

Appendix F2

Operational Worksheets and Calculations

Operational Energy Analysis

Operational Energy Analysis
Energy Use Summary
Net Annual Electricity Usage

Source	Total Electricity Demand (MWh/yr)	Total Natural Gas Demand (MMBtu/yr)	Total Gasoline Demand (gallons/yr)	Total Diesel Demand (gallons/yr)
Existing	5,095	8,842	1,751,600	313,704
Project				
Total Building Energy - Buildout	229,055	2,410	-	-
Solar Array	(12,436)	-	-	-
EV Charging	4,437	-	-	-
Emergency Generators	-	-	-	78,165
Wastewater Treatment Plant	(65)	-	-	-
Mobile Sources	-	7,646	6,172,474	1,270,318
Project Total	220,990	10,056	6,172,474	1,348,483
Net Total (Project Buildout - Existing)	215,895	1,214	4,420,874	1,034,778
State Electricity Use/State Natural Gas Use/State Gasoline Use/State Diesel Use	284,436,262	12,327,096,996	15,471,000,000	3,702,083,333
% of State Total	0.08%	0.00001%	0.03%	0.03%
County Electricity Use/County Natural Gas Use/County Gasoline Use/County Diesel Use	16,708,080	440,030,822	643,000,000	100,000,000
% of County Total	1.29%	0.0003%	0.69%	1.03%

Operational Energy Analysis
Energy Use Summary
Existing Uses

Source	Natural Gas demand (MMBTU/yr)	Electricity demand (MWh/yr)	Electricity demand from water demand (MWh/yr)	Total Electricity Demand (MWh/yr)
Existing Uses				
Automobile Care Center	126	41	3	44
General Light Industry	2,332	752	100	852
Government (Civic Center)	477	491	36	527
Hardware/Paint Store	44	184	8	193
High Turnover (Sit Down Restaurant)	2,261	374	18	392
Place of Worship	263	85	3	88
Racquet Club	413	133	6	139
Refrigerated Warehouse-No Rail	757	1,962	245	2,207
Single Family Housing	116	22	1	23
Unrefrigerated Warehouse-No Rail	507	482	148	630
Total	7,295	4,525	570	5,095

Source	CalEEMod		Total Water Use	Electricity Demand from water Demand
	Indoor Water Use (Mgal/yr)	Outdoor Water Use (Mgal/yr)	(Mgal/yr)	(MWh/yr)
Existing Uses				
Automobile Care Center	0.4	0.2	0.65	3.06
General Light Industry	18.4	0.0	18.44	99.77
Government (Civic Center)	4.7	2.9	7.65	35.86
Hardware/Paint Store	1.1	0.7	1.80	8.42
High Turnover (Sit Down Restaurant)	3.2	0.2	3.44	18.21
Place of Worship	0.3	0.4	0.72	3.07
Racquet Club	0.8	0.5	1.35	6.31
Refrigerated Warehouse-No Rail	45.4	0.0	45.37	245.48
Single Family Housing	0.2	0.1	0.32	1.49
Unrefrigerated Warehouse-No Rail	27.4	0.0	27.43	148.43
Total	102.0	5.1	107.2	570.1

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)
All Uses	2,117	111	1,272	1,911

Sources and Assumptions:

- Energy use taken from CalEEMod v2016.3.2 outputs used in the Air Quality analysis.
- Water electricity intensity rates taken from CalEEMod default emission factors

**Operational Energy Analysis
Energy Use Summary**

Source	Natural Gas demand (MMBTU/yr)	Electricity demand (MWh/yr)	Electricity demand from water demand (MWh/yr)	Total Electricity Demand (MWh/yr)
Phase 1				
High Rise Apartments	0	20,574		20,574
General Office Building	0	91,451		91,451
Hotel	0	8,594		8,594
Active Uses	1,687	4,223		4,223
Logistics/Warehouse	0	618		618
Recreational Uses	0	711		711
Subtotal	1,687	126,171		126,171
Phase 2a				
High Rise Apartments	0	3,813		3,813
General Office Building	0	38,488		38,488
Hotel	0	3,081		3,081
Active Uses	241	499		499
Logistics/Warehouse	0	419		419
Subtotal	241	46,300		46,300
Phase 2b				
High Rise Apartments	0	5,456		5,456
General Office Building	0	15,571		15,571
Active Uses	241	687		687
Subtotal	241	21,714		21,714
Phase 3				
High Rise Apartments	0	8,940		8,940
Hotel	0	14,584		14,584
Active Uses	241	6,162		6,162
Active Uses	0	257		257
Subtotal	241	29,942		29,942
Grand Total	2,410	224,127	4,929	229,055

