

Appendix E
Energy Calculation Worksheets

E-1 Project Construction

**6220 West Yucca Street Mixed Use Project
Construction Energy Analysis**

Annual Fuel Summary

61,565 gallons of diesel fuel for heavy-duty construction equipment
61,815 gallons of diesel fuel for haul trucks
38,186 gallons of diesel fuel for vendor trucks
63,866 gallons of fuel (primarily gasoline) for workers

161,565 Total Gallons Diesel
63,866 Total Gallons Gasoline

1.8 Estimated Project Construction Duration (years)

88,126 Annual Average Gallons Diesel
34,836 Annual Average Gallons Gasoline

Los Angeles County Fuel Consumption (2016) ¹		Percent of Annual Project Compared to LA County
Diesel	580,800,000	0.01517%
Gasoline	3,577,000,000	0.00097%

1. California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2016, http://www.energy.ca.gov/almanac/transportation_data/gasoline/2016_A15_Results.xlsx. Accessed March 2018.
Diesel is adjusted to account for retail (52%) and non-retail (48%) diesel sales.

**6220 West Yucca Street Mixed Use Project
Construction Energy**

Construction Water Energy Estimates

Source	Construction Water Use Gallons/Year	Total Water Use (Mgal)	Annual Electricity Demand from water Demand (kWh)	Total Electricity Demand from water Demand during Construction (kWh)
Project	931770.000	0.93177	12133	22243
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)
Project	9727	111	1272	1911

Source: California Emissions Estimator Model (CalEEMod).

Source: Water System and Supply Report for the 6220 West Yucca Project, Southland Civil Engineering

6220 West Yucca Street Mixed Use Project
Construction Energy Analysis

Off-Road Equipment

Equipment ≤ 50 hp

pounds fuel/hp-hr (OFFROAD2011 model, ≤ 50 hp): 0.408 lb/hp-hr
 diesel pounds/gallon (CARB density assumption): 7.07 lb/gal
 diesel gallons/hp-hr: 0.0577 gal/hp-hr
 Total <50 - hp-hr
 Total diesel gallons: - gal

Equipment > 50 hp

pounds fuel/hp-hr (OFFROAD2011 model, > 50 hp): 0.367 lb/hp-hr
 diesel pounds/gallon (CARB density assumption): 7.07 lb/gal
 diesel gallons/hp-hr: 0.0519 gal/hp-hr
 Total >50 1,185,998 hp-hr
 Total diesel gallons: 61,565 gal

Total diesel gallons (off-road equipment): 61,565 gal
Annual construction-period diesel gallons (off-road equipment): 33,581 gal

Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Proposed Project							
Demolition	Excavators	1	8	158	0.38	15	7,205
Demolition	Rubber Tired Dozers	2	8	247	0.4	15	23,712
Demolition	Tractors/Loaders/Backhoes	3	8	97	0.37	15	12,920
Site Preparation	Rubber Tired Dozers	3	7	247	0.4	8	16,598
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37	8	
Grading	Bore/Drill Rigs	1	8	221	0.5	86	76,024
Grading	Excavators	2	8	158	0.38	86	82,615
Grading	Rubber Tired Dozers	1	6	247	0.4	86	50,981
Grading	Rubber Tired Loaders	1	8	203	0.36	86	50,279
Grading	Scrapers	1	8	367	0.48	86	121,198
Grading	Tractors/Loaders/Backhoes	2	7	97	0.37	86	43,212
Building Construction 1	Forklifts	3	6	89	0.2	281	90,032
Building Construction 1	Generator Sets	1	8	84	0.74	281	139,736
Building Construction 1	Other Construction Equipment	1	8	172	0.42	281	162,396
Building Construction 1	Tractors/Loaders/Backhoes	1	6	97	0.37	281	60,511
Paving	Pavers	2	6	130	0.42	87	57,002
Paving	Paving Equipment	2	8	132	0.36	87	66,148
Paving	Rollers	2	7	80	0.38	87	37,027
Paving	Tractors/Loaders/Backhoes	1	8	97	0.37	87	24,979
Building Construction 2	Generator Sets	1	8	84	0.74	89	44,258
Building Construction 2	Tractors/Loaders/Backhoes	1	6	97	0.37	89	19,165
						Total >50	1,185,998
						Total <50	-

