

Appendix E

Energy Calculations

**5700 Hannum
Construction Energy Analysis**

Annual Fuel Summary

Heavy-Duty Construction Equipment	
84,718	Total Project Consumption
33,980	Annual Consumption
Haul Trucks	
47,017	Total Project Consumption
18,858	Annual Consumption
Vendor Trucks	
33,531	Total Project Consumption
13,449	Annual Consumption
Workers	
74,674	Total Project Consumption
29,952	Annual Consumption
80,548	Project Consumption of diesel for Haul Trucks and Vendors
32,308	Annual Consumption
165,266	Total Gallons Diesel
74,674	Total Gallons Gasoline

2.49 Estimated Project Construction Duration (years)

66,288 Annual Average Gallons Diesel
29,952 Annual Average Gallons Gasoline

Los Angeles County			Percent of Annual Project Compared to Los Angeles County	
Source	Fuel Type	Gallons		
Workers	Gasoline	3,070,000,000		0.0010%
Off-Road/Vendor/Haul Trucks	Diesel	463,800,000		0.0143%

Notes:

1 Gasoline and diesel amounts from CEC, 2023. 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 40,936 kWh/year
 Water Conveyance for Dust Control 2,831 kWh/year
Total 43,767 kWh/year

84,218,000,000 | Total SCE, 2022
 0.00000005% Project percentage of SCE

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Electricity Use from Water Conveyance for Dust Control

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	2.23	50	0.335	2.3	0.9
Lower South	Grading	2.23	105	0.702	4.8	1.9
Total				1.037	7.1	2.8

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

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).

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Construction Energy Analysis

Temporary Construction Trailer - Electricity

Land Use	Square Feet	Energy Use per year (kWh)	Total Energy Use (kWh)	Energy Use per SF
General Office	2,000	40,936	102,060.12	20.5

Note: Energy use per sf is derived from CalEEMod User Guide, Appendix G, Table G-28 for the Statewide average for General Office Building land use

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 Construction Energy Analysis
 Off-Road Equipment

Equipment ≤ 100 hp
 pounds diesel fuel/hp-hr (lb/hp-hr):² 0.408 lb/hp-hr
 diesel density (lb/gal):¹ 7.11 lb/gal
 diesel gallons/hp-hr: 0.0574 gal/hp-hr
 Total hp-hr: 855,103 hp-hr
 Total diesel gallons: 49,077 gal

Equipment > 100 hp
 pounds diesel fuel/hp-hr (lb/hp-hr):¹ 0.367 lb/hp-hr
 diesel density (lb/gal):¹ 7.11 lb/gal
 diesel gallons/hp-hr: 0.0516 gal/hp-hr
 Total hp-hr: 690,384 hp-hr
 Total diesel gallons: 35,641 gal

Total diesel gallons (off-road equipment): 84,718 gal

[1. OFFROAD2017 Emission Factor Documentation](#)