Source	CalEEMod		Total Water Use	Electricity Demand from water Demand
	Indoor Water Use (Mgal/yr)	Outdoor Water Use (Mgal/yr)	(Mgal/yr)	(MWh/yr)
All Land Uses - Buildout	659	389	1,048	4,929

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)
All Uses	2,117	111	1,272	1,911

Sources and Assumptions:

- Energy use taken from CalEEMod v2016.3.2 outputs used in the Air Quality analysis.
- Water electricity intensity rates taken from CalEEMod default emission factors

**Downtown West San Jose Mixed Use Development
Operational Vehicle Fuel Consumption**

Scenario	Existing	Op year 1	op year 2
Unmitigated CO ₂ e (MT/year)	18,838	62,353	68,172
Mitigated CO ₂ e (MT/year)	18,838	62,353	68,172

Summary Fuel Type	Existing		Op year 1		Op year 2		
	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated	
Gasoline	1,751,600	1,751,600	5,698,778	5,698,778	6,172,474	6,172,474	gallons
Diesel	313,704	313,704	1,117,883	1,117,882.96	1,270,318	1,270,318	gallons
Electric	0.00	0.00	0.00	0.00	0.00	0.00	GWh
Natural Gas	1,546.43	1,546.43	6,500.37	6,500.37	7,645.92	7,645.92	MBTU

Existing 2021

Unmitigated Calculations

Fuel Type	% Emissions	CO ₂ e (MT)	CO ₂ e (kg)	CO ₂ e (lbs)	kg CO ₂ /gallon	Gallons	Mcf	MBTU	GWh
Gasoline	82.7%	15,572	15,571,723	NA	8.89	1,751,600	NA	NA	NA
Diesel	16.9%	3,187	3,187,235	NA	10.16	313,704	NA	NA	NA
Electric	0.0%	0	NA	0	NA	NA	NA	NA	0.00
Natural Gas	0.4%	79	79,292	NA	NA	NA	1,492.69	1,546.43	NA

Mitigated Calculations

Fuel Type	% Emissions	CO ₂ e (MT)	CO ₂ e (kg)	CO ₂ e (lbs)	kg CO ₂ /gallon	Gallons	Mcf	MBTU	GWh
Gasoline	82.7%	15,572	15,571,723	NA	8.89	1,751,600	NA	NA	NA
Diesel	16.9%	3,187	3,187,235	NA	10.16	313,704	NA	NA	NA
Electric	0.0%	0	NA	0	NA	NA	NA	NA	0.00
Natural Gas	0.4%	79	79,292	NA	NA	NA	1,492.69	1,546.43	NA

Operational Year 1 2026

Unmitigated Calculations

Fuel Type	% Emissions	CO ₂ e (MT)	CO ₂ e (kg)	CO ₂ e (lbs)	kg CO ₂ /gallon	Gallons	Mcf	MBTU	GWh
Gasoline	81.3%	50,662	50,662,137	NA	8.89	5,698,778	NA	NA	NA
Diesel	18.2%	11,358	11,357,691	NA	10.16	1,117,883	NA	NA	NA
Electric	0.0%	0	NA	0	NA	NA	NA	NA	0.00
Natural Gas	0.5%	333	333,301	NA	NA	NA	6,274.49	6,500.37	NA

Mitigated Calculations

Fuel Type	% Emissions	CO ₂ e (MT)	CO ₂ e (kg)	CO ₂ e (lbs)	kg CO ₂ /gallon	Gallons	Mcf	MBTU	GWh
Gasoline	81.3%	50,662	50,662,137	NA	8.89	5,698,778	NA	NA	NA
Diesel	18.2%	11,358	11,357,691	NA	10.16	1,117,883	NA	NA	NA
Electric	0.0%	0	NA	0	NA	NA	NA	NA	0.00
Natural Gas	0.5%	333	333,301	NA	NA	NA	6,274.49	6,500.37	NA

Operational Year 2 2032

Unmitigated Calculations

Fuel Type	% Emissions	CO ₂ e (MT)	CO ₂ e (kg)	CO ₂ e (lbs)	kg CO ₂ /gallon	Gallons	Mcf	MBTU	GWh
Gasoline	80.5%	54,873	54,873,293	NA	8.89	6,172,474	NA	NA	NA
Diesel	18.9%	12,906	12,906,431	NA	10.16	1,270,318	NA	NA	NA
Electric	0.0%	0	NA	0	NA	NA	NA	NA	0.00
Natural Gas	0.6%	392	392,038	NA	NA	NA	7,380.23	7,645.92	NA