**6220 West Yucca Street Mixed Use Project
Construction Energy Analysis**

On-Road Haul Trucks

EMFAC2017 Diesel Fuel Consumption Factor:¹ 0.1585 gallons/mile
 Total Haul Truck VMT: 364,000 miles
Total VMT diesel gallons (on-road haul trucks): 57,692 gal

EMFAC2017 Diesel Fuel Consumption Factor:² 1.8123 gallons/hour
 Total Haul Truck Idle-Hours per Year: 2,275 hours
Total Idling diesel gallons (on-road haul trucks): 4,123 gal

*Estimated Fuel Savings from
Anti-Idling Regulation (64 percent based on
estimated CARB emissions reductions):³
11,453*

Total diesel gallons (on-road haul trucks): 61,815 gal
Annual construction-period diesel gallons (on-road haul trucks): 33,717 gal

1. California Air Resources Board, EMFAC2014 (California State-wide; T7 Single Construction; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (California State-wide; T7 Single Construction; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, <https://www.arb.ca.gov/regact/idling/idling.htm>, accessed November 2016.

Phase	Total One-Way			VMT	Idle Hours
	Days	Trips	Miles/Trip		
Proposed Project					
Demolition	15	1,000	20.0	20,000	125
Site Preparation	8	-	-	-	-
Grading	86	17,200	20.0	344,000	2,150
Building Construction 1	281	-	-	-	-
Paving	87	-	-	-	-
Architectural Coating	89	-	-	-	-
Building Construction 2	89	-	-	-	-
Total Haul Truck VMT:				364,000	
Total Idle-Hours:					2,275

**6220 West Yucca Street Mixed Use Project
Construction Energy Analysis**

On-Road Vendor Trucks

EMFAC2017 Diesel Fuel Consumption Factor:¹ 0.1392 gallons/mile
 Total Vendor Truck VMT: 190,550 miles
Total VMT diesel gallons (on-road vendor trucks): 26,528 gal

EMFAC2017 Diesel Fuel Consumption Factor:² 1.6885 gallons/hour
 Total Vendor Truck Idle-Hours per Year: 6,904 hours
Total Idling diesel gallons (on-road vendor trucks): 11,657 gal

*Estimated Fuel Savings from
 Anti-Idling Regulation (64 percent based on
 estimated CARB emissions reductions):³
 32,382*

Total diesel gallons (on-road vendor trucks): 38,186 gal
Annual construction-period diesel gallons (on-road vendor trucks): 20,829 gal

1. California Air Resources Board, EMFAC2014 (California State-wide; HHDT and MHDT; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (California State-wide; HHDT and MHDT; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, <https://www.arb.ca.gov/regact/idling/idling.htm>, accessed November 2016.

Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Proposed Project					
Demolition	15	6	6.9	621	23
Site Preparation	8	-	-	-	-
Grading	86	6	6.9	3,560	129
Building Construction 1	281	73	6.9	141,540	5,128
Paving	87	-	-	-	-
Architectural Coating	89	-	-	-	-
Building Construction 2	89	73	6.9	44,829	1,624
				Total Vendor Truck VMT:	190,550
				Total Idle-Hours:	6,904

**6220 West Yucca Street Mixed Use Project
Construction Energy Analysis**

On-Road Workers (LDA, LDT1, LDT2)

EMFAC2017 Gasoline Fuel Consumption Factor:¹ 0.0387 gallons/mile
 Total Worker VMT: 1,650,575 miles
Total VMT gasoline gallons (workers): 63,866 gal
Annual construction-period VMT gasoline gallons (workers): 34,836 gal

1. California Air Resources Board, EMFAC2014 (California State-wide; LDA, LDT1, LDT2; CY 2017; Aggregate MY; Aggregate Speed)

Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Proposed Project				
Demolition	15	18	14.7	3,969
Site Preparation	8	18	14.7	2,117
Grading	86	20	14.7	25,284
Building Construction 1	281	280	14.7	1,156,596
Paving	87	18	14.7	23,020
Architectural Coating	89	56	14.7	73,265
Building Construction 2	89	280	14.7	366,324
Total Worker VMT:				1,650,575