Construction Phase	Equipment	Fuel Type	Number	Hours/Day	HP	Load	Days	Total hp-hr
Demolition	Concrete/Industrial Saws	Diesel	2	8	33	0.73	50	19,272
Demolition	Excavators	Diesel	1	8	36	0.38	50	5,472
Demolition	Generator Sets	Diesel	2	8	14	0.74	50	8,288
Demolition	Rough Terrain Forklifts	Diesel	1	8	96	0.4	50	15,360
Demolition	Rubber Tired Loaders	Diesel	1	8	150	0.36	50	21,600
Demolition	Signal Boards	Diesel	1	8	6	0.82	50	1,968
Demolition	Skid Steer Loaders	Diesel	1	8	71	0.37	50	10,508
Grading	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	105	26,107
Grading	Bore/Drill Rigs	Diesel	2	8	83	0.5	105	69,720
Grading	Cranes	Diesel	1	8	367	0.29	105	89,401
Grading	Excavators	Diesel	2	8	36	0.38	105	22,982
Grading	Generator Sets	Diesel	1	8	14	0.74	105	8,702
Grading	Rough Terrain Forklifts	Diesel	1	8	96	0.4	105	32,256
Grading	Rubber Tired Loaders	Diesel	1	8	150	0.36	105	45,360
Grading	Signal Boards	Diesel	1	8	6	0.82	105	4,133
Grading	Sweepers/Scrubbers	Diesel	1	8	36	0.46	105	13,910
Building Construction	Cranes	Diesel	1	8	367	0.29	131	111,539
Building Construction	Forklifts	Diesel	2	8	82	0.2	131	34,374
Building Construction	Generator Sets	Diesel	2	8	14	0.74	131	21,715
Building Construction	Aerial Lifts	Diesel	5	8	46	0.31	131	74,722
Building Construction	Air Compressors	Diesel	2	8	37	0.48	131	37,225
Building Construction	Concrete/Industrial Saws	Diesel	1	8	33	0.73	131	25,246
Building Construction	Rough Terrain Forklifts	Diesel	2	8	96	0.4	131	80,486
Foundations	Cranes	Diesel	1	8	367	0.29	182	154,962
Foundations	Tractors/Loaders/Backhoes	Diesel	1	8	84	0.37	182	45,252
Foundations	Graders	Diesel	1	8	148	0.41	182	88,350
Foundations	Pumps	Diesel	2	8	11	0.74	182	23,704
Foundations	Rough Terrain Forklifts	Diesel	2	8	96	0.4	182	111,821
Foundations	Rubber Tired Loaders	Diesel	1	8	150	0.36	182	78,624
Foundations	Signal Boards	Diesel	1	8	6	0.82	182	7,164
Foundations	Skid Steer Loaders	Diesel	1	8	71	0.37	182	38,249
Paving	Pavers	Diesel	1	8	81	0.42	105	28,577
Paving	Paving Equipment	Diesel	1	8	89	0.36	105	26,914
Paving	Signal Boards	Diesel	1	8	6	0.82	105	4,133
Paving	Surfacing Equipment	Diesel	1	8	399	0.3	105	100,548
Architectural Coating	Air Compressors	Diesel	1	8	37	0.48	208	29,553
Architectural Coating	Forklifts	Diesel	1	8	82	0.2	208	27,290
Total - >100 hp								690,384
Total - <100 hp								855,103

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Project Operational Energy Demand

Electricity	kWh/yr	Electrified NG kWh/yr	Electricity from Water (kWh/yr)	MWh/yr
Condo/Townhouse High Rise	1,014,600	243,989	90,003	1,348.6
General Office Building	82,336	27,748	0	110.1
Health Club	59,425	19,658	0	79.1
Regional Shopping Center	55,757	0	696	56.5
Other Non-Asphalt Surfaces	42,066	0	0	42.1
Enclosed Parking with Elevator	612,198	0	0	612.2
EV Charging	70,664			70.7
Total Building Energy	1,866,382	291,394	-	2,157.776
Total	1,937,046	291,394	90,699	2,319.139

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

Electricity	MWh/yr
SCE, 2027 Projected Sales	101,171,000
Project Annual	2,319
Existing Annual	525.7
Net Project Annual	1,793.5
Percent Net Project of SCE	0.0018%

Source: CEC, 2021 Integrated Energy Policy Report, SCE Mid Demand Case. <https://www.cec.state.ca.us/energy-policy>

Water	Mgal/yr	MWh/yr
Condo/Townhouse High Rise	13	90
General Office Building	0	-
Health Club	0.0	-
Regional Shopping Center	0	1
Other Non-Asphalt Surfaces	0	-
Enclosed Parking with Elevator	0	-
Total	13	91

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
Total	90,699	90.70

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)
Condo/Townhouse High Rise	3,066,936	2,963,223	243,989
General Office Building	103,855	100,343	27,748
Health Club	216,789	209,458	19,658
Regional Shopping Center	27,575	26,643	-
Other Non-Asphalt Surfaces	0	-	-
Enclosed Parking with Elevator	0	-	-
Mobile Sources	380,216	367,358	-
Total	4,077,911	3,947,027	291,394

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. 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 2027	810,665
Project Annual	0.39
Existing Annual	0.67
Net Project Annual	(0.3)
Percent Net Project of SoCalGas	-0.00003%

Source: California Gas and Electric Utilities, 2022 California Gas

Report, p. 186, 2022.

