Appendix N
Energy Analysis

ESA

Appendix N
Energy Analysis
Veterans Industrial Project - 215

1. Background & Existing Conditions
2. Energy Calculations
    a. Two Building Scenario
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3. CalEEMod Output
   (See Appendix G for CalEEMod Output)
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    a. Two Building Scenario
    b. One Building Scenario

Energy Analysis
Veterans Industrial Project - 215
1. Background & Existing Conditions

Veterans Industrial Project - 215
Energy Information - Electricity

Electricity Information

SCE Company Profile
https://www.sce.com/wps/portal/hor .

Riverside County 15,980,727,891 kWh 2018
15,981 gWh

http://www.ecdms.energy.ca.gov/elecbycounty.aspx

SCE Total 83,399,900,000 kWh
83,400 GWh 2018

http://www.ecdms.energy.ca.gov/gasbyutil.aspx

Electric Power Mix Delivered to SCE Retail Customers in 2017

Energy Resources	2017 SCE Power Mix [a]	2017 CA Power Mix [a]
Eligible Renewable	32%	29%
• Biomass & waste	0%	2%
• Geothermal	8%	4%
• Small hydroelectric	1%	3%
• Solar	13%	10%
• Wind	10%	10%
Coal	0%	4%
Large Hydroelectric	8%	15%
Natural Gas	20%	34%
Nuclear	6%	9%
Other	0%	<1%
Unspecified sources of power [b]	34%	9%
TOTAL	**100%**	**100%**

[a] California Energy Commission, Utility Annual Power Content Labels for 2016, 2016 Power Content Table, Southern California Edison – Default, September
[b] "Unspecified sources of power" means electricity from transactions that are not traceable to specific generation sources.

SOURCE: CEC 2019a

http://www.energy.ca.gov/pcl/#annual

Veterans Industrial Project - 215
Energy Information -Natural Gas

Natural Gas Information

SCG Company Profile
http://www.socalgas.com/about-us/company-info.shtml

California Gas and Electricity Utilities
https://www.socalgas.com/regulatory/cgr.shtml
pg. 80 pg. 81 pg. 17

Riverside County	398.538428	million therms	2018
	398,538,428	therms	
	1 Therm =	99.9761 CF	
	39,844,317,732	cubic feet	
	39,844	million cubic feet	
	1 Therm =	99976.12	
	3.98443E+13	BTU	
	39,844,327	MBTU	

http://www.ecdms.energy.ca.gov/gasbycounty.aspx

SoCalGas Total

5156.07	million therms	2018
5,156,070,000	therms	
1 Therm =	99.9761 cf	
515,483,769,927	cubic feet	
515,484	million cubic feet	
1 Therm =	99976.12 BTU	
5.15484E+14	BTU	
515,483,896	MBTU	

http://www.ecdms.energy.ca.gov/gasbyutil.aspx

Veterans Industrial Project - 215
Energy Information - Transportation Fuels

Transportation Fuels

Gasoline

State Consumption

13,475,000,000 gallons 2018

13,475.00 million gallons

http://www.energy.ca.gov/almanac/transportation_data/gasoline/

County Consumption

916 million gallons Riverside

http://listserver.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html

Diesel

Diesel Consumption

1,602,000,000 gallons 2017

1,602.00 million gallons

http://www.energy.ca.gov/almanac/transportation_data/diesel.html

County Consumption

119 million gallons Riverside

http://listserver.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html

Integrated Energy Policy Report

https://www.energy.ca.gov/energypolicy/

Energy Analysis
Veterans Industrial Project - 215
2. Energy Calculations

2. Energy Calculations
a. Two Building Scenario

Veterans Industrial Project - 215
Energy Summary

Construction Fuel Consumption Summary

	gallons	
Year	**Diesel**	**Gas**
Building 1	153,543	10,369
Offsite Improvements	8,565	770
Building 2	107,190	8,302
Total	***269,298***	***19,441***
Annual Average	269,298	19,441

