundations	Bore/Drill Rigs	Diesel	1	10	83	0.5	2	830
North	Foundations	Concrete/Industrial Saws	Diesel	1	10	33	0.73	2	482
North	Foundations	Plate Compactors	Diesel	1	10	8	0.43	2	69
North	Foundations	Off-Highway Trucks	Diesel	1	10	376	0.38	2	2,858
North	Foundations	Pumps	Diesel	1	22	11	0.74	2	358
North	Foundations	Rough Terrain Forklifts	Diesel	2	10	96	0.4	2	1,536
North	Foundations	Signal Boards	Diesel	1	10	6	0.82	2	98
North	Foundations	Skid Steer Loaders	Diesel	1	10	71	0.37	2	525
North	Building Construction-2	Forklifts	Diesel	2	8	82	0.2	950	249,280
North	Building Construction-2	Tractors/Loaders/Backhoes	Diesel	3	8	84	0.37	950	708,624
North	Building Construction-2	Aerial Lifts	Diesel	2	8	46	0.31	950	216,752
North	Building Construction-2	Concrete/Industrial Saws	Diesel	5	8	33	0.73	950	915,420
North	Building Construction-2	Graders	Diesel	2	8	148	0.41	950	922,336
North	Building Construction-2	Off-Highway Trucks	Diesel	1	8	376	0.38	950	1,085,888
North	Building Construction-2	Pumps	Diesel	2	8	11	0.74	950	123,728
North	Building Construction-2	Signal Boards	Diesel	2	8	6	0.82	950	74,784
North	Paving	Cement and Mortar Mixers	Diesel	1	8	10	0.56	78	3,494
North	Paving	Pavers	Diesel	1	8	81	0.42	78	21,228
North	Paving	Paving Equipment	Diesel	2	8	89	0.36	78	39,986
North	Paving	Concrete/Industrial Saws	Diesel	1	8	33	0.73	78	15,032
North	Paving	Off-Highway Trucks	Diesel	1	8	376	0.38	78	89,157
North	Paving	Pumps	Diesel	1	8	11	0.74	78	5,079
North	Paving	Rough Terrain Forklifts	Diesel	1	8	96	0.4	78	23,962
North	Paving	Signal Boards	Diesel	1	8	6	0.82	78	3,070
North	Architectural Coating-1	Air Compressors	Diesel	1	8	37	0.48	340	48,307
North	Architectural Coating-2	Air Compressors	Diesel	1	8	37	0.48	340	48,307
West	Demolition	Concrete/Industrial Saws	Diesel	1	8	33	0.73	52	10,021
West	Demolition	Air Compressors	Diesel	1	8	37	0.48	52	7,388
West	Demolition	Forklifts	Diesel	1	8	82	0.2	52	6,822
West	Demolition	Off-Highway Trucks	Diesel	1	8	376	0.38	52	59,438
West	Demolition	Rough Terrain Forklifts	Diesel	1	8	96	0.4	52	15,974
West	Demolition	Rubber Tired Loaders	Diesel	1	8	150	0.36	52	22,464
West	Demolition	Signal Boards	Diesel	1	8	6	0.82	52	2,047
West	Demolition	Skid Steer Loaders	Diesel	1	8	71	0.37	52	10,928
West	Demolition	Sweepers/Scrubbers	Diesel	1	8	36	0.46	52	6,889
West	Site Preparation	Graders	Diesel	1	8	148	0.41	52	25,243
West	Site Preparation	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	52	12,929
West	Grading	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	105	26,107
West	Grading	Excavators	Diesel	1	8	36	0.38	105	11,491
West	Grading	Off-Highway Trucks	Diesel	1	8	376	0.38	105	120,019
West	Grading	Rough Terrain Forklifts	Diesel	1	8	96	0.4	105	32,256
West	Grading	Rubber Tired Loaders	Diesel	1	8	150	0.36	105	45,360
West	Grading	Signal Boards	Diesel	1	8	6	0.82	105	4,133
West	Grading	Sweepers/Scrubbers	Diesel	1	8	36	0.46	105	13,910
West	Building Construction	Forklifts	Diesel	1	8	82	0.2	599	78,589
West	Building Construction	Aerial Lifts	Diesel	2	8	46	0.31	599	136,668
West	Building Construction	Concrete/Industrial Saws	Diesel	1	8	33	0.73	599	115,439
West	Building Construction	Off-Highway Trucks	Diesel	1	8	376	0.38	599	684,681
West	Building Construction	Pumps	Diesel	1	8	11	0.74	599	39,007
West	Building Construction	Rollers	Diesel	2	8	36	0.38	599	131,109
West	Building Construction	Rough Terrain Forklifts	Diesel	1	8	96	0.4	599	184,013
West	Building Construction	Signal Boards	Diesel	2	8	6	0.82	599	47,153
West	Building Construction	Welders	Diesel	2	8	46	0.45	599	198,389
West	Foundations	Forklifts	Diesel	1	10	82	0.2	1	164
West	Foundations	Tractors/Loaders/Backhoes	Diesel	3	10	84	0.37	1	932
West	Foundations	Bore/Drill Rigs	Diesel	1	10	83	0.5	1	415
West	Foundations	Concrete/Industrial Saws	Diesel	3	10	33	0.73	1	723
West	Foundations	Plate Compactors	Diesel	3	10	8	0.43	1	103
West	Foundations	Off-Highway Trucks	Diesel	2	10	376	0.38	1	2,858
West	Foundations	Pumps	Diesel	3	22	11	0.74	1	537
West	Foundations	Rollers	Diesel	3	10	36	0.38	1	410
West	Foundations	Rough Terrain Forklifts	Diesel	3	10	96	0.4	1	1,152
West	Foundations	Graders	Diesel	3	10	148	0.41	1	1,820
West	Foundations	Signal Boards	Diesel	3	10	6	0.82	1	148
West	Foundations	Cranes	Diesel	2	10	367	0.29	1	2,129
West	Paving	Cement and Mortar Mixers	Diesel	1	8	10	0.56	79	3,539
West	Paving	Pavers	Diesel	1	8	81	0.42	79	21,501
West	Paving	Concrete/Industrial Saws	Diesel	1	8	33	0.73	79	15,225
West	Paving	Graders	Diesel	1	8	148	0.41	79	38,350
West	Paving	Off-Highway Trucks	Diesel	1	8	376	0.38	79	90,300
West	Paving	Paving Equipment	Diesel	2	8	89	0.36	79	40,499
West	Paving	Pumps	Diesel	1	8	11	0.74	79	5,144
West	Paving	Rough Terrain Forklifts	Diesel	1	8	96	0.4	79	24,269
West	Paving	Signal Boards	Diesel	1	8	6	0.82	79	3,109
West	Architectural Coating	Air Compressors	Diesel	1	8	37	0.48	234	33,247