E-2 Project Operations

**6220 West Yucca Street Mixed Use Project
Operational Energy Analysis**

Energy and VMT Estimates

Source	Natural Gas demand (million kBTU/yr)	Natural Gas demand (million cf/yr)	Electricity demand (million kWh/yr)	Electricity demand from water demand (million kWh/yr)	Electricity demand from EV Charging Stations (million kWh/yr)	Annual Worker and Visitor VMT
Project	5.861	5.663	3.068	0.314	0.035	4,601,555
	Natural Gas demand (kBTU/yr)	Natural Gas demand (cf/yr)	Electricity demand (kWh/yr)	Electricity demand from water demand (kWh/yr)	Electricity demand from EV Charging Stations (kWh/yr)	Total Electricity demand (kWh/yr)
Project	5,861,204	5,662,999	3,068,294	313,974	35,332	3,417,600
Net (Project)	5,861,204	5,662,999	3,068,294	313,974	35,332	3,417,600

LADWP 2021-2022 Total Energy Sales (kWh)	Project Electricity Demand (kWh/yr)	Percent Net Project of LADWP
26,835,000,000	3,417,600	0.013%

	SoCal Gas 2022 (cf/year)	Project Natural Gas demand (cf/year)	Percent Net Project of LADWP
Percent Consumption	913,960,000,000	5,662,999	0.0006%
Percent Capacity	1,414,375,000,000	5,662,999	0.0004%

Source	Indoor	Outdoor	Total Water Use (Mgal/yr)	Electricity Demand from water Demand (million kWh)
Project	18.986176	5.126688	24.113	0.314

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)
Project with Energy/Transportation Efficiency	9727	111	1272	1911

Source: California Air Resources Board, CalEEMod, Version 2016.3.2.

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. Accessed March 2018.)

6220 Yucca St.

Electric Vehicle Charging

Estimated Electricity demand from Electric Vehicle Supply Equipment (EVSE)

Number of Parking Spaces	Percent of Spaces with Charging Stations	Average Charge (kWh/day) ^b	Days/Year	Electricity Demand (kWh/yr)
436	5.0%	4.4	365	35,332.00

Notes:

- a. Conservatively assumes each private garage has two outlets/panels.
- b. Estimated based on reference sources listed below.

Source	Electricity Demand (million kWh)	GHG Emissions (lbs/yr)				MTCO _{2e} (MT/yr)
		CO ₂	CH ₄	N ₂ O	CO _{2e}	
EV Charging	0.0353	21,023	1.02	0.21	21,111	9.6

GHG	Intensity factor (lbs/MWh)
CO ₂	595
CH ₄	0.029
N ₂ O	0.006

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>.

6220 West Yucca Street Mixed Use Project
Operational Energy Analysis

Project Transportation Energy
Year: 2021

Annual VMT (All): 4,601,555 miles/year

Fuel Type: ¹	GAS	DSL	ELEC
Percent:	95.46%	3.81%	0.66%
Miles per Gallon Fuel:	23.27	9.09	-
Annual VMT by Fuel Type :	4,392,548	175,243	30,151 miles/year
Annual Fuel Usage :	188,726	19,272	
Total Annual Petroleum Based Fuels Usage(GAS + DSL):	207,998		
LA County 2016 Annual Fuel Consumption ³	3,577,000,000	580,800,000	
Percentage Net Project of LA County	0.0053%	0.0033%	
LA County 2022 Annual Fuel Consumption ⁴	3,473,034,567	775,866,746	
Project Percentage Net Project of LA County	0.005%	0.002%	
Annual Fuel Savings from Electric Vehicles: ²	-	-	1,295 gal/year (assumed to be gasoline)

Notes:

1. California Air Resources Board, EMFAC2017, South Coast Air Basin; 2021; Annual; All vehicle types; Aggregate model year; Aggregate speed).
<https://www.arb.ca.gov/emfac/2017/>
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
3. California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2016,
http://www.energy.ca.gov/almanac/transportation_data/gasoline/2016_A15_Results.xlsx. Accessed March 2018.
 Diesel is adjusted to account for retail (52%) and non-retail (48%) diesel sales.
4. California Air Resources Board, EMFAC2017 (Los Angeles County, Annual; 2022, Aggregate Fleet).