*Note: Mitigated and unmitigated construction emissions of CO_2 are identical

State Usage (2017)[1,2]	1,602,000,000	13,475,000,000
Project % State	0.0168%	0.0001%
County Usage	119,000,000	916,000,000
Project % County	0.2263%	0.0021%

Construction	Total Gallons	Annual	
Onsite Equipment	186,352	93,176	diesel
Haul Trucks	63,784	31,892	diesel
Vendor Trucks	19,162	9,581	diesel
Worker Trips	19,441	9,720	gasoline

Annual Operational Fuel Consumption

	gallons		MBTU/yr[3]	GWh/yr[3]
	Diesel	**Gas**	**Natural Gas**	**Electric**
High Cube Warehouse				
Unmitigated	3,025,209.00	375,326.00	0.00	6.58
% of County	*2.54%*	*0.04%*	0.000%	0.041%
Intensive Ecommerce				
Unmitigated	3,284,920.00	2,834,857.00	0.00	8.56
% of County	*2.76%*	*0.31%*	0.000%	0.054%
SCE[4]				15,981
SoCalGas[5]			39,844,327	

	KBTU	kWh
High Cube	0	6,578,231
Ecommerce	0	8,556,841

Veterans Industrial Project - 215
Energy Summary

Assumptions

Gasoline

19.6	pounds of CO_2 per gallon of gasoline[6]
0.45	kg = 1 pound
8.89	Kg of CO_2 per gallon of Gasoline

Diesel

22.4	pounds of CO_2 per gallon of diesel fuel[6]
0.45	kg = 1 pound
10.16	Kg of CO_2 per gallon of Gasoline

Construction	diesel	Used for trucks (haul and vendor) and off-road equipment
	gasoline	worker vehicles
	*Mitigated and unmitigated emissions will be the same as vehicle use does not change.	
Operation	diesel	Majority of trucks and buses
	gasoline	remaining vehicle mix

LCFS & Pavley assumed for on-road vehicles after year 2011

Sources:

1 CEC. 2018a. Gasoline Fuel Data, Facts and Statistics. Taxable Diesel Sales in California. Available: http://www.energy.ca.gov/almanac/transportation_data/gasoline/. Accessed October 2018.

2 CEC. 2018b. Diesel Fuel Data, Facts and Statistics. Taxable Diesel Sales in California. Available: http://www.energy.ca.gov/almanac/transportation_data/diesel.html. Accessed October 2018.

3 ESA 2018 Annual CalEEMod Output

4 http://www.ecdms.energy.ca.gov/elecbyutil.aspx

5 http://www.ecdms.energy.ca.gov/gasbyutil.aspx

6 U.S. Energy 2017: https://www.eia.gov/tools/faqs/faq.php?id=307&t=11

Veterans Industrial Project - 215

Fuel Conversion - Construction

		Total CO_2 MT/yr	Fuel Type	Factor $KGCO_2$/gal	Gallons	Total Diesel (gal)	Total Gas (gal)
	Bldg1						
Build 1	*Excavation/Mass Grading*						
	Off-road	235.33	diesel	10.16	23,161.53		
	Haul				25,334.47		
	Vendor				1,465.01		
	Worker				1,358.39	49,961.01	1,358.39
	Offsite Improvement Areas						
	Off-road	79.59	diesel	10.16	7,832.98		
	Haul	0.00	diesel	10.16	0.00		
	Vendor	7.75	diesel	10.16	732.51		
	Worker	6.47	gasoline	8.89	769.75	8,565.49	769.75
	Paving						
	Off-road	127.75	diesel	10.16	12,573.19		
	Haul	58.05	diesel	10.16	5,947.66		
	Vendor	12.92	diesel	10.16	1,220.85		
	Worker	9.52	gasoline	8.89	1,131.99	19,741.69	1,131.99
	Concrete Pour						
	Off-road	349.11	diesel	10.16	34,359.60		
	Haul	108.08	diesel	10.16	11,073.11		
	Vendor	3.10	diesel	10.16	293.00		
	Worker	9.52	gasoline	8.89	1,131.99	45,725.72	1,131.99
	Building Construction						
	Off-road	293.36	diesel	10.16	28,872.50		
	Haul	0.00	diesel	10.16	0.00		
	Vendor	74.93	diesel	10.16	7,080.90		
	Worker	55.19	gasoline	8.89	6,565.54	35,953.40	6,565.54
	Architectural Coating						
	Off-road	20.47	diesel	10.16	2,014.59		
	Haul	0.00	diesel	10.16	0.00		
	Vendor	2.07	diesel	10.16	146.50		
	Worker	2.03	gasoline	8.89	181.12	2,161.09	181.12
Build 2	*Concrete Pour*						
	Off-road	346.25	diesel	10.16	34,077.74		
	Haul	118.61	diesel	10.16	12,214.26		
	Vendor	2.92	diesel	10.16	275.63		
	Worker	8.69	gasoline	8.89	1,042.95	46,567.63	1,042.95
	Building Construction						
	Off-road	293.36	diesel	10.16	28,872.50		
	Haul	0.00	diesel	10.16	0.00		
	Vendor	70.51	diesel	10.16	6,660.95		

Veterans Industrial Project - 215
Fuel Conversion - Construction

Worker	50.39	gasoline	8.89	6,049.10	35,533.45	6,049.10
Paving						
Off-road	127.75	diesel	10.16	12,573.19		
Haul	89.48	diesel	10.16	9,214.56		
Vendor	12.16	diesel	10.16	1,148.44		
Worker	8.69	gasoline	8.89	1,042.95	22,936.19	1,042.95
Architectural Coating						
Off-road	20.47	diesel	10.16	2,014.59		
Haul	0.00	diesel	10.16	0.00		
Vendor	1.95	diesel	10.16	137.81		
Worker	1.85	gasoline	8.89	166.87	2,152.40	166.87

2. Energy Calculations
b. One Building Scenario

Veterans Industrial Project - 215
Energy Summary - One Building Option

Construction Fuel Consumption Summary

	gallons		Years
Year	**Diesel**	**Gas**	
Building 1	330,090	30,682	
Offsite Improvements	8,565	770	
Total	***338,656***	***31,452***	
Annual Average	260,504	24,194	1.3

*Note: Mitigated and unmitigated construction emissions of CO_2 are identical

State Usage (2017)[1,2]	1,602,000,000	13,475,000,000	
Project % State	0.0163%	0.0002%	
County Usage	119,000,000	916,000,000	
Project % County	0.2189%	0.0026%	
Construction	Total Gallons	Annual	
Onsite Equipment	167,627	83,813	diesel
Haul Trucks	152,379	76,190	diesel
Vendor Trucks	18,650	9,325	diesel
Worker Trips	31,452	15,726	gasoline

Annual Operational Fuel Consumption

Intensive Ecommerce				
Unmitigated	3,284,920.00	2,834,857.00	0.00	8.56
% of County	*2.76%*	*0.31%*	0.000%	0.054%
SCE[4]				15,981
SoCalGas[5]			39,844,327	
			kWh	
	KBTU		kWh	
Ecommerce	0		8,556,841	

Assumptions

Gasoline

19.6	pounds of CO_2 per gallon of gasoline[6]
0.45	kg = 1 pound
8.89	Kg of CO_2 per gallon of Gasoline

Diesel

22.4	pounds of CO_2 per gallon of diesel fuel[6]
0.45	kg = 1 pound
10.16	Kg of CO_2 per gallon of Gasoline

Construction	diesel	Used for trucks (haul and vendor) and off-road equipment
	gasoline	worker vehicles
	*Mitigated and unmitigated emissions will be the same as vehicle use does not change.	
Operation	diesel	Majority of trucks and buses
	gasoline	remaining vehicle mix

LCFS & Pavley assumed for on-road vehicles after year 2011

Sources:

1 CEC. 2018a. Gasoline Fuel Data, Facts and Statistics. Taxable Diesel Sales in California. Available: http://www.energy.ca.gov/almanac/transportation_data/gasoline/. Accessed October 2018.

2 CEC. 2018b. Diesel Fuel Data, Facts and Statistics. Taxable Diesel Sales in California. Available: http://www.energy.ca.gov/almanac/transportation_data/diesel.html. Accessed October 2018.

3 ESA 2018 Annual CalEEMod Output

4 http://www.ecdms.energy.ca.gov/elecbyutil.aspx

5 http://www.ecdms.energy.ca.gov/gasbyutil.aspx

6 U.S. Energy 2017: https://www.eia.gov/tools/faqs/faq.php?id=307&t=11

Veterans Industrial Project - 215

Fuel Conversion - Construction - 1 Building Option

		Total CO_2 MT/yr	Fuel Type	Factor $KGCO_2$/gal	Gallons	Total Diesel (gal)	Total Gas (gal)
	Bldg1						
Build 1	*Excavation/Mass Grading*						
	Off-road	423.52	diesel	10.16	41,683.03		
	Haul				86,757.10		
	Vendor				2,637.03		
	Worker				2,445.10	131,077.15	2,445.10
	Offsite Improvement Areas						
	Off-road	79.59	diesel	10.16	7,832.98		
	Haul		diesel	10.16	0.00		
	Vendor		diesel	10.16	732.51		
	Worker		gasoline	8.89	769.75	8,565.49	769.75
	Paving						
	Off-road	112.26	diesel	10.16	11,049.14		
	Haul		diesel	10.16	20,223.80		
	Vendor		diesel	10.16	1,831.27		
	Worker		gasoline	8.89	1,697.98	33,104.21	1,697.98
	Concrete Pour						
	Off-road	519.37	diesel	10.16	51,116.54		
	Haul		diesel	10.16	45,399		
	Vendor		diesel	10.16	440		
	Worker		gasoline	8.89	2,547	96,954.60	2,546.98
	Building Construction						
	Off-road	530.05	diesel	10.16	52,167.61		
	Haul		diesel	10.16	0.00		
	Vendor		diesel	10.16	12,794.46		
	Worker		gasoline	8.89	23,726.49	64,962.07	23,726.49
	Architectural Coating						
	Off-road	38.38	diesel	10.16	3,777.35		
	Haul		diesel	10.16	0.00		
	Vendor		diesel	10.16	214.87		
	Worker		gasoline	8.89	265.64	3,992.21	265.64

Energy Analysis
Veterans Industrial Project - 215
4. EMFAC2017

4. EMFAC2017

a. Two Building Scenario

Veterans Industrail Park

Total On-Road Fuel Consumption

		gal/mile	gal/min
2019Hauling	Hauling	0.14787634	2.28937E-06
2019Vendor	Vendor	0.12208267	2.47848E-06
2019Worker	Worker	0.03773297	9.17354E-07
2019Water	Water	0.25604353	8.04115E-06

Construction Phase	Daily One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)
Excavation & Mass Grading	2019				
Total Haul Trips	8566				
Hauling	286	30	8	20	15
Vendor	20	30	8	20	15
Worker	60	30	8	20	0
Road Construction	2019				
Total Haul Trips	0				
Hauling	0	30	8	20	15
Vendor	10	30	8	20	15
Worker	34	30	8	20	0
Concrete Pour (bldg1)	2019				
Total Haul Trips	3744				
Hauling	125	30	8	20	15
Vendor	4	30	8	20	15
Worker	50	30	8	20	0
Building Construction (Bldg1)	2019				
Total Haul Trips	0				
Hauling	0	145	8	20	15
Vendor	20	145	8	20	15
Worker	60	145	8	20	0
Architectural Coating (Bldg1)	2019				
Total Haul Trips	0				
Hauling	0	30	8	20	15
Vendor	2	30	8	20	15
Worker	8	30	8	20	0
Paving/Landscaping (Bldg1)	2019				
Total Haul Trips	2011				
Hauling	41	50	8	20	15
Vendor	10	50	8	20	15
Worker	30	50	8	20	0

