

# Attachment 4. Project Economics Table for Recommended Sites (excerpt from Optony Solar Feasibility Study)

► Solar Feasibility Study for the City of Sunnyvale

FINAL

## Attachment A-1: Solar PV Project Financial Analysis Summary (3% Utility Escalator)

	Corporation Yard	Hamilton Well / Water Plant	Mary-Carson Water Plant	Ortega Well	Raynor Well	San Lucar Pump Station	Serra Well	Wolfe-Evelyn Water Plant	Wright Avenue Water Plant	Sunken Garden - Lift Meter	Sunken Garden - Golf Range Meter	Baylands Park - Lift Meter	Baylands Park - Park Meter	Baylands Park - Storm Lift Meter	SMaRT Station	Landfill	Wastewater Treatment Plant Retention Ponds	Total for Utility Sites	Total Including Community Solar Sites
<b>System Overview</b>																			
System Size (kW)	25	-	-	122	-	-	-	-	-	-	-	28	38	-	241	5,000	5,000	454	10,454
Yield (kWh/kW)	1,507	-	-	1,410	-	-	-	-	-	-	-	1,451	1,451	-	1,441	1,576	1,607	1,438	1,585
Annual onsite energy usage (kWh)	47,780	68,320	448,960	227,067	5,480	400,640	15,920	329,760	154,880	73,498	36,772	58,960	57,840	76,512	419,369	419,369	2,421,758	2,421,758	2,421,758
Year 1 Solar Output (kWh)	37,665	0	0	172,312	0	0	0	0	0	0	0	40,620	55,127	0	347,282	7,880,404	8,036,925	653,005	16,570,335
Annual PV degradation	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Facility Energy Offset by Solar	79%	0%	0%	76%	0%	0%	0%	0%	0%	0%	0%	69%	95%	0%	83%	0%	0%	81%	81%
<b>Current Utility Information</b>																			
Utility Provider	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E
Utility Rate Schedule	A-10 S TOU	A-1	A-6 TOU	A-6 TOU	A-6 TOU	A-6 TOU	A-1	A-6 TOU	A-6 TOU	A-1	A-1	A-1	A-1	A-6 TOU	E-19 SV	N/A	N/A	N/A	N/A
Average Utility Cost (\$/kWh)	\$0.1315	\$0.1883	\$0.2324	\$0.2324	\$0.2324	\$0.2324	\$0.1883	\$0.2324	\$0.2324	\$0.1883	\$0.1883	\$0.1883	\$0.1883	\$0.2324	\$0.0966	-	-	\$0.2012	\$0.2012
Utility Annual Inflation (%)	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
<b>Direct Purchase Information</b>																			
Engineering, Procurement, and Construction \$	\$95,750	\$0	\$0	\$489,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$80,080	\$108,680	\$0	\$689,260	\$19,150,000	\$19,150,000	\$1,462,770	\$39,762,770
Solar Rebate (\$/kWh)	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
Solar Rebate Term	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)
Year 1 O&M	\$375	\$0	\$0	\$1,834	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$420	\$570	\$0	\$3,615	\$75,000	\$75,000	\$6,814	\$156,814
Discount Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
<b>Lease/Loan Information</b>																			
Lease/Loan Term	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)
Lease/Loan Interest Rate (%)	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
End of Term Buyout	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>PPA Information</b>																			
Initial PPA rate (\$/kWh)	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500
PPA annual escalator	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
S-REC Value (keep/sell) (\$/kWh)	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
S-REC escalator	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
S-REC Contract Term	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)
Buyer sells S-REC (Direct Purchase/Loan)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
<b>Environmental Impact</b>																			
Annual CO2 Reduction (Tons)	10	-	-	45	-	-	-	-	-	-	-	11	14	-	91	2,055	2,096	170	4,322
Annual VMT Reduction Equivalent	22,543	-	-	103,130	-	-	-	-	-	-	-	24,311	32,994	-	207,851	4,716,478	4,810,157	390,828	9,917,463
Equivalent Annual Carbon Sequestration by US Forests (acres)	8	-	-	37	-	-	-	-	-	-	-	9	12	-	74	1,685	1,718	140	3,543
<b>NPV of Total Energy COST</b>																			
Utility Energy Purchase (25 year)	\$228,251	\$309,390	\$1,681,714	\$1,035,934	\$31,070	\$1,700,116	\$77,203	\$1,242,809	\$580,904	\$322,348	\$166,169	\$272,082	\$269,525	\$295,290	\$2,501,756	\$0	\$0	\$5,091,354	\$10,714,560
PPA (25 year)	\$135,402	-	-	\$668,371	-	-	-	-	-	-	-	\$159,810	\$216,581	-	\$1,348,398	\$0	\$0	\$2,528,562	\$2,528,562
Direct Purchase - incl O&M, rebate (25 year)	\$107,441	-	-	\$594,370	-	-	-	-	-	-	-	\$106,865	\$144,727	-	\$900,949	\$0	\$0	\$1,854,352	\$1,854,352
Lease/Loan (25 year)	\$114,785	-	-	\$631,877	-	-	-	-	-	-	-	\$113,008	\$153,063	-	\$953,816	\$0	\$0	\$1,966,549	\$1,966,549
<b>% Energy Cost Savings (Undiscounted)</b>																			
Direct Purchase (25 year)	66%	-	-	57%	-	-	-	-	-	-	-	69%	58%	-	72%	-	-	-	-
Lease/Loan (25 year)	57%	-	-	47%	-	-	-	-	-	-	-	63%	49%	-	66%	-	-	-	-
PPA (25 year)	41%	-	-	35%	-	-	-	-	-	-	-	41%	19%	-	46%	-	-	-	-
<b>Levelized Cost of Energy (LCOE) Analysis</b>																			
Utility LCOE (\$/kWh) - (25 year)	0.2787	-	-	0.2661	-	-	-	-	-	-	-	0.2692	0.2718	-	0.3480	-	-	0.3111	-
Direct Purchase LCOE (\$/kWh) - (25 year)	0.0992	-	-	0.1193	-	-	-	-	-	-	-	0.0882	0.1139	-	0.0973	-	-	0.1024	-
Lease/Loan LCOE (\$/kWh) - (25 year)	0.1203	-	-	0.1421	-	-	-	-	-	-	-	0.0996	0.1375	-	0.1179	-	-	0.1250	-
PPA LCOE (\$/kWh) - (25 year)	0.1649	-	-	0.1724	-	-	-	-	-	-	-	0.1588	0.2194	-	0.1884	-	-	0.1836	-

Note: The above analysis uses 3% utility escalation rate.

## Attachment A-2: Solar PV Project Financial Analysis Summary (5% Utility Escalator)

	Corporation Yard	Hamilton Well / Water Plant	Mary-Carson Water Plant	Ortega Well	Raynor Well	San Lucar Pump Station	Serra Well	Wolfe-Evelyn Water Plant	Wright Avenue Water Plant	Sunken Garden - Lift Meter	Sunken Garden - Golf Range Meter	Baylands Park - Lift Meter	Baylands Park - Park Meter	Baylands Park - Storm Lift Meter	SMaRT Station	Landfill	Wastewater Treatment Plant Retention Ponds	Total for Utility Sites	Total Including Community Solar Sites
<b>System Overview</b>																			
System Size (kW)	25	-	-	122	-	-	-	-	-	-	-	28	38	-	241	5,000	5,000	454	10,454
Yield (kWh/kW)	1,507	-	-	1,410	-	-	-	-	-	-	-	1,451	1,451	-	1,441	1,576	1,607	1,438	1,585
Annual onsite energy usage (kWh)	47,780	68,320	448,960	227,067	5,480	400,640	15,920	329,760	154,880	73,498	36,772	58,960	57,840	76,512	419,369	-	-	2,421,758	2,421,758
Year 1 Solar Output (kWh)	37,665	0	0	172,312	0	0	0	0	0	0	0	40,620	55,127	0	347,282	7,880,404	8,036,925	653,005	16,570,335
Annual PV degradation	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Facility Energy Offset by Solar	79%	0%	0%	76%	0%	0%	0%	0%	0%	0%	0%	69%	95%	0%	83%	-	-	81%	81%
<b>Current Utility Information</b>																			
Utility Provider	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E	PG&E
Utility Rate Schedule	A-10 S TOU	A-1	A-6 TOU	A-6 TOU	A-6 TOU	A-6 TOU	A-1	A-6 TOU	A-6 TOU	A-1	A-1	A-1	A-1	A-6 TOU	E-19 SV	N/A	N/A	N/A	N/A
Average Utility Cost (\$/kWh)	\$0.1315	\$0.1883	\$0.2324	\$0.2324	\$0.2324	\$0.2324	\$0.1883	\$0.2324	\$0.2324	\$0.1883	\$0.1883	\$0.1883	\$0.1883	\$0.2324	\$0.0966	-	-	\$0.2012	\$0.2012
Utility Annual Inflation (%)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
<b>Direct Purchase Information</b>																			
Engineering, Procurement, and Construction \$ <sup>2</sup>	\$95,750	\$0	\$0	\$489,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$80,080	\$108,680	\$0	\$689,260	\$19,150,000	\$19,150,000	\$1,462,770	\$39,762,770
Solar Rebate (\$/kWh)	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
Solar Rebate Term	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)
Year 1 O&M	\$375	\$0	\$0	\$1,834	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$420	\$570	\$0	\$3,615	\$75,000	\$75,000	\$6,814	\$156,814
Discount Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
<b>Lease/Loan Information</b>																			
Lease/Loan Term	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)	15 year(s)