Total - >100 hp 15,145,561  
Total - <100 hp 16,065,185

Fourth & Central  
 Construction Energy Analysis  
 Off-Road Equipment - Electric

Construction Year	Project Area	Construction Phase	Equipment	Fuel Type	Number	Hours/Day	HP	Load	Days	Electric Conversion (kW/HP)	Electric Demand (kWh)
2027	Lower South	Parking Garage Construction	Cranes	Electric	1	8	367	0.29	45	0.745701	28,571
2027	Lower South	Building Construction-6	Cranes	Electric	2	8	367	0.29	179	0.745701	227,301
2028	Lower South	Building Construction-6	Cranes	Electric	2	8	367	0.29	313	0.745701	397,460
2029	Lower South	Building Construction-6	Cranes	Electric	2	8	367	0.29	158	0.745701	200,635
2027	Lower South	Building Construction-7	Cranes	Electric	1	8	367	0.29	179	0.745701	113,651
2028	Lower South	Building Construction-7	Cranes	Electric	1	8	367	0.29	313	0.745701	198,730
2029	Lower South	Building Construction-7	Cranes	Electric	1	8	367	0.29	158	0.745701	100,317
2027	Lower South	Building Construction-8	Cranes	Electric	1	8	367	0.29	179	0.745701	113,651
2028	Lower South	Building Construction-8	Cranes	Electric	1	8	367	0.29	313	0.745701	198,730
2029	Lower South	Building Construction-8	Cranes	Electric	1	8	367	0.29	52	0.745701	33,016
2027	Lower South	Building Construction-9	Cranes	Electric	2	8	367	0.29	179	0.745701	227,301
2028	Lower South	Building Construction-9	Cranes	Electric	2	8	367	0.29	313	0.745701	397,460
2029	Lower South	Building Construction-9	Cranes	Electric	2	8	367	0.29	185	0.745701	234,920
2027	Upper South	Parking Garage Construction	Cranes	Electric	2	8	367	0.29	28	0.745701	35,556
2027	Upper South	Building Construction-3	Cranes	Electric	1	8	367	0.29	285	0.745701	180,952
2028	Upper South	Building Construction-3	Cranes	Electric	1	8	367	0.29	93	0.745701	59,048
2027	Upper South	Building Construction-4	Cranes	Electric	1	8	367	0.29	285	0.745701	180,952
2028	Upper South	Building Construction-4	Cranes	Electric	1	8	367	0.29	280	0.745701	177,778
2027	Upper South	Building Construction-5	Cranes	Electric	2	8	367	0.29	285	0.745701	361,904
2028	Upper South	Building Construction-5	Cranes	Electric	2	8	367	0.29	313	0.745701	397,460
2029	Upper South	Building Construction-5	Cranes	Electric	2	8	367	0.29	105	0.745701	133,333
2026	North	Building Construction-1	Cranes	Electric	1	8	367	0.29	112	0.745701	71,111
2027	North	Building Construction-1	Cranes	Electric	1	8	367	0.29	267	0.745701	169,524
2026	North	Foundations	Cranes	Electric	2	10	367	0.29	2	0.745701	3,175
2026	North	Building Construction-2	Cranes	Electric	1	8	367	0.29	112	0.745701	71,111
2027	North	Building Construction-2	Cranes	Electric	1	8	367	0.29	313	0.745701	198,730
2028	North	Building Construction-2	Cranes	Electric	1	8	367	0.29	313	0.745701	198,730
2029	North	Building Construction-2	Cranes	Electric	1	8	367	0.29	212	0.745701	134,603
2025	West	Building Construction	Cranes	Electric	1	8	367	0.29	71	0.745701	45,079
2026	West	Building Construction	Cranes	Electric	1	8	367	0.29	313	0.745701	198,730
2027	West	Building Construction	Cranes	Electric	1	8	367	0.29	215	0.745701	136,508
										<b>Total Electricity</b>	<b>5,226,024</b>
										<b>Average per Year</b>	<b>1,045,205</b>

# **Operational Energy Worksheets**

**Fourth and Central  
Existing Energy Demand**

Electricity	kWh/yr	MWh/yr
4th Street	3,684,407	3,684.4
Central/Astro	2,767,702	2,767.7
Main Office	30,305	30.3
<b>Total Building Energy</b>	<b>6,482,414</b>	<b>6,482.4</b>
<b>Total</b>	<b>6,482,414</b>	<b>6,482.4</b>
<b>Total (including water, see below)</b>	<b>6,542,773</b>	<b>6,542.773</b>

Electricity	MWh/yr
LADWP 2025-2026 Total Energy Sales	23,537,000
Existing Annual	6,543

Source: Los Angeles Department of Water and Power, 2017 Long-Term Resource Plan, Appendix A, 2017.

Water	mgal	MWh
Existing Site Total	4.6	60
<b>Total</b>	<b>4.6</b>	<b>60</b>

Electricity Intensity Factors	kWh/Mgal
Electricity Factor - Supply	9,727
Electricity Factor - Treat	111
Electricity Factor - Distribute	1,272
Electricity Factor - Wastewater Treatment	1,911

Electricity from Water Demand	kWh/yr	MWh/yr
<b>Total</b>	<b>60,359</b>	<b>60.359</b>

Source: California Air Resources Board, CalEEMod, Version 2020.4.0.

Water Demand based on Project Water supply Assessment

Sewage Facilities Charge, Sewage Generation Factor for Residential and Commercial Categories, 2012.

Natural Gas	kBtu/yr	cubic foot (cf)
Refrigerated Warehouse - No Rail	7,593,622	7,336,832
Parking Lot	0	-
Mobile Sources	0	-
<b>Total</b>	<b>7,593,622</b>	<b>7,336,832</b>

Source: California Air Resources Board, CalEEMod, Version 2020.4.0.

Conversion factor of 1,035 Btu per cubic foot based on United States Energy Information Administration data

(see: USEIA, Natural Gas, Heat Content of Natural Gas Consumed, February 28, 2018,

[https://www.eia.gov/dnav/ng/ng\\_cons\\_heat\\_a\\_EPGO\\_VGTH\\_btucf\\_a.htm](https://www.eia.gov/dnav/ng/ng_cons_heat_a_EPGO_VGTH_btucf_a.htm). Accessed March 2020.)

Natural Gas	million cubic foot (cf)
SoCalGas 2025	854,830
Existing Annual	7.337

Source: California Gas and Electric Utilities, 2020 California Gas Report, p. 145, 2020.

**Fourth and Central  
Existing Energy Demand  
Fuel Usage from VMT**

	14,448 Daily VMT
Annual VMT (Traffic Study) <sup>4</sup> :	3,779,447 miles/year
Light Duty VMT:	519,792 miles/year
LHDT1 VMT:	73,840 miles/year
LHDT2 VMT:	140,296 miles/year
MHDT VMT:	1,160,735 miles/year
HHDT VMT:	1,884,783 miles/year

Fuel Type: <sup>1</sup>	Gasoline	Diesel	Electricity	Plug-in Hybrid
Light Duty Percent:	94.9%	1.5%	2.0%	1.6%
LHDT1 Percent:	64.3%	31.9%	3.8%	0.0%
LHDT2 Percent:	38.1%	58.1%	3.9%	0.0%
MHDT Percent:	23.1%	73.7%	3.2%	0.0%
HHDT Percent:	0.0%	98.4%	1.6%	0.0%
Light Duty MPG:	24.67	20.21	0.00	51.84
LHDT1 MPG:	13.28	20.39	0.00	0.00
LHDT2 MPG:	11.64	17.17	0.00	0.00
MHDT MPG:	5.13	8.94	0.00	0.00
HHDT MPG:	3.97	6.11	0.00	0.00
Light Duty (LDA, LDT1, LDT2) VMT by Fuel Type:	493,415	7,591	10,621	8,165
LHDT1 VMT by Fuel Type:	47,505	23,534	2,801	-
LHDT2 VMT by Fuel Type:	53,392	81,459	5,445	-
MHDT VMT by Fuel Type:	268,139	855,470	37,126	-
HHDT VMT by Fuel Type:	863	1,854,158	29,763	-
Annual VMT by Fuel Type (miles):	863,314	2,822,211	85,756	8,165
Light Duty Fuel Use (gal):	20,003	376	-	157
LHDT1 Fuel Use (gal):	3,578	1,154	-	-
LHDT2 Fuel Use (gal):	4,586	4,744	-	-
MHDT Fuel Use (gal):	52,282	95,711	-	-
HHDT Fuel Use (gal):	217	303,706	-	-
<b>Total Fuel Use (gal):</b>	<b>80,666</b>	<b>405,691</b>	-	<b>157</b>

Los Angeles County Fuel Consumption <sup>3</sup>		
	Gasoline	Diesel
Los Angeles County:	3,559,000,000	563,300,000
Existing Annual:	80,824	405,691
Percent Net Project of Los Angeles County:	0.002%	0.072%

Notes:

- California Air Resources Board, EMFAC2021 (South Coast Air Basin; Annual; 2021', Aggregate Fleet).
- Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
- California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2018. Available at: [https://ww2.energy.ca.gov/almanac/transportation\\_data/gasoline/piira\\_retail\\_survey.html](https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html). Accessed March 2020. Diesel is adjusted to account for retail (48%) and non-retail (52%) diesel sales.
- Gibson Transportation Consulting, TA, 2022.

**4th and Central Project  
Existing Energy Demand  
Air Quality and Greenhouse Gas Assessment**

**Emergency Generator Emissions**

updated: 4/19/2022

**Conversion Factors**

HP/kW	1.3410	
PM10 Fraction of Total PM	0.960	Table A - Updated CEIDARS Table with PM2.5 Fractions, INTERNAL COMBUSTION - DISTILLATE AND DIESEL-ELECTRIC GENERATION
PM2.5 Fraction of Total PM	0.937	Table A - Updated CEIDARS Table with PM2.5 Fractions, INTERNAL COMBUSTION - DISTILLATE AND DIESEL-ELECTRIC GENERATION
CO2 g/gal	10.21	Climate Registry, Table 13.1: <a href="https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf">https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf</a>
CH4 g/gal	0.58	Climate Registry, Table 13.7: <a href="https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf">https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf</a>
N2O g/gal	0.26	Climate Registry, Table 13.7: <a href="https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf">https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf</a>
GWP CH4	25	IPCC AR4
GWP N2O	298	IPCC AR4
CO2e g/gal	10,302	
CO2 g/gal	10,210	
CO2/CO2e	0.9911	

**Emergency Generator -Existing 1**

Ratings:	<input type="text" value="450"/> kW	(based on existing site information)
	640 HP	(conversion from kW to hp)
Load Factor:	0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:	Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:	2 hours/day	(testing/maintenance)
	50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)

**Emergency Generator -Existing 2**

Ratings:	<input type="text" value="450"/> kW	(based on existing site information)
	640 HP	(conversion from kW to hp)
Load Factor:	0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:	Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:	2 hours/day	(testing/maintenance)
	50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)

**Emergency Generator -Existing 1**

Units	Greenhouse Gases <sup>1</sup>		Diesel Fuel Consumption
	CO <sub>2</sub>	CO <sub>2</sub> e	gallons
g/kW-hr	—	—	—
g/HP-hr	526.17	530.91	—
lbs/hr	549.38	554.33	—
<b>lbs/day</b>	1,098.75	1,108.65	—
lbs/yr	27,468.80	27,716.26	—
tons/yr	13.73	13.86	—
<b>metric tons/yr</b>	<b>12.46</b>	<b>12.57</b>	<b>1,234</b>

**Emergency Generator -Existing 2**

Units	Greenhouse Gases <sup>1</sup>		Diesel Fuel Consumption
	CO <sub>2</sub>	CO <sub>2</sub> e	gallons
g/kW-hr	—	—	—
g/HP-hr	526.17	530.91	—
lbs/hr	549.38	554.33	—
<b>lbs/day</b>	1,098.75	1,108.65	—
lbs/yr	27,468.80	27,716.26	—
tons/yr	13.73	13.86	—
<b>metric tons/yr</b>	<b>12.46</b>	<b>12.57</b>	<b>1,234</b>

**Total (gallons/year): 2,467**

Notes:

1. Emission factor for CO<sub>2</sub>: U.S. Environmental Protection Agency, AP-42 Compilation of Air Pollutant Emission Factors, Fifth Edition, Section 3.4, Table 3.4-1. Emissions of GHGs assume 99.11% of the CO<sub>2</sub>e emissions occur as CO<sub>2</sub>, which is typical for off-road diesel engines.

**Fourth and Central  
Project Operational Energy Demand**

Electricity	kWh/yr	Electrified NG kWh/yr	Electricity from Water (kWh/yr)	MWh/yr
Apartments High Rise	2,429,785	584,309	334,687	3,348.8
Apartments Mid Rise	686,250	165,028	0	851.3
Enclosed Parking with Elevator	4,071,959	0	1,657	4,073.6
General Office Building	6,696,351	2,256,722	0	8,953.1
Health Club	592,962	196,153	497,557	1,286.7
High Turnover (Sit Down Restaurant)	1,121,258	315,643	0	1,436.9
Hotel	870,189	536,752	19,698	1,426.6
Other Asphalt Surfaces	26,280	0	0	26.3
Other Non-Asphalt Surfaces	207,723	0	6,214	213.9
Parking Lot	11,601	0	0	11.6
Quality Restaurant	1,121,258	315,643	0	1,436.9
Regional Shopping Center	450,693	104,708	0	555.4
Condo/Townhouse	2,257,908	1,358,853	0	3,616.8
Cooling Tower	146,176			146.2
EV Charging	398,288			398.3
<b>Total Building Energy</b>	<b>20,690,393</b>	<b>5,833,812</b>	-	<b>26,524.206</b>
<b>Total</b>	<b>21,088,681</b>	<b>5,833,812</b>	<b>859,813</b>	<b>27,782.306</b>

Source: California Air Resources Board, CalEEMod, Version 2020.4.0.

Electricity	MWh/yr
LADWP 2030-31 Total Energy Sales	28,260,000
Project Annual	27,782
Existing Annual	6,542.8
Net Project Annual	21,239.5
Percent Net Project of LADWP	0.0752%

Source: Los Angeles Department of Water and Power, 2017 Long-Term Resource Plan, Appendix A, 2017.

Water	Mgal/yr	MWh/yr
Apartments High Rise	49	335
Apartments Mid Rise	0	-
Enclosed Parking with Elevator	0.2	1.7
General Office Building	0	-
Health Club	73	498
High Turnover (Sit Down Restaurant)	0	-
Hotel	3	20
Other Asphalt Surfaces	0	-
Other Non-Asphalt Surfaces	1	6
Parking Lot	0	-
Quality Restaurant	0	-
Regional Shopping Center	0	-
Condo/Townhouse	0	-
<b>Total</b>	<b>126</b>	<b>860</b>

Electricity Intensity Factors	kWh/Mgal
Electricity Factor - Supply	3,044
Electricity Factor - Treat	725
Electricity Factor - Distribute	1,537
Electricity Factor - Wastewater Treatment	1,501

Electricity from Water Demand	kWh/yr	MWh/yr
<b>Total</b>	<b>859,813</b>	<b>859.81</b>

Source: California Air Resources Board, CalEEMod User's Guide Appendix G, Table G-32

Water Demand based on Project Water supply Assessment

Sewage Facilities Charge, Sewage Generation Factor for Residential and Commercial Categories, 2012.

Natural Gas	kBtu/yr	cubic foot (cf)	Electrification (kWh/yr)
Apartments High Rise	7,344,766	7,096,392	584,309
Apartments Mid Rise	2,074,400	2,004,251	165,028
Enclosed Parking with Elevator	0	-	-
General Office Building	8,446,497	8,160,867	2,256,722
Health Club	2,163,194	2,090,043	196,153
High Turnover (Sit Down Restaurant)	3,261,162	3,150,881	315,643
Hotel	1,803,306	1,742,325	536,752
Other Asphalt Surfaces	0	-	-
Other Non-Asphalt Surfaces	0	-	-
Parking Lot	0	-	-
Quality Restaurant	3,261,162	3,150,881	315,643
Regional Shopping Center	222,896	215,358	104,708
Condo/Townhouse	14,321,183	13,836,892	1,358,853
Mobile Sources	2,929,058	2,830,007	
<b>Total</b>	<b>45,827,624</b>	<b>44,277,897</b>	<b>5,833,812</b>

Source: California Air Resources Board, CalEEMod, Version 2020.4.0.

Conversion factor of 1,035 Btu per cubic foot based on United States Energy Information Administration data

(see: USEIA, Natural Gas, Heat Content of Natural Gas Consumed, February 28, 2018,

[https://www.eia.gov/dnav/ng/ng\\_cons\\_heat\\_a\\_EPG0\\_VGTH\\_btucf\\_a.htm](https://www.eia.gov/dnav/ng/ng_cons_heat_a_EPG0_VGTH_btucf_a.htm). Accessed March 2020.)

Natural gas to electricity conversion uses an efficiency factor derived from EIA's Commercial Building Energy Consumption Survey, <https://www.eia.gov/consumption/commercial/data/2018/>

Natural Gas	million cubic foot (cf)
SoCalGas 2030	820,520
Project Annual	2.83
Existing Annual	7.3
Net Project Ar	(4.5)
Percent Net P	-0.00055%

Source: California Gas and Electric Utilities, 2020 California Gas Report, p. 145, 2020.



**Fourth and Central  
Project Operational Energy Demand**

**Estimated Electricity demand from Electric Vehicle Supply Equipment (EVSE)**

ASSSUME 10% of EV Charging

Land Use Type	Number of Parking Spaes	Average Charge (kWh/day) <sup>a</sup>	Days/Year	Electricity Demand (kWh/yr)	Electricity Demand (MWh/yr)
<b>Total</b>	<b>248</b>	<b>4.4</b>	<b>365</b>	398,288	398.29

Notes:

- a. Estimated based on reference sources listed below.
- b. Project would install EV charging spaces for 10 percent of its parking capacity for immediate use
- c. Project would install pre-wiring for EV charging spaces for 30 percent of its parking capacity for future use (so 20% in addition to the immediate use).

Sources:

US Department of Energy. Alternative Fuels Data Center, 2016. Hybrid and Plug-In Electric Vehicle Emissions Data Sources and Assumptions.

Available at: [https://www.afdc.energy.gov/vehicles/electric\\_emissions\\_sources.html](https://www.afdc.energy.gov/vehicles/electric_emissions_sources.html).

US Department of Energy. Smith, Margaret, 2016. Level 1 Electric Vehicle Charging Stations at the Workplace.

Available at: [https://www.afdc.energy.gov/uploads/publication/WPCC\\_L1ChargingAtTheWorkplace\\_0716.pdf](https://www.afdc.energy.gov/uploads/publication/WPCC_L1ChargingAtTheWorkplace_0716.pdf).

UCLA Luskin Center for Innovation. Williams, Brett and JR deShazo, 2013. Pricing Workplace Charging: Financial Viability and Fueling Costs.

Available at: <http://luskin.ucla.edu/sites/default/files/Luskin-WPC-TRB-13-11-15d.pdf>.

**Fourth and Central  
Project Operational Energy Demand  
Fuel Usage from VMT**

Annual VMT (Traffic Study)<sup>4</sup>: 32,738,310 miles/year

Fuel Type: <sup>1</sup>	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid
Percent:	86.1%	5.3%	5.8%	0.3%	2.5%
Miles per Gallon Fuel:	26.4	9.2	-	4.6	62.0
Annual VMT by Fuel Type (miles):	28,184,752	1,736,709	1,892,975	94,181	829,694
Annual Fuel Usage (gallons):	1,065,758	189,305	-	2,929,058	13,376
Annual Fuel Savings from Electric Vehicles: <sup>2</sup>	-	-	71,580		

	Los Angeles County Fuel Consumption <sup>3</sup>	
	Gasoline	Diesel
Los Angeles County:	3,559,000,000	563,300,000
Project Annual Mobile:	1,079,134	189,305
Project Annual Emergency Generator:	-	28,440
<b>Project Annual Total:</b>	<b>1,079,134</b>	<b>217,745</b>
Existing Annual Mobile:	80,824	405,691
Existing Annual Emergency Generator:	-	2,467
<b>Existing Annual Total:</b>	<b>80,824</b>	<b>408,159</b>
<b>Net Annual:</b>	<b>998,310</b>	<b>(190,414)</b>
Percent Net Project of Los Angeles County:	0.028%	-0.034%

Notes:

1. California Air Resources Board, EMFAC2021 (South Coast Air Basin; Annual; 2030', Aggregate Fleet).
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
3. California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2018. Available at: [https://ww2.energy.ca.gov/almanac/transportation\\_data/gasoline/piira\\_retail\\_survey.html](https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html). Accessed March 2020. Diesel is adjusted to account for retail (48%) and non-retail (52%) diesel sales.
4. Gibson Transportation Consulting, TA, 2022.