Veterans Industrail Park

Total On-Road Fuel Consumption

		gal/mile	gal/min
2019Hauling	Hauling	0.14787634	2.28937E-06
2019Vendor	Vendor	0.12208267	2.47848E-06
2019Worker	Worker	0.03773297	9.17354E-07
2019Water	Water	0.25604353	8.04115E-06

Construction Phase	Daily One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)
Concreter Pour (bldg2)	2022				
Total Haul Trips	4365				
Hauling	146	30	8	20	15
Vendor	4	30	8	20	15
Worker	50	30	8	20	0
Building Construction (Bldg2)	2022				
Total Haul Trips	0				
Hauling	0	145	8	20	15
Vendor	20	145	8	20	15
Worker	60	145	8	20	0
Architectural Coating (Bldg2)	2022				
Total Haul Trips	0				
Hauling	0	30	8	20	15
Vendor	2	30	8	20	15
Worker	8	30	8	20	0
Paving (Bldg2)	2022				
Total Haul Trips	3293				
Hauling	66	50	8	20	15
Vendor	10	50	8	20	15
Worker	30	50	8	20	0
Operational HCW	2020				
Total Haul Trips	1421				
Hauling	1421	1	24	40	15
Vendor	0	1	24	0	15
Worker	1687	1	24	16.6	0
Operational IE	2020				
Total Haul Trips	1543				
Hauling	1543	1	24	40	0
Vendor	0	1	24	0	0
Worker	12742	1	24	16.6	0

Veterans Industrail Park

T **Total On-Road Fuel Consumption**

Construction Phase	Regional Emissions (gallons)						
	gal/mile	gal/min	gal/day	Total Gallons/phase			
Excavation & Mass Grading							
Total Haul Trips							
Hauling	0.15	2.29E-06	846	25,334			
Vendor	0.12	2.48E-06	49	1,465			
Worker	0.04	9.17E-07	45	1,358			
Road Construction							
Total Haul Trips							
Hauling	0.15	2.29E-06	0	0			
Vendor	0.12	2.48E-06	24	733			
Worker	0.04	9.17E-07	26	770			
Concrete Pour (bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	370	11,073			
Vendor	0.12	2.48E-06	10	293			
Worker	0.04	9.17E-07	38	1,132			
Building Construction (Bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	0	0			
Vendor	0.12	2.48E-06	49	7,081			
Worker	0.04	9.17E-07	45	6,566			
Architectural Coating (Bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	0	0			
Vendor	0.12	2.48E-06	5	147			
Worker	0.04	9.17E-07	6	181			
Paving/Landscaping (Bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	121	5,948			
Vendor	0.12	2.48E-06	24	1,221			
Worker	0.04	9.17E-07	23	1,132			