Lease/Loan Interest Rate (%)	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
End of Term Buyout	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>PPA Information</b>																			
Initial PPA rate (\$/kWh) <sup>3</sup>	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500	\$0.1500
PPA annual escalator	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
S-REC Value (keep/sell) (\$/kWh)	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
S-REC escalator	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
S-REC Contract Term	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)	year(s)
Buyer sells S-REC (Direct Purchase/Loan)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
<b>Environmental Impact</b>																			
Annual CO2 Reduction (Tons)	10	-	-	45	-	-	-	-	-	-	-	11	14	-	91	2,055	2,096	170	4,322
Annual VMT Reduction Equivalent	22,543	-	-	103,130	-	-	-	-	-	-	-	24,311	32,994	-	207,851	4,716,478	4,810,157	390,828	9,917,463
Equivalent Annual Carbon Sequestration by US Forests (acres)	8	-	-	37	-	-	-	-	-	-	-	9	12	-	74	1,685	1,718	140	3,543
<b>NPV of Total Energy COST</b>																			
Utility Energy Purchase (25 year)	\$290,273	\$393,459	\$2,138,677	\$1,317,422	\$39,512	\$2,162,079	\$98,180	\$1,580,511	\$738,749	\$409,938	\$211,321	\$346,013	\$342,762	\$375,527	\$3,181,544	\$0	\$0	\$6,474,800	\$13,625,968
PPA (25 year)	\$136,557	-	-	\$690,735	-	-	-	-	-	-	-	\$165,704	\$224,496	-	\$1,393,969	\$0	\$0	\$2,611,461	\$2,611,461
Direct Purchase - incl O&M, rebate (25 year)	\$108,596	-	-	\$616,734	-	-	-	-	-	-	-	\$112,759	\$152,642	-	\$946,520	\$0	\$0	\$1,937,251	\$1,937,251
Lease/Loan (25 year)	\$115,940	-	-	\$654,241	-	-	-	-	-	-	-	\$118,901	\$160,978	-	\$999,387	\$0	\$0	\$2,049,447	\$2,049,447
<b>% Energy Cost Savings (Undiscounted)</b>																			
Direct Purchase (25 year)	73%	-	-	65%	-	-	-	-	-	-	-	75%	65%	-	77%	-	-	-	-
Lease/Loan (25 year)	67%	-	-	57%	-	-	-	-	-	-	-	70%	59%	-	72%	-	-	-	-
PPA (25 year)	54%	-	-	49%	-	-	-	-	-	-	-	53%	36%	-	57%	-	-	-	-
<b>Levelized Cost of Energy (LCOE) Analysis</b>																			
Utility LCOE (\$/kWh) - (25 year)	0.3648	-	-	0.3484	-	-	-	-	-	-	-	0.3524	0.3558	-	0.4555	-	-	0.4072	-
Direct Purchase LCOE (\$/kWh) - (25 year)	0.2970	-	-	0.2290	-	-	-	-	-	-	-	0.2895	0.2290	-	0.2098	-	-	0.1998	-
Lease/Loan LCOE (\$/kWh) - (25 year)	0.1222	-	-	0.1496	-	-	-	-	-	-	-	0.1066	0.1470	-	0.1255	-	-	0.1321	-
PPA LCOE (\$/kWh) - (25 year)	0.1667	-	-	0.1793	-	-	-	-	-	-	-	0.1657	0.2289	-	0.1960	-	-	0.1908	-

Note: The above analysis uses 5% utility escalation rate