Mitigated Calculations

Fuel Type	% Emissions	CO ₂ e (MT)	CO ₂ e (kg)	CO ₂ e (lbs)	kg CO ₂ /gallon	Gallons	Mcf	MBTU	GWh
Gasoline	80.5%	54,873	54,873,293	NA	8.89	6,172,474	NA	NA	NA
Diesel	18.9%	12,906	12,906,431	NA	10.16	1,270,318	NA	NA	NA
Electric	0.0%	0	NA	0	NA	NA	NA	NA	0.00
Natural Gas	0.6%	392	392,038	NA	NA	NA	7,380.23	7,645.92	NA

Emissions Percentage

Fuel Type	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Gasoline	82.7%	82.4%	82.3%	81.9%	81.6%	81.3%	81.0%	80.8%	80.8%	80.6%	80.6%	80.5%
Diesel	16.9%	17.2%	17.2%	17.6%	17.9%	18.2%	18.5%	18.6%	18.7%	18.8%	18.9%	18.9%
Electric	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Natural Gas	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	0.6%	0.6%	0.6%

Conversion Factors:

1000	kg/MT	
8.89	kg CO ₂ /gallon gasoline	https://www.eia.gov/environment/emissions/co2_vol_mass.php
10.16	kg CO ₂ /gallon diesel	https://www.eia.gov/environment/emissions/co2_vol_mass.php
53.12	kg CO ₂ / thousand cubic feet	https://www.eia.gov/environment/emissions/co2_vol_mass.php
1036	btu/cubic foot	
0.907185	MT/ton	
2000	lbs/ton	

Solar Photovoltaic Panel Electricity Demand

Land Use ^a	Electricity Demand kilowatt-hours/year		Reduced Demand with Solar Photovoltaics (kWh/year)	
CalEEMod Total from ε	169,660,769.0	→	157,224,523.0	92.67%
Solar 7.8 MW Photovo Percent of	(12,436,246) -7.33%			

Notes:

- a. Project electricity demand estimated from CalEEMod (2016.3.2) Output & Calcs spreadsheet
- b. Electricity provided by 7.8 MW Photovoltaics based on data from U.S. Department of Energy, National Renewable Energy Laboratory, PVWatts Calculator, <http://pvwatts.nrel.gov/pvwatts.php>.

Operational Energy Analysis
Energy Use Summary
WWTP

Facility	Max Flow Rating:
Regional Non-Potable (SJ-SC RWF + SVAWPC)	1,072 mgal/year
Downtown West Water Reuse Facility	1,072 mgal/year

Source	Electricity from Water Demand (MWh)
Regional Non-Potable (SJ-SC RWF + SVAWPC)	5,801
Downtown West Water Reuse Facility	5,735
Electricity Savings	65

Water Electricity Intensity Factors	Treatment	Recycled Water Distribution	Distribute/Wastewater Treatment	Total Energy Intensity
Regional Non-Potable (SJ-SC RWF + SVAWPC)	2,117	111	3,183	5,411
Downtown West Water Reuse Facility	3,410	1,250	690	5,350

Sources and Assumptions:

- Annual water usage amounts from Chapter 2.0, Project Description

- Water electricity intensity factor for recycled water taken from Sherwood Design Engineer's *Technical Memorandum: Water Reuse Basis of Design*, January 20, 2020
- Electricity demand represents the energy savings realized with the Project's onsite WWTP.

EV Charging Calculations

Assumptions / Conversions

Typical Charge Rate 6.25 kWh/hour Chargepoint. 2017. Level Up Your EV Charging Knowledge. Available at: <https://www.chargepoint.com/blog/level-up-your-ev-charging-knowledge/>
 Fuel Economy 0.25 kWh/mi National Renewable Energy Laboratory (NREL). 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025 (Table C.1). Available at: <https://www.nrel.gov/docs>
 Range Miles per Hour 25 mi/hr calculation
 Charge hours per day - residential 2 hrs/day at 25 miles per hour of charging, this equals 50 miles traveled per day, which seems possibly too high
 Charge hours per day - commercial 8 hrs/day at 25 miles per hour of charging, this equals 200 miles traveled per day per space = space fully utilized during normal working hours
 Days/year - commercial 240
 Days/year - residential 365
 grams per pound 453.592 g/lb
 grams per MT 1,000,000 g/MT
 Each new eVMT replaces a gas/diesel VMT
 Only eVMT beyond the EMFAC2017 eVMT penetration rate is attributed to the project. Could use CARB VISION Reference scenario instead.