Veterans Industrail Park

T **Total On-Road Fuel Consumption**

Construction Phase	Regional Emissions (gallons)						
	gal/mile	gal/min	gal/day	Total Gallons/phase			
Concreter Pour (bldg2)							
Total Haul Trips							
Hauling	0.14	2.54E-06	409	12,214			
Vendor	0.11	2.67E-06	9	276			
Worker	0.03	1.01E-06	35	1,043			
Building Construction (Bldg2)							
Total Haul Trips							
Hauling	0.14	2.54E-06	0	0			
Vendor	0.11	2.67E-06	46	6,661			
Worker	0.03	1.01E-06	42	6,049			
Architectural Coating (Bldg2)							
Total Haul Trips							
Hauling	0.14	2.54E-06	0	0			
Vendor	0.11	2.67E-06	5	138			
Worker	0.03	1.01E-06	6	167			
Paving (Bldg2)							
Total Haul Trips							
Hauling	0.14	2.54E-06	185	9,215			
Vendor	0.11	2.67E-06	23	1,148			
Worker	0.03	1.01E-06	21	1,043			
Operational HCW							
Total Haul Trips							
Hauling	0.15	2.24E-06	8,288	8,288			
Vendor	0.12	2.43E-06	0	0			
Worker	0.04	8.93E-07	1,028	1,028			
Operational IE							
Total Haul Trips							
Hauling	0.15	2.24E-06	9,000	9,000			
Vendor	0.12	2.43E-06	0	0			
Worker	0.04	8.93E-07	7,767	7,767			

4. EMFAC2017

b. One Building Scenario

Veterans Industrail Park - One Building Scenario
Total On-Road Fuel Consumption

Veterans Industrail Park - One Building Scenario

Total On-Road Fuel Consumption

		gal/mile	gal/min
2019Hauling	Hauling	0.14787634	2.28937E-06
2019Vendor	Vendor	0.12208267	2.47848E-06
2019Worker	Worker	0.03773297	9.17354E-07
2019Water	Water	0.25604353	8.04115E-06

Construction Phase	Daily One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)
Excavation & Mass Grading	2019				
Total Haul Trips	29334				
Hauling	544	54	8	20	15
Vendor	20	54	8	20	15
Worker	60	54	8	20	0
Road Construction	2019				
Total Haul Trips	0				
Hauling	0	30	8	20	15
Vendor	10	30	8	20	15
Worker	34	30	8	20	0
Concrete Pour (bldg1)	2019				
Total Haul Trips	15350				
Hauling	342	45	8	20	15
Vendor	4	45	8	20	15
Worker	75	45	8	20	0
Building Construction (Bldg1)	2019				
Total Haul Trips	0				
Hauling	0	262	8	20	15
Vendor	20	262	8	20	15
Worker	120	262	8	20	0
Architectural Coating (Bldg1)	2019				
Total Haul Trips	0				
Hauling	0	44	8	20	15
Vendor	2	44	8	20	15
Worker	8	44	8	20	0
Paving/Landscaping (Bldg1)	2019				
Total Haul Trips	6838				
Hauling	92	75	8	20	15
Vendor	10	75	8	20	15
Worker	30	75	8	20	0

Veterans Ir **Veterans Industrail Park - One Building Scenario**

T **Total On-Road Fuel Consumption**

Construction Phase	Regional Emissions (gallons)						
	gal/mile	gal/min	gal/day	Total Gallons/phase			
Excavation & Mass Grading							
Total Haul Trips							
Hauling	0.15	2.29E-06	1,609	86,757			
Vendor	0.12	2.48E-06	49	2,637			
Worker	0.04	9.17E-07	45	2,445			
Road Construction							
Total Haul Trips							
Hauling	0.15	2.29E-06	0	0			
Vendor	0.12	2.48E-06	24	733			
Worker	0.04	9.17E-07	26	770			
Concrete Pour (bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	1,011	45,399			
Vendor	0.12	2.48E-06	10	440			
Worker	0.04	9.17E-07	57	2,547			
Building Construction (Bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	0	0			
Vendor	0.12	2.48E-06	49	12,794			
Worker	0.04	9.17E-07	91	23,726			
Architectural Coating (Bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	0	0			
Vendor	0.12	2.48E-06	5	215			
Worker	0.04	9.17E-07	6	266			
Paving/Landscaping (Bldg1)							
Total Haul Trips							
Hauling	0.15	2.29E-06	272	20,224			
Vendor	0.12	2.48E-06	24	1,831			
Worker	0.04	9.17E-07	23	1,698			