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Project Operational Energy Demand
Fuel Usage from VMT

Annual VMT (Traffic Study)⁴: 3,833,960 miles/year

Fuel Type: ¹	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid
Percent:	88.1%	4.8%	4.5%	0.3%	2.3%
Miles per Gallon Fuel:	26.1	9.0	-	4.2	59.8
Annual VMT by Fuel Type (miles):	3,377,052	185,033	173,156	11,172	87,547
Annual Fuel Usage (gallons):	129,549	20,604	-	380,216	1,464

	Los Angeles County Fuel Consumption ³	
	Gasoline	Diesel
Los Angeles County:	3,070,000,000	463,800,000
Project Annual Mobile:	131,013	20,604
Project Annual Total:	131,013	20,604
Existing Annual Mobile:	27,420	3,722
Existing Annual Total:	27,420	3,722
Net Annual:	103,593	16,882
Percent Net Project of Los Angeles County:	0.003%	0.004%

Notes:

1. California Air Resources Board, EMFAC2021 (South Coast Air Basin; Annual; 2027', 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, 2022. Available at: https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html. Accessed October 2023. Diesel is adjusted to account for retail (63.6%) and non-retail (36.4%) diesel sales.
4. Gibson Transportation Consulting, TA, 2023.

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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) ^a	Days/Year	Electricity Demand (kWh/yr)	Electricity Demand (MWh/yr)
Total	44	4.4	365	70,664	70.66

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.

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.

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>.

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Existing Energy Demand

Electricity	kWh/yr	MWh/yr
General Office Building	488,567	488.6
Total Building Energy	488,567	488.6
Total	488,567	488.6
Total (including water, see below)	525,675	525.675

Electricity	MWh/yr
SCE, 2022	84,218,000
Existing Annual	526

Source: SCE 2022 Annual Reort. <https://download.edison.com/406/files/20232/20>

Water	mgal	MWh
Existing Site Total	5.5	37
Total	5.5	37

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
Total	37,108	37.108

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)
General Office Building	616,257	595,417
Mobile Sources	73,261	70,784
Total	689,518	666,201

Natural Gas	million cubic foot (cf)
SoCalGas 2022	890,600
Existing Annual	0.666

Source: California Gas and Electric Utilities, 2020 California Gas Report, p. 145,2022.

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. Accessed March 2020.)

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Project Operational Energy Demand
Fuel Usage from VMT

Annual VMT (Traffic Study)⁴: 700,253 miles/year

Fuel Type: ¹	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid
Percent:	91.5%	4.4%	2.2%	0.3%	1.6%
Miles per Gallon Fuel:	23.6	8.3	-	4.0	53.2
Annual VMT by Fuel Type (miles):	640,882	30,915	15,457	2,025	10,973
Annual Fuel Usage (gallons):	27,213	3,722	-	73,261	206
Annual Fuel Savings from Electric Vehicles: ²	-	-	656		

	Los Angeles County Fuel Consumption ³	
	Gasoline	Diesel
Los Angeles County:	3,070,000,000	463,800,000
Existing Annual Mobile:	27,420	3,722
Existing Annual Total:	27,420	3,722

Notes:

- California Air Resources Board, EMFAC2021 (South Coast Air Basin; Annual; 2022', Aggregate Fleet).
- Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
- California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2022. Available at: https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html. Accessed October 2023. Diesel is adjusted to account for retail (63.6%) and non-retail (36.4%) diesel sales.
- Gibson Transportation Consulting, TA, 2023.