**4th and Central Project  
Project Operational Energy Demand  
Air Quality and Greenhouse Gas Assessment**


**Emergency Generator Emissions**

updated: 4/19/2022


**Conversion Factors**

HP/kW	1.3410	
PM10 Fraction of Total PM	0.960	Table A - Updated CEIDARS Table with PM2.5 Fractions, INTERNAL COMBUSTION - DISTILLATE AND DIESEL-ELECTRIC GENERATION
PM2.5 Fraction of Total PM	0.937	Table A - Updated CEIDARS Table with PM2.5 Fractions, INTERNAL COMBUSTION - DISTILLATE AND DIESEL-ELECTRIC GENERATION
CO2 g/gal	10.21	Climate Registry, Table 13.1: <a href="https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf">https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf</a>
CH4 g/gal	0.58	Climate Registry, Table 13.7: <a href="https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf">https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf</a>
N2O g/gal	0.26	Climate Registry, Table 13.7: <a href="https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf">https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf</a>
GWP CH4	25	IPCC AR4
GWP N2O	298	IPCC AR4
CO2e g/gal	10,302	
CO2 g/gal	10,210	
CO2/CO2e	0.9911	


**Emergency Generator - Building 2**

Ratings:		2,500 kW	(based on engineering assumptions)
		3,353 HP	(based on engineering assumptions; conversion from kW to hp)
		kW	(based on engineering assumptions)
		- HP	(conversion from kW to hp)
Load Factor:		0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:		Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:		2 hours/day	(testing/maintenance)
		50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)


**Emergency Generator - Building 3-5**

Ratings:		1,500 kW	(based on engineering assumptions)
		2,012 HP	(based on engineering assumptions; conversion from kW to hp)
		kW	(based on engineering assumptions)
		- HP	(conversion from kW to hp)
Load Factor:		0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:		Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:		2 hours/day	(testing/maintenance)
		50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)


**Emergency Generator - Building 3-5**

Ratings:		1,500 kW	(based on engineering assumptions)
		2,012 HP	(based on engineering assumptions; conversion from kW to hp)
		kW	(based on engineering assumptions)
		- HP	(conversion from kW to hp)
Load Factor:		0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:		Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:		2 hours/day	(testing/maintenance)
		50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)

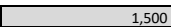
**Emergency Generator - Building 6-9**

Ratings:		2,000 kW	(based on engineering assumptions)
		2,682 HP	(based on engineering assumptions; conversion from kW to hp)
		kW	(based on engineering assumptions)
		- HP	(conversion from kW to hp)
Load Factor:		0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:		Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:		2 hours/day	(testing/maintenance)
		50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)

**Emergency Generator - Building 6-9**

Ratings:		2,000 kW	(based on engineering assumptions)
		2,682 HP	(based on engineering assumptions; conversion from kW to hp)
		kW	(based on engineering assumptions)
		- HP	(conversion from kW to hp)
Load Factor:		0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:		Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:		2 hours/day	(testing/maintenance)
		50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)

**Emergency Generator - Building 10**

Ratings:		1,500 kW	(based on engineering assumptions)
		2,012 HP	(based on engineering assumptions; conversion from kW to hp)
		kW	(based on engineering assumptions)
		- HP	(conversion from kW to hp)
Load Factor:		0.74	(based on CalEEMod Generator Set Load Factor)
Engine Emissions Tier:		Rule 1470 Compliant	(compliance with CARB and AQMD diesel regulations)
Operating Hours per Unit:		2 hours/day	(testing/maintenance)
		50 hours/year	(testing/maintenance, Regulatory Limit per SCAQMD Rule 1470)

Emergency Generator - Building 2

Units	Greenhouse Gases <sup>1</sup>	
	CO <sub>2</sub>	CO <sub>2</sub> e
g/kW-hr	—	—
g/HP-hr	526.17	530.91
lbs/hr	2878.22	2,904.14
<b>lbs/day</b>	5,756.43	5,808.29
lbs/yr	143,910.76	145,207.23
tons/yr	71.96	72.60
<b>metric tons/yr</b>	<b>65.28</b>	<b>65.86</b>

Emergency Generator - Building 3-5

Units	Greenhouse Gases <sup>1</sup>	
	CO <sub>2</sub>	CO <sub>2</sub> e
g/kW-hr	—	—
g/HP-hr	526.17	530.91
lbs/hr	1727.10	1,742.66
<b>lbs/day</b>	3,454.20	3,485.32
lbs/yr	86,355.04	87,133.00
tons/yr	43.18	43.57
<b>metric tons/yr</b>	<b>39.17</b>	<b>39.52</b>

Emergency Generator - Building 3-5

Units	Greenhouse Gases <sup>1</sup>	
	CO <sub>2</sub>	CO <sub>2</sub> e
g/kW-hr	—	—
g/HP-hr	526.17	530.91
lbs/hr	1727.10	1,742.66
<b>lbs/day</b>	3,454.20	3,485.32
lbs/yr	86,355.04	87,133.00
tons/yr	43.18	43.57
<b>metric tons/yr</b>	<b>39.17</b>	<b>39.52</b>

Emergency Generator - Building 6-9

Units	Greenhouse Gases <sup>1</sup>	
	CO <sub>2</sub>	CO <sub>2</sub> e
g/kW-hr	—	—
g/HP-hr	526.17	530.91
lbs/hr	2302.23	2,322.97
<b>lbs/day</b>	4,604.46	4,645.94
lbs/yr	115,111.44	116,148.46
tons/yr	57.56	58.07
<b>metric tons/yr</b>	<b>52.21</b>	<b>52.68</b>

Emergency Generator - Building 6-9

Units	Greenhouse Gases <sup>1</sup>	
	CO <sub>2</sub>	CO <sub>2</sub> e
g/kW-hr	—	—
g/HP-hr	526.17	530.91
lbs/hr	2302.23	2,322.97
<b>lbs/day</b>	4,604.46	4,645.94
lbs/yr	115,111.44	116,148.46
tons/yr	57.56	58.07
<b>metric tons/yr</b>	<b>52.21</b>	<b>52.68</b>

Emergency Generator - Building 10

Units	Greenhouse Gases <sup>1</sup>	
	CO <sub>2</sub>	CO <sub>2</sub> e
g/kW-hr	—	—
g/HP-hr	526.17	530.91
lbs/hr	1727.10	1,742.66
<b>lbs/day</b>	3,454.20	3,485.32
lbs/yr	86,355.04	87,133.00
tons/yr	43.18	43.57
<b>metric tons/yr</b>	<b>39.17</b>	<b>39.52</b>

Total Emergency Generator Emissions

Units	Greenhouse Gases <sup>1</sup>		Diesel Fuel Consumption
	CO <sub>2</sub>	CO <sub>2</sub> e	gallons
lbs/hr	12663.98	12778.06	
<b>lbs/day</b>	<b>25327.95</b>	<b>25556.13</b>	
lbs/yr	633198.76	638903.13	
tons/yr	316.60	319.45	
<b>metric tons/yr</b>	<b>287.21</b>	<b>289.80</b>	<b>28,440</b>

Notes:

1. Emission factor for CO<sub>2</sub>: U.S. Environmental Protection Agency, AP-42 Compilation of Air Pollutant Emission Factors, Fifth Edition, Section 3.4, Table 3.4-1. Emissions of GHGs assume 99.11% of the CO<sub>2</sub>e emissions occur as CO<sub>2</sub>, which is typical for off-road diesel engines.

**4th and Central  
Cooling Towers  
Greenhouse Gas Analysis**

Cooling Towers Daily Emissions

58,834 gal/day  
21,474,410 gal/year  
21.4744 mgal/year

CalEEMod Water Electricity Factors	Electricity Intensity Factor To Supply (kWh/Mgal)	Electricity Intensity Factor To Treat (kWh/Mgal)	Electricity Intensity Factor To Distribute (kWh/Mgal)	Electricity Intensity Factor For Wastewater Treatment (kWh/Mgal)
	3044	725	1537	1501

Source	Electricity Demand from Water Demand (million kWh)	GHG Emissions (lbs/yr)				MTCO2e (MT/yr)	Year
		CO2	CH4	N2O	CO2e		
Cooling Tower	0.1462	54,952	7.15	1.01	55,431	25.14	2030
	0.1462	51,288	7.15	1.01	51,767	23.5	2031
	0.1462	47,625	7.15	1.01	48,104	21.8	2032
	0.1462	43,961	7.15	1.01	44,440	20.2	2033
	0.1462	40,298	7.15	1.01	40,777	18.5	2034
	0.1462	36,634	7.15	1.01	37,114	16.8	2035
	0.1462	32,971	7.15	1.01	33,450	15.2	2036
	0.1462	29,307	7.15	1.01	29,787	13.5	2037
	0.1462	25,644	7.15	1.01	26,123	11.8	2038
	0.1462	21,981	7.15	1.01	22,460	10.2	2039
	0.1462	18,317	7.15	1.01	18,796	8.5	2040
	0.1462	14,654	7.15	1.01	15,133	6.9	2041
	0.1462	10,990	7.15	1.01	11,470	5.2	2042
	0.1462	7,327	7.15	1.01	7,806	3.5	2043
	0.1462	3,663	7.15	1.01	4,143	1.9	2044
	0.1462	-	-	-	-	-	2045
	0.1462	-	-	-	-	-	2046
	0.1462	-	-	-	-	-	2047
	0.1462	-	-	-	-	-	2048
	0.1462	-	-	-	-	-	2049
	0.1462	-	-	-	-	-	2050
	0.1462	-	-	-	-	-	2051
	0.1462	-	-	-	-	-	2052
	0.1462	-	-	-	-	-	2053
	0.1462	-	-	-	-	-	2054
	0.1462	-	-	-	-	-	2055
0.1462	-	-	-	-	-	2056	
0.1462	-	-	-	-	-	2057	
0.1462	-	-	-	-	-	2058	
0.1462	-	-	-	-	-	2059	
0.1462	-	-	-	-	-	2060	