Traffic Data - Annual

Scenario / Year	VMT (mi)	# Trips	Mi/trip
Existing Year (2015) No Build	68,727,960	8,222,760	8.36
Interim Year - completion of Phase 1	196,832,160	21,852,810	9.01
2040 with Project	193,835,250	22,011,570	8.81

EVSE Data

	% Spaces
PDF	10%
MM AQ-2h	15%

Parking Data

Phase	Residential	Commercial	Total
1	1,148	1,777	2,925
2a	206	469	675
2b	282	554	836
3	724		724
Total	2,360	2,800	5,160

EVSE Spaces

Phase	PDF			MM AQ-2h		
	Residential	Commercial	Total	Residential	Commercial	Total
1	115	178	293	172	267	439
2a	21	47	68	31	70	101
2b	28	55	84	42	83	125
3	72	0	72	109	0	109
Total	236	280	516	354	420	774

eVMT Calculations

Scenario / Year / Value	Unmitigated - 10%			Mitigated - 15%		
	Residential	Commercial	Total	Residential	Commercial	Total
Phase 1: 2028-2031						
EV Parking spaces	115	178	293	172	267	439
daily hours charging per space	2	8		2	8	
kWh supplied for charging - daily	1,435	8,885	10,320	2,153	13,328	15,480
eVMT for charging - daily	5,740	35,540	41,280	8,610	53,310	61,920
kWh supplied for charging - annual	523,775	2,132,400	2,656,175	785,663	3,198,600	3,984,263
eVMT for charging - annual	2,095,100	8,529,600	10,624,700	3,142,650	12,794,400	15,937,050
Percent eVMT of total VMT	1.06%	4.33%	5.40%	1.60%	6.50%	8.10%
Percent eVMT of total VMT - reference scenario			6.6%-7.9%			6.6%-7.9%
Percent eVMT of total VMT - CTF scenario			8.5%-13.7%			8.5%-13.7%
eTrips for charging - daily	637	3,946	4,583	956	5,919	6,875
eTrips for charging - annual	232,603	946,978	1,179,581	348,905	1,420,467	1,769,372
Full Buildout: 2032+						
EV Parking spaces	236	280	516	354	420	774
daily hours charging per space	2	8		2	8	
kWh supplied for charging - daily	2,950	14,000	16,950	4,425	21,000	25,425
eVMT for charging - daily	11,800	56,000	67,800	17,700	84,000	101,700
kWh supplied for charging - annual	1,076,750	3,360,000	4,436,750	1,615,125	5,040,000	6,655,125
eVMT for charging - annual	4,307,000	13,440,000	17,747,000	6,460,500	20,160,000	26,620,500
Percent eVMT of total VMT	2.19%	6.83%	9.02%	3.28%	10.24%	13.52%
Percent eVMT of total VMT - reference scenario			8.2%-9.8%			8.2%-9.8%
Percent eVMT of total VMT - CTF scenario			15.7%-58.4%			15.7%-58.4%
eTrips for charging - daily	1,340	6,359	7,699	2,010	9,539	11,549
eTrips for charging - annual	489,095	1,526,221	2,015,316	733,642	2,289,332	3,022,974

EMFAC2017 eVMT Light-Duty vehicle penetration

Year	eVMT percent	eTrips percent
2024	3.03%	2.94%
2025	3.37%	3.20%
2026	3.61%	3.45%
2027	3.82%	3.67%
2028	4.01%	3.87%
2029	4.19%	4.06%
2030	4.34%	4.23%
2031	4.48%	4.39%
2032	4.60%	4.53%
2033	4.71%	4.66%
2034	4.81%	4.77%
2035	4.90%	4.88%
2036	4.97%	4.97%
2037	5.04%	5.05%
2038	5.10%	5.13%
2039	5.15%	5.20%
2040	5.19%	5.26%
2041	5.23%	5.31%
2042	5.26%	5.35%
2043	5.28%	5.39%
2044	5.30%	5.42%
2045	5.32%	5.45%
2046	5.33%	5.47%
2047	5.34%	5.48%
2048	5.35%	5.50%
2049	5.35%	5.51%
2050	5.36%	5.52%

Operational Energy Analysis

Operational Energy Analysis

Energy Use Summary

Source	Number of Generators	Power Rating HP	Total CO ₂ MT/generator/yr ¹	Total CO ₂ Total MT/yr	Fuel Type	Factor KGCO ₂ /gal	Gallons
Phase 1	26	872	17.0	441	diesel	10.21	43,240
Phase 2a	9	872	17.0	153	diesel	10.21	14,968
Phase 2b	5	872	17.0	85	diesel	10.21	8,315
Phase 3	7	872	17.0	119	diesel	10.21	11,642
Buildout	47	3,488	67.9	798	diesel	10.21	78,165

Conversion Factors:

10.21 diesel

KgCO₂/gallon²

8.91 gasoline

KgCO₂/gallon²

1 MT = 1,000 kilograms

Sources and Assumptions:

1

Criteria Air Pollutant Emissions Summary.xlsx

2

Climate Registry, Table 13.1: <https://www.theclimaterregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf>