Application of SAN DIEGO GAS & ELECTRIC)
COMPANY for authority to update its gas and)
electric revenue requirement and base rates)
effective January 1, 2019 (U 902-M))

Application No. 17-10-___

Exhibit No.: (SDG&E-34-WP)

WORKPAPERS TO
PREPARED DIRECT TESTIMONY
OF MATTHEW C. VANDERBILT
ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY
VOLUME 2 OF 2

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

OCTOBER 2017

SDGE

A Sempra Energy utility®

48	New York	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50	44.8	45.8	Operating	7/24/2002			14	1	Y		NG	
49	California	GT	GT	General Electric Co	General Electric Co-LM6000PD Sprint	49.9	48.1	48.1	Operating	6/29/2010			6	1	Y		NG	
50	Alberta	GT	GT	General Electric Co	General Electric Co-GE LM6000	40	40	40	Operating	12/2/2009			6	1	Y		NG	
51	Alberta	GT	GT	General Electric Co	General Electric Co-GE LM6000	40	40	40	Operating	12/2/2009			6	1	Y		NG	
52	Alberta	GT	GT	General Electric Co	General Electric Co-GE LM6000	40	40	40	Operating	12/2/2009			6	1	Y		NG	
53	Massachusetts	GT	GT	General Electric Co	General Electric Co-GE LM6000	60	36.908	46.908	Operating	6/7/2002			14	1	Y		NG	
54	Massachusetts	GT	GT	General Electric Co	General Electric Co-GE LM6000	60	37.441	47.441	Operating	6/7/2002			14	1	Y		NG	
55	New York	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	60	48.5	49.1	Operating	6/21/2004			12	1	Y		NG	
56	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.9	48.71	48.71	Operating	1/1/2014			2	1	Y		NG	
57	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	47	45	45	Operating	1/1/2003			13	1	Y		NG	
58	New York	GT	GT	General Electric Co	General Electric Co-LM5000PC	47	42	47	Retired	2/1/1991	9/30/2008		17	1	Y		NG	
59	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	49.9	49.9	Operating	12/14/2001			14	1	Y		NG	
60	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	49.9	49.9	Operating	12/14/2001			14	1	Y		NG	
61	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	45	45	Operating	2/13/2002			14	1	Y		NG	
62	California	GT	GT	General Electric Co	General Electric Co-GE LM6000	57.4	48	48	Operating	3/1/2004			12	1	Y		NG	
63	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	47	45	45	Operating	1/1/2003			13	1	Y		NG	
64	Alaska	GT	GT	General Electric Co	General Electric Co-GE LM6000	48	44	49	Operating	4/30/2014			2	1	Y		NG	
65	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	49.9	46.7	46.7	Operating	7/26/2001			15	1	Y		NG	
66	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	49.9	47.6	47.6	Operating	7/26/2001			15	1	Y		NG	
67	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	49.9	48.2	48.2	Operating	9/10/2001			15	1	Y		NG	
68	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	47.3	38	45.8	Operating	11/1/2001			14	1	Y		NG	
69	Arkansas	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	57.4	46	49	Operating	5/1/2003			13	1	Y		NG	
70	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	47.3	44	44.5	Operating	1/14/2002			14	1	Y		NG	
71	Louisiana	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50.4	47	47	Operating	6/9/2006			10	1	Y		NG	
72	Louisiana	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50.4	47	47	Operating	6/9/2006			10	1	Y		NG	
73	Louisiana	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50.4	47	47	Operating	7/29/2005			11	1	Y		NG	
74	Louisiana	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50.4	47	47	Operating	7/29/2005			11	1	Y		NG	
75	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	49.9	45.6	45.6	Operating	7/13/2001			15	1	Y		NG	
76	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	49.9	46	46	Operating	7/13/2001			15	1	Y		NG	
77	Nevada	GT	GT	General Electric Co	General Electric Co-LM6000PA	49.8	41	43	Converted	3/1/1994	3/31/1994		0	1	Y		NG	
78	Nebraska	GT	GT	General Electric Co	General Electric Co-LM6000PD Sprint	46	39.4	50.9	Converted	8/1/2003	7/11/2004		0	1	Y		NG	
79	Nebraska	GT	GT	General Electric Co	General Electric Co-LM6000PD Sprint	45	39.2	50.8	Converted	8/1/2003	7/11/2004		0	1	Y		NG	
80	Nebraska	GT	GT	General Electric Co	General Electric Co-LM6000PD Sprint	46	40.7	48.4	Operating	11/13/2003			12	1	Y		NG	
81	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	47	43	43	Operating	9/6/2001			15	1	Y		NG	
82	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	45	45	45	Converted	3/7/2003	8/12/2013		10	1	Y		NG	
83	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	45	45	45	Converted	3/7/2003	8/12/2013		10	1	Y		NG	
84	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	45	45	45	Converted	3/7/2003	8/12/2013		10	1	Y		NG	
85	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	45	45	45	Converted	3/7/2003	8/12/2013		10	1	Y		NG	
86	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
87	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	7/25/2002			14	1	Y		NG	
88	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	7/25/2002			14	1	Y		NG	
89	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	7/25/2002			14	1	Y		NG	
90	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
91	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
92	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
93	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
94	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
95	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
96	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
97	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	42	45	Operating	6/1/2002			14	1	Y		NG	
98	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.9	49.9	49.9	Operating	10/9/2012			4	1	Y		NG	
99	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.9	49.9	49.9	Operating	10/9/2012			4	1	Y		NG	
100	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.9	49.9	49.9	Operating	10/9/2012			4	1	Y		NG	
101	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.9	49.9	49.9	Operating	10/9/2012			4	1	Y		NG	
102	Montana	GT	GT	General Electric Co	General Electric Co-GE LM6000	43	40.1	43.2	Operating	5/30/2003			13	1	Y		NG	
103	Alberta	GT	GT	General Electric Co	General Electric Co-GE LM6000	41.5	41.5	41.5	Operating	10/1/2003			13	1	Y		NG	
104	Alberta	GT	GT	General Electric Co	General Electric Co-LM6000PD	41.5	41.5	41.5	Operating	8/31/2010			6	1	Y		NG	
105	California	GT	GT	General Electric Co	General Electric Co-LM5000-PD (STIG)	50.4	48	50	Operating	11/1/1993			22	1	Y		NG	
106	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	53	40.5	45.7	Operating	7/1/2002			14	1	Y		NG	

107	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	53	41.1	46.3	Operating	7/1/2002			14	1	Y		NG
108	New York	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	53	40	46.8	Operating	5/30/2002			14	1	Y		NG
109	New York	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	53	40	43.2	Operating	5/30/2002			14	1	Y		NG
110	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	46.5	47	Operating	7/1/2001			15	1	Y		NG
111	New York	GT	GT	General Electric Co	General Electric Co-LM6000PC	47	40	39.9	Operating	6/1/2001			15	1	Y		NG
112	New York	GT	GT	General Electric Co	General Electric Co-LM6000PC	47	39.9	40	Operating	6/1/2001			15	1	Y		NG
113	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	39.9	39.9	Operating	7/1/2001			15	1	Y		NG
114	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	39.9	39.9	Operating	7/1/2001			15	1	Y		NG
115	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	45.1	46.6	Operating	8/1/2001			15	1	Y		NG
116	New York	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	45.5	46.8	Operating	8/1/2001			15	1	Y		NG
117	California	GT	GT	General Electric Co	General Electric Co-LM5000-PD (STIG)	50	49.3	49.9	Operating	4/1/1996			20	1	Y		NG
118	Nova Scotia	GT	GT	General Electric Co	General Electric Co-LM6000PC	49	47	49	Converted	11/1/2003	2/23/2012		8	1	Y		NG
119	Nova Scotia	GT	GT	General Electric Co	General Electric Co-LM6000PC	49	47	49	Converted	1/18/2005	2/23/2012		7	1	Y		NG
120	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	59	47.8	47.8	Operating	4/21/2010			6	1	Y		NG
121	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	59	48	48	Operating	4/21/2010			6	1	Y		NG
122	Minnesota	GT	GT	General Electric Co	General Electric Co-LM6000PC	50	41.9	41.9	Standby	6/1/2003			13	1	Y		NG
123	Alaska	GT	GT	General Electric Co	General Electric Co-GE LM6000	42.5	42.5	42.5	Operating	7/1/1999			17	1	Y		NG
124	New York	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50	47	47	Converted	7/1/2005	9/30/2005		0	1	Y		NG
125	California	GT	GT	General Electric Co	General Electric Co-LM5000-PD (STIG)	49.5	48.5	48.5	Operating	11/1/1989			26	1	Y		NG
126	Connecticut	GT	GT	General Electric Co	General Electric Co-GE LM6000	44.66	42.861	48.6	Operating	5/23/2012			4	1	Y		NG
127	Connecticut	GT	GT	General Electric Co	General Electric Co-GE LM6000	44.66	42.861	48.6	Operating	5/23/2012			4	1	Y		NG
128	Connecticut	GT	GT	General Electric Co	General Electric Co-GE LM6000	44.66	42.861	48.6	Operating	5/23/2012			4	1	Y		NG
129	Pennsylvania	GT	GT	General Electric Co	General Electric Co-GE LM6000	43.8	44	44	Operating	11/1/2000			15	1	Y		NG
130	Pennsylvania	GT	GT	General Electric Co	General Electric Co-GE LM6000	43.8	44	44	Operating	11/1/2000			15	1	Y		NG
131	New Mexico	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	42.3	41	41.3	Operating	12/31/2015			0	1	Y		NG
132	New Mexico	GT	GT	General Electric Co	General Electric Co-LM6000PC	44	37	43	Operating	6/24/2002			14	1	Y		NG
133	New Mexico	GT	GT	General Electric Co	General Electric Co-LM6000PC	44	37	43	Operating	6/24/2002			14	1	Y		NG
134	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50	50	50	Operating	6/26/2006			10	1	Y		NG
135	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	50	50	50	Operating	6/26/2006			10	1	Y		NG
136	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	48	48	48	Operating	4/1/2011			5	1	Y		NG
137	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	48	48	48	Operating	4/1/2011			5	1	Y		NG
138	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	47	46.1	46.1	Operating	5/1/2003			13	1	Y		NG
139	Illinois	GT	GT	General Electric Co	General Electric Co-LM5000PC	41.5	29.5	30	Operating	6/1/1999			17	1	Y		NG
140	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	44	49.5	49.5	Operating	5/10/2001			15	1	Y		NG
141	California	GT	GT	General Electric Co	General Electric Co-GE LM6000	53	47	47	Operating	6/27/2005			11	1	Y		NG
142	California	GT	GT	General Electric Co	General Electric Co-GE LM6000	53	47.9	47.9	Operating	8/12/2009			7	1	Y		NG
143	Saskatchewan	GT	GT	General Electric Co	General Electric Co-GE LM6000	43	43	43	Operating	12/1/2010			5	1	Y		NG
144	Saskatchewan	GT	GT	General Electric Co	General Electric Co-GE LM6000	43	43	43	Operating	12/1/2010			5	1	Y		NG
145	Saskatchewan	GT	GT	General Electric Co	General Electric Co-GE LM6000	43	43	43	Operating	12/1/2010			5	1	Y		NG
146	Saskatchewan	GT	GT	General Electric Co	General Electric Co-LM6000PD Sprint	47	47	47	Operating	12/1/2009			6	1	Y		NG
147	Saskatchewan	GT	GT	General Electric Co	General Electric Co-LM6000PD Sprint	47	47	47	Operating	12/1/2009			6	1	Y		NG
148	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	60	46.8	59.3	Standby	3/15/2001			15	1	Y		NG
149	Illinois	GT	GT	General Electric Co	General Electric Co-LM6000PC	60	47.7	59.3	Standby	3/15/2001			15	1	Y		NG
150	Alabama	GT	GT	General Electric Co	General Electric Co-GE LM6000	51.5	50	50	Operating	6/1/1999			17	1	Y		NG
151	Alabama	GT	GT	General Electric Co	General Electric Co-GE LM6000	51.5	50	50	Operating	6/1/1999			17	1	Y		NG
152	Mississippi	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	43	47	Operating	7/8/2003			13	1	Y		NG
153	Mississippi	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	43	47	Operating	7/8/2003			13	1	Y		NG
154	Mississippi	GT	GT	General Electric Co	General Electric Co-GE LM6000	47	43	47	Operating	7/8/2003			13	1	Y		NG
155	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.8	47	47	Operating	8/1/2007			9	1	Y		NG
156	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.8	47	47	Operating	8/1/2007			9	1	Y		NG
157	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.8	46	46	Operating	8/1/2007			9	1	Y		NG
158	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.8	46	46	Operating	8/1/2007			9	1	Y		NG
159	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49.8	49	49	Operating	11/1/2012			3	1	Y		NG
160	Georgia	GT	GT	General Electric Co	General Electric Co-GE LM6000	60	48.5	48.5	Operating	6/1/1999			17	1	Y		NG
161	Georgia	GT	GT	General Electric Co	General Electric Co-GE LM6000	60	48.5	48.5	Operating	6/1/1999			17	1	Y		NG
162	Oregon	GT	GT	General Electric Co	General Electric Co-GE LM6000	54	41.6	47.3	Retired	7/1/2003	12/31/2008		5	1	Y		NG
163	Oregon	GT	GT	General Electric Co	General Electric Co-GE LM6000	54	41.6	47.3	Retired	7/1/2003	5/31/2007		3	1	Y		NG
164	Utah	GT	GT	General Electric Co	General Electric Co-LM6000PD	40	36.8	39	Operating	4/3/2006			10	1	Y		NG
165	Utah	GT	GT	General Electric Co	General Electric Co-LM6000PD	40	36.8	39	Operating	7/1/2010			6	1	Y		NG

166	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	46.1	45.9	48.7	Operating	8/27/2001			15	1	Y		NG
167	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	46.1	45.9	48.7	Operating	8/27/2001			15	1	Y		NG
168	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49	46.3	48.3	Operating	6/1/2002			14	1	Y		NG
169	California	GT	GT	General Electric Co	General Electric Co-LM6000PC Sprint	49	46.1	47.8	Operating	6/1/2002			14	1	Y		NG
170	Florida	GT	GT	General Electric Co	General Electric Co-GE LM6000	60	46	48	Operating	9/4/2005			11	1	Y		NG
171	Florida	GT	GT	General Electric Co	General Electric Co-GE LM6000	60	46	48	Operating	11/2/2005			10	1	Y		NG
172	Texas	GT	GT	General Electric Co	General Electric Co-LM6000PD	48	48	48	Operating	8/24/2010			6	1	Y		NG
173	Alberta	GT	GT	General Electric Co	General Electric Co-LM6000PD	40.8	40.8	40.8	Operating	11/28/2001			14	1	Y		NG
174	New Brunswick	GT	GT	General Electric Co	General Electric Co-LM6000PD	44	44	44	Operating	12/1/2004			11	1	Y		NG
175	New Brunswick	GT	GT	General Electric Co	General Electric Co-LM6000PD	44	44	44	Operating	12/1/2004			11	1	Y		NG
176	Florida	GT	GT	General Electric Co	General Electric Co-LM6000PD Sprint	46.8	31	35	Operating	2/1/1990			26	1	Y		NG
177	California	GT	GT	General Electric Co	General Electric Co-GE LM6000	49.5	49.5	49.5	Operating	11/15/2003			12	1	Y		NG
178	California	GT	GT	General Electric Co	General Electric Co-LM5000-PD (STIG)	49.5	49.5	49.5	Retired	4/1/1996	11/15/2003		7	1	Y		NG
179	California	GT	GT	General Electric Co	General Electric Co-GE LM6000 PG	58	50	58	Operating	7/13/2012			4	1	Y		NG
180	California	GT	GT	General Electric Co	General Electric Co-GE LM6000 PG	58	50	58	Operating	7/13/2012			4	1	Y		NG
181	California	GT	GT	General Electric Co	General Electric Co-GE LM6000 PG	58	50	58	Operating	7/13/2012			4	1	Y		NG
182	Texas	GT	GT	General Electric Co	General Electric Co-GE LM6000	51.3	51.3	51.3	Operating	2/26/2015			1	1	Y		NG
183	Texas	GT	GT	General Electric Co	General Electric Co-GE LM6000	51.3	51.3	51.3	Operating	2/26/2015			1	1	Y		NG
184	Texas	GT	GT	General Electric Co	General Electric Co-GE LM6000	51.3	51.3	51.3	Operating	2/26/2015			1	1	Y		NG
185	California	GT	GT	General Electric Co	General Electric Co-LM6000PC	51	45.4	46.8	Operating	10/23/2002			14	1	Y		NG
186	Connecticut	GT	GT	General Electric Co	General Electric Co-LM6000PA	50	43.473	49.181	Operating	1/15/2002			14	1	Y		NG
187	Connecticut	GT	GT	General Electric Co	General Electric Co-LM6000PA	50	43.019	50	Operating	1/15/2002			14	1	Y		NG
188	Connecticut	GT	GT	General Electric Co	General Electric Co-LM6000PA	50	44.566	49.177	Operating	1/15/2002			14	1	Y		NG
189	Connecticut	GT	GT	General Electric Co	General Electric Co-LM6000PA	50	43.157	48.049	Operating	1/15/2002			14	1	Y		NG
190	Connecticut	GT	GT	General Electric Co	General Electric Co-LM6000PA	50	44.425	50	Operating	1/15/2002			14	1	Y		NG
191	Utah	GT	GT	General Electric Co	General Electric Co-LM6000PC	43.4	37	41	Operating	6/14/2002			14	1	Y		NG
192	Utah	GT	GT	General Electric Co	General Electric Co-LM6000PC	43.4	37	41	Operating	6/14/2002			14	1	Y		NG
193	Utah	GT	GT	General Electric Co	General Electric Co-LM6000PC	43.4	37	41	Operating	6/14/2002			14	1	Y		NG
194	Utah	GT	GT	General Electric Co	General Electric Co-LM6000PC	43.4	37	41	Operating	6/14/2002			14	1	Y		NG
195	Utah	GT	GT	General Electric Co	General Electric Co-LM6000PC	43.4	37	41	Operating	7/30/2002			14	1	Y		NG
196	Kansas	GT	GT	General Electric Co	General Electric Co-GE LM6000	54	45	45	Operating	6/11/2008			8	1	Y		NG
197	Kansas	GT	GT	General Electric Co	General Electric Co-GE LM6000	54	45	45	Operating	6/11/2008			8	1	Y		NG
198	Kansas	GT	GT	General Electric Co	General Electric Co-GE LM6000	54	44	44	Operating	6/11/2008			8	1	Y		NG
199	Kansas	GT	GT	General Electric Co	General Electric Co-GE LM6000	54	46	46	Operating	6/11/2008			8	1	Y		NG
200	Oklahoma	GT	GT	General Electric Co	General Electric Co-GE LM6000	45	45	45	Operating	7/22/2009			7	1	Y		NG
201	Oklahoma	GT	GT	General Electric Co	General Electric Co-GE LM6000	45	45	45	Operating	7/22/2009			7	1	Y		NG
202	Oklahoma	GT	GT	General Electric Co	General Electric Co-GE LM6000	45	45	45	Operating	7/22/2009			7	1	Y		NG
203	Oklahoma	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	45	45	Operating	5/1/2001			15	1	Y		NG
204	Oklahoma	GT	GT	General Electric Co	General Electric Co-LM6000PC	45	45	45	Operating	5/1/2001			15	1	Y		NG

Appendix D

Explanation of Variance from Previous Cost Studies

Miramar Variance Explanation

Cost Category	2010 Cost Estimate Cost	2016 Cost Estimate Cost	Delta	Comment
21 - Civil	$25,221	$153,821	$128,600	In 2016, the assumption for the thickness of cover material was changed from 24 inches to 6 inches decreasing costs. The cost decrease was offset by the increase in pavement quantities due to a change in site area.
22 - Concrete	$220,412	$258,596	$38,184	In 2016, the estimated quantity of concrete increased due to plant modifications since the time of the last estimate.
23 - Steel	$24,630	$27,694	$3,064	In 2016, there were no changes in quantities. The increase reflects change in costs over time.
24 - Architectural	$27,301	$50,341	$23,040	In 2016, the estimated quantities were increased due to plant modifications since the time of the last estimate
31 - Mech. Equipment	$282,718	$317,885	$35,167	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
35 - Piping	$17,413	$19,579	$2,166	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
41 - Electrical Equipment	$76,678	$85,623	$8,945	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
42 - Raceway, Cable Tray & Conduit	$50,321	$56,580	$6,259	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
43 - Cable	$38,884	$43,721	$4,837	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
44 - Control & Instrumentation	$11,437	$12,859	$1,422	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
98 - Waste	$260,560	$43,572	($216,988)	The 2016 estimate assumes concrete will be recycled on-site, which is the prevailing approach to demolition. The previous estimate assumed concrete would be removed from the site for disposal.
81 - Scrap (Copper)	($194,776)	($173,692)	$21,084	The market value of scrap copper decreased since the time of the last estimate (from $3,880 per ton to $3,460 per ton).
81 - Scrap (Steel)	($222,405)	($84,493)	$137,912	The market value of scrap steel decreased since the time of the last estimate (from $229 per ton to $87 per ton).
Direct Cost	**$618,394**	**$812,086**	**$193,692**	
G&A and Profit	$0	$133,783	$133,783	In the previous estimate G&A and profit was included in the wage rate, but in 2016 it was shown separately
Engineering	$49,472	$60,000	$10,528	
Construction Management Support	$12,368	$18,917	$6,549	
Total Contingency	$302,919	$308,232	$5,313	
Total Project Cost	**$983,153**	**$1,333,018**	**$349,865**	

Prepared by

Sargent & Lundy LLC
Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

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Cuyamaca Peak Energy Plant
Decommissioning Study

Prepared for
San Diego Gas & Electric Company

Report SL-013559.C

Project 12699-004
February 2017

SDGE
A Sempra Energy utility®

F I N A L

Cuyamaca Peak Energy Plant
Decommissioning Study

Prepared for
San Diego Gas & Electric Company

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LEGAL NOTICE

This report ('Deliverable') was prepared by Sargent & Lundy, L.L.C. ('S&L'), expressly for the sole use of San Diego Gas & Electric Company ('Client') in accordance with the agreement between S&L and Client. This Deliverable was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances. Client acknowledges (1) S&L prepared this Deliverable subject to the particular scope limitations, budgetary and time constraints, and business objectives of the Client; (2) information and data provided by others may not have been independently verified by S&L; and (3) the information and data contained in this Deliverable are time sensitive and changes in the data, applicable codes, standards, and acceptable engineering practices may invalidate the findings of this Deliverable. Any use or reliance upon this Deliverable by third parties shall be at their sole risk.

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Cuyamaca Peak Energy Plant Decommissioning Study

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TABLES & FIGURES

ACRONYMS AND ABBREVIATIONS

Term	Definition or Clarification
ASL	Average Service Life
COD	Commercial operation date
CT(s)	Combustion turbine(s)
Cuyamaca	Cuyamaca Peak Energy Plant
DLN	Dry low-NO_X
FERC	Federal Energy Regulatory Commission
kV	Kilovolts
kVA	Kilovolt amperes
MVA	Megavolt amperes
MW	Megawatts
NO_X	Nitrogen oxide
O&M	Operations and maintenance
Owner	San Diego Gas & Electric Company
OEM(s)	Original equipment manufacturer(s)
PCB	Polychlorinated biphenyl
PWPS	Pratt & Whitney Power Systems
S&L	Sargent & Lundy LLC
SCR	Selective catalytic reduction
SDG&E	San Diego Gas & Electric Company

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EXECUTIVE SUMMARY

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform an independent conceptual dismantling cost estimate and an average service life estimate for the Cuyamaca Peak Energy Plant (Cuyamaca) near San Diego, California. The work scope included a review of drawings and documents of the facility, a site visit, and the development of a conceptual demolition cost estimate and report.

METHODOLOGY

The S&L methodology for developing the cost estimate consisted of three elements: 1) our experience in developing plant demolition costs and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities. The cost estimate was developed based on the drawings, documents, and data provided by the Owner. These drawings and documents were used to estimate the building foundation sizes, building volumes, steel quantities, quantity of piping, valves, and other equipment. A site walkdown was performed to conduct a review of the site for dismantlement and determine any unique site-specific requirements. This information was used with unit cost factors developed by S&L based on industry data and our experience. Unit cost factors for concrete removal, steel removal, cutting costs, and so forth were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

The S&L methodology for estimating the Average Service Life (ASL) of the facility is based on a review of the operations and maintenance (O&M) history of the site, a benchmarking analysis of similar facilities, and information from the facility's major original equipment manufacturers (OEMs).

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CONCEPTUAL COST ESTIMATE

Cuyamaca Peak Energy Plant

The summary of the cost estimate for decommissioning Cuyamaca is shown in Table ES-1. The cost estimate broken into Federal Energy Regulatory Commission (FERC) accounts is shown in Table ES-2. All costs are in 2016 US dollars. The decommissioning costs are expected to increase by the end of service life of the facility due to escalation.

Table ES-1 — Cost Estimate Summary Cuyamaca Peak Energy Plant

Acct	Description		Scrap Value	Material Cost	Labor Cost	Total Cost
11.21	Civil Work			$ 70,712	$ 107,414	$ 178,126
11.22	Concrete				$ 70,324	$ 70,324
11.23	Steel		$ (12,041)		$ 47,554	$ 35,513
11.24	Architectural				$ 10,298	$ 10,298
11.31	Mechanical Equipment		$ (21,576)		$ 112,118	$ 90,542
11.35	Piping		$ (2,784)		$ 14,081	$ 11,297
11.41	Electrical Equipment		$ (9,701)		$ 59,535	$ 49,834
11.42	Raceway, Cable Tray, & Conduit				$ 28,290	$ 28,290
11.43	Cable				$ 47,579	$ 47,579
11.44	Control & Instrumentation				$ 12,859	$ 12,859
11.98	Waste			$ 13,659		$ 13,659
11.81	Scrap Value		$ (96,880)			$ (96,880)
	Subtotal Direct & Construction Indirect Cost		$ (142,982)	$ 84,371	$ 510,052	$ 451,441
91.9	Contractor's General and Administration Expense - % of ACCT No. 90, 91-1 to 91-8	7.0%			$ 25,503	*$ 25,503*
91.10	Contractor's Profit - % of ACCT No. 90, 91-1 to 91-8	8.0%		$ 6,750	$ 40,804	*$ 47,554*
	Subtotal		$ -	$ 6,750	$ 66,307	$ 73,057
93.1	Engineering, Procurement, & Project Services - % of ACCT No. 92	6.0%				*$ 45,000*
93.2	Construction Management Support - % of ACCT No. 92	2.0%				*$ 10,490*
	Subtotal of Indirect Costs					*$ 55,490*
95.1	Contingency on Scrap Value - % of ACCT No. 92, 94.1	20.0%	$ 28,596			*$ 28,596*
95.2	Contingency on Material - % of ACCT No. 92, 94.2	20.0%		$ 18,224		*$ 18,224*
95.3	Contingency on Labor - % ACCT No. 92, 94.3	20.0%			$ 115,272	*$ 115,272*
95.4	Contingency on Indirect - % of ACCT No. 93, 94.4	20.0%				*$ 11,098*
	Subtotal Contingency		$ 28,596	$ 18,224	$ 115,272	*$ 173,190*
	Total Project Cost		**$ (114,386)**	**$ 109,345**	**$ 691,631**	**$ 753,178**

Table ES-2 — Cuyamaca Peak Energy Plant Cost Estimate Summary by FERC Account

FERC NO.	Description	Scrap Value	Material Cost	Labor Cost	Other Direct Cost	Indirect Cost	Contingency	*Total Cost*
341	Other Production - Structures & Improvements	$ (7,630)	$ 84,371	$ 175,683	$ 29,588		$ 59,455	*$ 341,467*
342	Other Production - Fuel Holders, Producers and Accessories	$ (6,743)		$ 26,629	$ 3,462		$ 7,367	*$ 30,715*
343	Other Production - Prime Movers				$ -		$ -	*$ -*
344	Other Production - Generators	$ (22,028)		$ 151,518	$ 19,697		$ 38,649	*$ 187,836*
345	Other Production - Accessory Electric Equipment	$ (106,581)		$ 156,222	$ 20,309		$ 56,622	*$ 126,572*
I1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES (Approx 85% Steam Plant)					$ 45,000	$ 9,000	*$ 54,000*
I2	CONSTRUCTION MANAGEMENT SUPPORT (Approx 85% Steam Plant)					$ 10,490	$ 2,098	*$ 12,588*
I3	S-U/COMMISSIONING							*$ -*
I4	OWNERS COST							*$ -*
I5	EPC FEE							*$ -*
	Total Project Cost	**$ (142,982)**	**$ 84,371**	**$ 510,052**	**$ 73,056**	**$ 55,490**	**$ 173,191**	**$ 753,178**

AVERAGE SERVICE LIFE

Generally, simple-cycle power plants based on natural-gas-fired combustion turbines (CTs) are expected to have a service life of 30 years or more. SDG&E stated that inspections are performed monthly, quarterly, and semiannually on the CTs and balance of plant; maintenance on the CTs is performed during an annual outage. The average service life of Cuyamaca is expected to be 30 years or more, with prudent O&M. However, considering the regional transition to renewable energy resources and other regulatory impacts in California, a reduction in estimated service life may be realistic. Considering the high potential for early retirement of current technologies will allow utilization costs to be more appropriately assigned to ratepayers.

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SARGENT & LUNDY LLC

Prepared by

Bradley E. Toon
Senior Management Consultant

Clifford J. Kozak
Senior Management Consultant

Borko Andric
Project Associate
Cost Information Division

Lara A. Bledin
Management Consultant

Reviewed by

Matt N. Ozan
Manager
Cost Information Division

Robert. P. Charles
Senior Principal Consultant &
Project Manager

Approved by

Robert. P. Charles
Senior Principal Consultant &
Project Manager

February 1, 2016
Date

LAST PAGE OF EXECUTIVE SUMMARY.

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1. SCOPE OF WORK

Sargent & Lundy (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform an independent conceptual cost estimate and average service life estimate for the Cuyamaca Peak Energy Plant (Cuyamaca) near San Diego, California. The work scope included review of drawings and documents of the facility, a site visit, and the development of a conceptual demolition cost estimate and report as well as an average service life.

S&L has been dedicated to providing complete engineering and environmental services exclusively to the power industry since 1891. Through our work with various utilities, lending institutions, and developers over the years, S&L Consulting has become one of the premier power project consultants in the power industry. This commitment to quality is proven by the successful completion of our International Organization for Standardization (ISO) 9000 certification audit. Our experience encompasses independent engineer services, including decommissioning cost estimations and average service life evaluations for both global and domestic electric power assets. S&L has recently completed decommissioning studies for a number of clients.

S&L has engineered over 958 power plant units. We have both the benefit of extensive design experience with feedback from operating plants as well as individuals with extensive plant operations experience to support our consulting services.

LAST PAGE OF SECTION 1.

2. GENERAL DESCRIPTION

2.1 CUYAMACA PEAK ENERGY PLANT

Cuyamaca consists of two simple-cycle combustion turbine (CT) generators located in the El Cajon area of San Diego, California. The units began service in May 2002. In January 2012, the ownership of the plant was transferred from CalPeak Power to SDG&E.

The CTs are Pratt & Whitney Power Systems (PWPS) Model FT8® SWIFTPAC® aeroderivative turbines. Each CT is rated for 25 megawatts (MW) and is equipped with dry low-nitrogen oxide (NO_X) burners ("DLN" burners).

Cuyamaca includes one 71-megavolt-ampere (MVA) electric generator mounted on a common shaft with the two CTs as well as a selective catalytic reduction (SCR) unit in an exhaust duct common to both CTs to further reduce NO_X emissions to the permitted level. Additionally, the CTs are equipped with a fogging system that cools the inlet air and boosts the power output of the CTs.

LAST PAGE OF SECTION 2.

3. COST ESTIMATE

3.1 METHODOLOGY

The methodology used for developing the cost estimate includes a combination of stochastic and deterministic methods. Deterministic methods were used based on the quantity and size of equipment (e.g., the number of foundations, linear feet of piping, equipment, and etc.). Stochastic methods were also used if quantity information (e.g., fire lines and hydrants, misc. electrical equipment, etc.) was not available.

The cost estimate was developed based on drawings, documents, and data provided by the Owner. These drawings and documents were used to estimate the building foundation sizes, building volumes, steel quantities, quantity of piping, valves, and other equipment.

The S&L methodology for developing the cost estimate consisted of three elements: 1) our experience in developing plant demolition costs and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities.

Cost estimates were created using the S&L cost model format and the S&L cost database. The estimates developed include details for each type of work performed, indirect costs, and contingencies. The cost estimate database report lists costs by buildings, plant systems, and several other categories.

An inventory of plant piping, valves, equipment, HVAC ducts, concrete, galleries, cable trays, and other equipment was developed based on a review of drawings and data provided. Mr. Borko Andric and Mr. Brad Toon of S&L visited the plant and performed a site walkdown to conduct a review of the site for dismantlement and to determine any unique site-specific requirements. This information was used with unit cost factors developed by S&L based on industry data and our experience. Unit cost factors for concrete removal, steel removal, cutting costs, and other tasks were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

S&L worked from site general arrangement drawings and company documentation for the facilities, including information about any existing or un-remediated metal cleaning storage ponds, asbestos inventories,

polychlorinated biphenyl (PCB) inventories, or sludge ponds. S&L relied on SDG&E to identify the location of environmental problems that need to be considered in the estimates, since our scope of work does not include a detailed survey and testing program to identify such problems.

3.2 COST ESTIMATE SUMMARY

3.2.1 Cuyamaca Peak Energy Plant

The summary of the cost estimate for decommissioning Cuyamaca is shown in Table 3-1 below. The commercial and technical basis for the estimate is included in Section 4. The detailed estimate is included in Appendix A. The breakdown into Federal Energy Regulatory Commission (FERC) accounts is shown in Table 3-2. The allocation of FERC accounts is shown in Appendix B. All costs are in 2016 US dollars. The decommissioning costs are expected to increase by the end of service life of the asset due to escalation.

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Table 3-1 — Cost Estimate Summary for Cuyamaca Peak Energy Plant

Acct	Description		Scrap Value	Material Cost	Labor Cost	Total Cost
11.21	Civil Work			$ 70,712	$ 107,414	$ 178,126
11.22	Concrete				$ 70,324	$ 70,324
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11.42	Raceway, Cable Tray, & Conduit				$ 28,290	$ 28,290
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	Subtotal Contingency		$ 28,596	$ 18,224	$ 115,272	*$ 173,190*
	Total Project Cost		**$ (114,386)**	**$ 109,345**	**$ 691,631**	**$ 753,178**

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Table 3-2 — Cost Estimate Summary by FERC Account for Cuyamaca Peak Energy Plant

FERC NO.	Description	Scrap Value	Material Cost	Labor Cost	Other Direct Cost	Indirect Cost	Contingency	*Total Cost*
341	Other Production - Structures & Improvements	$ (7,630)	$ 84,371	$ 175,683	$ 29,588		$ 59,455	*$ 341,467*
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343	Other Production - Prime Movers				$ -		$ -	*$ -*
344	Other Production - Generators	$ (22,028)		$ 151,518	$ 19,697		$ 38,649	*$ 187,836*
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I2	CONSTRUCTION MANAGEMENT SUPPORT (Approx 85% Steam Plant)					$ 10,490	$ 2,098	*$ 12,588*
I3	S-U/COMMISSIONING							*$ -*
I4	OWNERS COST							*$ -*
I5	EPC FEE							*$ -*
	Total Project Cost	**$ (142,982)**	**$ 84,371**	**$ 510,052**	**$ 73,056**	**$ 55,490**	**$ 173,191**	**$ 753,178**

LAST PAGE OF SECTION 3.

4. BASIS OF ESTIMATE

The basis for the cost estimate is as follows:

A. Labor Wage Rates

- Craft labor wage rate selected for the estimates are prevailing rates based on those published in *RSMeans Labor Rates for the Construction Industry*, 2016 Edition, for San Diego, CA.
- The labor estimate is based on a 40-hour workweek, with no per diem or other labor incentives.

B. Labor Crews

- The craft rates are incorporated into work crews appropriate for the activities by adding allowances for small tools, construction equipment, insurance, payment bonds, and site overheads to arrive at the crew rates used in the cost estimate.
- An example of crew rates for demolition of equipment and demolition of concrete is shown in Table 4-1 below:

Table 4-1 — Example Crew Rates

San Diego, CA		Demo Equipment		Demo Concrete	
		$/hr	Percentage	$/hr	Percentage
Crew Base		$ 32.74	31%	$38.33	33%
Crew Fringes		$ 19.34	18%	$21.11	18%
Crew FICA		$ 2.50	2%	$2.93	2%
Crew SUI		$ 0.42	0%	$0.42	0%
Crew FUI		$ 0.04	0%	$0.04	0%
Crew Workers Comp. Ins		$ 7.50	7%	$8.78	7%
Other *		$ 1.64	2%	$1.92	2%
Equipment		$ 21.55	20%	$20.80	18%
Site OH		$ 21.43	20%	$23.58	20%
Total		$ 107.16	100%	$117.91	100%

* Expendables/Small Tools, Show up Time, Working Foreman, General Liability Insurance

C. Productivity

- The labor productivity is estimated to be 1.2[1] for the San Diego area based on Compass International data relating to productivity experienced on demolition and productivity in the area. For reference, the Houston area has a labor productivity factor of 1.
- No allowances have been made to cover items such as loss in productivity because of inclement weather conditions.

[1] Productivity index calculated as (Specific City Labor Rate) ÷ (National Average Labor Rate) × 100

D. Quantity Sources

- Quantities of pieces of equipment and/or bulk material commodities used in this cost estimate were developed from engineering-supplied information from the sites and the S&L database.

E. Scrap

- Scrap metals are a globally traded commodity and are part of the larger metals industry. The value of scrap metal is subject to constantly changing economic conditions, as such the price of mixed steel, stainless steel, copper, and aluminum can vary greatly over time as a result of global supply and demand. The value of scrap for this study was determined by a three-month average from 'Scrap Metals MarketWatch'(July, August, and September of 2016) for the West Coast (Zone 1) of the United States. The 'Scrap Metals MarketWatch' can be found on the following website:

- www.americanrecycler.com

- The values obtained are delivered prices expressed as cost per gross ton or pound to account for separation, preparation and shipping costs to the mills. Metal recycling is a cyclical industry. The costs used in this study represent market prices in mid-2016, and cannot be used to estimate the value of scrap in the future. Estimated scrap prices are listed in Table 4-2.

Table 4-2 — Estimated Scrap Prices

	#1 & 2 Mixed Steel	#1 Copper	Aluminum	Stainless Steel
	$ / Gross Ton	$/lb.	$/lb.	$/lb.
Date				
July 1, 2016	185	1.95	0.45	0.55
August 1, 2016	185	1.94	0.46	0.57
September 1, 2016	184	1.97	0.47	0.55
3 Month Average	*184.67*	*1.95*	*0.46*	*0.56*
Converted to $/tons	$165 / ton	$3,907 / ton	$920 / ton	$1,113 / ton
Scrap dealer costs - deduct	$78 / ton	$440 / ton	$260 / ton	$200 / ton
Net Value to Utility	**$87 / ton**	**$3,467 / ton**	**$660 / ton**	**$913 / ton**

F. Project Schedule

- 12-month construction schedule.

G. Contractor Costs

- Contractors' general and administrative (G&A) cost is included at 5% of labor and material.
- Contractors' profit is included at 8% of labor and material.

H. Indirect Expenses

- Project indirect expenses are based on percent total direct construction labor only.
- Engineering is included to cover preparation of the decommissioning work specification, engineering required to place the plant in safe shutdown, and any unique engineering required during demolition.
- Construction management and field engineering is estimated to be 2%. This covers oversight of demolition activities but not full-time construction management.
- Owner's costs not included.

I. Escalation Rates

- Not included.

J. Sales and Use Taxes

- Sales and use taxes not included.

K. Contingency

- A 20% contingency is applied for material, labor, and indirect expenses.
- A -20% contingency is applied for scrap value, as a drop in scrap value will result in an increase in project cost.

L. Contract Basis for Estimate

- The estimate is based on a multiple lump sum.

M. Assumptions

- The facility will be in safe-shutdown mode and ready for a decommissioning contractor to start work.
- All chemicals and lubricating oils will be removed from the facilities to be demolished by the utility before demolition.
- No extraordinary environmental costs for demolition will be needed.
- There will be no PCBs on site at the time of demolition.
- Switchyards within the plant boundaries are not part of the scope, nor are access roads to these facilities.
- All items above grade and to a depth of 1 foot will be demolished. All foundations will be removed. Any other items buried more than 1 foot deep will remain in place.
- Underground piping will be abandoned in place.
- Underground piping larger than 4 feet in diameter will be filled with sand or slurry and capped at the ends to prevent collapse (none noted at this site). Non-metal pipe will be collapsed.
- All demolished materials are considered debris, except for organic combustibles and non-embedded metals that have scrap value.
- The basis for salvage estimating is for scrap value only. No resale of equipment or material is included.

- Handling on-site and off-site disposal of hazardous materials will be performed in compliance with methods approved by SDG&E's Environmental Services Department.
- Disturbed areas will be paved, as the site will become a parking lot.
- All borrow material is assumed to be from off-site sources.
- Catalyst is assumed to be removed and returned to the original equipment manufacturer (OEM) before demolition.

LAST PAGE OF SECTION 4.

5. AVERAGE SERVICE LIFE EVALUATION

The S&L methodology for estimating the Average Service Life (ASL) of the facility is based on a review of the operations and maintenance (O&M) history of the site, a benchmarking analysis of similar facilities, information from the facility's major OEMs, and other information from the Sargent & Lundy database.

5.1 DESCRIPTION OF FACILITY

Cuyamaca consists of two simple-cycle CT generators located in the El Cajon area of San Diego, California. The units began service in May 2002. In January 2012, the ownership of the plant was transferred from CalPeak Power to SDG&E. When the plant was owned by CalPeak Power it was called "El Cajon Power Plant." The plant includes the major equipment listed in Table 5-1.

Table 5-1 — List of Equipment

Equipment	Manufacturer / Model	Note
Combustion Turbine #1 (CT1)	Pratt & Whitney FT8® SWIFTPAC® Aeroderivative	25 MW
Combustion Turbine #2 (CT2)	Pratt & Whitney FT8® SWIFTPAC® Aeroderivative	25 MW
Generator (Common – Shared generator)	Brush FR BDAX7-290 ER	13.8 kV; 2,977.8 amp; 71,176 kVA
Generator Step-Up Transformer	Delta Star	13.8 kV-69 kV; 60 MVA

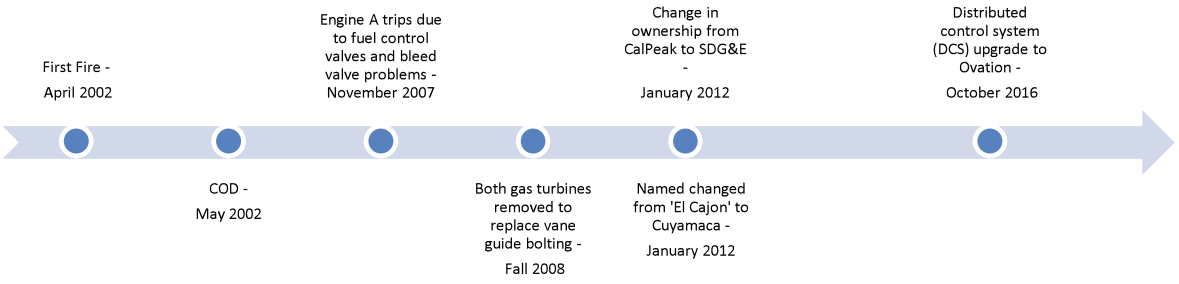
The PWPS Model FT8® SWIFTPAC® CT is part of a line of aeroderivative CTs with decades of operating experience. The CT model installed at Cuyamaca, rated for 25 MW per CT with DLN burners, was introduced commercially in 2003. With the long-term operating experience of this PWPS line of CTs and with the good operating experience at Cuyamaca, the FT8® model is considered proven technology.

Aeroderivative-type CTs (as opposed to heavy-duty frame CTs) are typically selected for simple-cycle peaking service where frequent starts are anticipated and a fast startup time is valued. Considering the elevated number starts for the Cuyamaca units (see Table 5-2 below), an aeroderivative CT is an appropriate selection for Cuyamaca.

Cuyamaca includes one 71-MVA electric generator mounted on a common shaft with the two CTs as well as an SCR unit in an exhaust duct common to both CTs to further reduce NO_X emissions to the permitted level. Additionally, the CTs are equipped with a fogging system that cools the inlet air and boosts the power output of the CTs.

Figure 5-1 below shows the major events and major outages during the life of the plant. The plant has performed regularly scheduled CT maintenance outages and inspections as well as maintenance for balance-of-plant systems.

Figure 5-1 — Timeline of Major Dates in History of Cuyamaca Peak Energy Plant



5.1.1 Site Operation and Maintenance

As shown in Figure 5-1, the unit experienced some problems over its 14-year life:

- In 2007, the "A" engine tripped, requiring corrections/repairs to the fuel control valves and bleed valve and repairs to the unit.

  The engine tripped on CT compressor surge and high vibrations in November 2007. The high-pressure compressor section was damaged along with minor damage to the burner and turbine areas. The CT was sent to the PWPS shop for evaluation and repair. The root cause was determined to be malfunctioning fuel gas control valves and a CT bleed valve in the compressor section which, during transitional operating conditions, caused surges, high vibrations, and consequent damage. The CT was repaired, the control logic and valves were adjusted/corrected, and the condition has reportedly not recurred.
- In 2008, vane guide bolting replacement was performed for both engines.

SDG&E indicated that the average availability of Cuyamaca has been 93.4%. The average capacity factor for Cuyamaca is 6.24%.

Cuyamaca operates as a peaking station, and the operation of the units varies with demand. See Table 5-2 and Table 5-3 for the plant's number of starts and operating hours. The operating profile between the two CTs has been about equal in terms of the total number of starts and operating hours over the plant's lifetime. Following the SDG&E acquisition, both starts and operating hours per year have increased on the order of 35%.

Table 5-2 — Number of Starts

Number of Starts (before change in Ownership)	Starts
2002	142
2003	56
2004	94
2005	63
2006	53
2007	128
2008	168
2009	149
Total: 2002-2009	853
Average per Year	107

Equipment	Starts During 15-Year Lifetime	Average/Year
Combustion Turbine 1 (A)	1833	122
Combustion Turbine 2 (B)	1910	127

Table 5-3 — Operating Hours

Operating Hours (before change in Ownership)	Hours
2002	648
2003	249
2004	439
2005	230
2006	197
2007	728
2008	286
2009	518
Total: 2002-2009	3295
Average per Year	412

Equipment	Total Hours During 15-Year Lifetime	Average Hours/Year
Combustion Turbine 1 (A)	7,229.7	482
Combustion Turbine 2 (B)	7,204.6	480

Cuyamaca undergoes regular maintenance inspections and outage work for the CTs and balance-of-plant areas, as indicated in Table 5-4 and Table 5-5.

Table 5-4 — Combustion Turbine Maintenance Schedule

Maintenance Type	Interval
Hot Section Inspection and Refurbishment	25,000 hrs.
Major Inspection and Refurbishment	50,000 hrs.
Routine CT Maintenance Outage	Annual
Inspection of CTs and Balance of Plant	Monthly/Quarterly / Semiannually

Table 5-5 — Combustion Turbine Maintenance History

Year	Month	
2002	May	COD
2007	November	Forced Outage – Engine A; Fuel Control Valves and Bleed Valve
2008	Autumn	Maintenance Outage – Both Engines; Vane Guide Bolting Replaced
2011	March	Annual Inspection
2012	January	Change in Ownership from CalPeak to SDG&E
2012	September	Annual Inspection
2013	October	Annual Inspection
2014	December	Annual Inspection
2015	November	Annual Inspection
2016	October	Annual Inspection

Inspections are performed monthly, quarterly, and semiannually on the CTs and balance of plant, and maintenance on the CTs is performed during an annual outage.

Per Table 5-4, the major maintenance work is performed on the basis of operating hours and not the number of starts. CT suppliers typically have criteria for both number of starts and number of operating hours to perform major maintenance work; that is, whichever threshold is reached first would define the interval to perform major maintenance. Typically, for peaker units, the number of starts defines the major maintenance schedule. The PWPS maintenance manual was not available for this review. It is important for the prudent maintenance of the plant to verify if there is a "number of starts" criterion in the PWPS maintenance procedures for major maintenance events and to verify if it would be reached per the current operating schedule before the "operating hours" criteria in Table 5-4.

Additionally, while there has been no adverse experience reported at Cuyamaca with fogging systems, their use has caused significant wear on other CT plants. Fogging systems are designed to spray a fine mist into the CT inlet air duct, reducing the inlet air temperature, which increases power output of the CT. If the spray nozzles are not maintained and a fine mist is not provided, or the required water quality is not met, severe wear on the blades may occur. The fogging system must be regularly inspected and maintained for the site to reach average service life.

5.2 BENCHMARKING ANALYSIS

A benchmarking study was performed by S&L to evaluate the average service life of plants similar to Cuyamaca. The ABB Velocity Suite database was used to collect data for the peer groups established by S&L. The database utilizes information reported to the FERC from the electricity industry for plants in North America. A peer group for Cuyamaca was established using the criteria shown in Table 5-6.

Table 5-6 — Cuyamaca Benchmarking Peer Group Criteria

Criteria	Peer Group Selection
Plant Type	Natural-Gas-Fired, Simple-Cycle Units
Nameplate Capacity	40 – 60 MW
Manufacturer	Pratt & Whitney Power Systems
Models	FT8 Series

The benchmarking analysis considered all PWPS FT8 series, natural-gas-fired, simple-cycle plants with a nameplate capacity between 40 and 60 MW. The database yielded 43 units with those criteria. The oldest and youngest plants in the group entered commercial operation in May 2000 and January 2011, respectively. The average age of the peer group units is 12 years, with a median age of 14 years. The Cuyamaca units have a commercial operation date (COD) of May 2002. Of the 43 units in the peer group, 42 are operating and one unit has been placed on standby.

CTs are typically rated for a certain number of starts and operating hours by OEMs. Since units of this size are typically operated as peaking units, the time before that limit is reached may be more than the expected service life. Likewise, a number of capital investments may be made, in addition to regular maintenance, to extend the life of the CT.

The benchmarking analysis shows that the 43 units in the peer group are operating (one on standby). This result can be expected, since the oldest unit in the group only entered service 16 years ago. The results of the benchmarking analysis are shown in Appendix C.

5.3 EVALUATION OF AVERAGE SERVICE LIFE

Generally, simple-cycle power plants based on natural-gas-fired CTs are expected to have a service life of 30 years or more.

There are a great number of factors that can extend or shorten the service life of such simple-cycle plants. Some factors that shorten the life of a plant are outside the operators' control, such as natural disasters, ambient weather conditions, manufacturer defects, and operational dispatch approach. However, by in large, the factors that extend the expected service life of a simple-cycle plant are diligent O&M practices and investments.

All power plant components require regular maintenance. CTs especially require strict maintenance inspection and regular refurbishment and replacement of parts since sections of the equipment (e.g., blades, nozzles, shrouds, combustion liners, bearings, and eventually the rotor) are exposed to high temperatures and stress. Hot gas path components and the CT rotor are typically rated for 100,000 to 160,000 operating hours or a maximum number of starts defined by the OEM and may need to be refurbished or replaced after that duration.

The CT maintenance and inspection schedule is designed to allow operators to track the wear of components, and repair or replace components before a failure occurs. When major plant component reach their expected end-of-life, a lifetime extension program may be implemented. Lifetime extension programs typically include inspection and testing of compressor blades and vanes, flame tubes, burners, seal rings, casings, turbine blades, inner casings, and rotor discs.

In contrast, some plant components, such as steel structures and water piping, have a service life that will far exceed the life of a plant. Again, investment in maintenance determines the longevity of the plant in many ways.

In summary, the average service life of a modern gas-fired, turbine-based, simple-cycle plant is expected to be 30 years or more, assuming the plant follows diligent O&M practices, invests in upgrades and refurbishments when necessary, and follows the OEM procedures, such as using fuel compliant with the turbines' specifications. The units that have already retired and those in operation that have planned targeted retirement dates show a service life of 35 years or more. Depending on the O&M practices and level of investment in maintenance, a plant like Cuyamaca should be able to operate for more than 30 years.

5.4 CONCLUSION

The average service life of the Cuyamaca unit is expected to be 30 years or more, with prudent O&M. However, considering the regional transition to renewable energy resources and other regulatory impacts in California, a reduction in estimated service life may be realistic. Considering the high potential for early retirement of current technologies will allow utilization costs to be more appropriately assigned to ratepayers.

LAST PAGE OF SECTION 5.

6. REFERENCES

1. Sargent & Lundy Proprietary Cost Data Base.
2. RSMeans Cost Data, 2016.
3. Compass International – Global Construction Costs 2016.
4. Engineering Drawings, Equipment Lists, O&M Records and other information provided by the San Diego Gas & Electric.
5. ABB Velocity Suite (https://www.velocitysuiteonline.com/RDWeb/Pages/en-US/login.aspx).
6. Metal Scrap Values in the United States – West Coast (Zone 1). (www.americanrecycler.com).

LAST PAGE OF TEXT.

Appendix A

Conceptual Estimate of Cost to Dismantle Cuyamaca Peak Energy Plant

ESTIMATE NO. : 33965A
PROJECT NO. :12699-004
ISSUE DATE : 01/26/2017
PREP/REV :BA/GA
APPROVED :MNO

SARGENT & LUNDY

SDG&E
CUYAMACA STATION
DISMANTLEMENT STUDY
SUGGESTED FERC ACCOUNTS / COST ESTIMATE

CODE OF ACCOUNT	DESCRIPTION A	SCRAP VALUE	MATERIAL COST	LABOR COST	TOTAL COST
11	DEMOLITION				
11-21 Total	CIVIL WORK		70,712	107,414	178,126
11-22 Total	CONCRETE			70,324	70,324
11-23 Total	STEEL	-12,041		47,554	35,513
11-24 Total	ARCHITECTURAL			10,298	10,298
11-31 Total	MECHANICAL EQUIPMENT	-21,576		112,118	90,542
11-35 Total	PIPING	-2,784		14,081	11,297
11-41 Total	ELECTRICAL EQUIPMENT	-9,701		59,535	49,834
11-42 Total	RACEWAY, CABLE TRAY, & CONDUIT			28,290	28,290
11-43 Total	CABLE			47,579	47,579
11-44 Total	CONTROL & INSTRUMENTATION			12,859	12,859
11-98 Total	WASTE		13,659		13,659
11-81 Total	SCRAP VALUE - COPPER	-96,880			-96,880
11 Total	DEMOLITION	-142,981	84,371	510,052	451,442
90	SUBTOTAL DIRECT & CONSTRUCTION INDIRECT COST	-142,981	84,371	510,052	451,442
91	OTHER DIRECT & CONSTRUCTION INDIRECT COST				
91-1	SCAFFOLDING - NOT REQUIRED				
91-2	COST DUE TO OVERTIME WORKING 5 -10 HOUR DAYS				
91-3	PER DIEM				
91-4	CONSUMABLES - INCLUDED IN WAGE RATE				
91-5	FREIGHT ON MATERIAL - INCLUDED IN MATERIAL COST				
91-6	FREIGHT ON EQUIPMENT - INCL IN EQUIPMENT COST				
91-7	SALES TAX - NOT INCLUDED				
91-8	N/A - NOT INCLUDED				
91-9	CONTRACTOR'S GENERAL AND ADMINISTRATION EXPENSE - % of ACCT NO. 90			25,503	25,503
91-10	CONTRACTOR'S PROFIT - % of ACCT NO. 90		6,750	40,804	47,554
	91 - SUBTOTAL		6,750	66,307	73,056
92	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	-142,981	91,121	576,359	524,499
93	INDIRECT COST				
93-1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES - % of ACCT NO. 92				45,000
93-2	CONSTRUCTION MANAGEMENT SUPPORT - % of ACCT NO. 92				10,490
93-3	S-U / COMMISSIONING - NOT INCLUDED				
93-4	N/A - NOT INCLUDED				
93-5	OWNERS COST - NOT INCLUDED				
93-6	EPC FEE - NOT INCLUDED				
	93 - TOTAL				55,490
94	TOTAL ESCALATION				
95	TOTAL CONTINGENCY				173,190

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CODE OF ACCOUNT	DESCRIPTION A	SCRAP VALUE	MATERIAL COST	LABOR COST	TOTAL COST
95-1	CONTINGENCY ON SCRAP VALUE - % of ACCT NO. 92, 94.1	28,596			28,596
95-2	CONTINGENCY ON MATERIAL - % of ACCT NO. 92, 94.2		18,224		18,224
95-3	CONTINGENCY ON LABOR - % of ACCT NO. 92, 94.3			115,272	115,272
95-4	CONTINGENCY ON INDIRECT - % of ACCT NO. 93, 94.4				11,098
96	TOTAL CONSTRUCTION COST				753,179
97	INTEREST DURING CONSTRUCTION (COMPOUNDED MONTHLY)				
98	TOTAL PROJECT COST				753,179

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ESTIMATE NO. : 33965A
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SUGGESTED FERC ACCOUNTS / COST ESTIMATE

PRICE LEVEL: 2016 LOCATION: San Diego, CA WAGE RATE: CASAN16 PRODUCTIVITY FACTOR: 1.2

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCOUNTS
11	**DEMOLITION**										
11-21	**CIVIL WORK**										
11-21-1	INCORPORATE EXISTING PAVED SURFACES INTO NEW PARKING LOT	EXISTING PAVED SURFACES (IF NOT DISTURBED, WILL NOT BE DEMOLISHED)	1,500	SY			216	146.02	31,540	31,540	341
11-21-2	COVER DISTURBED AREAS OF SITE WITH 2.5" OF ASPHALT OVER 4" OF CRUSHED ROCK BASE	NEW PARKING LOT	1,955	SY		58,650	540	126.10	68,041	126,691	341
11-21-3	BACKFILL	COVER DISTURBED AREAS OF SITE WITH 1' OF BACKFILL MATERIAL	652	CY		12,062	27	226.83	6,212	18,274	341
11-21-4	REMOVE FENCING		370	LF			11	146.02	1,621	1,621	341
	11-21 Total					70,712	794		107,414	178,126	
11-22	**CONCRETE**			**CY**							
11-22-1	TURBINE GENERATOR FDN	BOTH CT'S AND GENERATOR	148	CY			150	117.91	17,716	17,716	344
11-22-2	SCR		89	CY			120	117.91	14,167	14,167	344
11-22-3	STACK FDN		36	CY			49	117.91	5,730	5,730	344
11-22-4	TANKS FOUNDATION	RAW AND DEMIN WATER TANKS	84	CY			113	117.91	13,371	13,371	341
11-22-5	AMMONIA AND WASH DOWN TANK CURBS AND WALL		27	CY			36	117.91	4,218	4,218	341
11-22-6	PERIMETER CURB	850 LF	45	CY			61	117.91	7,163	7,163	341
11-22-7	MAIN TRANSFORMER FDN	INCLUDES SWYTCHYARD FOUNDATIONS	20	CY			27	117.91	3,184	3,184	345
11-22-8	AUX TRANSFORMERS FDN		8	CY			11	117.91	1,273	1,273	345
11-22-9	CONTROL / SWITCHGEAR BUILDING		22	CY			30	117.91	3,502	3,502	345
	11-22 Total						596		70,324	70,324	
11-23	**STEEL**		**138**	**TN**							
11-23-1	EXHAUST STACK	55' 10' DIA	20	TN	-1,757		65	107.16	6,941	5,183	344
11-23-2	RAW WATER STORAGE TANK	47,000 GALLON	12	TN	-1,044		38	107.16	4,123	3,079	342
11-23-3	DEMIN WATER STORAGE TANK	47,000 GALLON	12	TN	-1,044		38	107.16	4,123	3,079	342
11-23-4	AQUEOUS AMMONIA STORAGE TANK	12,000 GALLON	5	TN	-392		14	107.16	1,546	1,155	342
11-23-5	WASHDOWN DRAIN TANK		2	TN	-174		6	107.16	687	513	342
11-23-6	PERIMETER SHEET METAL WALL	INCLUDES STEEL COLUMNS	31	TN	-2,714		100	107.16	10,720	8,006	341
11-23-7	MISC. GALLERY STEEL		57	TN	-4,916		181	107.16	19,413	14,498	341
	11-23 Total				-12,041		444		47,554	35,513	
11-24	**ARCHITECTURAL**		**13,440**	**CF**							
11-24-1	CONTROL / SWITCHGEAR BUILDING	13' X 40' X 12'H	6,240	CF			30	117.16	3,509	3,509	341
11-24-2	ELECTRICAL BUILDING	12' X 50' X 12'H	7,200	CF			35	117.16	4,049	4,049	341
11-24-3	CONCRETE BLOCK WALL	80'L X 22'H X 2' THICK	1,760	SF			23	117.91	2,739	2,739	341
	11-24 Total						88		10,298	10,298	
11-31	**MECHANICAL EQUIPMENT**		**248**	**TN**							

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DISMANTLEMENT STUDY
SUGGESTED FERC ACCOUNTS / COST ESTIMATE

PRICE LEVEL: 2016 LOCATION: San Diego, CA WAGE RATE: CASAN16 PRODUCTIVITY FACTOR: 1.2

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCOUNTS
11-31-1	COMBUSTION TURBINE (CT) WITH ACCESSORIES	FT8 SWIFTPAC (2 CTs W/GENERATOR AND ACCESSORIES	119	TN	-10,353		510	107.16	54,630	44,277	344
11-31-2	SCR CASING		19	TN	-1,653		81	107.16	8,722	7,069	344
11-31-3	SCR CAVITY DUCTWORK		39	TN	-3,393		167	107.16	17,904	14,511	344
11-31-4	CT AIR INTAKE SYSTEM W DUCTS & SILENCER	CT1	14	TN	-1,218		60	107.16	6,427	5,209	344
11-31-5	CT AIR INTAKE SYSTEM W DUCTS & SILENCER	CT2	14	TN	-1,218		60	107.16	6,427	5,209	344
11-31-6	CT LUBE OIL SYSTEM		3	TN	-261		13	107.16	1,377	1,116	344
11-31-7	FUEL GAS COMPRESSOR AND GAS CONDITIONING SKID		25	TN	-2,175		107	107.16	11,477	9,302	344
11-31-8	MISC. MECHANICAL EQUIPMENT		15.0	TN	-1,305		48	107.16	5,154	3,849	342
	11-31 Total				-21,576		1,046		112,118	90,542	
11-35	**PIPING**		**32**	**TN**							
11-35-1	LARGE BORE PIPING ABOVE GROUND PIPING	3550 LF	24	TN	-2,088		77	107.16	8,246	6,158	342
11-35-2	SMALL BORE PIPING ABOVE GROUND PIPING	ALLOWANCE	8	TN	-696		26	107.16	2,749	2,053	342
11-35-3	FIRE LINES & HYDRANTS	ALLOWANCE	1	LT			29	107.16	3,086	3,086	341
	11-35 Total				-2,784		131		14,081	11,297	
11-41	**ELECTRICAL EQUIPMENT**		**111**	**TN**							
11-41-1	GENERATOR BUS, TRANSFORMER	ACCESSORY ELECTRICAL EQUIPMENT	63	TN	-5,481		202	107.16	21,647	16,166	345
11-41-2	OUTDOOR LIGHTING	INCL LIGHT POLES	1	LT			180	117.91	21,224	21,224	345
11-41-3	STATION AUX TRANSFORMERS	ONE (1) 13.8 KV / 4.16 KV, ONE (1) 13.8 KV / 480 V	9	TN	-740		27	107.16	2,921	2,181	345
11-41-4	MISC ELECTRICAL EQUIP	ALLOWANCE	40	TN	-3,480		128	107.16	13,744	10,264	345
	11-41 Total				-9,701		538		59,535	49,834	
11-42	**RACEWAY, CABLE TRAY, & CONDUIT**		**14,499**	**LF**							
11-42-1	CONDUIT		12,000	LF			144	107.16	15,431	15,431	345
11-42-2	TRAY		2,500	LF			120	107.16	12,859	12,859	345
	11-42 Total						264		28,290	28,290	
11-43	**CABLE**		**69,500**	**LF**							
11-43-1	MV CABLE		4,500	LF			54	107.16	5,787	5,787	345
11-43-2	LV CABLE		25,000	LF			150	107.16	16,074	16,074	345
11-43-3	CONTROL CABLE		40,000	LF			240	107.16	25,718	25,718	345
	11-43 Total						444		47,579	47,579	
11-44	**CONTROL & INSTRUMENTATION**		1	LT			120	107.16	12,859	12,859	345
	11-44 Total						120		12,859	12,859	
11-98	**WASTE**		**563**	**CY**							
11-98-1	CONCRETE DEBRIS	TOTAL PLUS 5% SWELL	503	CY		10,059		107.16		10,059	341
11-98-2	RUBBISH & TENANT DEBRIS	ALLOWANCE	60	CY		3,600		107.16		3,600	341
	11-98 Total					13,659				13,659	
11-81	**SCRAP VALUE - COPPER**										

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CUYAMACA STATION
DISMANTLEMENT STUDY
SUGGESTED FERC ACCOUNTS / COST ESTIMATE

PRICE LEVEL: 2016 LOCATION: San Diego, CA WAGE RATE: CASAN16 PRODUCTIVITY FACTOR: 1.2

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCOUNTS
11-81	STEEL	VALUE LISTED - SEE INDIV ACCOUNTS	**529**	**TN**				107.16			
11-81	COPPER		**28**	**TN**	-96,880			107.16		-96,880	345
	11-81 Total				-96,880					-96,880	
	11 Total				-142,981	84,371	4,465		510,052	451,442	
90	SUBTOTAL DIRECT & CONSTRUCTION INDIRECT COST				-142,981	84,371	4,465		510,052	451,442	
91	OTHER DIRECT & CONSTRUCTION INDIRECT COST										
91-1	SCAFFOLDING - NOT REQUIRED			%							
91-2	COST DUE TO OVERTIME WORKING 5 -10 HOUR DAYS		1.0	EA							
91-3	PER DIEM	NONE		$/HR							
91-4	CONSUMABLES - INCLUDED IN WAGE RATE			%							
91-5	FREIGHT ON MATERIAL - INCLUDED IN MATERIAL COST			%							
91-6	FREIGHT ON EQUIPMENT - INCL IN EQUIPMENT COST			%							
91-7	SALES TAX - NOT INCLUDED			%							
91-8	N/A - NOT INCLUDED			%							
91-9	CONTRACTOR'S GENERAL AND ADMINISTRATION EXPENSE - % of ACCT NO. 90		5.0	%					25,503	25,503	
91-10	CONTRACTOR'S PROFIT - % of ACCT NO. 90		8.0	%		6,750			40,804	47,554	
	91 - SUBTOTAL					6,750			66,307	73,056	
92	TOTAL DIRECT & CONSTRUCTION INDIRECT COST				-142,981	91,121	4,465		576,359	524,499	
93	INDIRECT COST										
93-1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES - % of ACCT NO. 92		1.0	LS						45,000	
93-2	CONSTRUCTION MANAGEMENT SUPPORT - % of ACCT NO. 92		2.0	%						10,490	
93-3	S-U / COMMISSIONING - NOT INCLUDED			%							
93-4	N/A - NOT INCLUDED			%							
93-5	OWNERS COST - NOT INCLUDED			%							
93-6	EPC FEE - NOT INCLUDED			%							
	93 - TOTAL									55,490	

ESTIMATE NO. : 33965A
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SUGGESTED FERC ACCOUNTS / COST ESTIMATE

PRICE LEVEL: 2016 LOCATION: San Diego, CA WAGE RATE: CASAN16 PRODUCTIVITY FACTOR: 1.2

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCOUNTS
94	TOTAL ESCALATION										
95	TOTAL CONTINGENCY									173,190	
95-1	CONTINGENCY ON SCRAP VALUE - % of ACCT NO. 92, 94.1		-20.0	%	28,596					28,596	
95-2	CONTINGENCY ON MATERIAL - % of ACCT NO. 92, 94.2		20.0	%		18,224				18,224	
95-3	CONTINGENCY ON LABOR - % of ACCT NO. 92, 94.3		20.0	%					115,272	115,272	
95-4	CONTINGENCY ON INDIRECT - % of ACCT NO. 93, 94.4		20.0	%						11,098	
96	TOTAL CONSTRUCTION COST									753,179	
97	INTEREST DURING CONSTRUCTION (COMPOUNDED MONTHLY)										
98	TOTAL PROJECT COST									753,179	

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Appendix B

Conceptual Estimate of Cost — FERC Accounts

ESTIMATE NO. : 33965A
PROJECT NO. :12699-004
ISSUE DATE :01/26/2017
PREP/REV :BA/GA
APPROVED :MNO

SARGENT & LUNDY

SDG&E
CUYAMCA STATION
DISMANTLEMENT STUDY
BY FERC ACCOUNTS

FERC ACC.	DESCRIPTION	SCRAP VALUE	MATERIAL COST	LABOR COST	OTHER DIRECT COST	INDIRECT COST	ESCALATION	CONTINGENCY	TOTAL COST
341	Other Production - Structures & Improvements	-7,630	84,371	175,683	29,588			59,455	341,467
342	Other Production - Fuel Holders, Producers and Accessories	-6,743		26,629	3,462			7,367	30,715
343	Other Production - Prime Movers								
344	Other Production - Generators	-22,028		151,518	19,697			38,649	187,836
345	Other Production - Accessory Electric Equipment	-106,581		156,222	20,309			56,622	126,573
I1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES					45,000		9,000	54,000
I2	CONSTRUCTION MANAGEMENT SUPPORT					10,490		2,098	12,588
I3	S-U/COMMISSIONING								
I4	OWNERS COST								
I5	EPC FEE								
I6	N/A								
	TOTAL CONSTRUCTION COST	-142,981	84,371	510,052	73,056	55,490		173,190	753,179
	INTEREST DURING CONSTRUCTION (COMPOUNDED MONTHLY)								0
	TOTAL PROJECT COST								753,179

Appendix C

Benchmarking Peer Group Dataset

ABB Velocity Suite Database
Peer Group
Natural Gas-fired Simple Cycles
Nameplate Rating: 40 - 60 MW
Manf: Pratt & Whitney Power Systems
Model: FT8-2 Swift Pac

	Plant State	Unit	Prime Mover Code	Prime Mover Category	Generator Manufacturer	Generator Model	Nameplate Capacity MW	Net Summer Capacity MW	Net Winter Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Primary Fuel Code
1	Missouri	GT1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	60	47	59	Operating	5/1/2002			14	1	NG
2	Missouri	GT2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	60	47	59	Operating	5/1/2002			14	1	NG
3	Missouri	GT3	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	60	47	59	Operating	5/1/2002			14	1	NG
4	Missouri	GT4	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	60	47	59	Operating	5/1/2002			14	1	NG
5	West Virginia	GT1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57	50	57	Operating	8/1/2001			15	1	NG
6	West Virginia	GT2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57	50	57	Operating	8/1/2001			15	1	NG
7	West Virginia	GT3	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57	50	57	Operating	8/1/2001			15	1	NG
8	West Virginia	GT4	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57	50	57	Operating	8/1/2001			15	1	NG
9	West Virginia	GT5	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57	50	57	Operating	8/1/2001			15	1	NG
10	West Virginia	GT6	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57	50	57	Operating	8/1/2001			15	1	NG
11	California	CPP4	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	49.5	52	52	Operating	10/26/2001			14	1	NG
12	California	CPP7	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	49	52	52	Operating	9/30/2001			15	1	NG
13	California	CPP2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	49.5	49.5	49.5	Operating	12/15/2001			14	1	NG
14	California	CPP1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	49.5	50.6	57	Operating	5/1/2002			14	1	NG
15	Pennsylvania	GT01	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	53.5	53.5	Operating	7/31/2001			15	1	NG
16	Pennsylvania	GT02	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	53.5	53.5	Operating	7/31/2001			15	1	NG
17	Pennsylvania	GT03	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	53.5	53.5	Operating	7/31/2001			15	1	NG
18	Pennsylvania	GT04	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	53.5	53.5	Operating	7/31/2001			15	1	NG
19	Pennsylvania	GT05	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	53.5	53.5	Operating	7/31/2001			15	1	NG
20	Nevada	GT21	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 SwiftPac	58.9	52	57	Operating	7/16/2008			8	1	NG
21	North Carolina	GT1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	6/1/2007			9	1	NG
22	North Carolina	GT2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	6/1/2007			9	1	NG
23	North Carolina	GT3	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	6/1/2007			9	1	NG
24	North Carolina	GT4	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	6/1/2007			9	1	NG
25	North Carolina	GT5	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	6/1/2007			9	1	NG
26	North Carolina	GT6	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	6/1/2007			9	1	NG
27	North Carolina	GT1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	10/1/2007			9	1	NG
28	North Carolina	GT2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	10/1/2007			9	1	NG
29	North Carolina	GT3	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	10/1/2007			9	1	NG
30	North Carolina	GT4	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	10/1/2007			9	1	NG
31	North Carolina	GT5	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	57.3	56.5	61.1	Operating	10/1/2007			9	1	NG
32	Montana	GT1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 SwiftPac	50	44.1	48.1	Operating	1/1/2011			5	1	NG
33	Montana	GT2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 SwiftPac	50	44.1	48.1	Operating	1/1/2011			5	1	NG
34	Montana	GT3	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 SwiftPac	50	44.1	48.1	Restarted	1/1/2011			5	1	NG
35	Nebraska	4	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	49	49	Operating	5/1/2000			16	1	NG
36	Nebraska	5	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	48.1	48.1	Operating	5/1/2000			16	1	NG
37	Washington	3	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	47	60	Operating	7/1/2001			15	1	NG
38	Washington	4	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	47	60	Operating	7/1/2001			15	1	NG
39	Minnesota	2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	49.9	49.5	49.9	Operating	5/23/2002			14	1	NG
40	California	CPP6	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	48.7	48.7	48.7	Operating	5/1/2002			14	1	NG
41	Missouri	MGS1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	50	50	Operating	7/31/2002			14	1	NG
42	Missouri	MGS2	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	58.9	50	50	Operating	7/31/2002			14	1	NG
43	California	GEN1	GT	GT	Pratt & Whitney	Pratt & Whitney-FT8 Twinpac	46.5	33.3	46.5	Standby	12/15/2001			14	1	NG

Prepared by

Sargent & Lundy LLC
Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

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Desert Star Energy Center
Decommissioning Study

Prepared for
San Diego Gas & Electric Company

Report SL-013559.D

Project 12699-004
February 2017

SDGE
A Sempra Energy utility®

F I N A L

Desert Star Energy Center
Decommissioning Study

Prepared for
San Diego Gas & Electric Company

SL-013559.D
February 2017

55 East Monroe Street
Chicago, IL 60603-5780 USA

Project 12699-004

LEGAL NOTICE

This report ('Deliverable') was prepared by Sargent & Lundy, L.L.C. ('S&L'), expressly for the sole use of San Diego Gas & Electric Company ('Client') in accordance with the agreement between S&L and Client. This Deliverable was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances. Client acknowledges (1) S&L prepared this Deliverable subject to the particular scope limitations, budgetary and time constraints, and business objectives of the Client; (2) information and data provided by others may not have been independently verified by S&L; and (3) the information and data contained in this Deliverable are time sensitive and changes in the data, applicable codes, standards, and acceptable engineering practices may invalidate the findings of this Deliverable. Any use or reliance upon this Deliverable by third parties shall be at their sole risk.

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Desert Star Energy Center
Decommissioning Study

CONTENTS

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CONTENTS (cont.)

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TABLES & FIGURES

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ACRONYMS AND ABBREVIATIONS

Term	Definition or Clarification
ACC	Air-cooled condenser
ASL	Average Service Life
COD	Commercial operational date
CT(s)	Combustion turbine(s)
Desert Star	Desert Star Energy Center
FERC	Federal Energy Regulatory Commission
GSU	Generator step-up transformer
HGPI	Hot gas path inspection
HRSG(s)	Heat recovery steam generator(s)
MVA	Megavolt amperes
MW	Megawatts
O&M	Operations and maintenance
Owner	San Diego Gas & Electric Company
OEM(s)	Original equipment manufacturer(s)
PCB	Polychlorinated biphenyl
PF	Power factor
S&L	Sargent & Lundy LLC
SCR	Selective catalytic reduction
SDG&E	San Diego Gas & Electric Company

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EXECUTIVE SUMMARY

Sargent & Lundy LLC (S&L) was engaged by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform an independent conceptual dismantlement cost estimate and an Average Service Life (ASL) estimate of the Desert Star Energy Center (Desert Star). Desert Star is a 2x2x1 natural-gas-fired, combined-cycle (490 megawatts [MW]) plant located in Boulder City, Nevada, approximately 40 miles southeast of Las Vegas, Nevada.

METHODOLOGY

The S&L methodology for developing the cost estimate consisted of three elements: 1) our experience in developing plant demolition costs and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities. The cost estimate was developed based on the drawings, documents, and data provided by SDG&E. These drawings and documents were used to estimate the building foundation sizes, building volumes, steel quantities, quantity of piping, valves, and other equipment. A site walkdown was performed to conduct a review of the site for dismantlement and determine any unique site-specific requirements. This information was used with unit cost factors developed by S&L based on industry data and our experience. Unit cost factors for concrete removal, steel removal, cutting costs, and so forth were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

The S&L methodology for estimating the Average Service Life of the facility is based on a review of the operations and maintenance (O&M) history of the site, a benchmarking analysis of similar facilities, and information from the facility's major original equipment manufacturers (OEMs).

CONCEPTUAL COST ESTIMATE

Desert Star Energy Center

The summary of the cost estimate for decommissioning Desert Star is shown in Table ES-1. The cost estimate broken into Federal Energy Regulatory Commission (FERC) accounts is shown in Table ES-2. All costs are in 2016 US dollars. The decommissioning costs are expected to increase by the end of service life of the asset due to escalation.

Table ES-1 — Cost Estimate Summary for Desert Star Energy Center

Acct	Description		Scrap Value	Material Cost	Labor Cost	Total Cost
11.00	Civil Work					
11.21	Concrete			$ 1,303,132	$ 1,224,762	2,527,894
11.22	Steel				$ 815,678	815,678
11.23	Architectural		$ (27,840)		$ 104,455	76,615
11.24	Mechanical Equipment				$ 236,923	236,923
11.31	Piping		$ (823,333)		$ 3,371,322	2,547,989
11.35	Electrical Equipment		$ (49,155)		$ 185,947	136,792
11.41	Raceway, Cable Tray, & Conduit		$ (49,764)		$ 212,600	162,836
11.42	Cable				$ 130,308	130,308
11.43	Control & Instrumentation				$ 187,169	187,169
11.44	Waste				$ 17,023	17,023
11.98	Concrete Debris			$ 90,000		90,000
11.81	Scrap Value		$ (1,507,072)			-1,507,072
	Subtotal Direct & Construction Indirect Cost		$ (2,457,164)	$ 1,393,132	$ 6,486,187	*$ 5,422,155*
91.9	Contractor's General and Administration Expense - % of ACCT No. 90, 91-1 to 91-8	7.0%			$ 324,309	*$ 324,309*
91.10	Contractor's Profit - % of ACCT No. 90, 91-1 to 91-8	8.0%		$ 111,451	$ 518,895	*$ 630,346*
	Subtotal		$ -	$ 111,451	$ 843,204	$ 954,655
93.1	Engineering, Procurement, & Project Services - % of ACCT No. 92					*$ 200,000*
93.2	Construction Management Support - % of ACCT No. 92	2.0%				*$ 127,536*
	Subtotal of Indirect Costs					*$ 327,536*
95.1	Contingency on Scrap Value - % of ACCT No. 92, 94.	20.0%	$ 491,433			*$ 491,433*
95.2	Contingency on Material - % of ACCT No. 92, 94.2	20.0%		$ 300,917		*$ 300,917*
95.3	Contingency on Labor - % ACCT No. 92, 94.3	20.0%			$ 1,465,878	*$ 1,465,878*
95.4	Contingency on Indirect - % of ACCT No. 93, 94.4	20.0%				*$ 65,507*
	Subtotal Contingency					*$ 2,323,735*
	Total Project Cost					**$ 9,028,081**

Table ES-2 — Desert Star Energy Center Cost Estimate Summary by FERC Account

FERC NO.	Description	Scrap Value	Material Cost	Labor Cost	Other Direct Cost	Indirect Cost	Contingency	*Total Cost*
311	Structures and Improvements		$ 1,366,276	$ 1,295,208	$ 277,679		$ 587,833	*$ 3,526,996*
312	Boiler Plant Equipment	$ (393,684)		$ 2,068,005	$ 268,841		$ 546,106	*$ 2,489,268*
314	TurboGenerator Units	$ (400,291)		$ 1,515,965	$ 197,075		$ 422,666	*$ 1,735,415*
315	Accessory Electric Equipment	$ (567,482)		$ 367,234	$ 47,740		$ 196,491	*$ 43,983*
316	Miscellaneous Power Plant Equipment	$ (1,066)		$ 28,177	$ 3,663		$ 6,581	*$ 37,355*
341	Other Production - Structures & Improvements	$ (935)	$ 26,856	$ 430,535	$ 58,118		$ 103,289	*$ 617,863*
342	Other Production - Fuel Holders, Producers and Accessories	$ (47,067)		$ 149,353	$ 19,416		$ 43,167	*$ 164,869*
344	Other Production - Generators	$ (57,285)		$ 414,366	$ 53,868		$ 105,104	*$ 516,053*
345	Other Production - Accessory Electric Equipment	$ (989,354)		$ 217,345	$ 28,255		$ 246,991	*$ (496,763)*
I1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES (Approx 85% Steam Plant)					$ 200,000	$ 40,000	*$ 240,000*
I2	CONSTRUCTION MANAGEMENT SUPPORT (Approx 85% Steam Plant)					$ 127,536	$ 25,507	*$ 153,043*
I3	S-U/COMMISSIONING							
I4	OWNERS COST							
I5	EPC FEE							
	Total Project Cost	**$ (2,457,164)**	**$ 1,393,132**	**$ 6,486,188**	**$ 954,655**	**$ 327,536**	**$ 2,323,735**	**$ 9,028,081**

AVERAGE SERVICE LIFE

SDG&E has indicated that the current expected retirement date for Desert Star is 2029. This retirement date is based on a service life of approximately 30 years. The average service life of a modern gas-fired, turbine-based, combined-cycle plant is expected to be 30 years, assuming the plant follows diligent O&M practices, invests in upgrades and refurbishments when necessary, and follows OEM procedures (such as using fuel compliant with the turbines' specifications). Our benchmarking analysis of FERC data showed several similar plants with operating lives over 30 years.

SDG&E stated that inspections are performed on the plant equipment in accordance with industry norms for combined-cycle plants. Thus, the average service life of Desert Star is expected to be 30 years or more with prudent O&M. However, considering the regional transition to renewable energy resources and other regulatory impacts in California, a reduction in estimated service life may be realistic. Considering the high potential for early retirement of current technologies will allow utilization costs to be more appropriately assigned to ratepayers.

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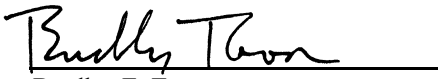
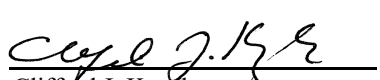
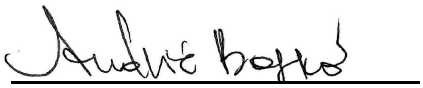


Bradley E. Toon
Senior Management Consultant



Clifford J. Kozak
Senior Management Consultant



Borko Andric
Project Associate
Cost Information Division

Lara A. Bledin
Management Consultant

Reviewed by

Matt N. Ozan
Manager
Cost Information Division

Robert. P. Charles
Senior Principal Consultant &
Project Manager

Approved by

Robert. P. Charles
Senior Principal Consultant &
Project Manager

February 1, 2017
Date

LAST PAGE OF EXECUTIVE SUMMARY.

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1. SCOPE OF WORK

Sargent & Lundy (S&L) was engaged by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform an independent conceptual cost estimate for the dismantlement of Desert Star Energy Center (Desert Star), which consists of a 2x2x1 natural-gas-fired, combined-cycle (490-megawatt [MW]) power plant located in Boulder City, Nevada, approximately 40 miles southeast of Las Vegas, Nevada. S&L was also contracted to estimate the Average Service Life (ASL) of the facility.

S&L has been dedicated to providing complete engineering and environmental services exclusively to the power industry since 1891. Through our work with various utilities, lending institutions, and developers over the years, S&L Consulting has become one of the premier power project consultants in the power industry. This commitment to quality is proven by the successful completion of our International Organization for Standardization (ISO) 9000 certification audit. Our experience encompasses independent engineer services, including decommissioning cost estimations and average service life evaluations for both global and domestic electric power assets. S&L has recently completed decommissioning studies for a number of clients.

S&L has engineered over 958 power plant units. We have both the benefit of extensive design experience with feedback from operating plants as well as individuals with extensive plant operations experience to support our consulting services.

LAST PAGE OF SECTION 1.

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2. GENERAL DESCRIPTION

2.1 DESERT STAR ENERGY CENTER

Desert Star is a 2x2x1 gas-fired, combined-cycle, 490-MW-rated power plant located about 40 miles southeast of Las Vegas, Nevada. The commercial operational date (COD) was May 5, 2000. The plant consists of two Siemens-Westinghouse 501FC+ combustion turbine (CT) generators and a Westinghouse BB 33-65 steam turbine. Each CT generator is rated for 160 MW, and the steam turbine generator is rated for 170 MW. Each CT exhausts into separate Nooter/Eriksen triple-pressure heat recover steam generators (HRSGs) equipped with selective catalytic reduction (SCR). The steam produced by the two HRSGs drives the single steam turbine generator, and the exhaust steam is condensed in a GEA 30-bay air-cooled condenser (ACC).

Views of the overall sites, Unit 2 HRSG, and ACC are shown in Figure 2-1, Figure 2-2, and Figure 2-3, respectively.

Figure 2-1 — Desert Star Energy Center Overview

Source: Google Earth

Figure 2-2 — Desert Star Unit 2 HRSG

Figure 2-3 — Desert Star ACC

LAST PAGE OF SECTION 2.

3. COST ESTIMATE

3.1 METHODOLOGY

The methodology used for developing the cost estimate includes a combination of stochastic and deterministic methods. Deterministic methods were used based on the quantity and size of equipment (e.g., the number of foundations, linear feet of piping, equipment, and etc.). Stochastic methods were also used if quantity information (e.g., fire lines and hydrants, misc. electrical equipment, etc.) was not available.

The cost estimate was developed based on drawings, documents, and data provided by the Owner. These drawings and documents were used to estimate the building foundation sizes, building volumes, steel quantity, quantity of piping, valves, and other equipment.

The S&L methodology for developing the cost estimate consist of three elements: 1) our experience in developing plant demolition cost and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities.

Cost estimates were created using the S&L cost model format and the S&L cost database. The estimates developed include details for each type of work performed, indirect costs, and contingencies. The cost estimate database report lists costs by buildings, plant systems, and several other categories.

An inventory of plant piping, valves, equipment, HVAC ducts, concrete, galleries, cable trays, and other equipment was developed based on a review of drawings and data provided. Mr. Borko Andric and Mr. Brad Toon of S&L visited Desert Star and performed a site walkdown to conduct a review for dismantlement and determine any unique site-specific requirements. This information was used with unit cost factors developed by S&L based on industry data and our experience. Unit cost factors for concrete removal, steel removal, cutting costs, and other tasks were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

S&L worked from site general arrangement drawings and company documentation for the facilities, including information about any existing or un-remediated metal cleaning storage ponds, asbestos inventories,

polychlorinated biphenyl (PCB) inventories, or sludge ponds. S&L relied on SDG&E to identify the location of environmental problems that need to be considered in the estimates, as our scope of work does not include a detailed survey and testing program to identify such problems.

3.2 COST ESTIMATE SUMMARY

3.2.1 Desert Star Energy Center

The summary of the Desert Star decommissioning cost estimate is shown in Table 3-1 below. The commercial and technical basis for the estimate is included in Section 4. The detailed estimate is included in Appendix A. The cost estimate breakdown into FERC accounts is shown in Table 3-2, and the allocation of FERC accounts is shown in Appendix B. All costs are in 2016 US dollars. The decommissioning costs are expected to increase by the end of service life of the asset due to escalation.

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Table 3-1 — Cost Estimate Summary for Desert Star Energy Center

Acct	Description		Scrap Value	Material Cost	Labor Cost	Total Cost
11.00	Civil Work					
11.21	Concrete			$ 1,303,132	$ 1,224,762	2,527,894
11.22	Steel				$ 815,678	815,678
11.23	Architectural		$ (27,840)		$ 104,455	76,615
11.24	Mechanical Equipment				$ 236,923	236,923
11.31	Piping		$ (823,333)		$ 3,371,322	2,547,989
11.35	Electrical Equipment		$ (49,155)		$ 185,947	136,792
11.41	Raceway, Cable Tray, & Conduit		$ (49,764)		$ 212,600	162,836
11.42	Cable				$ 130,308	130,308
11.43	Control & Instrumentation				$ 187,169	187,169
11.44	Waste				$ 17,023	17,023
11.98	Concrete Debris			$ 90,000		90,000
11.81	Scrap Value		$ (1,507,072)			-1,507,072
	Subtotal Direct & Construction Indirect Cost		$ (2,457,164)	$ 1,393,132	$ 6,486,187	*$ 5,422,155*
91.9	Contractor's General and Administration Expense - % of ACCT No. 90, 91-1 to 91-8	7.0%			$ 324,309	*$ 324,309*
91.10	Contractor's Profit - % of ACCT No. 90, 91-1 to 91-8	8.0%		$ 111,451	$ 518,895	*$ 630,346*
	Subtotal		$ -	$ 111,451	$ 843,204	$ 954,655
93.1	Engineering, Procurement, & Project Services - % of ACCT No. 92					*$ 200,000*
93.2	Construction Management Support - % of ACCT No. 92	2.0%				*$ 127,536*
	Subtotal of Indirect Costs					*$ 327,536*
95.1	Contingency on Scrap Value - % of ACCT No. 92, 94	20.0%	$ 491,433			*$ 491,433*
95.2	Contingency on Material - % of ACCT No. 92, 94.2	20.0%		$ 300,917		*$ 300,917*
95.3	Contingency on Labor - % ACCT No. 92, 94.3	20.0%			$ 1,465,878	*$ 1,465,878*
95.4	Contingency on Indirect - % of ACCT No. 93, 94.4	20.0%				*$ 65,507*
	Subtotal Contingency					*$ 2,323,735*
	Total Project Cost					**$ 9,028,081**

Confidential

Table 3-2 — Cost Estimate Summary by FERC Account for Desert Star Energy Center

FERC NO.	Description	Scrap Value	Material Cost	Labor Cost	Other Direct Cost	Indirect Cost	Contingency	*Total Cost*
311	Structures and Improvements		$ 1,366,276	$ 1,295,208	$ 277,679		$ 587,833	*$ 3,526,996*
312	Boiler Plant Equipment	$ (393,684)		$ 2,068,005	$ 268,841		$ 546,106	*$ 2,489,268*
314	TurboGenerator Units	$ (400,291)		$ 1,515,965	$ 197,075		$ 422,666	*$ 1,735,415*
315	Accessory Electric Equipment	$ (567,482)		$ 367,234	$ 47,740		$ 196,491	*$ 43,983*
316	Miscellaneous Power Plant Equipment	$ (1,066)		$ 28,177	$ 3,663		$ 6,581	*$ 37,355*
341	Other Production - Structures & Improvements	$ (935)	$ 26,856	$ 430,535	$ 58,118		$ 103,289	*$ 617,863*
342	Other Production - Fuel Holders, Producers and Accessories	$ (47,067)		$ 149,353	$ 19,416		$ 43,167	*$ 164,869*
344	Other Production - Generators	$ (57,285)		$ 414,366	$ 53,868		$ 105,104	*$ 516,053*
345	Other Production - Accessory Electric Equipment	$ (989,354)		$ 217,345	$ 28,255		$ 246,991	*$ (496,763)*
I1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES (Approx 85% Steam Plant)					$ 200,000	$ 40,000	*$ 240,000*
I2	CONSTRUCTION MANAGEMENT SUPPORT (Approx 85% Steam Plant)					$ 127,536	$ 25,507	*$ 153,043*
I3	S-U/COMMISSIONING							
I4	OWNERS COST							
I5	EPC FEE							
	Total Project Cost	**$ (2,457,164)**	**$ 1,393,132**	**$ 6,486,188**	**$ 954,655**	**$ 327,536**	**$ 2,323,735**	**$ 9,028,081**

LAST PAGE OF SECTION 3.

4. BASIS OF ESTIMATE

The basis for the cost estimate is as follow:

A. Labor Wage Rates

- Craft labor wage rates selected for the estimates are prevailing rates based on those published in *RSMeans Labor Rates for the Construction Industry*, 2016 edition, for Las Vegas, NV.
- The labor estimate is based on a 40-hour workweek, with no per diem or other labor incentives.

B. Labor Crews

- The craft rates are incorporated into work crews appropriate for the activities by adding allowances for small tools, construction equipment, insurance, payment bonds, and site overheads to arrive at crew rates used in the cost estimate.
- An example of crew rates for demolition of equipment and demolition of concrete is shown in Table 4-1 below:

Table 4-1 — Example Crew Rates

San Diego, CA		Demo Equipment		Demo Concrete	
		$/hr	Percentage	$/hr	Percentage
Crew Base		$ 32.74	31%	$38.33	33%
Crew Fringes		$ 19.34	18%	$21.11	18%
Crew FICA		$ 2.50	2%	$2.93	2%
Crew SUI		$ 0.42	0%	$0.42	0%
Crew FUI		$ 0.04	0%	$0.04	0%
Crew Workers Comp. Ins		$ 7.50	7%	$8.78	7%
Other *		$ 1.64	2%	$1.92	2%
Equipment		$ 21.55	20%	$20.80	18%
Site OH		$ 21.43	20%	$23.58	20%
Total		$ 107.16	100%	$117.91	100%
* Expendables/Small Tools, Show up Time, Working Foreman, General Liability Insurance					

C. Productivity

- The labor productivity is estimated to be 1.15[1] for the Las Vegas area based on Compass International data relating to productivity experienced on demolition and productivity for the area. For reference, the Houston area has a labor productivity factor of 1.

[1] Productivity index calculated as (Specific City Labor Rate) ÷ (National Average Labor Rate) × 100

- No allowances have been made to cover items such as loss in productivity because of inclement weather conditions.

D. Quantity Sources

- Quantities of pieces of equipment and/or bulk material commodities used in this cost estimate were developed from engineering-supplied information from the sites and the S&L database.

E. Scrap

- Scrap metals are a globally traded commodity and are part of the larger metals industry. The value of scrap metal is subject to constantly changing economic conditions, as such the price of mixed steel, stainless steel, copper, and aluminum can vary greatly over time as a result of global supply and demand. The value of scrap for this study was determined by a three-month average from 'Scrap Metals MarketWatch'(July, August, and September of 2016) for the West Coast (Zone 1) of the United States. The 'Scrap Metals MarketWatch' can be found on the following website:

- www.americanrecycler.com

- The values obtained are delivered prices expressed as cost per gross ton or pound to account for separation, preparation and shipping costs to the mills. Metal recycling is a cyclical industry. The costs used in this study represent market prices in mid-2016, and cannot be used to estimate the value of scrap in the future. Estimated scrap prices are listed in Table 4-2.

Table 4-2 — Estimated Scrap Prices

	#1 & 2 Mixed Steel	#1 Copper	Aluminum	Stainless Steel
	$ / Gross Ton	$/lb.	$/lb.	$/lb.
Date				
July 1, 2016	185	1.95	0.45	0.55
August 1, 2016	185	1.94	0.46	0.57
September 1, 2016	184	1.97	0.47	0.55
3 Month Average	*184.67*	*1.95*	*0.46*	*0.56*

Converted to $/US tons	$165 / ton	$3,907 / ton	$920 / ton	$1,113 / ton
Scrap dealer costs - deduct	$78 / ton	$440 / ton	$260 / ton	$200 / ton
Net Value to Utility	**$87 / ton**	**$3,467 / ton**	**$660 / ton**	**$913 / ton**

F. Project Schedule

- 18-month construction schedule.

G. Contractor Costs

- Contractors' general and administrative (G&A) is included at 5% of labor and material.
- Contractors' profit is included at 8% of labor and material.

H. Indirect Expenses

- Project indirect expenses are based on percent total direct construction labor only.
- Engineering is included to cover preparation of the decommissioning work specification, engineering required to place the plant in safe shutdown, and any unique engineering required during demolition.
- Construction management and field engineering is estimated to be 2%. This covers oversight of demolition activities but not full-time construction management.
- Owner's costs not included.

I. Escalation Rates

- Not included.

J. Sales and Use Taxes

- Sales and use taxes not included.

K. Contingency

- A 20% contingency is applied for material, labor, and indirect expenses.
- A -20% contingency is applied for scrap value, as a drop in scrap value will result in an increase in project cost.

L. Contract Basis for Estimate

- The estimate is based on a multiple lump sum.

M. Assumptions

- The facility will be in safe-shutdown mode and ready for a decommissioning contractor to start work.
- All chemicals and lubricating oils will be removed from the facilities to be demolished by the utility before demolition.
- No extraordinary environmental costs for demolition will be needed.
- There will be no PCBs on site at the time of demolition.
- Switchyards within the plant boundaries are not part of the scope, nor are access roads to these facilities.
- All items above grade and to a depth of 1 foot will be demolished. All foundations will be removed. Any other items buried more than 1 foot deep will remain in place.
- Underground piping will be abandoned in place.
- Underground piping larger than 4 feet in diameter will be filled with sand or slurry and capped at the ends to prevent collapse (none noted at this site). Non-metal pipe will be collapsed.
- All demolished materials are considered debris, except for organic combustibles and non-embedded metals that have scrap value.
- The basis for salvage estimating is for scrap value only. No resale of equipment or material is included.

- Handling on-site and off-site disposal of hazardous materials will be performed in compliance with methods approved by SDG&E's Environmental Services Department.
- Disturbed areas will be buried under 6 inches of topsoil.
- All fill material is assumed to be from off-site sources.
- Catalyst is assumed to be removed and returned to the original equipment manufacturer (OEM) before demolition.

LAST PAGE OF SECTION 4.

5. AVERAGE SERVICE LIFE EVALUATION

The S&L methodology for estimating the Average Service Life of the facility is based on a review of the operations and maintenance (O&M) history of the site, a benchmarking analysis of similar facilities, information from the facility's major OEMs, and other information from the Sargent & Lundy database.

5.1 DESCRIPTION OF FACILITY

Desert Star is a 2x2x1, gas-fired, combined-cycle, 490-MW-rated power plant located approximately 40 miles southeast of Las Vegas, Nevada. COD was May 5, 2000. The plant includes the major equipment listed in Table 5-1.

Table 5-1 — List of Equipment

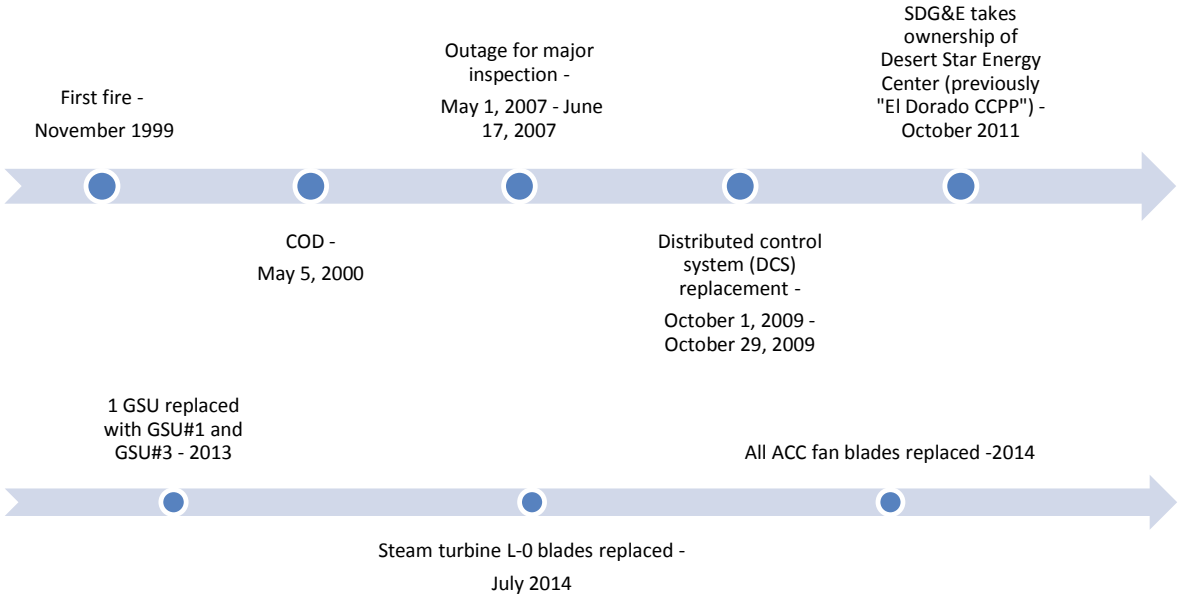
Equipment	Manufacturer / Model	Note
Combustion Turbine #1 (CT1)	Siemens-Westinghouse 501FC+	
Generator #1	Westinghouse A.C. Modular Hydrogen Inner-Cooled. Frame: 2-97X122	Nameplate Rating: 160 MW 13,800 volts, 8,409 amps, 0.84 PF
Combustion Turbine #2 (CT2)	Siemens-Westinghouse 501FC+	
Generator #2	Westinghouse A.C. Modular Hydrogen Inner-Cooled. Frame: 2-97X122	Nameplate Rating: 160 MW 13,800 volts, 8,409 amps, 0.84 PF
Steam Turbine	Westinghouse BB 33-65	
Generator	Westinghouse A.C. Modular Hydrogen Inner-Cooled. Frame: 2-97X134	Nameplate Rating: 170 MW 16,000 volts, 8,299 amps, 0.85 PF
Heat Recovery Steam Generator #1 (HRSG1)	Nooter Erikson Triple Pressure Re-Heat HRSG with Peerless SCR	
Heat Recovery Steam Generator #2 (HRSG2)	Nooter Erikson Triple Pressure Re-Heat HRSG with Peerless SCR	
Air Cooled Condenser (ACC)	GEA Thirty Bay Air-Cooled Condenser	
Closed Cooling Water (CCW)	Balcke-Durr; Model 274B4-48-04	10 fin tube section air-cooled heat exchanger with 20 fans

Equipment	Manufacturer / Model	Note
Feed Water Pumps (x4)	Ingersoll-Dresser Size: 6X11DAH10 Motor: Westinghouse, 2,500 horsepower, 4,000 volt	
Generator Step-Up Transformer (GSU#1)	ABB 230,000/13,800 volt, 105/140/175 MVA (OA/FA/FA)	
Generator Step-Up Transformer (GSU#2)	ABB 236,000/13,800 volt, 126/168/210 MVA (OA/FA/FA)	
Generator Step-Up Transformer (GSU#3)	ABB 230,000/16,000X18,000 volt, 150/200/250 MVA (OA/FA/FA)	
Alstom Spare Transformer	ABB 236,000/18,000 volt, 132/176/220 MVA (OA/FA/FA)	
Siemens Spare Transformer	ABB 230,000/18,000X16,000X13,800 volt, 180/240/300 MVA (OA/FA/FA)	

The Siemens-Westinghouse 501FC+ gas turbines are based on the Westinghouse 501F, which was first introduced in 1993 at a power rating of 160 MW. This unit has evolved over several decades from the Westinghouse W501A, which was introduced in 1968 at a power rating of 42 MW. At least five major revisions to the design were released between 1968 and 1993, each with a higher power rating and lower heat rate. In 1997, Siemens acquired the Westinghouse gas turbine business. Consequently, the unit is sometimes referred to as the Siemens-Westinghouse 501FC+. The Siemens gas turbine model SGT6-5000F is based on the same design. Presently, the main long-term service agreements (LTSAs) for the gas turbines at Desert Star are maintained with Siemens.

Figure 5-1 below shows the site's major historical events, including major outages and repair work. The plant has performed regularly scheduled outages. Recently, all the blades in the ACC were replaced with reinforced fiberglass after the original aluminum blades showed cracks. In 2013, a three-winding transformer serving CT-1 and the steam turbine generator faulted, so it was replaced with two transformers—one for CT-1 and one for the steam turbine generator. L-0 blades on the steam turbine generator were replaced in 2014.

Figure 5-1 — Timeline of Major Dates in History of the Site



5.1.1 Site Operation and Maintenance

In October 2011, SDG&E took ownership of Desert Star, which was previously called "El Dorado Power Plant." From COD to the change of ownership in 2011, the facility performed preventive, corrective, and predictive maintenance practices. The gas turbines were maintained through Siemens service agreements, and the steam turbine, HRSGs, and balance of plant were covered by others selected through competitive bids. During that period, the plant typically performed maintenance in two outages each year: the scheduled gas turbine inspection was performed in October and minor issues were addressed in April.

From 2001 through 2011, Desert Star was operated as a base-loaded plant. From 2012 through the time of S&L's site visit in September 2016, the plant was cycled to meet market energy demand. As a result of the change in dispatch, the inspection schedule was revised in 2014 as shown in Table 5-4. The plant is dispatched by the California ISO grid. From 2005 through 2015, the plant achieved an availability factor of 84.9% with a capacity factor or 67.8%.

The number of starts and operating hours on CT1, CT2, and the steam turbine are shown below in Table 5-2 and Table 5-3.

Table 5-2 — Number of Starts (2000 – 2016)

Type of Start	CT1	CT2
Hot	111	96
Warm	89	88
Cold	89	91

Table 5-3 — Equivalent Operating Hours (2000 – 2016)

Equipment	Hours
Combustion Turbine 1 & Generator 1	108,888
Combustion Turbine 2 & Generator 2	107,300
Steam Turbine & Generator	102,202

The combustor inspection, hot gas path inspection (HGPI), and major inspection follow the schedule shown in the table below:

Table 5-4 — Gas Turbine Inspection Interval Schedule

Inspection Type	Until 2014	Since 2014	After Next HGPI
Combustor Inspection	8,000 hrs.	12,000 hrs.	None Scheduled
Hot Gas Path Inspection	24,000 hrs.	24,000 hrs.	25,000
Major Inspection	48,000 hrs.	48,000 hrs.	50,000

As noted above, the plant has experienced greater service in plant cycling since 2012 according to dispatching instructions. Therefore, the recent change to a longer interval between combustor inspections is contrary to the change in operations.

Presently, the plant operates about 4,000 hours of each year. Therefore, a 24,000-hour maintenance interval is roughly six years.

The historical maintenance on the CT and steam turbine generators are as shown in Table 5-5. Combustor inspections, HGPIs, and major inspections are indicated by "CI," "HGP," and "MI," respectively.

Table 5-5 — Gas Turbine and Steam Turbine Maintenance History

Year	Month	CT1	CT2	Steam Turbine
2001	May	CI		
	December		CI	
2002	April	CI	HGP	
2003	February		CI	
	March	CI		
2004	April	HGP	HGP	
2005	May	CI	CI	
2006	May	CI	CI	
2007	February			MI
	June	MI	MI	
2008	October	CI	CI	
	December			High-Pressure Turbine
2009	October	CI	CI	
2010	October	HGP	HGP	
2011	October	SDG&E takes ownership		
2011	November	CI	CI	
2012	April	CI	CI	
2013	April	CI	CI	
2014	July	CT Major; Generator Major; CT Rotor Replacement		Steam Turbine Major; Generator Major
2015	February		CT Major; Generator Major; CT Rotor Replacement	

Since the change in ownership, SDG&E has continued regular maintenance of the major equipment. The maintenance history in Table 5-5 shows that the plant has followed a regular maintenance plan that is in line with industrial norms for combined-cycle plants.

Overall, the plant has been maintained in accordance with industry norms for its entire operating life.

5.2 BENCHMARKING ANALYSIS

The goal of the benchmarking analysis is to obtain a sample of the average service life of plants similar to Desert Star. The ABB Velocity Suite database was used to collect data for this study. The database utilizes information reported to the Federal Energy Regulatory Commission (FERC) from the electricity industry for plants in North America. Two peer groups for combined-cycle plants of similar size to Desert Star were established using the criteria shown in Table 5-6 and Table 5-7.

Table 5-6 — Desert Star Benchmarking Peer Group 1 Criteria

Criteria	Peer Group Selection
Plant Type	Natural-Gas-Fired, Combined-Cycle Units
Nameplate Capacity	440 – 600 MW
Plant Arrangement	2x2x1 & 3x3x1

The Group 1 benchmarking analysis considered all natural-gas-fired, combined-cycle plants with 2x2x1 and 3x3x1 arrangements and a nameplate capacity between 440 and 600 MW. The database yielded 96 plants with those criteria; key features of the group included the following:

- The oldest and youngest plants in the group entered commercial operation in 1985 and April 2016, respectively.
- The oldest plant in the group had been operating for 31 years at the time that this report was written (October 2016).
- All the plants in the peer group are still operating, and the oldest plant is the only site with a reported projected retirement date (May 2018).
- If the oldest plant retires as projected, it will have operated for 33 years, which is consistent with the expected service life of a gas-fired, combined-cycle plant (approximately 30 years).
- Many of the plants in the peer group are approximately the same vintage as Desert Star. The average age of plants in the peer group is 13 years, while Desert Star has operated for 16 years to date.

The benchmarking analysis is consistent with the typical 30-year expected service life of natural-gas-fired, combined-cycle power plants. Since only one of 96 has a scheduled retirement date, it is assumed that most of

the peer group plants will operate for longer than 30 years. The results of the benchmarking analysis are shown in Appendix C.

Since Peer Group 1 only yielded one plant with a retirement date, a second peer group was established based on the criteria shown in Table 5-7. The aim was to find a peer group with more than one retirement date.

Table 5-7 — Desert Star Benchmarking Peer Group 2 Criteria

Criteria	Peer Group Selection
Plant Type	Natural-Gas-Fired, Combined-Cycle Units
Nameplate Capacity	300 – 400 MW
Plant Arrangement	2x2x1, 3x3x1, 4x4x1

The Group 2 benchmarking analysis considered all natural-gas-fired, combined-cycle plants with 2x2x1, 3x3x1, and 4x4x1 arrangements and a nameplate capacity between 300 and 400 MW. The database yielded 80 plants with those criteria, the key features of which are as follows:

- The oldest and youngest plants in the group entered commercial operation in 1974 and 2015, respectively.
- The oldest plant in the group had been operating for 42 years at the time this report was written (October 2016).
- There are only three retired plants in the group (4%), with age at retirement ranging from 20 to 28 years. (It is not possible to determine the causes of retirement from the database. It is noted that reasons for a unit to be retired could involve conditions besides technical, maintenance, or performance problems, such as economic factors, fuel cost, power pricing, environmental factors, or a combination of these reasons.)
- There are 11 units (14%) that are 24 years and older in service. Six of these units have been in service 30 years or more.
- Many of the plants in the peer group are approximately the same vintage as Desert Star. The average age of plants in the peer group is 15, while Desert Star has operated for 16 years to date.

The Group 2 benchmarking analysis is consistent with the typical 30-year expected service life of natural-gas-fired, combined-cycle power plants. Since only three of 80 plants have been retired, it is assumed that most of the peer group plants will operate for longer than 30 years. The results of the benchmarking analysis are shown in Appendix C.

5.3 EVALUATION OF AVERAGE SERVICE LIFE

SDG&E has indicated that the current expected retirement date for Desert Star is 2029. This retirement date is based on a service life of approximately 30 years, which is the expected industry norm.

There are a great number of factors that can extend or shorten the service life of combined-cycle plants. Some factors that shorten the life of a plant are outside the operators' control, such as natural disasters, ambient weather conditions, manufacturer defects, and operational dispatch approach. However, by in large, the factors that extend the expected service life are diligent O&M practices and investments.

All power plant components require regular maintenance. Gas turbines especially require strict maintenance inspection and regular refurbishment and replacement of parts since sections of the equipment (e.g., blades, nozzles, shrouds, combustion liners, transition pieces, bearings, and eventually the rotor) are exposed to high temperatures and stress. Hot gas path components and the gas turbine rotor are typically rated for 100,000 to 160,000 operating hours or 3,000 to 5,000 starts, for example, and may need to be refurbished or replaced after that duration.

The gas turbine maintenance and inspection schedule is designed to allow operators to track the wear of components and to repair or replace components before a failure occurs. When major plant components reach their expected end-of-life, a lifetime extension program may be implemented. Lifetime extension programs typically include inspection and testing of compressor blades and vanes, flame tubes, burners, seal rings, casings, turbine blades, inner casings, and the rotor discs.

In contrast, some plant components, such as steel structures and water piping, have a service life that will far exceed the life of a plant. Steam turbines have been known to operate well past 60 years. Again, investment in maintenance determines the longevity of a plant in many ways.

In summary, the average service life of a modern gas-fired, turbine-based, combined-cycle plant is 30 years, assuming the plant follows diligent O&M practices, invests in upgrades and refurbishments when necessary, and follows OEM procedures (such as using fuel compliant with the turbines' specifications). Depending on the O&M practices and level of investment in maintenance, a plant like Desert Star may be able to operate for more than 30 years.

5.4 CONCLUSION

The average service life of Desert Star is expected to be 30 years or more. However, considering the regional transition to renewable energy resources and other regulatory impacts in California, a reduction in estimated service life may be realistic. Considering the high potential for early retirement of current technologies will allow utilization costs to be more appropriately assigned to ratepayers.

LAST PAGE OF SECTION 5.

6. REFERENCES

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2. RSMeans Cost Data, 2016.
3. Compass International – Global Construction Costs 2016.
4. Engineering Drawings, Equipment Lists, O&M Records and other information provided by the San Diego Gas & Electric.
5. ABB Velocity Suite (https://www.velocitysuiteonline.com/RDWeb/Pages/en-US/login.aspx).
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Appendix A

Conceptual Estimate of Cost to Dismantle Desert Star Energy Center

ESTIMATE NO. : 31088C
PROJECT NO. :12699-004
ISSUE DATE : 01/27/2017
PREP/REV :BA/GA
APPROVED :MNO

SARGENT & LUNDY

SAN DIEGO GAS & ELECTRIC
DESERT STAR STATION
DISMANTLEMENT STUDY
SUGGESTED FERC ACCOUNTS / COST ESTIMATE

CODE OF ACCOUNT	DESCRIPTION A	SCRAP VALUE	MATERIAL COST	LABOR COST	TOTAL COST
11	DEMOLITION				
11-21 Total	CIVIL WORK		1,303,132	1,224,762	2,527,894
11-22 Total	CONCRETE			815,678	815,678
11-23 Total	STEEL	-27,840		104,455	76,615
11-24 Total	ARCHITECTURAL			236,923	236,923
11-31 Total	MECHANICAL EQUIPMENT	-823,333		3,371,322	2,547,989
11-35 Total	PIPING	-49,155		185,947	136,792
11-41 Total	ELECTRICAL EQUIPMENT	-49,764		212,600	162,836
11-42 Total	RACEWAY, CABLE TRAY, & CONDUIT			130,308	130,308
11-43 Total	CABLE			187,169	187,169
11-44 Total	CONTROL & INSTRUMENTATION			17,023	17,023
11-98 Total	WASTE		90,000		90,000
11-81 Total	SCRAP VALUE - COPPER	-1,507,072			-1,507,072
11 Total	DEMOLITION	-2,457,164	1,393,132	6,486,188	5,422,156
90	SUBTOTAL DIRECT & CONSTRUCTION INDIRECT COST	-2,457,164	1,393,132	6,486,188	5,422,156
91	OTHER DIRECT & CONSTRUCTION INDIRECT COST				
91-1	SCAFFOLDING - NOT REQUIRED				
91-2	COST DUE TO OVERTIME WORKING 5 -10 HOUR DAYS				
91-3	PER DIEM				
91-4	CONSUMABLES - INCLUDED IN LABOR RATE				
91-5	FREIGHT ON MATERIAL - INCLUDED IN MATERIAL COST				
91-6	FREIGHT ON EQUIPMENT - INCL IN EQUIPMENT COST				
91-7	SALES TAX - NOT INCLUDED				
91-8					
91-9	CONTRACTOR'S GENERAL AND ADMINISTRATION EXPENSE - % of ACCT NO. 90, 91-1 TO 91-8			324,309	324,309
91-10	CONTRACTOR'S PROFIT - % of ACCT NO. 90, 91-1 TO 91-8		111,451	518,895	630,346
	91 - SUBTOTAL		111,451	843,204	954,655
92	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	-2,457,164	1,504,583	7,329,392	6,376,811
93	INDIRECT COST				
93-1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES - % of ACCT NO. 92				200,000
93-2	CONSTRUCTION MANAGEMENT SUPPORT - % of ACCT NO. 92				127,536
93-3	S-U / COMMISSIONING - NOT INCLUDED				
93-4	N/A - NOT INCLUDED				
93-5	OWNERS COST - NOT INCLUDED				
93-6	EPC FEE - NOT INCLUDED				
	93 - TOTAL				327,536
94	TOTAL ESCALATION				
94-1	ESCALATION ON SCRAP VALUE - NOT INCLUDED				
94-2	ESCALATION ON MATERIAL - NOT INCLUDED				
94-3	ESCALATION ON LABOR - NOT INCLUDED				
94-4	ESCALATION ON INDIRECT - NOT INCLUDED				
95	TOTAL CONTINGENCY				2,323,735
95-1	CONTINGENCY ON SCRAP VALUE - % of ACCT NO. 92, 94.1	491,433			491,433
95-2	CONTINGENCY ON MATERIAL - % of ACCT NO. 92, 94.2		300,917		300,917
95-3	CONTINGENCY ON LABOR - % of ACCT NO. 92, 94.3			1,465,878	1,465,878
95-4	CONTINGENCY ON INDIRECT - % of ACCT NO. 93, 94.4				65,507

ESTIMATE NO. : 31088C
PROJECT NO. :12699-004
ISSUE DATE : 01/27/2017
PREP/REV :BA/GA
APPROVED :MNO

SARGENT & LUNDY

SAN DIEGO GAS & ELECTRIC
DESERT STAR STATION
DISMANTLEMENT STUDY
SUGGESTED FERC ACCOUNTS / COST ESTIMATE

CODE OF ACCOUNT	DESCRIPTION A	SCRAP VALUE	MATERIAL COST	LABOR COST	TOTAL COST
96	TOTAL CONSTRUCTION COST				9,028,082
97	INTEREST DURING CONSTRUCTION (COMPOUNDED MONTHLY)				
98	TOTAL PROJECT COST				9,028,082

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ESTIMATE NO. : 31088C
PROJECT NO. :12699-004
ISSUE DATE : 01/26/2017
PREP/REV :BA/GA
APPROVED :MNO

SAN DIEGO GAS & ELECTRIC
DESERT STAR STATION
DISMANTLEMENT STUDY
SUGGESTED FERC ACCOUNTS / COST ESTIMATE

SARGENT & LUNDY

PRICE LEVEL: 2016 LOCATION: Las Vegas, NV WAGE RATE: NVLAS16 PRODUCTIVITY FACTOR: 1.15

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
11	**DEMOLITION**										
11-21	**CIVIL WORK**										
11-21-1	PAVED SURFACES	Steam Plant	9,029	SY			1,246	142.31	177,319	177,319	311
11-21-2	PAVED SURFACES	Other Production	9,029	SY			1,246	142.31	177,319	177,319	341
11-21-3	COVER DISTURBED AREAS OF SITE WITH 6" OF TOP SOIL	OFFSITE SUPPLY - 10 MILE ROUND TRIP AND SPREADING	86,981	CY		1,130,756	3,501	217.98	763,147	1,893,903	311
11-21-4	COVER DISTURBED AREAS OF SITE WITH 6" OF TOP SOIL - C/T SPECIFIC OTHER PLANT	OFFSITE SUPPLY - 10 MILE ROUND TRIP AND SPREADING	607	CY		7,885	24	217.98	5,321	13,206	341
11-21-5	COVER DISTURBED AREAS OF SITE WITH 6" OF TOP SOIL, PHOTOVOLTAIC PLANT	OFFSITE SUPPLY - 10 MILE ROUND TRIP AND SPREADING	1,146	CY		14,892	46	217.98	10,050	24,942	341
11-21-6	SEED & MULCH SITE		107	AC		145,520	591	95.21	56,235	201,755	311
11-21-7	SEED & MULCH SITE , PHOTOVOLTAIC PLANT		2	AC		2,720	11	95.21	1,051	3,771	341
11-21-8	SEED & MULCH SITE , C/T OTHER PLANT		1	AC		1,360	6	95.21	526	1,886	341
11-21-9	FENCING		8,260	LF			237	142.31	33,795	33,795	311
	11-21 Total					1,303,132	6,908		1,224,762	2,527,894	
11-22	**CONCRETE**			**CY**							
11-22-1	COMBUSTION TURBINE FDN PLAN	U-1, S-021 REV F	720	CY			700	114.20	79,996	79,996	344
11-22-2	COMBUSTION TURBINE FDN PLAN	U-2, S-025 REV F	720	CY			700	114.20	79,996	79,996	344
11-22-3	STEAM TURBINE GEN FDN	S-036, S-037	673	CY			655	114.20	74,774	74,774	314
11-22-4	HRSG / STACK FDN	U-1, S-030 REV D	480	CY			467	114.20	53,330	53,330	312
11-22-5	HRSG / STACK FDN	U-2, S-033 REV D	480	CY			467	114.20	53,330	53,330	312
11-22-6	CEMS ENCLOSURE	U-1, S-031 REVD, 8'X21'X1'	6	CY			8	114.20	886	886	312
11-22-7	CEMS ENCLOSURE	U-12 S-031 REVD, 8'X21'X1'	6	CY			8	114.20	886	886	312
11-22-8	AIR COMPRESSOR	S-034 HRSG FOUNDATION AREA	3	CY			4	114.20	437	437	316
11-22-9	AIR DRYER	S-034 HRSG FOUNDATION AREA	1	CY			1	114.20	148	148	316
11-22-10	AIR RECEIVER	S-034 HRSG FOUNDATION AREA	35	CY			45	114.20	5,097	5,097	316
11-22-11	BOILER FEED PUMPS (4)	S-034 HRSG FOUNDATION AREA	33	CY			43	114.20	4,876	4,876	312
11-22-12	SCR SKID	S-034 HRSG FOUNDATION AREA	8	CY			11	114.20	1,247	1,247	312
11-22-13	BURNER SKID	S-034 HRSG FOUNDATION AREA	1	CY			1	114.20	115	115	312
11-22-14	BURNER BLOWER SKID	S-034 HRSG FOUNDATION AREA	1	CY			1	114.20	109	109	312
11-22-15	BLOWDOWN TANK	S-034 HRSG FOUNDATION AREA	2	CY			3	114.20	295	295	312
11-22-16	EXCITATION SKID	S-039 STEAM TURBINE/GENERATOR EQUIPMENT FDNS	6	CY			8	114.20	919	919	314
11-22-17	EXCITATION TRANSFORMER	S-039 STEAM TURBINE/GENERATOR EQUIPMENT FDNS	4	CY			6	114.20	650	650	314

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
11-22-18	STEAM TURBINE LUBE OIL MODULE	S-039 STEAM TURBINE/GENERATOR EQUIPMENT FDNS	24	CY			31	114.20	3,546	3,546	314
11-22-19	SEAL OIL SUPPLY SKID	S-039 STEAM TURBINE/GENERATOR EQUIPMENT FDNS	8	CY			10	114.20	1,197	1,197	314
11-22-20	GLAND STEAM CONDENSER SKID	S-039 STEAM TURBINE/GENERATOR EQUIPMENT FDNS	3	CY			3	114.20	394	394	314
11-22-21	GLAND STEAM SUPPLY SKID	S-039 STEAM TURBINE/GENERATOR EQUIPMENT FDNS	9	CY			11	114.20	1,285	1,285	314
11-22-22	MAIN & AUX TRANSFORMER FDNS	S-045 MAIN & AUX TRANSFORMERS (1)	148	CY			191	114.20	21,866	21,866	315
11-22-23	MAIN & AUX TRANSFORMER FDNS	S-047 MAIN & AUX TRANSFORMERS (2)	160	CY			207	114.20	23,639	23,639	345
11-22-24	SPARE TRANSFORMER (ALSTOM) PAD AND CONTAINMENT)		22	CY			28	114.20	3,250	3,250	315
11-22-25	SPARE TRANSFORMER (SIEMENS) PAD AND CONTAINMENT)		57	CY			74	114.20	8,422	8,422	345
11-22-26	AQUEOUS AMMONIA STORAGE TANK AND UNLOADING AREA FDNS	S-076	196	CY			254	114.20	29,017	29,017	311
11-22-27	PIPE RACK FOUNDATION	S-048	218	CY			282	114.20	32,209	32,209	312
11-22-28	AIR COOLED CONDENSER FDN	S-60 REV J	440	CY			569	114.20	65,008	65,008	314
11-22-29	AIR COOLED CONDENSER AREA MISC FDN	S-61 REVG	60	CY			78	114.20	8,865	8,865	314
11-22-30	FLASH TANK AND TRANSFER PUMP FDN	S-062	23	CY			30	114.20	3,398	3,398	314
11-22-31	CCW HEAT EXCHANGER, PUMP AND HEAD TANK FDNS	S-068	62	CY			80	114.20	9,160	9,160	314
11-22-32	FIRE WATER STORAGE TANK FDN	S-070, Steam Plant	25	CY			32	114.20	3,694	3,694	316
11-22-33	FIRE WATER STORAGE TANK FDN	S-070, Other Plant	25	CY			32	114.20	3,694	3,694	341
11-22-34	DEMIN WATER STORAGE TANK FDN	S-070	50	CY			65	114.20	7,387	7,387	312
11-22-35	WATER TREATMENT FDNS		130	CY			168	114.20	19,207	19,207	312
11-22-36	MISC FDNS		80	CY			104	114.20	11,820	11,820	316
11-22-37	CONTROL/ADMINISTRATION BLDG	S-043 Steam Plant @ 50%	352	CY			455	114.20	51,933	51,933	311
11-22-38	CONTROL/ADMINISTRATION BLDG	S-043, Other Plant @ 50%	352	CY			455	114.20	51,933	51,933	341
11-22-39	SAMPLE BUILDING	DWG S-073	27	CY			35	114.20	3,989	3,989	311
11-22-40	BULK STORAGE BUILDING	S-074 , 50% Steam Plant	28	CY			36	114.20	4,137	4,137	311
11-22-41	BULK STORAGE BUILDING	S-074 , 50% Other Plant	28	CY			36	114.20	4,137	4,137	341
11-22-42	SAMPLE PANEL BUILDING	28'X22'X12 HIGH STEEL BLDG	29	CY			38	114.20	4,285	4,285	311
11-22-43	WAREHOUSE #2	30'X40'X24' HIGH STEEL BLDG 50% Steam Plant	28	CY			36	114.20	4,137	4,137	311
11-22-44	WAREHOUSE #2	30'X40'X24' HIGH STEEL BLDG, 50% Other Plant	28	CY			36	114.20	4,137	4,137	341
11-22-45	VISITOR CENTER	24'X64'X10' STEEL BLDG	72	CY			93	114.20	10,638	10,638	341
11-22-46	PHOTOVOLTAIC ARRAY SUPPORTS	72 CAISSONS	25	CY			32	114.20	3,694	3,694	341
11-22-47	NEW EQUIPMENT BUILDING	Steam Plant @ 50%	94	CY			122	114.20	13,888	13,888	311
11-22-48	NEW EQUIPMENT BUILDING	Other Plant @ 50%	94	CY			122	114.20	13,888	13,888	341
11-22-49	NEW WAREHOUSE #3	Steam Plant @ 50%	104	CY			135	114.20	15,366	15,366	311
11-22-50	NEW WAREHOUSE #3	Other Plant @ 50%	104	CY			135	114.20	15,366	15,366	341

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
	11-22 Total						7,143		815,678	815,678	
11-23	**STEEL**		**320**	**TN**							
11-23-1	EXHAUST STACK	INCLDED WITH HRSG		TN				103.01			312
11-23-2	EXHAUST STACK	INCLDED WITH HRSG		TN				103.01			312
11-23-3	PIPE RACK	50% Steam Plant S-052,-53,-54 & -55	85	TN	-7,395		261	103.01	26,905	19,510	312
11-23-4	PIPE RACK	50% other plant S-052,-53,-54 & -55	85	TN	-7,395		261	103.01	26,905	19,510	342
11-23-5	MISCELLANEOUS STEEL	CCW PIPE RACK, PIPE SUPPORTS , MISC BRACING ETC...	100	TN	-8,700		307	103.01	31,653	22,953	314
11-23-6	GALLERIES	S-056 + NEW PLATFORMS FOR GENERATOR AND HRSG DOORS	40	TN	-3,480		123	103.01	12,661	9,181	344
11-23-7	PHOTOVOLTAIC ARRAY	PV-1 & 2	10	TN	-870		61	103.01	6,331	5,461	341
	11-23 Total				-27,840		1,014		104,455	76,615	
11-24	**ARCHITECTURAL**		**455,112**	**CF**							
11-24-1	CONTROL/ADMINISTRATION BLDG	188'X79'X12' HIGH STEEL BLDG, 50% Steam Plant	89,112	CF			410	113.17	46,390	46,390	311
11-24-2	CONTROL/ADMINISTRATION BLDG	188'X79'X12' HIGH STEEL BLDG, 50% Otther Plant	89,112	CF			410	113.17	46,390	46,390	341
11-24-3	SAMPLE BUILDING	30X24X10' HIGH STEEL BLDG	7,200	CF			33	113.17	3,748	3,748	311
11-24-4	BULK STORAGE BUILDING	56'X13'X12 HIGH STEEL BLDG, 50% Steam Plant	4,368	CF			20	113.17	2,274	2,274	311
11-24-5	BULK STORAGE BUILDING	56'X13'X12 HIGH STEEL BLDG, 50% Other Plant	4,368	CF			20	113.17	2,274	2,274	341
11-24-6	SAMPLE PANEL BUILDING	28'X22'X12 HIGH STEEL BLDG	7,392	CF			34	113.17	3,848	3,848	311
11-24-7	WAREHOUSE #2	30'X40'X24' HIGH STEEL BLDG, 50% Steam Plant	19,200	CF			88	113.17	9,995	9,995	311
11-24-8	WAREHOUSE #2	30'X40'X24' HIGH STEEL BLDG, 50% Other Plant	19,200	CF			88	113.17	9,995	9,995	341
11-24-9	VISITOR CENTER (AT PHOTOVOLTAIC FIELD)	24'X64'X10' STEEL BLDG	15,360	CF			71	113.17	7,996	7,996	341
11-24-10	NEW EQUIPMENT BUILDING	45'X90'X26' HIGH STEEL BLDG, 50% Steam Plant	52,650	CF			242	113.17	27,409	27,409	311
11-24-11	NEW EQUIPMENT BUILDING	45'X90'X26' HIGH STEEL BLDG, 50% Other Plant	52,650	CF			242	113.17	27,409	27,409	341
11-24-12	NEW WAREHOUSE #3	45'X100'X21' HIGH STEEL BLDG, 50% Steam Plant	47,250	CF			217	113.17	24,598	24,598	311
11-24-13	NEW WAREHOUSE #3	45'X100'X21' HIGH STEEL BLDG, 50% Other Plant	47,250	CF			217	113.17	24,598	24,598	341
	11-24 Total						2,094		236,923	236,923	
11-31	**MECHANICAL EQUIPMENT**		**9,464**	**TN**							
11-3113	BOILER (STEAM GENERATOR) COMPLETE										
11-3113-1	HEAT RECOVERY STEAM GENERATORS (HRSG'S)	U-1, 3-PRESS HRSG W/REHEAT SUPPLEMENTAL DUCT BURNERS INCL INTERGRAL DEAERATOR, SCR INC 110' STACK	2,156	TN	-187,533		8,850	103.01	911,598	724,066	312

PRICE LEVEL: 2016 LOCATION: Las Vegas, NV WAGE RATE: NVLAS16 PRODUCTIVITY FACTOR: 1.15

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
11-3113-2	HEAT RECOVERY STEAM GENERATORS (HRSG'S)	U-2, 3-PRESS HRSG W/REHEAT SUPPLEMENTAL DUCT BURNERS INCL INTERGRAL DEAERATOR, SCR INC 110' STACK	2,156	TN	-187,533		8,850	103.01	911,598	724,066	312
11-3117	COMPRESSOR & ACCESSORIES										
11-3117-1	AIR COMPRESSOR, CENTRIFUGAL	2 @ 1335 SCFM STATION	9	TN	-783		23	103.01	2,399	1,616	316
11-3117-2	CT INLET CHILLER COMPRESSORS	U-1	220	TN	-19,140		569	103.01	58,638	39,498	342
11-3117-3	CT INLET CHILLER COMPRESSORS	U-2	220	TN	-19,140		569	103.01	58,638	39,498	342
11-3121	AIR COOLED CONDENSER & ACCESSORIES	250K BUNDLES @ 12 TN EA, 50D BUNDLES @ 10 TN EA & 30-200 HP FANS	3,500	TN	-304,500		9,056	103.01	932,884	628,384	314
11-3165	HEAT EXCHANGERS										
11-3165-1	CCW HEAT EXCHANGER	10 CELLS @ 30,000 LB EA	150	TN	-13,050		616	103.01	63,436	50,386	314
11-3165-2	FUEL GAS PREHEAT	2 SHELL & TUBE HT EX	1	TN	-87		4	103.01	423	336	342
11-3165-3	CT LUBE OIL SYSTEM INCL FIN FAN COOLER	U-1	3	TN	-261		12	103.01	1,269	1,008	344
11-3165-4	CT LUBE OIL SYSTEM INCL FIN FAN COOLER	U-2	3	TN	-261		12	103.01	1,269	1,008	344
11-3175	PUMPS										
11-3175-1	CONDENSATE PUMPS	U-0, 3 @ 1400 GPM & 625 TDH, 300 HP	4	TN	-348		12	103.01	1,266	918	314
11-3175-2	BOILER FEED PUMPS	U-1, 2 @ 1350 GPM FOR HRSGS, 2150 HP	22	TN	-1,914		68	103.01	6,964	5,050	312
11-3175-3	BOILER FEED PUMPS	U-2, 2 @ 1350 GPM FOR HRSGS, 2150 HP	22	TN	-1,914		68	103.01	6,964	5,050	312
11-3175-4	FIRE PUMPS	U-0, 2 @ 1500 GPM @ 125 PSI, 300 HP, Steam Plant	0.8	TN	-65		2	103.01	237	172	316
11-3175-5	FIRE PUMPS	U-0, 2 @ 1500 GPM @ 125 PSI, 300 HP, Other Plant	0.8	TN	-65		2	103.01	237	172	341
11-3175-6	CLOSED COOLING WATER	2 @ 7000 GPM @ 213 TDH, 550 HP	4	TN	-348		12	103.01	1,266	918	314
11-3175-7	MISCELLANEOUS PUMPS	14 SMALL PUMPS E.G. TRANSFER, DEMIN WTR RAW WATER, VACUUM , BLOWDOWN SUMPS AND SUMP PUMPS	2.5	TN	-218		8	103.01	791	574	316
11-3183	TANKS										
11-3183-1	DEMIN WATER STORAGE TANK	250,000 GALLON, 38' DIA X 30' HIGH	30	TN	-2,610		92	103.01	9,496	6,886	312
11-3183-2	RAW/FIRE WATER STORAGE TANK	250,000 GALLON, 38' DIA X 30' HIGH , 50% Steam Plant	15	TN	-1,305		46	103.01	4,748	3,443	312
11-3183-3	RAW/FIRE WATER STORAGE TANK	250,000 GALLON, 38' DIA X 30' HIGH , 50% Other Plant	15	TN	-1,305		46	103.01	4,748	3,443	342
11-3183-4	AQUEOUS AMMONIA STORAGE TANK	20,000 GALLON,	6	TN	-522		18	103.01	1,899	1,377	312
11-3183-5	CONDENSATE COLLECTION TANK	10,000 GALLON,	4	TN	-348		12	103.01	1,266	918	312
11-3185	TURBINE, COMBUSTION (CT) COMPLETE										

PRICE LEVEL: 2016 LOCATION: Las Vegas, NV WAGE RATE: NVLAS16 PRODUCTIVITY FACTOR: 1.15

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
11-3185-1	COMBUSTION TURBINE (CT) WITH ACCESSORIES	U-1, SIEMENS STG6-5000F (501FC+)C/T - NOMINAL 170 MW, FIRING NATURAL GAS ONLY, W DRY LOW NOX BURNERS, INLET AIR FILTERS SILENCING & EVAP COOLERS , INLET CHILLER COILS	213	TN	-18,531		874	103.01	90,079	71,548	344
11-3185-2	COMBUSTION TURBINE (CT) WITH ACCESSORIES	U-1, SIEMENS STG6-5000F (501FC+)C/T - NOMINAL 170 MW, FIRING NATURAL GAS ONLY, W DRY LOW NOX BURNERS, INLET AIR FILTERS SILENCING & EVAP COOLERS , INLET CHILLER COILS	213	TN	-18,531		874	103.01	90,079	71,548	344
11-3191	STEAM TURBINE	SIEMENS/WESTINGHOUSE B33/65CC, 175 MW CONDENSING REHEAT TURBINE W STANDARD ACCESSORIES	465	TN	-40,412		1,907	103.01	196,441	156,029	314
11-3193	WATER TREATING EQUIPMENT		30	TN	-2,610		123	103.01	12,687	10,077	312
	11-31 Total				-823,333		32,728		3,371,322	2,547,989	
11-35	**PIPING**		**383**	**TN**							
11-35-1	LARGE BORE PIPING ABOVE GROUND PIPING	U1, 14,000 LF/UNIT, 67 % Steam Plant	182	TN	-15,855		560	103.01	57,684	41,829	314
11-35-2	LARGE BORE PIPING ABOVE GROUND PIPING	U1, 14,000 LF/UNIT, 33 % Other Plant	90	TN	-7,809		276	103.01	28,412	20,603	344
11-35-3	LARGE BORE PIPING ABOVE GROUND PIPING	U2, 14,300 LF/UNIT, 67% Steam Plant	196	TN	-17,079		603	103.01	62,138	45,059	314
11-35-4	LARGE BORE PIPING ABOVE GROUND PIPING	U2, 14,300 LF/UNIT, 33% Other Plant	97	TN	-8,412		297	103.01	30,605	22,193	344
11-35-5	FIRE LINES & HYDRANTS	U-0, ABANDON UNDERGND LINES REMOVE HYDRANTS, 50% Steam Plant	1	LT			35	103.01	3,554	3,554	316
11-35-6	FIRE LINES & HYDRANTS	U-0, ABANDON UNDERGND LINES REMOVE HYDRANTS, 50% Other Plant	1	LT			35	103.01	3,554	3,554	341
	11-35 Total				-49,155		1,805		185,947	136,792	
11-41	**ELECTRICAL EQUIPMENT**		**572**	**TN**				103.01			
11-41-1	ELECTRICAL EQUIPMENT	U=0, CONTROL RM, 50% Steam Plant	1	LT			58	103.01	5,923	5,923	315
11-41-2	ELECTRICAL EQUIPMENT	U=0, CONTROL RM, 50% Other Plant	1	LT			58	103.01	5,923	5,923	345
11-41-3	GENERATOR BUS TRANSFORMERS AND MISC ELECT EQUIPMENT	U-1, ACCESSORY ELECTRICAL EQUIPMENT, 67% Steam Plant	168	TN	-14,631		517	103.01	53,231	38,600	315
11-41-4	GENERATOR BUS TRANSFORMERS AND MISC ELECT EQUIPMENT	U-1, ACCESSORY ELECTRICAL EQUIPMENT, 33% Other Plant	83	TN	-7,206		255	103.01	26,218	19,012	345
11-41-5	GENERATOR BUS TRANSFORMERS AND MISC ELECT EQUIPMENT	U-2, ACCESSORY ELECTRICAL EQUIPMENT, 67% Steam Plant	168	TN	-14,631		517	103.01	53,231	38,600	315

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
11-41-6	GENERATOR BUS TRANSFORMERS AND MISC ELECT EQUIPMENT	U-2, ACCESSORY ELECTRICAL EQUIPMENT, 33% Other Plant	83	TN	-7,206		255	103.01	26,218	19,012	345
11-41-7	OUTDOOR LIGHTING	U-0, INCL LIGHT POLES	1	LT			173	114.20	19,700	19,700	311
11-41-8	STATION AUX TRANSFORMERS AND MISC ELECTRICAL EQUIP	U-1	35	TN	-3,045		108	103.01	11,079	8,034	345
11-41-9	STATION AUX TRANSFORMERS AND MISC ELECTRICAL EQUIP	U-2	35	TN	-3,045		108	103.01	11,079	8,034	345
	11-41 Total				-49,764		2,045		212,600	162,836	
11-42	**RACEWAY, CABLE TRAY, & CONDUIT**		**95,000**	**LF**							
11-42-1	CONDUIT	Steam Plant 67% U-1	30,150	LF			347	103.01	35,716	35,716	315
11-42-2	CONDUIT	Other Plant 33% U-1	14,850	LF			171	103.01	17,592	17,592	345
11-42-3	CONDUIT	Steam Plant 67% U-2	30,150	LF			347	103.01	35,716	35,716	315
11-42-4	CONDUIT	Other Plant 33% U-2	14,850	LF			171	103.01	17,592	17,592	345
11-42-5	TRAY	Steam Plant 67% U-1	1,675	LF			77	103.01	7,937	7,937	315
11-42-6	TRAY	Other Plant 33% U-1	825	LF			38	103.01	3,909	3,909	345
11-42-7	TRAY	Steam Plant 67%, U-2	1,675	LF			77	103.01	7,937	7,937	315
11-42-8	TRAY	Other Plant 33% U-2	825	LF			38	103.01	3,909	3,909	345
	11-42 Total						1,265		130,308	130,308	
11-43	**CABLE**		**338,000**	**LF**				103.01			
11-43-1	MV CABLE	Steam Plant 67% U-1	19,430	LF			223	103.01	23,017	23,017	315
11-43-2	MV CABLE	Other Plant 33% U-1	9,570	LF			110	103.01	11,337	11,337	345
11-43-3	MV CABLE	Steam Plant 67% U-2	19,430	LF			223	103.01	23,017	23,017	315
11-43-4	MV CABLE	Other Plant 33% U-2	9,570	LF			110	103.01	11,337	11,337	345
11-43-5	LV CABLE	Steam Plant 67% U-1	67,000	LF			385	103.01	39,685	39,685	315
11-43-6	LV CABLE	Other Plant 33% U-1	33,000	LF			190	103.01	19,546	19,546	345
11-43-7	LV CABLE	Steam Plant 67% U-2	67,000	LF			385	103.01	39,685	39,685	315
11-43-8	LV CABLE	Other Plant 33% U-2	33,000	LF			190	103.01	19,546	19,546	345
11-43-9	CONTROL CABLE	U-1, ABANDONED	40,000	LF				103.01			315
11-43-10	LV CABLE	U-2, ABANDONED	40,000	LF				103.01			315
	11-43 Total						1,817		187,169	187,169	
11-44	**CONTROL & INSTRUMENTATION**		1	LT			115	148.03	17,023	17,023	315
	11-44 Total						115		17,023	17,023	
11-98	**WASTE**			**CY**							
11-98-1	CONCRETE DEBRIS	ONSITE BURIAL		CY				103.01			311
11-98-2	RUBBISH & TENANT DEBRIS	OFFSITE BURIAL	2,250	CY		90,000		103.01		90,000	311
	11-98 Total					90,000				90,000	
11-81	**SCRAP VALUE - COPPER**							103.01			
11-81	**STEEL**	VALUE LISTED INDIV ACCOUNTS ABOVE	**10,738**	**TN**				103.01			311
11-81	**COPPER**		**436**	**TN**							
11-81-1	COPPER	50% Steam Plant MPT #1, CORE AND COILS	26	TN	-91,067			103.01		-91,067	315

PRICE LEVEL: 2016 LOCATION: Las Vegas, NV WAGE RATE: NVLAS16 PRODUCTIVITY FACTOR: 1.15

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
11-81-2	COPPER	50% Other Plant MPT #1, CORE AND COILS	26	TN	-91,067			103.01		-91,067	345
11-81-3	COPPER	MPT #2, CORE AND COILS	60	TN	-206,527			103.01		-206,527	345
11-81-4	COPPER	MPT #3, CORE AND COILS	71	TN	-245,556			103.01		-245,556	345
11-81-5	COPPER	50% Steam Plant MPT ALSTOM SPARE, CORE AND COILS	35	TN	-122,778			103.01		-122,778	315
11-81-6	COPPER	50% Other Plant MPT ALSTOM SPARE, CORE AND COILS	35	TN	-122,778			103.01		-122,778	345
11-81-7	COPPER	50% Steam Plant MPT SIEMENS SPARE, CORE AND COILS	40	TN	-138,227			103.01		-138,227	315
11-81-8	COPPER	50% Other Plant MPT SIEMENS SPARE, CORE AND COILS	40	TN	-138,227			103.01		-138,227	345
11-81-9	COPPER	U1, AUX TRANSFORMER	15	TN	-51,900			103.01		-51,900	315
11-81-10	COPPER	U2, AUX TRANSFORMER	15	TN	-51,900			103.01		-51,900	315
11-81-11	COPPER	STEAM TURBINE GEN	24	TN	-82,348			103.01		-82,348	315
11-81-12	COPPER	U1 CT GEN	24	TN	-82,348			103.01		-82,348	345
11-81-13	COPPER	U2 CT GEN	24	TN	-82,348			103.01		-82,348	345
	11-81 Total				-1,507,072					-1,507,072	
	11 Total				-2,457,164	1,393,132	56,934		6,486,188	5,422,156	
90	SUBTOTAL DIRECT & CONSTRUCTION INDIRECT COST				-2,457,164	1,393,132	56,934		6,486,188	5,422,156	
91	OTHER DIRECT & CONSTRUCTION INDIRECT COST										
91-1	SCAFFOLDING - NOT REQUIRED			%							
91-2	COST DUE TO OVERTIME WORKING 5 -10 HOUR DAYS		1.0	EA							
91-3	PER DIEM	NONE		$/HR							
91-4	CONSUMABLES - INCLUDED IN LABOR RATE			%							
91-5	FREIGHT ON MATERIAL - INCLUDED IN MATERIAL COST			%							
91-6	FREIGHT ON EQUIPMENT - INCL IN EQUIPMENT COST			%							
91-7	SALES TAX - NOT INCLUDED			%							
91-8				%							
91-9	CONTRACTOR'S GENERAL AND ADMINISTRATION EXPENSE - % of ACCT NO. 90, 91-1 TO 91-8		5.0	%					324,309	324,309	
91-10	CONTRACTOR'S PROFIT - % of ACCT NO. 90, 91-1 TO 91-8		8.0	%		111,451			518,895	630,346	
	91 - SUBTOTAL					111,451			843,204	954,655	
92	TOTAL DIRECT & CONSTRUCTION INDIRECT COST				-2,457,164	1,504,583	56,934		7,329,392	6,376,811	
93	INDIRECT COST										
93-1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES - % of ACCT NO. 92		1.0	LS						200,000	

ESTIMATE NO. : 31088C
PROJECT NO. :12699-004
ISSUE DATE : 01/26/2017
PREP/REV :BA/GA
APPROVED :MNO

SARGENT & LUNDY

SAN DIEGO GAS & ELECTRIC
DESERT STAR STATION
DISMANTLEMENT STUDY
SUGGESTED FERC ACCOUNTS / COST ESTIMATE

PRICE LEVEL: 2016 LOCATION: Las Vegas, NV WAGE RATE: NVLAS16 PRODUCTIVITY FACTOR: 1.15

CODE OF ACCOUNT	DESCRIPTION A	DESCRIPTION B	QTY	UM	SCRAP VALUE	MATERIAL COST	MAN-HOURS	CREW WAGE RATE	LABOR COST	TOTAL COST	FERC ACCCOUNTS
93-2	CONSTRUCTION MANAGEMENT SUPPORT - % of ACCT NO. 92		2.0	%						127,536	
93-3	S-U / COMMISSIONING - NOT INCLUDED			%							
93-4	N/A - NOT INCLUDED			%							
93-5	OWNERS COST - NOT INCLUDED			%							
93-6	EPC FEE - NOT INCLUDED			%							
	93 - TOTAL									327,536	
94	TOTAL ESCALATION										
94-1	ESCALATION ON SCRAP VALUE - NOT INCLUDED			%							
94-2	ESCALATION ON MATERIAL - NOT INCLUDED			%							
94-3	ESCALATION ON LABOR - NOT INCLUDED			%							
94-4	ESCALATION ON INDIRECT - NOT INCLUDED			%							
95	TOTAL CONTINGENCY									2,323,735	
95-1	CONTINGENCY ON SCRAP VALUE - % of ACCT NO. 92, 94.1		-20.0	%	491,433					491,433	
95-2	CONTINGENCY ON MATERIAL - % of ACCT NO. 92, 94.2		20.0	%		300,917				300,917	
95-3	CONTINGENCY ON LABOR - % of ACCT NO. 92, 94.3		20.0	%					1,465,878	1,465,878	
95-4	CONTINGENCY ON INDIRECT - % of ACCT NO. 93, 94.4		20.0	%						65,507	
96	TOTAL CONSTRUCTION COST									9,028,082	
97	INTEREST DURING CONSTRUCTION (COMPOUNDED MONTHLY)										
98	TOTAL PROJECT COST									9,028,082	

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Appendix B

Conceptual Estimate of Cost — FERC Accounts

SAN DIEGO GAS & ELECTRIC
DESERT STAR STATION
DISMANTLEMENT STUDY
FERC ACCOUNT SUMMARY REPORT

FERC ACC.	DESCRIPTION	SCRAP VALUE	MATERIAL COST	LABOR COST	OTHER DIRECT COST	INDIRECT COST	ESCALATION	CONTINGENCY	TOTAL COST
311	Structures and Improvements		1,366,276	1,295,208	277,679			587,833	3,526,996
312	Boiler Plant Equipment	-393,684		2,068,005	268,841			546,106	2,489,268
314	TurboGenerator Units	-400,291		1,515,965	197,075			422,666	1,735,416
315	Accessory Electric Equipment	-567,482		367,234	47,740			196,491	43,984
316	Miscellaneous Power Plant Equipment	-1,066		28,177	3,663			6,581	37,356
341	Other Production - Structures & Improvements	-935	26,856	430,535	58,118			103,289	617,863
342	Other Production - Fuel Holders, Producers and Accessories	-47,067		149,353	19,416			43,167	164,869
344	Other Production - Generators	-57,285		414,366	53,868			105,104	516,052
345	Other Production - Accessory Electric Equipment	-989,354		217,345	28,255			246,991	-496,764
I1	ENGINEERING, PROCUREMENT, & PROJECT SERVICES					200,000		40,000	240,000
I2	CONSTRUCTION MANAGEMENT SUPPORT					127,536		25,507	153,043
I3	S-U/COMMISSIONING								
I4	OWNERS COST								
I5	EPC FEE								
I6	N/A								
	TOTAL CONSTRUCTION COST	-2,457,164	1,393,132	6,486,188	954,655	327,536		2,323,735	9,028,082
	INTEREST DURING CONSTRUCTION (COMPOUNDED MONTHLY)								0
	TOTAL PROJECT COST								9,028,082

Appendix C

Benchmarking Peer Group Dataset

ABB Velocity Suite Database
Peer Group
Natural Gas fired Combined Cycles
Nameplate Rating: 440 - 600 MW
Arrangement: 2x2x1 & 3x3x1

	Plant State	Prime Mover Category	Generator Manufacturer	Generator Model	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Combustion Turbines (Combined Cycles only)	Number of Steam Turbines (Combined Cycles only)	Primary Fuel Code
1	Alabama	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS7001FA GT	535.400	Operating	5/30/2000			16	2	1	NG
2	Alabama	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	535.400	Operating	6/1/2001			15	2	1	NG
3	Pennsylvania	CC	Siemens Power Generation Inc	Siemens Power Generation Inc-SCC6-5000F CC 2x1	556.000	Operating	7/14/2003			13	2	1	NG
4	Arizona	CC	ALSTOM/Siemens Power Generation Inc	ALSTOM-Unknown/Siemens Power Generation Inc-SGT6-5000F	568.000	Operating	7/15/2002			14	2	1	NG
5	Arizona	CC	ALSTOM/Siemens Power Generation Inc/Siemens Power Generation Inc	ALSTOM-Unknown/Siemens Power Generation Inc-SGT6-5000F/Siemens Power Generation Inc-SGT6-5000F	568.000	Operating	7/15/2002			14	2	1	NG
6	Arizona	CC	Siemens Power Generation Inc/Siemens Power Generation Inc	Siemens Power Generation Inc-SGT6-5000F/Siemens Power Generation Inc-Unknown	569.600	Operating	8/1/2003			13	2	1	NG
7	Oklahoma	CC	Siemens Power Generation Inc	Siemens Power Generation Inc-Unknown	532.900	Operating	6/1/2000			16	2	1	NG
8	Oklahoma	CC			532.900	Operating	6/11/2011			5	2	1	NG
9	New York	CC	General Electric Co	General Electric Co-PG7241(FA)	520.000	Operating	5/20/2006			10	2	1	NG
10	California	CC	Siemens Power Generation Inc	Siemens Power Generation Inc-V84.3A	591.000	Operating	11/14/2003			12	2	1	NG
11	Connecticut	CC	Siemens Power Generation Inc/Siemens Power Generation Inc	Siemens Power Generation Inc-Unknown/Siemens Power Generation Inc-V84.3A	520.000	Operating	7/1/1999			17	2	1	NG
12	Texas	CC			558.000	Operating	5/13/2009			7	2	1	NG
13	Texas	CC	ALSTOM/General Electric Co	ALSTOM-Unknown/General Electric Co-MS7001FA GT	593.300	Operating	10/17/2002			14	2	1	NG
14	Texas	CC	Siemens AG/Siemens Power Generation Inc	Siemens AG-501F/Siemens Power Generation Inc-Unknown	555.000	Operating	6/1/2000			16	2	1	NG
15	California	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	521.000	Operating	7/6/2005			11	2	1	NG
16	Rhode Island	CC	General Electric Co/Siemens Power Generation Inc/Siemens Power Generation Inc	General Electric Co-Unknown/Siemens Power Generation Inc-Unknown/Siemens Power Generation Inc-Unknown	596.000	Operating	11/5/2002			13	2	1	NG
17	Louisiana	CC	General Electric Co	General Electric Co-S207FA (CC)	570.000	Operating	6/15/2003			13	2	1	NG
18	Maine	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	550.200	Operating	5/1/2000			16	2	1	NG
19	Chihuahua	CC	Mitsubishi Heavy Industries	Mitsubishi Heavy Industries-M501F	517.000	Operating	5/9/2001			15	2	1	NG
20	Yucatan	CC	Siemens AG	Siemens AG-501F	484.000	Operating	10/14/2000			16	2	1	NG
21	Veracruz	CC	Mitsubishi Heavy Industries	Mitsubishi Heavy Industries-M501F	495.000	Operating	12/15/2001			14	2	1	NG
22	Michigan	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS7001FA GT	590.700	Operating	8/1/2002			14	2	1	NG
23	Texas	CC	General Electric Co	General Electric Co-MS7001FA GT	550.000	Operating	6/2/2000			16	2	1	NG
24	Florida	CC	Siemens Power Generation Inc/Siemens Power Generation Inc	Siemens Power Generation Inc-501FD/Siemens Power Generation Inc-501FD	546.500	Operating	4/1/1999			17	2	1	NG
25	Florida	CC	Siemens Power Generation Inc/Siemens Power Generation Inc	Siemens Power Generation Inc-501FD/Siemens Power Generation Inc-Unknown	516.000	Operating	12/9/2003			12	2	1	NG
26	Florida	CC	Siemens Power Generation Inc/Siemens Power Generation Inc	Siemens Power Generation Inc-501FD/Siemens Power Generation Inc-Unknown	590.000	Operating	11/7/2005			10	2	1	NG
27	Texas	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS7001FA GT	467.700	Operating	8/1/2001			15	2	1	NG
28	Puerto Rico	CC			568.000	Operating	3/1/2000			16	2	1	NG
29	Georgia	CC	Toshiba/General Electric Co	Toshiba-Unknown/General Electric Co-MS7001FA GT	596.600	Operating	8/27/2003			13	2	1	NG
30	Nevada	CC	Siemens Power Generation Inc	Siemens Power Generation Inc-Unknown	536.000	Operating	5/4/2000			16	2	1	NG
31	California	CC	Siemens Power Generation Inc/Siemens Power Generation Inc	Siemens Power Generation Inc-SGT6-5000F/Siemens Power Generation Inc-SGT6-5000F	537.400	Operating	8/3/2013			3	2	2	NG
32	Mississippi	CC	General Electric Co/General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-MS7001FA GT/General Electric Co-Unknown	551.300	Operating	6/15/2001			15	2	1	NG
33	Mississippi	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	551.300	Operating	6/15/2001			15	2	1	NG
34	Florida	CC	Mitsubishi Heavy Industries/Siemens Power Generation Inc	Mitsubishi Heavy Industries-M501F/Siemens Power Generation Inc-Unknown	521.200	Operating	5/1/1993			23	2	1	NG
35	Florida	CC	Mitsubishi Heavy Industries/Siemens Power Generation Inc	Mitsubishi Heavy Industries-M501F/Siemens Power Generation Inc-Unknown	521.200	Operating	6/1/1993			23	2	1	NG
36	Texas	CC	General Electric Co	General Electric Co-S207FA (CC)	518.000	Operating	6/15/2002			14	2	1	NG
37	Texas	CC	General Electric Co	General Electric Co-S207FA (CC)	518.000	Operating	7/24/2002			14	2	1	NG
38	Colorado	CC	ALSTOM/General Electric Co	ALSTOM-Unknown/General Electric Co-MS7001FA GT	541.000	Operating	4/1/2003			13	2	1	NG
39	Texas	CC	General Electric Co/ALSTOM	General Electric Co-MS7001FA GT/ALSTOM-Unknown	529.000	Operating	5/1/2000			16	2	1	NG
40	Texas	CC	Siemens Power Generation Inc/Toshiba	Siemens Power Generation Inc-SGT6-5000F/Toshiba-Unknown	595.000	Operating	6/1/2001			15	2	1	NG
41	Texas	CC	ALSTOM/General Electric Co	ALSTOM-Unknown/General Electric Co-MS7001FA GT	521.000	Operating	10/1/1999			17	2	1	NG
42	Texas	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS7001FA GT	544.100	Operating	1/29/2001			15	2	1	NG
43	Texas	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS7001FA GT	544.100	Operating	1/29/2001			15	2	1	NG
44	Texas	CC	General Electric Co	General Electric Co-MS7001FA GT	551.300	Operating	6/14/2000			16	2	1	NG
45	Tamaulipas	CC	General Electric Co	General Electric Co-S207FA (CC)	518.000	Operating	12/24/2003			12	2	1	NG
46	Tamaulipas	CC	General Electric Co	General Electric Co-S207FA (CC)	518.000	Operating	12/24/2003			12	2	1	NG
47	Texas	CC	ABB Power Generation Ltd/General Electric Co	ABB Power Generation Ltd-Unknown/General Electric Co-MS7001FA GT	506.660	Operating	10/14/1999			17	2	1	NG
48	Florida	CC	General Electric Co	General Electric Co-S207FA (CC)	598.100	Operating	3/31/2005			11	2	1	NG
49	Kentucky	CC			514.800	Operating	7/6/2015			1	2	1	NG
50	Oregon	CC	General Electric Co/ABB Power Generation Ltd	General Electric Co-MS7001FA GT/ABB Power Generation Ltd-Unknown	531.500	Operating	7/29/2001			15	2	1	NG
51	Texas	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	552.000	Operating	7/1/2000			16	2	1	NG
52	Texas	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	556.300	Operating	12/1/2000			15	2	1	NG
53	Texas	CC			545.691	Operating	6/30/2014			2	2	1	NG
54	Sonora	CC			464.400	Operating	4/28/2016			0	2	1	NG
55	Iowa	CC	Siemens Power Generation Inc	Siemens Power Generation Inc-SCC6-5000F CC 2x1	576.300	Operating	12/17/2004			11	2	1	NG
56	Mississippi	CC	General Electric Co	General Electric Co-MS7001FA GT	566.200	Operating	5/1/2001			15	2	1	NG
57	Mississippi	CC	General Electric Co	General Electric Co-MS7001FA GT	566.200	Operating	4/1/2001			15	2	1	NG
58	Georgia	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	568.000	Operating	5/20/2004			12	2	1	NG
59	Nevada	CC	General Electric Co	General Electric Co-PG7241(FA)	558.500	Operating	5/4/2011			5	2	1	NG
60	Nevada	CC	Siemens AG/General Electric Co/Siemens AG	Siemens AG-501F/General Electric Co-Unknown/Siemens AG-501F	498.525	Operating	5/17/2004			12	2	1	NG
61	New York	CC	General Electric Co/General Electric Co	General Electric Co-PG7241(FA)/General Electric Co-Unknown	528.000	Operating	12/31/2005			10	2	1	NG
62	Indiana	CC	General Electric Co	General Electric Co-S207FA (CC)	555.300	Operating	6/6/2003			13	2	1	NG

	Plant State	Prime Mover Category	Generator Manufacturer	Generator Model	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Combustion Turbines (Combined Cycles only)	Number of Steam Turbines (Combined Cycles only)	Primary Fuel Code
63	Minnesota	CC	Siemens Power Generation Inc/General Electric Co	Siemens Power Generation Inc-Unknown/General Electric Co-Unknown	585.900	Operating	4/30/2009			7	2	1	NG
64	Texas	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS7001FA GT	576.400	Operating	7/19/2001			15	2	1	NG
65	Texas	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS7001FA GT	576.400	Operating	8/27/2001			15	2	1	NG
66	Georgia	CC	Siemens Power Generation Inc	Siemens Power Generation Inc-Unknown	539.700	Operating	2/15/2003			13	2	1	NG
67	Georgia	CC	General Electric Co	General Electric Co-MS7001FA GT	596.000	Operating	6/1/2002			14	2	1	NG
68	Georgia	CC	General Electric Co	General Electric Co-MS7001FA GT	596.000	Operating	6/1/2002			14	2	1	NG
69	Washington	CC	General Electric Co	General Electric Co-S207FA (CC)	593.300	Operating	10/1/2003			13	2	1	NG
70	Utah	CC	General Electric Co	General Electric Co-MS7001FA GT	566.900	Operating	1/7/2006			10	2	1	NG
71	Utah	CC	Siemens Power Generation Inc/Siemens Power Generation Inc	Siemens Power Generation Inc-SGT6-5000F/Siemens Power Generation Inc-Unknown	591.300	Operating	9/21/2007			9	2	1	NG
72	Alabama	CC	Mitsubishi Heavy Industries/Siemens Power Generation Inc	Mitsubishi Heavy Industries-Unknown/Siemens Power Generation Inc-SGT6-5000F	507.000	Operating	1/1/2002			14	2	1	NG
73	Oklahoma	CC	Siemens Power Generation Inc/General Electric Co	Siemens Power Generation Inc-Unknown/General Electric Co-MS7001FA GT	527.000	Operating	6/29/2001			15	2	1	NG
74	California	CC	General Electric Co	General Electric Co-MS7001FA GT	530.000	Operating	2/28/2006			10	2	1	NG
75	California	CC	General Electric Co	General Electric Co-MS7001FA GT	559.000	Operating	4/1/2006			10	2	1	NG
76	South Carolina	CC	General Electric Co/General Electric Co	General Electric Co-Unknown/General Electric Co-MS9001EC	520.000	Operating	1/1/2002			14	2	1	NG
77	California	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	518.400	Operating	12/10/2005			10	2	1	NG
78	California	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	518.400	Operating	1/19/2006			10	2	1	NG
79	Florida	CC	General Electric Co	General Electric Co-PG7241(FA)	447.395	Operating	10/1/2003			13	2	1	NG
80	North Carolina	CC	General Electric Co/Toshiba/General Electric Co	General Electric Co-MS7001FA GT/Toshiba-Unknown/General Electric Co-MS7001FA GT	593.800	Operating	6/1/2003			13	2	1	NG
81	Texas	CC	General Electric Co/Mitsubishi Heavy Industries	General Electric Co-MS7001FA GT/Mitsubishi Heavy Industries-Unknown	505.000	Operating	11/28/2001			14	2	1	NG
82	Quebec	CC			533.000	Operating	9/1/2006			10	2	1	NG
83	Durango	CC			471.030	Operating	10/1/2010			6	2	1	NG
84	Veracruz	CC	Mitsubishi Heavy Industries	Mitsubishi Heavy Industries-M501F	491.500	Operating	5/23/2003			13	2	1	NG
85	Veracruz	CC	Mitsubishi Heavy Industries	Mitsubishi Heavy Industries-M501F	491.500	Operating	5/23/2003			13	2	1	NG
86	Virginia	CC	General Electric Co	General Electric Co-MS7001FA GT	559.000	Operating	5/24/2011			5	2	1	NG
87	Maine	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	563.900	Operating	5/9/2001			15	2	1	NG
88	Indiana	CC	General Electric Co/General Electric Co	General Electric Co-PG7241(FA)/General Electric Co-Unknown	576.800	Operating	2/1/2002			14	2	1	NG
89	Wisconsin	CC	General Electric Co/General Electric Co	General Electric Co-MS7001FA GT/General Electric Co-Unknown	579.000	Operating	7/19/2005			11	2	1	NG

Appendix D

Explanation of Variance from Previous Cost Studies

Desert Star Variance Explanation

Cost Category	2010 Cost Estimate Cost	2016 Cost Estimate Cost	Delta	Comment
21 - Civil	$5,933,335	$2,527,894	($3,405,441)	In 2016, the assumption for the thickness of cover material was changed from 24 inches to 6 inches decreasing costs. Also, pavement quantities were increased.
22 - Concrete	$835,078	$815,678	($19,400)	The quantity of concrete was adjusted for modifications to the site and correction from previous estimates.
23 - Steel	$95,119	$104,455	$9,336	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
24 - Architectural	$128,597	$236,923	$108,326	The increased cost reflects an increase in estimated plant quantities due to site modifications.
31 - Mech. Equipment	$3,258,400	$3,371,322	$112,922	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
35 - Piping	$180,251	$185,947	$5,696	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
41 - Electrical Equipment	$90,692	$212,600	$121,908	The increased cost reflects an increase in estimated plant quantities due to site modifications including a new spare transformer.
42 - Raceway, Cable Tray & Conduit	$126,317	$130,308	$3,991	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
43 - Cable	$181,437	$187,169	$5,732	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
44 - Control & Instrumentation	$9,097	$17,023	$7,926	In 2016, there were no changes in quantities. The increase reflects the change in costs over time.
98 - Waste	$179,187	$90,000	($89,187)	The cost for offsite debris burial decreased since the last estimate.
81 - Scrap (Copper)	($3,345,890)	($1,507,072)	$1,838,818	The estimated copper scrap quantities found in the station's transformers were corrected from the previous estimate.
81 - Scrap (Steel)	($2,623,275)	($950,092)	$1,673,183	The market value of scrap steel significantly decreased since the time of the last estimate (from $229 per ton to $87 per ton).
Direct Cost	**$5,048,345**	**$5,422,155**	**$373,810**	
G&A and Profit	$0	$954,655	$954,655	In the previous estimate G&A and profit was included in the wage rate, but in 2016 it was shown separately
Engineering	$151,450	$200,000	$48,550	
Construction Management Support	$100,967	$127,536	$26,569	
Total Contingency	$3,447,818	$2,323,735	($1,124,083)	
Total Project Cost	**$8,748,580**	**$9,028,081**	**$279,501**	

Prepared by

Sargent & Lundy LLC
Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

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Photovoltaic (PV) Sites
Decommissioning Study

Prepared for
San Diego Gas & Electric Company

Report SL-013559.E

Project 12699-004
February 2017

SDGE
A Sempra Energy utility®

F I N A L

Photovoltaic (PV) Sites
Decommissioning Study

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Project 12699-004

LEGAL NOTICE

This report ('Deliverable') was prepared by Sargent & Lundy, L.L.C. ('S&L'), expressly for the sole use of San Diego Gas & Electric Company ('Client') in accordance with the agreement between S&L and Client. This Deliverable was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances. Client acknowledges (1) S&L prepared this Deliverable subject to the particular scope limitations, budgetary and time constraints, and business objectives of the Client; (2) information and data provided by others may not have been independently verified by S&L; and (3) the information and data contained in this Deliverable are time sensitive and changes in the data, applicable codes, standards, and acceptable engineering practices may invalidate the findings of this Deliverable. Any use or reliance upon this Deliverable by third parties shall be at their sole risk.

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Photovoltaic (PV) Sites Decommissioning Study

CONTENTS

CONTENTS (cont.)

TABLES & FIGURES

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ACRONYMS AND ABBREVIATIONS

Term	Definition or Clarification
AC	Alternating current
ASL	Average Service Life
BESS(s)	Battery energy storage system(s)
DC	Direct current
FERC	Federal Energy Regulatory Commission
kW	Kilowatts
LID	Light-induced degradation
O&M	Operations and maintenance
Owner	San Diego Gas & Electric Company
PV	Photovoltaic
S&L	Sargent & Lundy LLC
SDG&E	San Diego Gas & Electric Company
W	Watts

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EXECUTIVE SUMMARY

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual cost estimate and Average Service Life (ASL) estimate for SDG&E's portfolio of photovoltaic (PV) generation sites. The work scope included a review of drawings, documents, and a descriptive list of the sites; a site visit to representative small-scale and canopy PV systems; and the development of a conceptual demolition cost estimate and report as well as the ASL.

METHODOLOGY

The S&L methodology for developing the cost estimate consisted of three elements: 1) our experience in developing plant demolition costs and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities. The cost estimate was developed based on the drawings, documents, and data provided by the Owner. These drawings and documents were used to estimate the number of PV panels, steel quantities, electrical equipment quantities, and other related items. We performed a site walkdown of a typical roof-installed PV site and a canopy-type PV installation to review the site components and determine any unique site-specific requirements. This information was used with unit cost factors developed by S&L based on industry data and our experience. Unit cost factors for panel removal, concrete removal, steel removal, cutting costs, and so forth were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

CONCEPTUAL COST ESTIMATE

Photovoltaic Energy Sites

The summary of the cost estimate for decommissioning the SDG&E PV sites is shown in Table ES-1. The cost estimate broken into Federal Energy Regulatory Commission (FERC) accounts is shown in Table ES-2. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

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Table ES-1 — Cost Estimate Summary for Photovoltaic Energy Sites

			Includes Contingency							
	Customer	*Location*	*Subcontract Cost*	*Scrap Value*	*Material Cost*	*Labor Cost*	*G&A & Profit*	*Engineering, Procurement, & Project Services; Construction Management Support*	*Contingency on Indirect*	*Total Cost*
Roof Top PV Sites										
1	TKG Engineering (EXP)	Roof	$ 79,856	$ (6,004)	$ -	$ 50,653	$ 13,163	$ 9,153	$ 1,831	$ 148,652
2	Reuben H Fleet (Science Center)	Roof	$ 158,495	$ (15,569)	$ -	$ 131,203	$ 28,854	$ 20,065	$ 4,013	$ 327,061
3	Ladera Ranch 999	Roof	$ 94,909	$ (7,785)	$ -	$ 65,467	$ 16,109	$ 11,202	$ 2,240	$ 182,142
4	Hunter Industries	Roof	$ 143,802	$ (13,829)	$ -	$ 116,377	$ 25,939	$ 18,037	$ 3,607	$ 293,933
5	The Towers at Bressi Ranch	Roof	$ 120,762	$ (10,941)	$ -	$ 91,764	$ 21,246	$ 14,774	$ 2,955	$ 240,560
6	Del Sur Elementary	Roof	$ 75,536	$ (5,468)	$ -	$ 46,139	$ 12,293	$ 8,548	$ 1,710	$ 138,759
7	Ladera Ranch 555	Roof	$ 90,049	$ (7,171)	$ -	$ 60,323	$ 15,125	$ 10,518	$ 2,104	$ 170,947
8	Innovative Oil and Gas/Hamann Companies	Roof	$ 379,424	$ (42,632)	$ -	$ 359,327	$ 73,104	$ 50,835	$ 10,167	$ 830,226
9	High Tech High Chula Vista	Roof	$ 150,575	$ (14,560)	$ -	$ 122,819	$ 27,252	$ 18,950	$ 3,790	$ 308,826
10	Hanna Gabriel Wells	Roof	$ 46,444	$ (1,934)	$ -	$ 16,241	$ 6,477	$ 4,504	$ 901	$ 72,632
11	San Diego CC Skills Center	Roof	$ 98,149	$ (8,190)	$ -	$ 69,209	$ 16,800	$ 11,682	$ 2,336	$ 189,987
13	Burnham Institute	Roof	$ 187,588	$ (19,129)	$ -	$ 161,358	$ 34,694	$ 24,126	$ 4,825	$ 393,461
14	La Maestra	Roof	$ 53,396	$ (2,673)	$ -	$ 22,555	$ 7,794	$ 5,420	$ 1,084	$ 87,576
15	Grossmont Trolley (Altera)	Roof	$ 99,589	$ (8,357)	$ -	$ 70,366	$ 17,054	$ 11,859	$ 2,372	$ 192,883
16	Thomas Jefferson School of Law	Roof	$ 76,796	$ (5,657)	$ -	$ 47,296	$ 12,524	$ 8,709	$ 1,742	$ 141,411
17	Port of San Diego	Roof	$ 60,416	$ (3,533)	$ -	$ 29,769	$ 9,196	$ 6,395	$ 1,279	$ 103,522
18	Wilco	Roof	$ 427,530	$ (48,465)	$ -	$ 408,295	$ 82,672	$ 57,489	$ 11,498	$ 939,019
19	Amylin Pharmaceuticals	Roof	$ 236,120	$ (25,129)	$ -	$ 211,883	$ 44,450	$ 30,910	$ 6,182	$ 504,416
22	High Tech High North County	Roof	$ 93,829	$ (7,658)	$ -	$ 64,566	$ 15,915	$ 11,067	$ 2,213	$ 179,933
23	Urban Corps	Roof	$ 53,396	$ (2,673)	$ -	$ 22,555	$ 7,794	$ 5,420	$ 1,084	$ 87,576
24	Pacific Ridge School	Roof	$ 50,696	$ (2,312)	$ -	$ 19,713	$ 7,252	$ 5,043	$ 1,009	$ 81,401
25	Sanford Burnham Medical Research	Roof	$ 163,535	$ (16,214)	$ -	$ 136,489	$ 29,868	$ 20,770	$ 4,154	$ 338,600
26	High Tech High CV K-8	Roof	$ 151,295	$ (14,640)	$ -	$ 123,732	$ 27,416	$ 19,064	$ 3,813	$ 310,680
27	Campus Pointe	Roof	$ 260,173	$ (28,050)	$ -	$ 236,624	$ 49,262	$ 34,256	$ 6,851	$ 559,116
28	CSU San Marcos	Roof	$ 64,736	$ (4,098)	$ -	$ 34,411	$ 10,075	$ 7,006	$ 1,401	$ 113,532
29	EIC roof top	Roof	$ 74,456	$ (5,342)	$ -	$ 44,853	$ 12,057	$ 8,384	$ 1,677	$ 136,087
31	UCSD - CDK Apartments	Roof	$ 67,616	$ (4,458)	$ -	$ 37,639	$ 10,678	$ 7,426	$ 1,485	$ 120,387
32	Soledad	Roof	$ 117,522	$ (10,502)	$ -	$ 88,678	$ 20,632	$ 14,347	$ 2,869	$ 233,546
33	Pacific Station	Roof	$ 124,002	$ (11,346)	$ -	$ 95,506	$ 21,936	$ 15,254	$ 3,051	$ 248,403
34	UCSD - Structural & Materials Engr	Roof	$ 136,242	$ (12,887)	$ -	$ 108,648	$ 24,436	$ 16,992	$ 3,398	$ 276,829
36	UCSD MESOM	Roof	$ 85,909	$ (6,649)	$ -	$ 56,067	$ 14,300	$ 9,944	$ 1,989	$ 161,560
37	Suites at Paseo	Roof	$ 59,336	$ (3,407)	$ -	$ 28,483	$ 8,960	$ 6,231	$ 1,246	$ 100,850
38	Del Lago Academy	Roof	$ 170,375	$ (17,065)	$ -	$ 143,831	$ 31,266	$ 21,742	$ 4,348	$ 354,497
Subtotal - Roof										***$ 8,569,013***

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Canopy PV Sites											
12	Sony Parking Structure	Carport - Canopy	$ 10,972	$ (53,088)	$ -	$ 186,418	$ 12,757	$ 7,851	$ 1,570	**$ 166,479**
20	County Operations Center Parking Structure A	Carport - Canopy	$ 23,178	$ (118,321)	$ -	$ 411,620	$ 27,876	$ 17,154	$ 3,431	**$ 364,939**
30	EIC solar trees	Carport - Free standing - Multiaxis	$ 3,305	$ (17,533)	$ -	$ 63,297	$ 4,366	$ 2,687	$ 537	**$ 56,659**
35	Sharp Rees Stealy Wellness Center	Carport - Canopy	$ 4,362	$ (20,407)	$ -	$ 73,495	$ 5,118	$ 3,150	$ 630	**$ 66,348**
39	San Diego Zoo	Carport - Canopy	$ 5,464	$ (25,727)	$ -	$ 91,563	$ 6,331	$ 3,896	$ 779	**$ 82,305**
40	Caltrans Fast EV Suncharge Del Lago	Carport - Canopy	$ 1,102	$ (3,660)	$ -	$ 15,806	$ 1,237	$ 761	$ 152	**$ 15,398**
41	Agua Hedionda Lagoon Foundation	Carport - Canopy	$ 1,057	$ (1,473)	$ -	$ 8,797	$ 828	$ 510	$ 102	**$ 9,821**
42	Civita Westpark Apartments	Carport	$ 4,406	$ (21,560)	$ -	$ 77,726	$ 5,394	$ 3,319	$ 664	**$ 69,950**
Subtotal - Canopy										***$ 831,898***

Site Name	*Solar Modules*	*Racking*	*Inverters*	*Switchgear*	*Foundations / Structural*	*Electrical Infrastructure*	*Earthwork / Recontouring*	*Revegetation*	*Project Management*	*Total Cost*
Utility Scale PV Sites										
PV Utility Scale - Ramona Project										
Removal Costs	$ 116,494	$ 214,448	$ 10,000	$ 2,500	$ 5,000	$ 178,789	$ 18,000	$ 22,000	$ 59,400	$ 626,631
Salvage Costs	$ (34,948)	$ (171,558)	$ (11,500)	$ -	$ -	$ (107,273)	$ -	$ -	$ -	$ (325,279)
										$ 301,352
PV Utility Scale - Pala Project										
Removal Costs	$ 53,872	$ 125,606	$ 5,000	$ 2,500	$ 2,500	$ 119,819	$ 9,000	$ 14,000	$ 27,000	$ 359,297
Salvage Costs	$ (16,161)	$ (100,484)	$ (5,750)	$ -	$ -	$ (71,891)	$ -	$ -	$ -	$ (194,286)
										$ 165,011
Subtotal										***$ 466,363***
TOTAL										**$ 9,867,274**

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Table ES-2 — PV Sites Cost Estimate Summary by FERC Account

	Customer	*Location*	341 - STRUCTURES AND IMPROVEMENTS	347 - ASSET RETIREMENT COST	348 - OTHER PRODUCTION - GENERATION	I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT	***TOTAL PROJECT COST***
Roof Top PV Sites								
1	TKG Engineering (EXP)	Roof	$ 13,956	$ 76,738	$ 46,974	$ 7,780	$ 3,204	$ 148,652
2	Reuben H Fleet (Science Center)	Roof	$ 31,119	$ 154,610	$ 117,254	$ 17,055	$ 7,023	$ 327,061
3	Ladera Ranch 999	Roof	$ 17,476	$ 91,228	$ 59,996	$ 9,522	$ 3,921	$ 182,142
4	Hunter Industries	Roof	$ 27,509	$ 140,453	$ 104,327	$ 15,332	$ 6,313	$ 293,933
5	The Towers at Bressi Ranch	Roof	$ 23,160	$ 116,801	$ 82,871	$ 12,558	$ 5,171	$ 240,560
6	Del Sur Elementary	Roof	$ 13,126	$ 72,313	$ 43,062	$ 7,266	$ 2,992	$ 138,759
7	Ladera Ranch 555	Roof	$ 16,666	$ 86,243	$ 55,416	$ 8,940	$ 3,681	$ 170,947
8	Innovative Oil and Gas/Hamann Companies	Roof	$ 78,353	$ 374,762	$ 316,108	$ 43,210	$ 17,792	$ 830,226
9	High Tech High Chula Vista	Roof	$ 29,558	$ 146,486	$ 110,042	$ 16,108	$ 6,633	$ 308,826
10	Hanna Gabriel Wells	Roof	$ 6,882	$ 43,403	$ 16,943	$ 3,828	$ 1,576	$ 72,632
11	San Diego CC Skills Center	Roof	$ 18,165	$ 94,580	$ 63,223	$ 9,930	$ 4,089	$ 189,987
13	Burnham Institute	Roof	$ 37,387	$ 183,545	$ 143,579	$ 20,507	$ 8,444	$ 393,461
14	La Maestra	Roof	$ 8,930	$ 49,590	$ 22,553	$ 4,607	$ 1,897	$ 87,576
15	Grossmont Trolley (Altera)	Roof	$ 18,375	$ 96,023	$ 64,254	$ 10,080	$ 4,151	$ 192,883
16	Thomas Jefferson School of Law	Roof	$ 13,320	$ 73,590	$ 44,050	$ 7,403	$ 3,048	$ 141,411
17	Port of San Diego	Roof	$ 10,205	$ 56,770	$ 28,873	$ 5,436	$ 2,238	$ 103,522
18	Wilco	Roof	$ 88,902	$ 422,231	$ 358,899	$ 48,866	$ 20,121	$ 939,019
19	Amylin Pharmaceuticals	Roof	$ 47,363	$ 232,400	$ 187,561	$ 26,273	$ 10,818	$ 504,416
22	High Tech High North County	Roof	$ 17,317	$ 90,143	$ 59,193	$ 9,407	$ 3,873	$ 179,933
23	Urban Corps	Roof	$ 8,930	$ 49,590	$ 22,553	$ 4,607	$ 1,897	$ 87,576
24	Pacific Ridge School	Roof	$ 8,366	$ 46,822	$ 20,162	$ 4,287	$ 1,765	$ 81,401
25	Sanford Burnham Medical Research	Roof	$ 32,077	$ 159,775	$ 121,825	$ 17,654	$ 7,269	$ 338,600
26	High Tech High CV K-8	Roof	$ 29,815	$ 147,238	$ 110,750	$ 16,205	$ 6,673	$ 310,680
27	Campus Pointe	Roof	$ 52,655	$ 256,158	$ 209,196	$ 29,117	$ 11,990	$ 559,116
28	CSU San Marcos	Roof	$ 11,049	$ 61,208	$ 32,867	$ 5,955	$ 2,452	$ 113,532
29	EIC roof top	Roof	$ 12,932	$ 71,193	$ 41,901	$ 7,127	$ 2,935	$ 136,087
31	UCSD - CDK Apartments	Roof	$ 11,671	$ 64,178	$ 35,627	$ 6,312	$ 2,599	$ 120,387
32	Soledad	Roof	$ 22,653	$ 113,508	$ 80,169	$ 12,195	$ 5,021	$ 233,546
33	Pacific Station	Roof	$ 23,850	$ 120,152	$ 86,096	$ 12,966	$ 5,339	$ 248,403
34	UCSD - Structural & Materials Engr	Roof	$ 26,153	$ 132,724	$ 97,561	$ 14,443	$ 5,947	$ 276,829
36	UCSD MESOM	Roof	$ 15,862	$ 82,008	$ 51,757	$ 8,453	$ 3,480	$ 161,560
37	Suites at Paseo	Roof	$ 10,011	$ 55,650	$ 27,712	$ 5,296	$ 2,181	$ 100,850
38	Del Lago Academy	Roof	$ 33,354	$ 166,800	$ 128,253	$ 18,481	$ 7,610	$ 354,497
Subtotal - Roof			*$ 817,148*	*$ 4,128,913*	*$ 2,991,606*	*$ 447,203*	*$ 184,143*	*$ 8,569,013*

Canopy PV Sites								
12	Sony Parking Structure	Carport - Canopy	$ 53,809	$ 20,345	$ 82,904	$ 6,673	$ 2,748	$ 166,479
20	County Operations Center Parking Structure A	Carport - Canopy	$ 115,442	$ 44,899	$ 184,013	$ 14,581	$ 6,004	$ 364,939
30	EIC solar trees	Carport - Free standing - Multiaxis	$ 19,315	$ 6,839	$ 27,281	$ 2,284	$ 940	$ 56,659
35	Sharp Rees Stealy Wellness Center	Carport - Canopy	$ 22,502	$ 7,991	$ 32,074	$ 2,677	$ 1,102	$ 66,348
39	San Diego Zoo	Carport - Canopy	$ 27,641	$ 9,978	$ 40,012	$ 3,311	$ 1,364	$ 82,305
40	Caltrans Fast EV Suncharge Del Lago	Carport - Canopy	$ 6,709	$ 1,731	$ 6,044	$ 647	$ 266	$ 15,398
41	Agua Hedionda Lagoon Foundation	Carport - Canopy	$ 5,643	$ 983	$ 2,583	$ 433	$ 178	$ 9,821
42	Civita Westpark Apartments	Carport	$ 23,866	$ 8,454	$ 33,646	$ 2,822	$ 1,162	$ 69,950
Subtotal - Canopy			*$ 274,927*	*$ 101,219*	*$ 408,558*	*$ 33,428*	*$ 13,765*	*$ 831,898*
Ramona Project		*Utility Scale*	*$ 5,000*	$ 40,000	$ 196,952	$ -	$ 59,400	$ 301,352
Pala Project		*Utility Scale*	$ 2,500	$ 23,000	$ 112,511	$ -	$ 27,000	$ 165,011
Subtotal - Utility			$ 7,500	$ 63,000	$ 309,463	$ -	$ 86,400	$ 466,363
TOTAL			**$ 1,099,576**	**$ 4,293,131**	**$ 3,709,628**	**$ 480,632**	**$ 284,307**	**$ 9,867,274**

AVERAGE SERVICE LIFE

In summary, the average service life of a PV plant is approximately 25 years, assuming the plant follows diligent and good operations and maintenance (O&M) practices.

However, PV technology is relatively new compared to most utility-scale power generation equipment. For example, the first megawatt- (MW-) scale PV site was installed in 1982. Since that time, technology has advanced a great deal, especially over the last decade. Consequently, very few utility-scale PV sites have reached the end of their service life. Average service life estimates are primarily based on manufacturers' guarantees. Since the number of PV assets to reach their end of service life is small, a left-modal Iowa curve is appropriate as a survivor curve because of its positive skew (for further information, see Section 5.3.2). Positive skew curves have means (averages) that are smaller than the median, indicating that most of the assets are expected to fail before the average service life.

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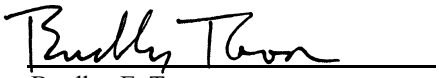

Bradley E. Toon
Senior Management Consultant

Emile Jabre
Management Consultant

Lara A. Bledin
Management Consultant

Reviewed by

Matt N. Ozan
Manager
Cost Information Division

Robert. P. Charles
Senior Principal Consultant &
Project Manager

Approved by

Robert. P. Charles
Senior Principal Consultant & Project Manager

February 1, 2017
Date

LAST PAGE OF EXECUTIVE SUMMARY.

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1. SCOPE OF WORK

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual cost estimate and Average Service Life (ASL) estimate for SDG&E's portfolio of photovoltaic (PV) generation sites. The work scope included a review of drawings, documents, and a descriptive list of the sites; a site visit to representative small-scale and canopy-PV systems; and the development of a conceptual demolition cost estimate and report as well as the ASL.

Sargent & Lundy has been dedicated to providing complete engineering and environmental services exclusively to the power industry since 1891. Through our work with various utilities, lending institutions, and developers, over the years Sargent & Lundy Consulting has become one of the premier power project consultants in the power industry. This commitment to quality is proven by the successful completion of our International Organization for Standardization (ISO) 9000 certification audit. Our experience encompasses independent engineer services, including decommissioning cost estimation and average service life evaluation for both global and domestic electric power assets. S&L has recently completed decommissioning studies for a number of clients.

Sargent & Lundy has engineered over 958 power plant units. We have both the benefit of extensive design experience with feedback from operating plants as well as individuals with extensive plant operations experience to support our consulting services.

LAST PAGE OF SECTION 1.

2. GENERAL DESCRIPTION

2.1 PHOTOVOLTAIC (PV) SITES

SDG&E's portfolio of PV sites consists of three types of installations: rooftop, canopy, and utility-scale sites. Many of the PV installation are part of the San Diego Sustainable Communities program that engages area partners to be involved with renewable energy projects in the area. Descriptions of the sites are as follows:

- Most rooftop installations are fixed-tilt PV panels located on commercial buildings, school and university buildings, and other structures. The oldest rooftop PV installation was energized in 2004, and they range in size from 16 to 504 kilowatts (kW).
- Canopy-mounted PV sites are primarily freestanding carport canopies located in parking lots. "Solar tree" canopy installations are multi-axial, while the rest are fixed-tilt. The oldest canopy installed was energized in 2009, and the sites range in size from 5 to 359 kW.
- The Ramona utility-scale PV site is rated at 4,950 kW and was energized in 2013. The Pala site will be a 2,230-kW utility-scale plant.

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3. COST ESTIMATE

3.1 METHODOLOGY

The methodology used for developing the cost estimate includes a combination of stochastic and deterministic methods. Deterministic methods were used based on the quantity and size of equipment (e.g., the number of PV panels, steel framing, and etc.). Stochastic methods were also used if quantity information (e.g., quantity of conduits, misc. electrical equipment) was not available.

The cost estimate was developed based on the list of PV projects, typical drawings, and data provided by the Owner and found in the S&L database. (Satellite images from maps.google.com were used to determine the installation type for some canopy sites.) These drawings and documents were used to estimate the number of PV panels, quantity of aluminum framing, quantity of steel in canopy and in-ground frames, and so forth.

The S&L methodology for developing the cost estimate consisted of three elements: 1) our experience in developing plant demolition costs and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities.

Cost estimates were created using the S&L cost model format and the S&L cost database. The estimates developed include details for each type of work performed, indirect costs, and contingencies.

The SDG&E portfolio of PV sites provided the number of panels, power rating, and type of installation. Mr. Borko Andric and Mr. Brad Toon of S&L visited a representative rooftop installation and solar trees site at the SDG&E Energy Innovation Center. This information was used with unit cost factors developed by S&L based on industry data alongside our experience. Unit cost factors for PV panel removal, roof repair, steel removal for canopy sites, and other tasks were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

S&L relied on SDG&E to identify the location of environmental problems that need to be considered in the estimates, since our scope of work does not include a detailed survey and testing program to identify such problems.

3.2 COST ESTIMATE SUMMARY

3.2.1 PV Energy Sites

The summary of the cost estimate for decommissioning the portfolio of PV energy sites is shown in Table 3-1. The commercial and technical basis for the estimate is included in Section 4. The detailed estimate is included in Appendix A. The breakdown into Federal Energy Regulatory Commission (FERC) accounts is shown in Table 3-2. The allocation of FERC accounts is shown in Appendix B. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

Table 3-1 — Cost Estimate Summary for PV Sites

			Includes Contingency							
	Customer	*Location*	*Subcontract Cost*	*Scrap Value*	*Material Cost*	*Labor Cost*	*G&A & Profit*	*Engineering, Procurement, & Project Services; Construction Management Support*	*Contingency on Indirect*	*Total Cost*
Roof Top PV Sites										
1	TKG Engineering (EXP)	Roof	$ 79,856	$ (6,004)	$ -	$ 50,653	$ 13,163	$ 9,153	$ 1,831	$ 148,652
2	Reuben H Fleet (Science Center)	Roof	$ 158,495	$ (15,569)	$ -	$ 131,203	$ 28,854	$ 20,065	$ 4,013	$ 327,061
3	Ladera Ranch 999	Roof	$ 94,909	$ (7,785)	$ -	$ 65,467	$ 16,109	$ 11,202	$ 2,240	$ 182,142
4	Hunter Industries	Roof	$ 143,802	$ (13,829)	$ -	$ 116,377	$ 25,939	$ 18,037	$ 3,607	$ 293,933
5	The Towers at Bressi Ranch	Roof	$ 120,762	$ (10,941)	$ -	$ 91,764	$ 21,246	$ 14,774	$ 2,955	$ 240,560
6	Del Sur Elementary	Roof	$ 75,536	$ (5,468)	$ -	$ 46,139	$ 12,293	$ 8,548	$ 1,710	$ 138,759
7	Ladera Ranch 555	Roof	$ 90,049	$ (7,171)	$ -	$ 60,323	$ 15,125	$ 10,518	$ 2,104	$ 170,947
8	Innovative Oil and Gas/Hamann Companies	Roof	$ 379,424	$ (42,632)	$ -	$ 359,327	$ 73,104	$ 50,835	$ 10,167	$ 830,226
9	High Tech High Chula Vista	Roof	$ 150,575	$ (14,560)	$ -	$ 122,819	$ 27,252	$ 18,950	$ 3,790	$ 308,826
10	Hanna Gabriel Wells	Roof	$ 46,444	$ (1,934)	$ -	$ 16,241	$ 6,477	$ 4,504	$ 901	$ 72,632
11	San Diego CC Skills Center	Roof	$ 98,149	$ (8,190)	$ -	$ 69,209	$ 16,800	$ 11,682	$ 2,336	$ 189,987
13	Burnham Institute	Roof	$ 187,588	$ (19,129)	$ -	$ 161,358	$ 34,694	$ 24,126	$ 4,825	$ 393,461
14	La Maestra	Roof	$ 53,396	$ (2,673)	$ -	$ 22,555	$ 7,794	$ 5,420	$ 1,084	$ 87,576
15	Grossmont Trolley (Altera)	Roof	$ 99,589	$ (8,357)	$ -	$ 70,366	$ 17,054	$ 11,859	$ 2,372	$ 192,883
16	Thomas Jefferson School of Law	Roof	$ 76,796	$ (5,657)	$ -	$ 47,296	$ 12,524	$ 8,709	$ 1,742	$ 141,411
17	Port of San Diego	Roof	$ 60,416	$ (3,533)	$ -	$ 29,769	$ 9,196	$ 6,395	$ 1,279	$ 103,522
18	Wilco	Roof	$ 427,530	$ (48,465)	$ -	$ 408,295	$ 82,672	$ 57,489	$ 11,498	$ 939,019
19	Amylin Pharmaceuticals	Roof	$ 236,120	$ (25,129)	$ -	$ 211,883	$ 44,450	$ 30,910	$ 6,182	$ 504,416
22	High Tech High North County	Roof	$ 93,829	$ (7,658)	$ -	$ 64,566	$ 15,915	$ 11,067	$ 2,213	$ 179,933
23	Urban Corps	Roof	$ 53,396	$ (2,673)	$ -	$ 22,555	$ 7,794	$ 5,420	$ 1,084	$ 87,576
24	Pacific Ridge School	Roof	$ 50,696	$ (2,312)	$ -	$ 19,713	$ 7,252	$ 5,043	$ 1,009	$ 81,401
25	Sanford Burnham Medical Research	Roof	$ 163,535	$ (16,214)	$ -	$ 136,489	$ 29,868	$ 20,770	$ 4,154	$ 338,600
26	High Tech High CV K-8	Roof	$ 151,295	$ (14,640)	$ -	$ 123,732	$ 27,416	$ 19,064	$ 3,813	$ 310,680
27	Campus Pointe	Roof	$ 260,173	$ (28,050)	$ -	$ 236,624	$ 49,262	$ 34,256	$ 6,851	$ 559,116
28	CSU San Marcos	Roof	$ 64,736	$ (4,098)	$ -	$ 34,411	$ 10,075	$ 7,006	$ 1,401	$ 113,532
29	EIC roof top	Roof	$ 74,456	$ (5,342)	$ -	$ 44,853	$ 12,057	$ 8,384	$ 1,677	$ 136,087
31	UCSD - CDK Apartments	Roof	$ 67,616	$ (4,458)	$ -	$ 37,639	$ 10,678	$ 7,426	$ 1,485	$ 120,387
32	Soledad	Roof	$ 117,522	$ (10,502)	$ -	$ 88,678	$ 20,632	$ 14,347	$ 2,869	$ 233,546
33	Pacific Station	Roof	$ 124,002	$ (11,346)	$ -	$ 95,506	$ 21,936	$ 15,254	$ 3,051	$ 248,403
34	UCSD - Structural & Materials Engr	Roof	$ 136,242	$ (12,887)	$ -	$ 108,648	$ 24,436	$ 16,992	$ 3,398	$ 276,829
36	UCSD MESOM	Roof	$ 85,909	$ (6,649)	$ -	$ 56,067	$ 14,300	$ 9,944	$ 1,989	$ 161,560
37	Suites at Paseo	Roof	$ 59,336	$ (3,407)	$ -	$ 28,483	$ 8,960	$ 6,231	$ 1,246	$ 100,850
38	Del Lago Academy	Roof	$ 170,375	$ (17,065)	$ -	$ 143,831	$ 31,266	$ 21,742	$ 4,348	$ 354,497
Subtotal - Roof										***$ 8,569,013***

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Canopy PV Sites											
12	Sony Parking Structure	Carport - Canopy	$ 10,972	$ (53,088)	$ -	$ 186,418	$ 12,757	$ 7,851	$ 1,570	**$**	**166,479**
20	County Operations Center Parking Structure A	Carport - Canopy	$ 23,178	$ (118,321)	$ -	$ 411,620	$ 27,876	$ 17,154	$ 3,431	**$**	**364,939**
30	EIC solar trees	Carport - Free standing - Multiaxis	$ 3,305	$ (17,533)	$ -	$ 63,297	$ 4,366	$ 2,687	$ 537	**$**	**56,659**
35	Sharp Rees Stealy Wellness Center	Carport - Canopy	$ 4,362	$ (20,407)	$ -	$ 73,495	$ 5,118	$ 3,150	$ 630	**$**	**66,348**
39	San Diego Zoo	Carport - Canopy	$ 5,464	$ (25,727)	$ -	$ 91,563	$ 6,331	$ 3,896	$ 779	**$**	**82,305**
40	Caltrans Fast EV Suncharge Del Lago	Carport - Canopy	$ 1,102	$ (3,660)	$ -	$ 15,806	$ 1,237	$ 761	$ 152	**$**	**15,398**
41	Agua Hedionda Lagoon Foundation	Carport - Canopy	$ 1,057	$ (1,473)	$ -	$ 8,797	$ 828	$ 510	$ 102	**$**	**9,821**
42	Civita Westpark Apartments	Carport	$ 4,406	$ (21,560)	$ -	$ 77,726	$ 5,394	$ 3,319	$ 664	**$**	**69,950**
Subtotal - Canopy										***$***	***831,898***

Site Name	*Solar Modules*	*Racking*	*Inverters*	*Switchgear*	*Foundations / Structural*	*Electrical Infrastructure*	*Earthwork / Recontouring*	*Revegetation*	*Project Management*	*Total Cost*
Utility Scale PV Sites										
PV Utility Scale - Ramona Project										
Removal Costs	$ 116,494	$ 214,448	$ 10,000	$ 2,500	$ 5,000	$ 178,789	$ 18,000	$ 22,000	$ 59,400	$ 626,631
Salvage Costs	$ (34,948)	$ (171,558)	$ (11,500)	$ -	$ -	$ (107,273)	$ -	$ -	$ -	$ (325,279)
										$ 301,352
PV Utility Scale - Pala Project										
Removal Costs	$ 53,872	$ 125,606	$ 5,000	$ 2,500	$ 2,500	$ 119,819	$ 9,000	$ 14,000	$ 27,000	$ 359,297
Salvage Costs	$ (16,161)	$ (100,484)	$ (5,750)	$ -	$ -	$ (71,891)	$ -	$ -	$ -	$ (194,286)
										$ 165,011
Subtotal										***$ 466,363***
TOTAL										**$ 9,867,274**

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Table 3-2 — Cost Estimate Summary by FERC Account for PV Sites

	Customer	Location	341 - STRUCTURES AND IMPROVEMENTS	347 - ASSET RETIREMENT COST	348 - OTHER PRODUCTION - GENERATION	I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT	*TOTAL PROJECT COST*
Roof Top PV Sites								
1	TKG Engineering (EXP)	Roof	$ 13,956	$ 76,738	$ 46,974	$ 7,780	$ 3,204	$ 148,652
2	Reuben H Fleet (Science Center)	Roof	$ 31,119	$ 154,610	$ 117,254	$ 17,055	$ 7,023	$ 327,061
3	Ladera Ranch 999	Roof	$ 17,476	$ 91,228	$ 59,996	$ 9,522	$ 3,921	$ 182,142
4	Hunter Industries	Roof	$ 27,509	$ 140,453	$ 104,327	$ 15,332	$ 6,313	$ 293,933
5	The Towers at Bressi Ranch	Roof	$ 23,160	$ 116,801	$ 82,871	$ 12,558	$ 5,171	$ 240,560
6	Del Sur Elementary	Roof	$ 13,126	$ 72,313	$ 43,062	$ 7,266	$ 2,992	$ 138,759
7	Ladera Ranch 555	Roof	$ 16,666	$ 86,243	$ 55,416	$ 8,940	$ 3,681	$ 170,947
8	Innovative Oil and Gas/Hamann Companies	Roof	$ 78,353	$ 374,762	$ 316,108	$ 43,210	$ 17,792	$ 830,226
9	High Tech High Chula Vista	Roof	$ 29,558	$ 146,486	$ 110,042	$ 16,108	$ 6,633	$ 308,826
10	Hanna Gabriel Wells	Roof	$ 6,882	$ 43,403	$ 16,943	$ 3,828	$ 1,576	$ 72,632
11	San Diego CC Skills Center	Roof	$ 18,165	$ 94,580	$ 63,223	$ 9,930	$ 4,089	$ 189,987
13	Burnham Institute	Roof	$ 37,387	$ 183,545	$ 143,579	$ 20,507	$ 8,444	$ 393,461
14	La Maestra	Roof	$ 8,930	$ 49,590	$ 22,553	$ 4,607	$ 1,897	$ 87,576
15	Grossmont Trolley (Altera)	Roof	$ 18,375	$ 96,023	$ 64,254	$ 10,080	$ 4,151	$ 192,883
16	Thomas Jefferson School of Law	Roof	$ 13,320	$ 73,590	$ 44,050	$ 7,403	$ 3,048	$ 141,411
17	Port of San Diego	Roof	$ 10,205	$ 56,770	$ 28,873	$ 5,436	$ 2,238	$ 103,522
18	Wilco	Roof	$ 88,902	$ 422,231	$ 358,899	$ 48,866	$ 20,121	$ 939,019
19	Amylin Pharmaceuticals	Roof	$ 47,363	$ 232,400	$ 187,561	$ 26,273	$ 10,818	$ 504,416
22	High Tech High North County	Roof	$ 17,317	$ 90,143	$ 59,193	$ 9,407	$ 3,873	$ 179,933
23	Urban Corps	Roof	$ 8,930	$ 49,590	$ 22,553	$ 4,607	$ 1,897	$ 87,576
24	Pacific Ridge School	Roof	$ 8,366	$ 46,822	$ 20,162	$ 4,287	$ 1,765	$ 81,401
25	Sanford Burnham Medical Research	Roof	$ 32,077	$ 159,775	$ 121,825	$ 17,654	$ 7,269	$ 338,600
26	High Tech High CV K-8	Roof	$ 29,815	$ 147,238	$ 110,750	$ 16,205	$ 6,673	$ 310,680
27	Campus Pointe	Roof	$ 52,655	$ 256,158	$ 209,196	$ 29,117	$ 11,990	$ 559,116
28	CSU San Marcos	Roof	$ 11,049	$ 61,208	$ 32,867	$ 5,955	$ 2,452	$ 113,532
29	EIC roof top	Roof	$ 12,932	$ 71,193	$ 41,901	$ 7,127	$ 2,935	$ 136,087
31	UCSD - CDK Apartments	Roof	$ 11,671	$ 64,178	$ 35,627	$ 6,312	$ 2,599	$ 120,387
32	Soledad	Roof	$ 22,653	$ 113,508	$ 80,169	$ 12,195	$ 5,021	$ 233,546
33	Pacific Station	Roof	$ 23,850	$ 120,152	$ 86,096	$ 12,966	$ 5,339	$ 248,403
34	UCSD - Structural & Materials Engr	Roof	$ 26,153	$ 132,724	$ 97,561	$ 14,443	$ 5,947	$ 276,829
36	UCSD MESOM	Roof	$ 15,862	$ 82,008	$ 51,757	$ 8,453	$ 3,480	$ 161,560
37	Suites at Paseo	Roof	$ 10,011	$ 55,650	$ 27,712	$ 5,296	$ 2,181	$ 100,850
38	Del Lago Academy	Roof	$ 33,354	$ 166,800	$ 128,253	$ 18,481	$ 7,610	$ 354,497
Subtotal - Roof			*$ 817,148*	*$ 4,128,913*	*$ 2,991,606*	*$ 447,203*	*$ 184,143*	*$ 8,569,013*

Canopy PV Sites								
12	Sony Parking Structure	Carport - Canopy	$ 53,809	$ 20,345	$ 82,904	$ 6,673	$ 2,748	$ 166,479
20	County Operations Center Parking Structure A	Carport - Canopy	$ 115,442	$ 44,899	$ 184,013	$ 14,581	$ 6,004	$ 364,939
30	EIC solar trees	Carport - Free standing - Multiaxis	$ 19,315	$ 6,839	$ 27,281	$ 2,284	$ 940	$ 56,659
35	Sharp Rees Stealy Wellness Center	Carport - Canopy	$ 22,502	$ 7,991	$ 32,074	$ 2,677	$ 1,102	$ 66,348
39	San Diego Zoo	Carport - Canopy	$ 27,641	$ 9,978	$ 40,012	$ 3,311	$ 1,364	$ 82,305
40	Caltrans Fast EV Suncharge Del Lago	Carport - Canopy	$ 6,709	$ 1,731	$ 6,044	$ 647	$ 266	$ 15,398
41	Agua Hedionda Lagoon Foundation	Carport - Canopy	$ 5,643	$ 983	$ 2,583	$ 433	$ 178	$ 9,821
42	Civita Westpark Apartments	Carport	$ 23,866	$ 8,454	$ 33,646	$ 2,822	$ 1,162	$ 69,950
Subtotal - Canopy			*$ 274,927*	*$ 101,219*	*$ 408,558*	*$ 33,428*	*$ 13,765*	*$ 831,898*
Ramona Project		*Utility Scale*	*$ 5,000*	$ 40,000	$ 196,952	$ -	$ 59,400	$ 301,352
Pala Project		*Utility Scale*	$ 2,500	$ 23,000	$ 112,511	$ -	$ 27,000	$ 165,011
Subtotal - Utility			$ 7,500	$ 63,000	$ 309,463	$ -	$ 86,400	$ 466,363
TOTAL			**$ 1,099,576**	**$ 4,293,131**	**$ 3,709,628**	**$ 480,632**	**$ 284,307**	**$ 9,867,274**

The decommissioning cost of PV sites on a per-panel basis varies with site characteristics and the number of panels. In general, decommissioning costs at sites with fewer panels are higher per panel than sites with many panels due to economy of scale. For example, the SDG&E rooftop site "Pacific Ridge School" has 102 panels and a decommissioning cost of approximately $810 per panel. In contrast, SDG&E rooftop site "Amylin Pharmaceuticals" has more than 10 times the number of panels, 1,104, and a decommissioning cost of approximately $464 per panel. The trend between decommissioning costs per panel and the number of panels is asymptotic and levels out for sites with a significant number of panels.

LAST PAGE OF SECTION 3.

4. BASIS OF ESTIMATE

The basis for the cost estimate is as follows:

The decommissioning cost estimates in Appendix A are for the dismantlement and removal of 44 different PV sites. In general, the sites can be categorized into three groups: rooftop installations, canopy installations, and utility-scale sites. The rooftop installations are mounted on bolts that are attached to roofs. The canopy installations are freestanding, and the demolition of the canopy's steel and concrete structure is included with the decommissioning costs. The two utility-scale sites are mounted on steel frames embedded in the ground. The decommissioning cost estimates for the two utility-scale sites, Pala and Ramona, were provided by SDG&E.

The cost estimate is based primarily on S&L experience on similar projects. Detailed engineering has not been performed to firm up the project details, and specific site characteristics have not been fully analyzed.

4.1 PROCEDURE

In general, the procedure to decommission the PV sites is as follows:

- **Rooftop Installations**
  - De-energize system.
  - Dismantle and remove all electrical equipment.
  - Remove solar panels.
  - Remove panel racking.
  - Remove mounting points on rooftop.
  - Remove repair/patch roof holes/damage from removing mounting bolts.
  - Remove inverter, combiner box, and electrical box aboveground conduits and wiring.
  - Remove transformers.
  - Scrap value for metals.
  - Dispose of materials.

- **Canopy Installations**
  - De-energize system.
  - Dismantle and remove all electrical equipment.
  - Remove solar panels.
  - Remove panel racking.
  - Remove steel canopy structure and cut for scrap as necessary.
  - Demolish steel structures' concrete foundations and remove concrete down to 1 foot.
  - Cap and abandon conduit below 1 foot of concrete foundations.
  - Remove inverter, combiner box, and electrical box aboveground conduits and wiring.
  - Remove transformers.
  - Scrap value for metals.
  - Dispose of materials.

- **Utility-Scale Installations**

- The utility-scale decommissioning cost estimates were provided by SDG&E. Typically, utility-scale PV sites are decommissioned by a process similar to that described for the roof and canopy sites. The steel frames for the PV panel are removed for scrap, and holes are filled and landscaped.

4.1.1 Pricing and Quantities

Quantities were provided by SDG&E in the form of a PV portfolio database. The database includes the number of panels, power rating, type of equipment, location, and mounting type. S&L visited the SDG&E Energy Innovation Center and walked down representative PV roof installations, canopies, and multi-axis trees. Aerial images from maps.google.com were also used to establish a visual basis for the sites.

A. Labor Wage Rates

- Craft labor wage rates selected for the estimates are based on those published in *RSMeans Labor Rates for the Construction Industry*, 2016 edition, for San Diego, CA, which are the prevailing rates for the industry in that region.
- The labor estimate is based on a 40-hour workweek; no per diem or other labor incentives.

B. Labor Crews

- The craft rates are incorporated into work crews appropriate for the activities by adding allowances for small tools, construction equipment, insurance, payment bonds, and site overheads to arrive at the crew rates used in the cost estimate.
- An example of crew rates for demolition of equipment and demolition of concrete is shown in Table 4-1 below:

Table 4-1 — Example Crew Rates

San Diego, CA		Demo Equipment		Demo Concrete	
		$/hr	Percentage	$/hr	Percentage
Crew Base		$ 32.74	31%	$38.33	33%
Crew Fringes		$ 19.34	18%	$21.11	18%
Crew FICA		$ 2.50	2%	$2.93	2%
Crew SUI		$ 0.42	0%	$0.42	0%
Crew FUI		$ 0.04	0%	$0.04	0%
Crew Workers Comp. Ins		$ 7.50	7%	$8.78	7%
Other *		$ 1.64	2%	$1.92	2%
Equipment		$ 21.55	20%	$20.80	18%
Site OH		$ 21.43	20%	$23.58	20%
Total		$ 107.16	100%	$117.91	100%

* Expendables/Small Tools, Show up Time, Working Foreman, General Liability Insurance

C. Productivity

- No allowances have been made to cover items such as loss in productivity because of inclement weather conditions.

D. Quantity Sources

- Quantities of pieces of equipment and/or bulk material commodities used in this cost estimate were developed from engineering-supplied information from SDG&E.

E. Scrap

- Scrap metals are a globally traded commodity and are part of the larger metals industry. The value of scrap metal is subject to constantly changing economic conditions, as such the price of mixed steel, stainless steel, copper, and aluminum can vary greatly over time as a result of global supply and demand. The value of scrap for this study was determined by a three-month average from 'Scrap Metals MarketWatch'(July, August, and September of 2016) for the West Coast (Zone 1) of the United States. The 'Scrap Metals MarketWatch' can be found on the following website:

- www.americanrecycler.com

- The values obtained are delivered prices expressed as cost per gross ton or pound to account for separation, preparation and shipping costs to the mills. Metal recycling is a cyclical industry. The costs used in this study represent market prices in mid-2016, and cannot be used to estimate the value of scrap in the future. Estimated scrap prices are listed in Table 4-2.

Table 4-2 — Estimated Scrap Prices

	#1 & 2 Mixed Steel	#1 Copper	Aluminum	Stainless Steel
	$ / Gross Ton	$/lb.	$/lb.	$/lb.
Date				
July 1, 2016	185	1.95	0.45	0.55
August 1, 2016	185	1.94	0.46	0.57
September 1, 2016	184	1.97	0.47	0.55
3 Month Average	*184.67*	*1.95*	*0.46*	*0.56*

Converted to $/tons	$165 / ton	$3,907 / ton	$920 / ton	$1,113 / ton
Scrap dealer costs - deduct	$78 / ton	$440 / ton	$260 / ton	$200 / ton
Net Value to Utility	**$87 / ton**	**$3,467 / ton**	**$660 / ton**	**$913 / ton**

F. Contractor Costs

- Contractors' general and administrative (G&A) cost is included at 5% of labor and material.
- Contractors' profit is included at 8% of labor and material.

G. Indirect Expenses

- Project indirect expenses are based on percent total direct construction labor only.
- Engineering costs are included to cover engineering services associated with planning decommissioning activities.
- Construction management and field engineering is estimated to be 2%. This covers oversight of demolition activities but not full-time construction management.
- Owner's costs not included.

H. Escalation Rates

- Not included.

I. Sales and Use Taxes

- Sales and use taxes not included.

J. Contingency

- A 20% contingency is applied for material, labor, and indirect expenses.
- -20% contingency applied for scrap value, as a drop in scrap value will result in an increase in project cost.

K. Contract Basis for Estimate

- The estimate is based on a multiple lump sum.

L. Assumptions

- PV sites with battery energy storage systems (BESSs) include only the PV portion of the facility. The BESS decommissioning is considered separately in the BESS decommissioning cost study (see S&L report SL-013559.F, dated February 1, 2017).
- All electrical equipment and wiring is de-energized by others.
- Per SDG&E's direction, transmission/distribution equipment beyond the PV sites step-up transformer is excluded from the estimate. This includes overhead transmission wires, switchyards, substations, etc.
- Per SDG&E's direction, all roof PV panels are assumed to be fixed to the roof by four bolts. An allowance of $500 per panel has been allocated for roof repair based on S&L's database of experience with similar repair work.
- No extraordinary environmental costs for demolition will be needed.
- Switchyards within the plant boundaries are not part of the scope, nor are access roads to these facilities.

- All items above grade and to a depth of 1 foot will be demolished (canopy foundations). All foundations will be removed. Any other items buried more than 1 foot deep will remain in place.
- All demolished materials are considered debris, except for non-embedded metals that have scrap value.
- The basis for salvage estimating is for scrap value only. No resale of equipment or material is included.
- All fill material is assumed to be from off-site sources within a 10-mile radius of the site.
- The material and labor cost for fill soil is estimated to be $37 per cubic yard for the San Diego area.

LAST PAGE OF SECTION 4.

5. AVERAGE SERVICE LIFE EVALUATION

5.1 DESCRIPTION OF FACILITY

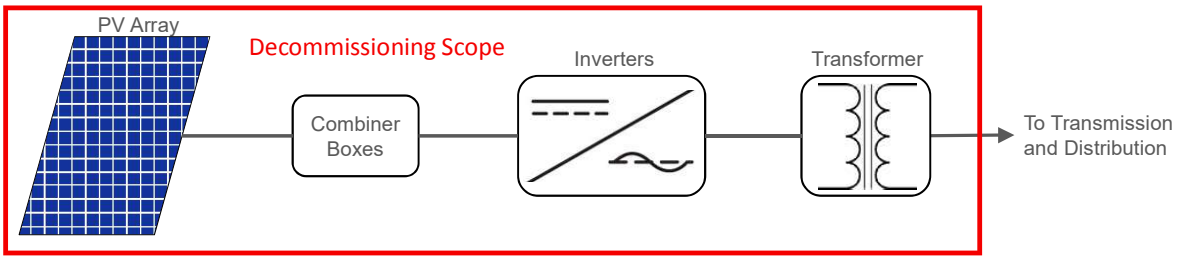
A solar PV power plant is a facility that employs PV modules that convert solar irradiation into useable electric power. Electric equipment, such as inverters and transformers, is used to convert and transform this useable power in order to make it adequate for grid transmission and distribution. The major components of a solar facility are the following:

- **Solar PV Modules:** These modules consist of solar cells made of a semiconductor material (silicon, cadmium telluride, etc.) connected together, employing the PV effect. There are numerous types of PV modules; however, the most commercially available technologies are monocrystalline silicon, polycrystalline silicon, and thin-film modules. The main difference between all these technologies is the process by which they are manufactured. Solar PV modules generate direct current (DC) power in a scale directly proportional to the number of modules.
- **Inverters:** Inverters are electrical equipment used to convert this DC power to alternating current (AC) power. There are three main types of inverters for solar PV facilities: micro, string, and central inverters. Microinverters are small inverters that are connected to each PV module to convert its DC output to AC. String inverters are medium-sized inverters that serve a string of PV modules. Central inverters are large-scale inverters (mainly for utility-scale PV power plants) that can serve numerous strings of PV modules. The number of strings is limited by the nameplate rating of the central inverter.
- **Solar PV Modules Mounting Systems:** These systems allow PV modules to be fixed to the ground or a rooftop. Fixed-tilt solar PV facilities have PV panels mounted to immovable mounting structures, while tracking solar PV facilities attach panels to moving structures that track the movement of the sun. A tracking system maximizes generation by receiving more direct irradiation throughout the day. Fixed systems can be installed on rooftops, canopies, carports, and other structures.
- **Transformers:** Transformers are used to step up the AC output voltage from the inverter to a grid's required AC voltage.
- **Other Major Equipment:** Substations are the point of interconnection between a solar facility and a grid. Within a substation are several other important pieces of equipment such as switchgears, circuit breakers, disconnects (used for the protection and isolation of the PV power plant), and metering equipment.

Figure 5-1 below represents a typical solar PV facility. The PV array consists of a large number of PV modules all connected together and then to combiner boxes that join all the circuits and deliver the total DC power to the inverters. In turn, the inverters convert this DC power to AC and deliver it to the substation. There, AC voltage goes through step-up transformers to required voltage levels and gets transmitted and distributed via the local

electric grid. In this system, in addition to using DC and AC wiring, fiber-optic wires are used to monitor and control the key parameters via a monitoring and control system called a supervisory control and data acquisition (SCADA) system.

Figure 5-1 — Typical Utility PV Facility



The tables below list SDG&E's portfolio per application.

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Table 5-1 — SDG&E's Solar PV Portfolio – Roof Mounted

Customer	Nameplate Capacity (kW)	Application	PV Module Rating (W)	Date Energized
TKG Engineering (EXP)	41	Roof	190	6/24/2004
Reuben H Fleet (Science Center)	100	Roof	175	3/30/2007
Ladera Ranch 999	50	Roof	175	7/24/2007
Hunter Industries	102	Roof	200	12/4/2007
The Towers at Bressi Ranch	80	Roof	200	2/28/2008
Del Sur Elementary	42	Roof	205	9/5/2008
Ladera Ranch 555	49	Roof	185	9/17/2008
Innovative Oil and Gas/Hamann Companies	504	Roof	305	12/9/2008
High Tech High Chula Vista	101	Roof	185	2/9/2009
Hanna Gabriel Wells	16	Roof	230	3/12/2009
San Diego CC Skills Center	57	Roof	185	7/8/2009
Burnham Institute	226	Roof	305	12/1/2009
La Maestra	21	Roof	210	3/1/2010
Grossmont Trolley (Altera)	65	Roof	210	4/27/2010
Thomas Jefferson School of Law	50	Roof	235	1/13/2011
Port of San Diego	30	Roof	225	12/16/2010
Wilco	384	Roof	215	5/27/2010
Amylin Pharmaceuticals	200	Roof	215	4/26/2010
High Tech High North County	70	Roof	240	3/11/2011
Urban Corps	23	Roof	230	6/17/2010
Pacific Ridge School	21	Roof	240	1/27/2011
Sanford Burnham Medical Research	200	Roof	318	1/28/2011
High Tech High CV K-8	130	Roof	235	8/8/2011
Campus Pointe	257	Roof	240	12/8/2011
CSU San Marcos	37	Roof	235	1/19/2012
EIC roof top	47	Roof	235	1/5/2012
UCSD - CDK Apartments	41	Roof	240	10/13/2011
Soledad	100	Roof	250	1/30/2012
Pacific Station	109	Roof	250	5/15/2012
UCSD - Structural & Materials Engr	120	Roof/Misc	245	10/22/2012
UCSD MESOM	61	Roof	245	6/14/2013
Suites at Paseo	37	Roof	300	6/20/2013
San Diego Zoo	88	Roof	245	4/21/2013

Table 5-2 — SDG&E's Solar PV Portfolio – Canopy Mounted

Customer	Nameplate Capacity (kW)	Appplication	PV Module Rating (W)	Date Energized
Sony Parking Structure	137	Carport	185	9/9/2009
County Operations Center Parking Structure A	359	Carport	215	2/21/2011
EIC solar trees	59	Carport	240	1/17/2012
Sharp Rees Stealy Wellness Center	74	Carport	255	1/31/2013
Del Lago Academy	173	Roof/Canopy	265	12/20/2013
Caltrans Fast EV Suncharge Del Lago	13	Carport	255	3/6/2014
Agua Hedionda Lagoon Foundation	5	Carport	255	3/28/2014
Civita Westpark Apartments	100	Carport	280	-

Table 5-3 — SDG&E's Solar PV Portfolio – Utility Scale

Customer	Nameplate Capacity (kW)	Appplication	PV Module Rating (W)	Date Energized
Ramona	4,950	Utility	330	12/31/2013
Pala	2,230	Utility	330	-

5.2 BENCHMARKING

The goal of the benchmarking analysis is to obtain a sample of the Average Service Life of plants similar to the PV sites in SDG&E's portfolio. The ABB Velocity Suite database was used to collect benchmarking information for this study. The database utilizes data reported to FERC from the electricity industry. Two peer groups were established: one for the small-scale (rooftop and canopy) sites and one for the utility-scale sites (Pala and Ramona).

5.2.1 Benchmarking – Small-Scale PV Sites

The benchmarking criteria for small-scale PV sites are shown in Table 5-4.

Table 5-4 — Small-Scale PV Sites Peer Group Criteria

Criteria	Peer Group Selection
Plant Type	Photovoltaic
Nameplate Capacity	0 – 510 kW

The benchmarking analysis collected data on all PV sites with a nameplate rating between 0 and 510 kW reported to FERC. The results produced 738 sites. The oldest and youngest plants in the group entered commercial operation in 1980 and July 2016, respectively. The oldest plant in the group was retired in June 1993 after 13 years of operation. The average age of the sites in the peer group is just over six years. The median age is seven. Of the 739 sites, 12 have retired.

All 738 sites (138,668 PV panels) are less than 30 years old, with more than 95% of units aged four to seven years. Of the total, less than 2% of sites (0.009% of panels) in the database have retired at a unit-average age of approximately eight years; however, it is not possible to determine the causes of retirement. The PV sites in the SDG&E portfolio range in age from one to 12 years. The average and median ages are approximately six years.

The ABB Velocity database identified a large number of sites for this peer group; however, approximately 98% of the peer group is still operating, with an age of six to seven years. In general, the results of the benchmarking analysis are consistent with the expected PV system service life of 25 years. The results of the benchmarking analysis are shown in Appendix C.

5.2.2 Benchmarking – Utility-Scale PV Sites

The benchmarking criteria for utility-scale PV sites are shown in Table 5-5.

Table 5-5 — Utility-Scale PV Sites Peer Group Criteria

Criteria	Peer Group Selection
Plant Type	Photovoltaic
Nameplate Capacity	2,000 – 5,000 kW

The benchmarking analysis obtained data for all PV sites with a nameplate rating between 2,000 and 5,000 kW reported to FERC. The results produced 761 sites. The oldest and youngest plants in the group entered commercial operation in October 2007 and September 2016, respectively. The average age of the sites in the peer group is just over two years. The median age is also two years. None of the sites have been retired.

In general, the results of the benchmarking analysis are consistent with the expected PV system service life of 25 years. The results of the benchmarking analysis are shown in Appendix C.

5.3 AVERAGE SERVICE LIFE

5.3.1 Typical Average Service Life

A solar PV power plant's key component is the PV module. Typically, PV modules have an average service life of approximately 25 years. Their performance decreases over time due to module degradation due to the effects of humidity, temperature, solar irradiation, manufacturing material quality, and manufacturing processes.

Monocrystalline and polycrystalline PV modules typically have higher degradation at initial exposure to sunlight. This direct degradation is called light-induced degradation (LID). The LID for crystalline PV modules ranges from 0.5% to 2.0% after initial exposure to sunlight. Thereafter, the long-term power output degradation ranges 0.3% to 1.0% per year until the useful lifetime of the PV module is over.

PV module mounting systems, such as canopy and steel frames, have an average service life of more than 25 years and are not a limiting factor in the service life of a site. Tracking systems typically have a warranty of 10 to 25 years.

Solar PV plant inverters typically have an average service life of 10 to 15 years. The lifespan of inverters is limited by several factors, including high internal temperatures and electrical loads. It is also dependent on the type of inverter; for example microinverters have a shorter service life than central inverters. Inverters are replaced as required during a project's service life.

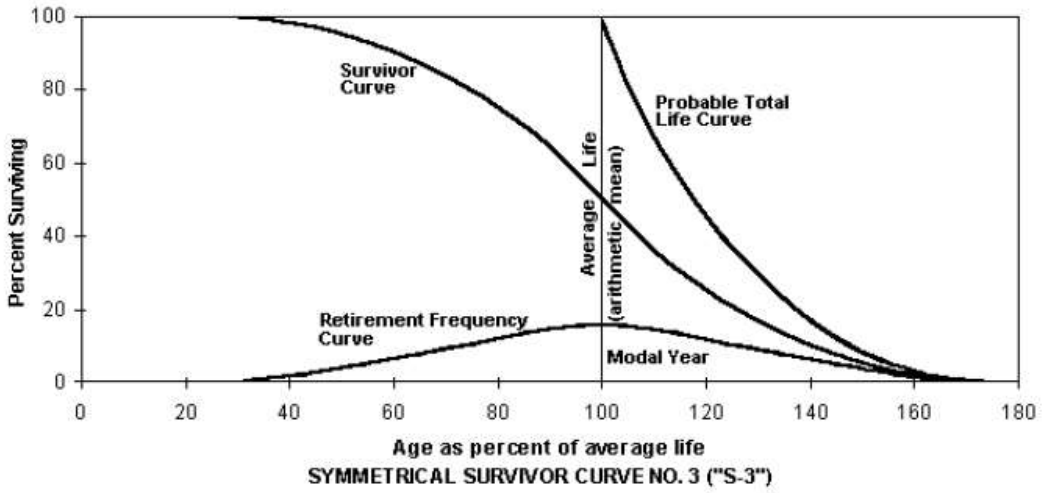
Well-maintained transformers have a service life of more than 25 years.

5.3.2 PV Survivor Curve

In the early 20th century, a team of researchers at Iowa State University began researching the retirement characteristics of physical assets to consider depreciation in rate cases. The study and subsequent revisions resulted in a set of survivor curves and probable-life curves that continue to be used in utility-rate and valuation studies. Depreciation adjustments may be applied to the value of assets because existing assets are worth less than new assets due to reduction in functionality or remaining useful life from wear and tear, weather, obsolescence, and inadequacy due to physical deterioration, functional obsolescence, and economic obsolescence.

The relationship between a typical survival curve and probable life is illustrated in Figure 5-2 below. The probable life is the average life expectancy of the survivors of the original group. For 100% of the original group, the probable total life is equal to the average service life of the group. As the number of survivors declines over time, the average service life of the remaining group increases. The probable total life curve thus falls to the right of the survivor curve. Mathematically, the probable life curve at a given point is equal to the area under the survivor curve to the right of the current age.

Figure 5-2 — Typical Survivor Curve and Relationship to Probable Total Life



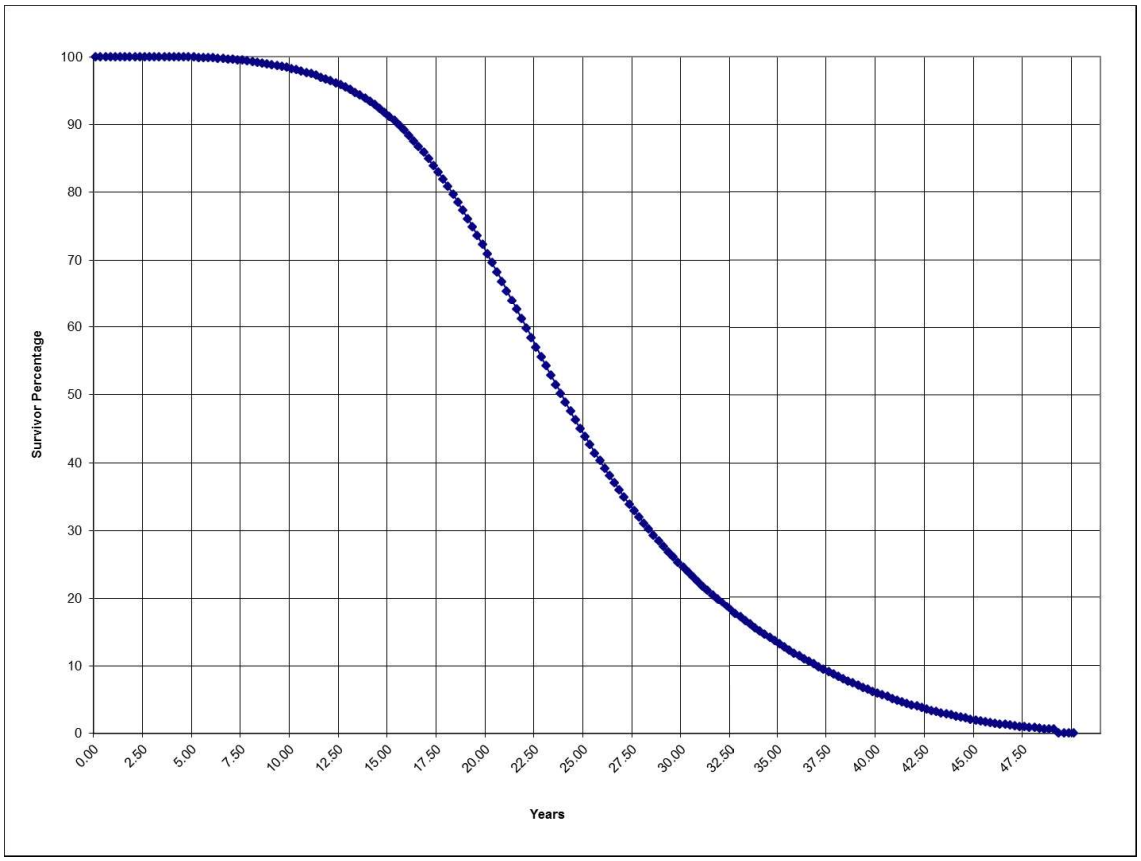
Source: *Replacements, Units, Service Lives, Factors* (December 2005), U.S. Department of Energy, Western Area Power Administration, U.S. Department of the Interior, and U.S. Bureau of Reclamation.

The survivor curves developed by the Iowa State University study, also called "Iowa curves," are divided into four main classes: right-modal (R-curve), left-modal (L-curve), symmetrical (S-curve), and original-modal (O-curve). A left-modal survivor curve with mid-range order, or slope, and average service life of 25 years is shown below in Figure 5-3, which is a typical survivor curve for PV assets.

PV technology is relatively new compared to most utility-scale power generation equipment. For example, the first megawatt- (MW-) scale PV site was installed in 1982. Since that time, technology has advanced a great deal, especially over the last decade. Consequently, very few utility-scale PV sites have reached the end of their service life, as the benchmarking data in this section shows. Average Service Life estimates are primarily based on manufacturers' guarantees.

Since the number of PV assets to reach their end of service life is small, there is higher uncertainty that PV assets will be removed from service before their expected end of service life life than convectional power generation technology such as gas turbines. As a result, a left-modal Iowa curve was selected to represent the survivor curve for PV asset. The positive skew of left-model curves shows statistically the mean (average) is smaller than the median. In other words, the curve indicates that most of the assets are expected to be removed from service before the Average Service Life.

Figure 5-3 — PV Asset Example Survivor Curve (Iowa Curve Type L3)



The curve shows that a majority of the assets are expected to be taken out of service before reaching the Average Service Life.

5.4 CONCLUSION

In summary, the Average Service Life of a PV plant is approximately 25 years, provided diligent operations and maintenance (O&M) practices are followed.

LAST PAGE OF SECTION 5.

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Appendix A

Conceptual Estimate of Cost to Decommission PV Sites

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Sites - Canopy Mounted

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNameplate_kW	PanelQty
12	SPS	Sony Parking Structure	16590 1/3 Via Del Campo, San Diego	Carport - Cano	PV	40065	136.8999939	867

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	19 /CY				114 /MH	$ 117.91	$ 13,442	$ 13,442
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				128 /MH	$ 117.91	$ 15,092	$ 15,092
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				103 /MH	$ 107.16	$ 11,037	$ 11,037
			Demo conduit from rack to tie point		1 EA				26 /MH	$ 107.16	$ 2,786	$ 2,786
			Disconnect wiring at inverter		1 EA				26 /MH	$ 107.16	$ 2,786	$ 2,786
			Disconnect wiring at combiner boxes, remove boxes		3 EA				106 /MH	$ 107.16	$ 11,359	$ 11,359
			Pull wire from combiners to inverter		3 EA				77 /MH	$ 107.16	$ 8,251	$ 8,251
			Disconnect and remove wiring at PV panels		867 EA				161 /MH	$ 107.16	$ 17,253	$ 17,253
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		867 EA				42 /MH	$ 107.16	$ 4,501	$ 4,501
			Remove PV panel and place in dumpster		867 EA				539 /MH	$ 107.16	$ 57,759	$ 57,759
			Remove Conduits to inverters		1 EA				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Remove inverters		1 EA				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Remove transformer		1 LT				51 /MH	$ 107.16	$ 5,465	$ 5,465
			Demolition			***$ -***	***$ -***	***$ -***			***$ 155,348***	***$ 155,348***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	1.96 TN		$ (171)		/MH			$ (171)
			Steel	Service rack components	1.51 TN		$ (131)		/MH			$ (131)
			Steel	Conduit and fittings	1.61 TN		$ (140)		/MH			$ (140)
			Steel	Transformers	17.89 TN		$ (1,556)		/MH			$ (1,556)
			Steel	Roof ladder, 1@ 350 lb each	0.58 TN		$ (50)		/MH			$ (50)
			Steel	Canopy & steel	64.22 TN		$ (5,587)		/MH			$ (5,587)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	7.35 TN		$ (4,851)		/MH			$ (4,851)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	0.64 TN		$ (2,214)		/MH			$ (2,214)
			Copper	Wire	5.23 TN		$ (18,096)		/MH			$ (18,096)
			Copper	Transformers	8.51 TN		$ (29,445)		/MH			$ (29,445)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	8631 LB		$ (3,970)		/MH			$ (3,970)
			Conduit and fittings	100 @ 1 lb each	321 LB		$ (148)		/MH			$ (148)
			Scrap Value			***$ -***	***$ (66,360)***	***$ -***			***$ -***	***$ (66,360)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	10 EA	$ 8,440			/MH			$ 8,440
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	19 /CY	$ 703			/MH			$ 703
			Civil Work			***$ 9,143***	***$ -***	***$ -***			***$ -***	***$ 9,143***
Direct Costs												*$ 98,131*
	61.00.00		**Construction Indirect**									
			Construction Indirect			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Subtotal						*$ 9,143*	*$ (66,360)*	*$ -*			*$ 155,348*	*$ 98,131*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 4,906.57
		91.10	Contractor's Profit									$ 7,850.52
												$ 12,757
Direct Costs + Construction Indirect Costs						*$ 9,143*	*$ (66,360)*	*$ -*	*$ -*	*$ -*	*$ -*	*$ 98,131*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 5,887.89
		93.2	Construction Management Support									$ 1,962.63
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 1,829						$ 1,829
		95.2	Contingency on Scrap Value				$ 13,272					$ 13,272
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 31,070	$ 31,070
		95.5	Contingency on Indirect									$ 1,570
Total						**$ 10,972**	**$ (53,088)**	**$ -**			**$ 186,418**	**$ 166,479**

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNameplate	PanelQty
20	COP	County Operations Center Parking Structure A	9338 Farnham St., San Diego, CA	Carport - Cano	PV	40595	358.7000122	1932

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	43 /CY				258 /MH	$ 117.91	$ 30,421	$ 30,421
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				286 /MH	$ 117.91	$ 33,722	$ 33,722
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				229 /MH	$ 107.16	$ 24,540	$ 24,540
			Demo conduit from rack to tie point		1 EA				57 /MH	$ 107.16	$ 6,108	$ 6,108
			Disconnect wiring at inverter		1 EA				57 /MH	$ 107.16	$ 6,108	$ 6,108
			Disconnect wiring at combiner boxes, remove boxes		3 EA				236 /MH	$ 107.16	$ 25,290	$ 25,290
			Pull wire from combiners to inverter		3 EA				172 /MH	$ 107.16	$ 18,432	$ 18,432
			Disconnect and remove wiring at PV panels		1932 EA				358 /MH	$ 107.16	$ 38,363	$ 38,363
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		1932 EA				93 /MH	$ 107.16	$ 9,966	$ 9,966
			Remove PV panel and place in dumpster		1932 EA				1202 /MH	$ 107.16	$ 128,806	$ 128,806
			Remove Conduits to inverters		1 EA				29 /MH	$ 107.16	$ 3,108	$ 3,108
			Remove inverters		1 EA				29 /MH	$ 107.16	$ 3,108	$ 3,108
			Remove transformer		1 LT				114 /MH	$ 107.16	$ 12,216	$ 12,216
			Demolition			***$ -***	***$ -***	***$ -***			***$ 343,017***	***$ 343,017***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	4.36 TN		$ (379)		/MH			$ (379)
			Steel	Service rack components	3.36 TN		$ (292)		/MH			$ (292)
			Steel	Conduit and fittings	3.58 TN		$ (311)		/MH			$ (311)
			Steel	Transformers	39.86 TN		$ (3,468)		/MH			$ (3,468)
			Steel	Roof ladder, 1@ 350 lb each	1.29 TN		$ (112)		/MH			$ (112)
			Steel	Canopy & steel	143.11 TN		$ (12,451)		/MH			$ (12,451)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	16.39 TN		$ (10,817)		/MH			$ (10,817)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	1.43 TN		$ (4,948)		/MH			$ (4,948)
			Copper	Wire	11.66 TN		$ (40,344)		/MH			$ (40,344)
			Copper	Transformers	18.96 TN		$ (65,602)		/MH			$ (65,602)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	19234 LB		$ (8,848)		/MH			$ (8,848)
			Conduit and fittings	100 @ 1 lb each	716 LB		$ (329)		/MH			$ (329)
			Scrap Value			***$ -***	***$ (147,901)***	***$ -***			***$ -***	***$ (147,901)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	21 EA	$ 17,724			/MH			$ 17,724
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	43 /CY	$ 1,591			/MH			$ 1,591
			Civil Work			***$ 19,315***	***$ -***	***$ -***			***$ -***	***$ 19,315***
Direct Costs												*$ 214,431*
	61.00.00		**Construction Indirect**									
			Construction Indirect			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Subtotal						*$ 19,315*	*$ (147,901)*	*$ -*			*$ 343,017*	*$ 214,431*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 10,721.55
		91.10	Contractor's Profit									$ 17,154.47
												$ 27,876
Direct Costs + Construction Indirect Costs						*$ 19,315*	*$ (147,901)*	*$ -*	*$ -*	*$ -*	*$ 343,017*	*$ 214,431*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 12,865.86
		93.2	Construction Management Support									$ 4,288.62
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 3,863						$ 3,863
		95.2	Contingency on Scrap Value				$ 29,580					$ 29,580
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 68,603	$ 68,603
		95.5	Contingency on Indirect									$ 3,431
Total						**$ 23,178**	**$ (118,321)**	**$ -**			**$ 411,620**	**$ 364,939**

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNameplate	PanelQty
30	EIT	EIC solar trees	4760 Clairemont Mesa Blvd, San Diego	Carport - Free s	PV	40925	59.35100174	286

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	6 /CY				36 /MH	$ 117.91	$ 4,245	$ 4,245
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				42 /MH	$ 117.91	$ 4,952	$ 4,952
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				34 /MH	$ 107.16	$ 3,643	$ 3,643
			Demo conduit from rack to tie point		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Disconnect wiring at inverter		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Disconnect wiring at combiner boxes, remove boxes		3 EA				35 /MH	$ 107.16	$ 3,751	$ 3,751
			Pull wire from combiners to inverter		3 EA				25 /MH	$ 107.16	$ 2,679	$ 2,679
			Disconnect and remove wiring at PV panels		286 EA				53 /MH	$ 107.16	$ 5,679	$ 5,679
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		286 EA				14 /MH	$ 107.16	$ 1,500	$ 1,500
			Remove PV panel and place in dumpster		286 EA				178 /MH	$ 107.16	$ 19,074	$ 19,074
			Remove Conduits to inverters		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Remove inverters		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Remove transformer		1 LT				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Demolition			$ -	$ -	$ -			$ 52,748	$ 52,748
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	0.65 TN		$ (57)		/MH			$ (57)
			Steel	Service rack components	0.5 TN		$ (44)		/MH			$ (44)
			Steel	Conduit and fittings	0.53 TN		$ (46)		/MH			$ (46)
			Steel	Transformers	5.9 TN		$ (513)		/MH			$ (513)
			Steel	Roof ladder, 1@ 350 lb each	0.19 TN		$ (17)		/MH			$ (17)
			Steel	Canopy & steel	21.19 TN		$ (1,844)		/MH			$ (1,844)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	2.43 TN		$ (1,604)		/MH			$ (1,604)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	0.21 TN		$ (727)		/MH			$ (727)
			Copper	Wire	1.73 TN		$ (5,986)		/MH			$ (5,986)
			Copper	Transformers	2.81 TN		$ (9,723)		/MH			$ (9,723)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	2847 LB		$ (1,310)		/MH			$ (1,310)
			Conduit and fittings	100 @ 1 lb each	106 LB		$ (49)		/MH			$ (49)
			Scrap Value			$ -	$ (21,917)	$ -			$ -	$ (21,917)
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	3 EA	$ 2,532			/MH			$ 2,532
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	6 /CY	$ 222			/MH			$ 222
			Civil Work			$ 2,754	$ -	$ -			$ -	$ 2,754
Direct Costs												$ 33,585
	61.00.00		**Construction Indirect**									
			Construction Indirect			$ -	$ -	$ -			$ -	$ -
Subtotal						$ 2,754	$ (21,917)	$ -			$ 52,748	$ 33,585
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 1,679.25
		91.10	Contractor's Profit									$ 2,686.79
						$ -	$ -	$ -			$ -	$ 4,366
Direct Costs + Construction Indirect Costs						$ 2,754	$ (21,917)	$ -	$ -	$ -	$ -	$ 52,748	$ 33,585
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 2,015.10
		93.2	Construction Management Support									$ 671.70
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 551						$ 551
		95.2	Contingency on Scrap Value				$ 4,383					$ 4,383
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 10,550	$ 10,550
		95.5	Contingency on Indirect									$ 537
Total						$ 3,305	$ (17,533)	$ -			$ 63,297	$ 56,659

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNameplate	PanelQty
35	SWC	Sharp Rees Stealy Wellness Center	300 Fir Street, San Diego, CA	Carport - Cano	PV	41305	74.34999847	333

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	7 /CY				42 /MH	$ 117.91	$ 4,952	$ 4,952
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				49 /MH	$ 117.91	$ 5,778	$ 5,778
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				39 /MH	$ 107.16	$ 4,179	$ 4,179
			Demo conduit from rack to tie point		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Disconnect wiring at inverter		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Disconnect wiring at combiner boxes, remove boxes		3 EA				41 /MH	$ 107.16	$ 4,394	$ 4,394
			Pull wire from combiners to inverter		3 EA				30 /MH	$ 107.16	$ 3,215	$ 3,215
			Disconnect and remove wiring at PV panels		333 EA				62 /MH	$ 107.16	$ 6,644	$ 6,644
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		333 EA				16 /MH	$ 107.16	$ 1,715	$ 1,715
			Remove PV panel and place in dumpster		333 EA				207 /MH	$ 107.16	$ 22,182	$ 22,182
			Remove Conduits to inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove transformer		1 LT				20 /MH	$ 107.16	$ 2,143	$ 2,143
			Demolition			***$ -***	***$ -***	***$ -***			***$ 61,246***	***$ 61,246***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	0.75 TN		$ (65)		/MH			$ (65)
			Steel	Service rack components	0.58 TN		$ (50)		/MH			$ (50)
			Steel	Conduit and fittings	0.62 TN		$ (54)		/MH			$ (54)
			Steel	Transformers	6.87 TN		$ (598)		/MH			$ (598)
			Steel	Roof ladder, 1@ 350 lb each	0.22 TN		$ (19)		/MH			$ (19)
			Steel	Canopy & steel	24.67 TN		$ (2,146)		/MH			$ (2,146)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	2.82 TN		$ (1,861)		/MH			$ (1,861)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	0.25 TN		$ (865)		/MH			$ (865)
			Copper	Wire	2.01 TN		$ (6,955)		/MH			$ (6,955)
			Copper	Transformers	3.27 TN		$ (11,314)		/MH			$ (11,314)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	3315 LB		$ (1,525)		/MH			$ (1,525)
			Conduit and fittings	100 @ 1 lb each	123 LB		$ (57)		/MH			$ (57)
			Scrap Value			***$ -***	***$ (25,509)***	***$ -***			***$ -***	***$ (25,509)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	4 EA	$ 3,376			/MH			$ 3,376
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 3,635***	***$ -***	***$ -***			***$ -***	***$ 3,635***
Direct Costs												*$ 39,372*
	61.00.00		**Construction Indirect**									
			Construction Indirect			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Subtotal						*$ 3,635*	*$ (25,509)*	*$ -*			*$ 61,246*	*$ 39,372*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 1,968.58
		91.10	Contractor's Profit									$ 3,149.73
												$ 5,118
Direct Costs + Construction Indirect Costs						*$ 3,635*	*$ (25,509)*	*$ -*	*$ -*	*$ -*	*$ 61,246*	*$ 39,372*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 2,362.30
		93.2	Construction Management Support									$ 787.43
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 727						$ 727
		95.2	Contingency on Scrap Value				$ 5,102					$ 5,102
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 12,249	$ 12,249
		95.5	Contingency on Indirect									$ 630
Total						**$ 4,362**	**$ (20,407)**	**$ -**			**$ 73,495**	**$ 66,348**

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNameplate	PanelQty
39	ZOO	San Diego Zoo	2902 Park Blvd, San Diego, CA	Carport - Cano	PV/ES	41385	88.40000153	420

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	9 /CY				54 /MH	$ 117.91	$ 6,367	$ 6,367
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				62 /MH	$ 117.91	$ 7,310	$ 7,310
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				50 /MH	$ 107.16	$ 5,358	$ 5,358
			Demo conduit from rack to tie point		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Disconnect wiring at inverter		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Disconnect wiring at combiner boxes, remove boxes		3 EA				51 /MH	$ 107.16	$ 5,465	$ 5,465
			Pull wire from combiners to inverter		3 EA				37 /MH	$ 107.16	$ 3,965	$ 3,965
			Disconnect and remove wiring at PV panels		420 EA				78 /MH	$ 107.16	$ 8,358	$ 8,358
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		420 EA				20 /MH	$ 107.16	$ 2,143	$ 2,143
			Remove PV panel and place in dumpster		420 EA				261 /MH	$ 107.16	$ 27,969	$ 27,969
			Remove Conduits to inverters		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove inverters		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove transformer		1 LT				25 /MH	$ 107.16	$ 2,679	$ 2,679
			Demolition			***$ -***	***$ -***	***$ -***			***$ 76,303***	***$ 76,303***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	0.95 TN		$ (83)		/MH			$ (83)
			Steel	Service rack components	0.73 TN		$ (64)		/MH			$ (64)
			Steel	Conduit and fittings	0.78 TN		$ (68)		/MH			$ (68)
			Steel	Transformers	8.66 TN		$ (753)		/MH			$ (753)
			Steel	Roof ladder, 1@ 350 lb each	0.28 TN		$ (24)		/MH			$ (24)
			Steel	Canopy & steel	31.11 TN		$ (2,707)		/MH			$ (2,707)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	3.56 TN		$ (2,350)		/MH			$ (2,350)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	0.31 TN		$ (1,073)		/MH			$ (1,073)
			Copper	Wire	2.54 TN		$ (8,788)		/MH			$ (8,788)
			Copper	Transformers	4.12 TN		$ (14,255)		/MH			$ (14,255)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	4181 LB		$ (1,923)		/MH			$ (1,923)
			Conduit and fittings	100 @ 1 lb each	156 LB		$ (72)		/MH			$ (72)
			Scrap Value			***$ -***	***$ (32,159)***	***$ -***			***$ -***	***$ (32,159)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	5 EA	$ 4,220			/MH			$ 4,220
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	9 /CY	$ 333			/MH			$ 333
			Civil Work			***$ 4,553***	***$ -***	***$ -***			***$ -***	***$ 4,553***
Direct Costs												*$ 48,696*
	61.00.00		**Construction Indirect**									
			Construction Indirect			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Subtotal						*$ 4,553*	*$ (32,159)*	*$ -*			*$ 76,303*	*$ 48,696*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 2,434.82
		91.10	Contractor's Profit									$ 3,895.72
												$ 6,331
Direct Costs + Construction Indirect Costs						*$ 4,553*	*$ (32,159)*	*$ -*	*$ -*	*$ -*	*$ -*	*$ 76,303*	*$ 48,696*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 2,921.79
		93.2	Construction Management Support									$ 973.93
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 911						$ 911
		95.2	Contingency on Scrap Value				$ 6,432					$ 6,432
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 15,261	$ 15,261
		95.5	Contingency on Indirect									$ 779
Total						**$ 5,464**	**$ (25,727)**	**$ -**			**$ 91,563**	**$ 82,305**

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNameplate	PanelQty
40	DLP	Caltrans Fast EV Suncharge Del Lago	3310 Del Lago Blvd D, Escondido, CA	Carport - Cano	PV/ES	41704	13.10000038	60

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	1 /CY				6 /MH	$ 117.91	$ 707	$ 707
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				9 /MH	$ 117.91	$ 1,061	$ 1,061
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				7 /MH	$ 107.16	$ 750	$ 750
			Demo conduit from rack to tie point		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at inverter		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at combiner boxes, remove boxes		3 EA				7 /MH	$ 107.16	$ 750	$ 750
			Pull wire from combiners to inverter		3 EA				5 /MH	$ 107.16	$ 536	$ 536
			Disconnect and remove wiring at PV panels		60 EA				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		60 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove PV panel and place in dumpster		60 EA				37 /MH	$ 107.16	$ 3,965	$ 3,965
			Remove Conduits to inverters		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Remove inverters		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Remove transformer		1 LT				4 /MH	$ 107.16	$ 429	$ 429
			Demolition			***$ -***	***$ -***	***$ -***			***$ 13,171***	***$ 13,171***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	0.14 TN		$ (12)		/MH			$ (12)
			Steel	Service rack components	0.1 TN		$ (9)		/MH			$ (9)
			Steel	Conduit and fittings	0.11 TN		$ (10)		/MH			$ (10)
			Steel	Transformers	1.24 TN		$ (108)		/MH			$ (108)
			Steel	Roof ladder, 1@ 350 lb each	0.04 TN		$ (3)		/MH			$ (3)
			Steel	Canopy & steel	4.44 TN		$ (386)		/MH			$ (386)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	0.51 TN		$ (337)		/MH			$ (337)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	0.04 TN		$ (138)		/MH			$ (138)
			Copper	Wire	0.36 TN		$ (1,246)		/MH			$ (1,246)
			Copper	Transformers	0.59 TN		$ (2,041)		/MH			$ (2,041)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	597 LB		$ (275)		/MH			$ (275)
			Conduit and fittings	100 @ 1 lb each	22 LB		$ (10)		/MH			$ (10)
			Scrap Value			***$ -***	***$ (4,575)***	***$ -***			***$ -***	***$ (4,575)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	2 /CY	$ 74			/MH			$ 74
			Civil Work			***$ 918***	***$ -***	***$ -***			***$ -***	***$ 918***
Direct Costs												*$ 9,514*
	61.00.00		**Construction Indirect**									
			Construction Indirect			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Subtotal						*$ 918*	*$ (4,575)*	*$ -*			*$ 13,171*	*$ 9,514*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 475.72
		91.10	Contractor's Profit									$ 761.16
												$ 1,237
Direct Costs + Construction Indirect Costs						*$ 918*	*$ (4,575)*	*$ -*	*$ -*	*$ -*	*$ 13,171*	*$ 9,514*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 570.87
		93.2	Construction Management Support									$ 190.29
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 184						$ 184
		95.2	Contingency on Scrap Value				$ 915					$ 915
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 2,634	$ 2,634
		95.5	Contingency on Indirect									$ 152
Total						**$ 1,102**	**$ (3,660)**	**$ -**			**$ 15,806**	**$ 15,398**

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNameplate	PanelQty
41	AHL	Agua Hedionda Lagoon Foundation	1580 Cannon Rd, Carlsbad, CA	Carport - Cano	PV	41726	5.300000191	24

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	1 /CY				6 /MH	$ 117.91	$ 707	$ 707
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				4 /MH	$ 117.91	$ 472	$ 472
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Demo conduit from rack to tie point		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at inverter		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at combiner boxes, remove boxes		3 EA				3 /MH	$ 107.16	$ 321	$ 321
			Pull wire from combiners to inverter		3 EA				2 /MH	$ 107.16	$ 214	$ 214
			Disconnect and remove wiring at PV panels		24 EA				4 /MH	$ 107.16	$ 429	$ 429
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		24 EA				1 /MH	$ 107.16	$ 107	$ 107
			Remove PV panel and place in dumpster		24 EA				15 /MH	$ 107.16	$ 1,607	$ 1,607
			Remove Conduits to inverters		1 EA				0 /MH	$ 107.16	$ -	$ -
			Remove inverters		1 EA				0 /MH	$ 107.16	$ -	$ -
			Remove transformer		1 LT				1 /MH	$ 107.16	$ 107	$ 107
			Demolition			***$ -***	***$ -***	***$ -***			***$ 7,331***	***$ 7,331***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	0.05 TN		$ (4)		/MH			$ (4)
			Steel	Service rack components	0.04 TN		$ (3)		/MH			$ (3)
			Steel	Conduit and fittings	0.04 TN		$ (3)		/MH			$ (3)
			Steel	Transformers	0.5 TN		$ (44)		/MH			$ (44)
			Steel	Roof ladder, 1@ 350 lb each	0.02 TN		$ (2)		/MH			$ (2)
			Steel	Canopy & steel	1.78 TN		$ (155)		/MH			$ (155)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	0.2 TN		$ (132)		/MH			$ (132)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	0.02 TN		$ (69)		/MH			$ (69)
			Copper	Wire	0.14 TN		$ (484)		/MH			$ (484)
			Copper	Transformers	0.24 TN		$ (830)		/MH			$ (830)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	239 LB		$ (110)		/MH			$ (110)
			Conduit and fittings	100 @ 1 lb each	9 LB		$ (4)		/MH			$ (4)
			Scrap Value			***$ -***	***$ (1,841)***	***$ -***			***$ -***	***$ (1,841)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	1 /CY	$ 37			/MH			$ 37
			Civil Work			***$ 881***	***$ -***	***$ -***			***$ -***	***$ 881***
Direct Costs												*$ 6,370*
	61.00.00		**Construction Indirect**									
			Construction Indirect			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Subtotal						*$ 881*	*$ (1,841)*	*$ -*			*$ 7,331*	*$ 6,370*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 318.52
		91.10	Contractor's Profit									$ 509.63
												$ 828
Direct Costs + Construction Indirect Costs						*$ 881*	*$ (1,841)*	*$ -*	*$ -*	*$ -*	*$ -*	*$ 7,331*	*$ 6,370*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 382.22
		93.2	Construction Management Support									$ 127.41
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 176						$ 176
		95.2	Contingency on Scrap Value				$ 368					$ 368
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 1,466	$ 1,466
		95.5	Contingency on Indirect									$ 102
Total						**$ 1,057**	**$ (1,473)**	**$ -**			**$ 8,797**	**$ 9,821**

ProjID	Code	Customer	Address	PV_Location	Technology	DateEnergized	FacilityNamepla te_kW	PanelQty
42	CWP	Civita Westpark Apartments	7777 Westside Dr, San Diego CA	Carport	PV/ES	42464	87	352

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Canopy Mount												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Column foundations	8 /CY				48 /MH	$ 117.91	$ 5,660	$ 5,660
			Concrete	Electrical equipment (Transformer, inve	1 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.24.00	*Architectural*									
			Remove structural canopy		1 EA				52 /MH	$ 117.91	$ 6,131	$ 6,131
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				42 /MH	$ 107.16	$ 4,501	$ 4,501
			Demo conduit from rack to tie point		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Disconnect wiring at inverter		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Disconnect wiring at combiner boxes, remove boxes		3 EA				43 /MH	$ 107.16	$ 4,608	$ 4,608
			Pull wire from combiners to inverter		3 EA				31 /MH	$ 107.16	$ 3,322	$ 3,322
			Disconnect and remove wiring at PV panels		352 EA				65 /MH	$ 107.16	$ 6,965	$ 6,965
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		352 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Remove PV panel and place in dumpster		352 EA				219 /MH	$ 107.16	$ 23,468	$ 23,468
			Remove Conduits to inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove transformer		1 LT				21 /MH	$ 107.16	$ 2,250	$ 2,250
			Demolition			***$ -***	***$ -***	***$ -***			***$ 64,772***	***$ 64,772***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, 82 kW inverter	0.8 TN		$ (70)		/MH			$ (70)
			Steel	Service rack components	0.61 TN		$ (53)		/MH			$ (53)
			Steel	Conduit and fittings	0.65 TN		$ (57)		/MH			$ (57)
			Steel	Transformers	7.26 TN		$ (632)		/MH			$ (632)
			Steel	Roof ladder, 1@ 350 lb each	0.23 TN		$ (20)		/MH			$ (20)
			Steel	Canopy & steel	26.07 TN		$ (2,268)		/MH			$ (2,268)
		18.20.00	*Stainless Steel*									
			Stainless Steel	336 Racks, 13.61 lbs each	2.99 TN		$ (1,973)		/MH			$ (1,973)
		18.30.00	*Copper*									
			Copper	1 EA, 82 kW inverter	0.26 TN		$ (900)		/MH			$ (900)
			Copper	Wire	2.13 TN		$ (7,370)		/MH			$ (7,370)
			Copper	Transformers	3.45 TN		$ (11,937)		/MH			$ (11,937)
		18.50.00	*Aluminum*									
			PV Module	336 Modules @8 lbs each	3504 LB		$ (1,612)		/MH			$ (1,612)
			Conduit and fittings	100 @ 1 lb each	130 LB		$ (60)		/MH			$ (60)
			Scrap Value			***$ -***	***$ (26,950)***	***$ -***			***$ -***	***$ (26,950)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	4 EA	$ 3,376			/MH			$ 3,376
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	8 /CY	$ 296			/MH			$ 296
			Civil Work			***$ 3,672***	***$ -***	***$ -***			***$ -***	***$ 3,672***
Direct Costs												*$ 41,493*
	61.00.00		**Construction Indirect**									
			Construction Indirect			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Subtotal						*$ 3,672*	*$ (26,950)*	*$ -*			*$ 64,772*	*$ 41,493*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 2,074.67
		91.10	Contractor's Profit									$ 3,319.47
												$ 5,394
Direct Costs + Construction Indirect Costs						*$ 3,672*	*$ (26,950)*	*$ -*	*$ -*	*$ -*	*$ -*	*$ 64,772*	*$ 41,493*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 2,489.60
		93.2	Construction Management Support									$ 829.87
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 734						$ 734
		95.2	Contingency on Scrap Value				$ 5,390					$ 5,390
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 12,954	$ 12,954
		95.5	Contingency on Indirect									$ 664
Total						**$ 4,406**	**$ (21,560)**	**$ -**			**$ 77,726**	**$ 69,950**

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Utility Scale - Ramona Project

Item	**Removal Costs**	**Scrap Value**
Solar modules	$ 116,494	$ (34,948)
Racking	$ 214,448	$ (171,558)
Inverters	$ 10,000	$ (11,500)
Switchgear	$ 2,500	$ -
Foundations/Structural	$ 5,000	$ -
Electrical Infrastructure	$ 178,789	$ (107,273)
Earthwork/Reconturing	$ 18,000	$ -
Revegetation	$ 22,000	$ -
Project Management	$ 59,400	$ -
Total	$ 626,631	$ (325,279)

Total	**$**	**301,352**

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Sites - Roof Mounted

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
1	TKG	TKG Engineering (EXP)	5670 Oberlin Dr, San Diego	Roof	PV	6/24/2004	40.70000076	264

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				9	/MH	$ 117.91	$ 1,061	$ 1,061
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				9	/MH	$ 107.16	$ 964	$ 964
			Disconnect wiring at inverter		1	EA				2	/MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at combiner boxes, remove boxes		2	EA				21	/MH	$ 107.16	$ 2,250	$ 2,250
			Pull wire from combiners to inverter		2	EA				15	/MH	$ 107.16	$ 1,607	$ 1,607
			Disconnect and remove wiring at PV panels		264	EA				40	/MH	$ 107.16	$ 4,286	$ 4,286
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		264	EA				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Demo conduit from rack to tie point		1	EA				9	/MH	$ 107.16	$ 964	$ 964
			Demo conduit from rack to transformer		1	EA				7	/MH	$ 107.16	$ 750	$ 750
			Demo conduit from combiners to inverter		1	EA				38	/MH	$ 107.16	$ 4,072	$ 4,072
			Remove Conduits to inverters		1	EA				2	/MH	$ 107.16	$ 214	$ 214
			Remove inverters		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Remove PV panel and place in dumpster		264	EA				132	/MH	$ 107.16	$ 14,145	$ 14,145
			Remove points where panel is fixed to roof		264	EA				59	/MH	$ 107.16	$ 6,322	$ 6,322
			Remove lightning projection and other auxiliary equipment		1	EA				25	/MH	$ 107.16	$ 2,679	$ 2,679
			Remove transformer		1	LT				10	/MH	$ 107.16	$ 1,072	$ 1,072
			Demolition				***$ -***	***$ -***	***$ -***				***$ 42,211***	***$ 42,211***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.18	TN		$ (16)			/MH			$ (16)
			Steel	Service rack components	0.07	TN		$ (6)			/MH			$ (6)
			Steel	Conduit and fittings	0.07	TN		$ (6)			/MH			$ (6)
			Steel	Transformers	2.15	TN		$ (187)			/MH			$ (187)
			Steel	Roof ladder, 1@ 350 lb each	0.03	TN		$ (3)			/MH			$ (3)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	1.8	TN		$ (1,188)			/MH			$ (1,188)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.06	TN		$ (208)			/MH			$ (208)
			Copper	Wire	0.4	TN		$ (1,384)			/MH			$ (1,384)
			Copper	Transformers	1.02	TN		$ (3,529)			/MH			$ (3,529)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	2112	LB		$ (972)			/MH			$ (972)
			Conduit and fittings	100 @ 1 lb each	14.77	LB		$ (7)			/MH			$ (7)
			Scrap Value				***$ -***	***$ (7,505)***	***$ -***				***$ -***	***$ (7,505)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1	EA	$ 844				/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 1,947***	***$ -***	***$ -***				***$ -***	***$ 1,947***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	264	EA	$ 39,600				/MH	$ -		$ 39,600
			Architectual				***$ 39,600***	***$ -***	***$ -***				***$ -***	***$ 39,600***
Direct Costs														*$ 76,253*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 66,547*	*$ (7,505)*	*$ -*			*$ 42,211*	*$ 101,253*	
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 5,063
		91.10	Contractor's Profit											$ 8,100
														$ 13,163
Direct Costs + Construction Indirect Costs							*$ 66,547*	*$ (7,505)*	*$ -*			*$ 42,211*	*$ 114,416*	
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 6,865
		93.2	Construction Management Support											$ 2,288
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 13,309.40							$ 13,309
		95.2	Contingency on Scrap Value					$ 1,501						$ 1,501
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 8,442	$ 8,442
		95.5	Contingency on Indirect											$ 1,831
Total							**$ 79,856**	**$ (6,004)**	**$ -**				**$ 50,653**	**$ 148,652**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
2	RHF	Reuben H Fleet (Science Center)	1875 El Prado, San Diego	Roof	PV	39171	100.0999985	684

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				23	/MH	$ 117.91	$ 2,712	$ 2,712
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				24	/MH	$ 107.16	$ 2,572	$ 2,572
			Disconnect wiring at inverter		1	EA				6	/MH	$ 107.16	$ 643	$ 643
			Disconnect wiring at combiner boxes, remove boxes		5	EA				55	/MH	$ 107.16	$ 5,894	$ 5,894
			Pull wire from combiners to inverter		5	EA				40	/MH	$ 107.16	$ 4,286	$ 4,286
			Disconnect and remove wiring at PV panels		684	EA				103	/MH	$ 107.16	$ 11,037	$ 11,037
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		684	EA				28	/MH	$ 107.16	$ 3,000	$ 3,000
			Demo conduit from rack to tie point		1	EA				24	/MH	$ 107.16	$ 2,572	$ 2,572
			Demo conduit from rack to transformer		1	EA				18	/MH	$ 107.16	$ 1,929	$ 1,929
			Demo conduit from combiners to inverter		1	EA				98	/MH	$ 107.16	$ 10,502	$ 10,502
			Remove Conduits to inverters		1	EA				6	/MH	$ 107.16	$ 643	$ 643
			Remove inverters		1	EA				9	/MH	$ 107.16	$ 964	$ 964
			Remove PV panel and place in dumpster		684	EA				342	/MH	$ 107.16	$ 36,649	$ 36,649
			Remove points where panel is fixed to roof		684	EA				153	/MH	$ 107.16	$ 16,395	$ 16,395
			Remove lightning projection and other auxiliary equipment		1	EA				64	/MH	$ 107.16	$ 6,858	$ 6,858
			Remove transformer		1	LT				25	/MH	$ 107.16	$ 2,679	$ 2,679
			Demolition				***$ -***	***$ -***	***$ -***				***$ 109,336***	***$ 109,336***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.48	TN		$ (42)			/MH			$ (42)
			Steel	Service rack components	0.18	TN		$ (16)			/MH			$ (16)
			Steel	Conduit and fittings	0.19	TN		$ (17)			/MH			$ (17)
			Steel	Transformers	5.57	TN		$ (485)			/MH			$ (485)
			Steel	Roof ladder, 1@ 350 lb each	0.07	TN		$ (6)			/MH			$ (6)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	4.66	TN		$ (3,076)			/MH			$ (3,076)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.15	TN		$ (519)			/MH			$ (519)
			Copper	Wire	1.04	TN		$ (3,598)			/MH			$ (3,598)
			Copper	Transformers	2.65	TN		$ (9,169)			/MH			$ (9,169)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	5472	LB		$ (2,517)			/MH			$ (2,517)
			Conduit and fittings	100 @ 1 lb each	38.26	LB		$ (18)			/MH			$ (18)
			Scrap Value				***$ -***	***$ (19,461)***	***$ -***				***$ -***	***$ (19,461)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	4	EA	$ 3,376				/MH			$ 3,376
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 4,479***	***$ -***	***$ -***				***$ -***	***$ 4,479***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	684	EA	$ 102,600				/MH		$ -	$ 102,600
			Architectual				***$ 102,600***	***$ -***	***$ -***				***$ -***	***$ 102,600***
Direct Costs														*$ 196,954*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 132,079*	*$ (19,461)*	*$ -*			*$ 109,336*		*$ 221,954*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 11,098
		91.10	Contractor's Profit											$ 17,756
														$ 28,854
Direct Costs + Construction Indirect Costs							*$ 132,079*	*$ (19,461)*	*$ -*			*$ 109,336*		*$ 250,808*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 15,048
		93.2	Construction Management Support											$ 5,016
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 26,416							$ 26,415.80
		95.2	Contingency on Scrap Value					$ 3,892						$ 3,892
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 21,867	$ 21,867
		95.5	Contingency on Indirect											$ 4,013
Total							**$ 158,495**	**$ (15,569)**	**$ -**				**$ 131,203**	**$ 327,061**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
3	LRN	Ladera Ranch 999	999 Corporate Drive, Ladera Ranch	Roof	PV	39287	50.09999847	342

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				11 /MH	$ 117.91	$ 1,297	$ 1,297
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Disconnect wiring at inverter		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Disconnect wiring at combiner boxes, remove boxes		2 EA				27 /MH	$ 107.16	$ 2,893	$ 2,893
			Pull wire from combiners to inverter		2 EA				20 /MH	$ 107.16	$ 2,143	$ 2,143
			Disconnect and remove wiring at PV panels		342 EA				51 /MH	$ 107.16	$ 5,465	$ 5,465
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		342 EA				14 /MH	$ 107.16	$ 1,500	$ 1,500
			Demo conduit from rack to tie point		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Demo conduit from rack to transformer		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Demo conduit from combiners to inverter		1 EA				49 /MH	$ 107.16	$ 5,251	$ 5,251
			Remove Conduits to inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove PV panel and place in dumpster		342 EA				171 /MH	$ 107.16	$ 18,324	$ 18,324
			Remove points where panel is fixed to roof		342 EA				77 /MH	$ 107.16	$ 8,251	$ 8,251
			Remove lightning projection and other auxiliary equipment		1 EA				32 /MH	$ 107.16	$ 3,429	$ 3,429
			Remove transformer		1 LT				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Demolition			***$ -***	***$ -***	***$ -***			***$ 54,556***	***$ 54,556***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.24 TN		$ (21)		/MH			$ (21)
			Steel	Service rack components	0.09 TN		$ (8)		/MH			$ (8)
			Steel	Conduit and fittings	0.1 TN		$ (9)		/MH			$ (9)
			Steel	Transformers	2.79 TN		$ (243)		/MH			$ (243)
			Steel	Roof ladder, 1@ 350 lb each	0.03 TN		$ (3)		/MH			$ (3)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	2.33 TN		$ (1,538)		/MH			$ (1,538)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.08 TN		$ (277)		/MH			$ (277)
			Copper	Wire	0.52 TN		$ (1,799)		/MH			$ (1,799)
			Copper	Transformers	1.32 TN		$ (4,567)		/MH			$ (4,567)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	2736 LB		$ (1,259)		/MH			$ (1,259)
			Conduit and fittings	100 @ 1 lb each	19.13 LB		$ (9)		/MH			$ (9)
			Scrap Value			***$ -***	***$ (9,731)***	***$ -***			***$ -***	***$ (9,731)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	2 EA	$ 1,688			/MH			$ 1,688
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 2,791***	***$ -***	***$ -***			***$ -***	***$ 2,791***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	342 EA	$ 51,300			/MH		$ -	$ 51,300
			Architectual			***$ 51,300***	***$ -***	***$ -***			***$ -***	***$ 51,300***
Direct Costs												*$ 98,915*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 79,091*	*$ (9,731)*	*$ -*			*$ 54,556*	*$ 123,915*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 6,195.77
		91.10	Contractor's Profit									$ 9,913
												$ 16,109
Direct Costs + Construction Indirect Costs						*$ 79,091*	*$ (9,731)*	*$ -*			*$ 54,556*	*$ 140,024*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 8,401
		93.2	Construction Management Support									$ 2,800
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 15,818						$ 15,818
		95.2	Contingency on Scrap Value				$ 1,946					$ 1,946
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 10,911	$ 10,911
		95.5	Contingency on Indirect									$ 2,240
Total						**$ 94,909**	**$ (7,785)**	**$ -**			**$ 65,467**	**$ 182,142**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
4	HUI	Hunter Industries	1840 La Costa Meadows Rd, San Marcos	Roof	PV	39420	101.8000031	608

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				20 /MH	$ 117.91	$ 2,358	$ 2,358
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				22 /MH	$ 107.16	$ 2,358	$ 2,358
			Disconnect wiring at inverter		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Disconnect wiring at combiner boxes, remove boxes		4 EA				49 /MH	$ 107.16	$ 5,251	$ 5,251
			Pull wire from combiners to inverter		4 EA				35 /MH	$ 107.16	$ 3,751	$ 3,751
			Disconnect and remove wiring at PV panels		608 EA				91 /MH	$ 107.16	$ 9,752	$ 9,752
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		608 EA				24 /MH	$ 107.16	$ 2,572	$ 2,572
			Demo conduit from rack to tie point		1 EA				22 /MH	$ 107.16	$ 2,358	$ 2,358
			Demo conduit from rack to transformer		1 EA				16 /MH	$ 107.16	$ 1,715	$ 1,715
			Demo conduit from combiners to inverter		1 EA				87 /MH	$ 107.16	$ 9,323	$ 9,323
			Remove Conduits to inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove inverters		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Remove PV panel and place in dumpster		608 EA				304 /MH	$ 107.16	$ 32,577	$ 32,577
			Remove points where panel is fixed to roof		608 EA				136 /MH	$ 107.16	$ 14,574	$ 14,574
			Remove lightning projection and other auxiliary equipment		1 EA				57 /MH	$ 107.16	$ 6,108	$ 6,108
			Remove transformer		1 LT				22 /MH	$ 107.16	$ 2,358	$ 2,358
			Demolition			***$ -***	***$ -***	***$ -***			***$ 96,980***	***$ 96,980***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.43 TN		$ (37)		/MH			$ (37)
			Steel	Service rack components	0.16 TN		$ (14)		/MH			$ (14)
			Steel	Conduit and fittings	0.17 TN		$ (15)		/MH			$ (15)
			Steel	Transformers	4.95 TN		$ (431)		/MH			$ (431)
			Steel	Roof ladder, 1@ 350 lb each	0.06 TN		$ (5)		/MH			$ (5)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	4.14 TN		$ (2,732)		/MH			$ (2,732)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.14 TN		$ (484)		/MH			$ (484)
			Copper	Wire	0.92 TN		$ (3,183)		/MH			$ (3,183)
			Copper	Transformers	2.35 TN		$ (8,131)		/MH			$ (8,131)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	4864 LB		$ (2,237)		/MH			$ (2,237)
			Conduit and fittings	100 @ 1 lb each	34 LB		$ (16)		/MH			$ (16)
			Scrap Value			***$ -***	***$ (17,286)***	***$ -***			***$ -***	***$ (17,286)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	3 EA	$ 2,532			/MH			$ 2,532
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 3,635***	***$ -***	***$ -***			***$ -***	***$ 3,635***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	608 EA	$ 91,200			/MH	$ -	$ -	$ 91,200
			Architectual			***$ 91,200***	***$ -***	***$ -***			***$ -***	***$ 91,200***
Direct Costs												*$ 174,529*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 119,835*	*$ (17,286)*	*$ -*			*$ 96,980*	*$ 199,529*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 9,976
		91.10	Contractor's Profit									$ 15,962
												$ 25,939
Direct Costs + Construction Indirect Costs						*$ 119,835*	*$ (17,286)*	*$ -*			*$ 96,980*	*$ 225,468*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 13,528.09
		93.2	Construction Management Support									$ 4,509.36
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 23,967						$ 23,967.0
		95.2	Contingency on Scrap Value				$ 3,457					$ 3,457
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 19,396	$ 19,396
		95.5	Contingency on Indirect									$ 3,607
Total						***$ 143,802***	***$ (13,829)***	***$ -***			***$ 116,377***	***$ 293,933***

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
5	TBR	The Towers at Bressi Ranch	6156 Innovation Way, Carlsbad, CA	Roof	PV	39506	80.40000153	480

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				16 /MH	$ 117.91	$ 1,887	$ 1,887
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Disconnect wiring at inverter		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Disconnect wiring at combiner boxes, remove boxes		3 EA				38 /MH	$ 107.16	$ 4,072	$ 4,072
			Pull wire from combiners to inverter		3 EA				28 /MH	$ 107.16	$ 3,000	$ 3,000
			Disconnect and remove wiring at PV panels		480 EA				72 /MH	$ 107.16	$ 7,716	$ 7,716
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		480 EA				19 /MH	$ 107.16	$ 2,036	$ 2,036
			Demo conduit from rack to tie point		1 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Demo conduit from rack to transformer		1 EA				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Demo conduit from combiners to inverter		1 EA				69 /MH	$ 107.16	$ 7,394	$ 7,394
			Remove Conduits to inverters		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Remove inverters		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove PV panel and place in dumpster		480 EA				240 /MH	$ 107.16	$ 25,718	$ 25,718
			Remove points where panel is fixed to roof		480 EA				107 /MH	$ 107.16	$ 11,466	$ 11,466
			Remove lightning projection and other auxiliary equipment		1 EA				45 /MH	$ 107.16	$ 4,822	$ 4,822
			Remove transformer		1 LT				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Demolition			***$ -***	***$ -***	***$ -***			***$ 76,470***	***$ 76,470***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.34 TN		$ (30)		/MH			$ (30)
			Steel	Service rack components	0.13 TN		$ (11)		/MH			$ (11)
			Steel	Conduit and fittings	0.13 TN		$ (11)		/MH			$ (11)
			Steel	Transformers	3.91 TN		$ (340)		/MH			$ (340)
			Steel	Roof ladder, 1@ 350 lb each	0.05 TN		$ (4)		/MH			$ (4)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	3.27 TN		$ (2,158)		/MH			$ (2,158)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.11 TN		$ (381)		/MH			$ (381)
			Copper	Wire	0.73 TN		$ (2,526)		/MH			$ (2,526)
			Copper	Transformers	1.86 TN		$ (6,436)		/MH			$ (6,436)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	3840 LB		$ (1,766)		/MH			$ (1,766)
			Conduit and fittings	100 @ 1 lb each	26.85 LB		$ (12)		/MH			$ (12)
			Scrap Value			***$ -***	***$ (13,676)***	***$ -***			***$ -***	***$ (13,676)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	3 EA	$ 2,532			/MH			$ 2,532
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 3,635***	***$ -***	***$ -***			***$ -***	***$ 3,635***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	480 EA	$ 72,000			/MH		$ -	$ 72,000
			Architectual			***$ 72,000***	***$ -***	***$ -***			***$ -***	***$ 72,000***
Direct Costs												*$ 138,429*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 100,635*	*$ (13,676)*	*$ -*			*$ 76,470*	*$ 163,429*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 8,171
		91.10	Contractor's Profit									$ 13,074
												$ 21,246
Direct Costs + Construction Indirect Costs						*$ 100,635*	*$ (13,676)*	*$ -*			*$ 76,470*	*$ 184,675*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 11,081
		93.2	Construction Management Support									$ 3,694
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 20,127						$ 20,127.00
		95.2	Contingency on Scrap Value				$ 2,735					$ 2,735
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 15,293.98	$ 15,294
		95.5	Contingency on Indirect									$ 2,954.80
Total						**$ 120,762**	**$ (10,941)**	**$ -**			**$ 91,764**	**$ 240,560**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
6	DSE	Del Sur Elementary	15665 Paseo Del Sur, San Diego	Roof	PV	39696	42.40000153	240

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				8 /MH	$ 117.91	$ 943	$ 943
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Disconnect wiring at inverter		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at combiner boxes, remove boxes		2 EA				19 /MH	$ 107.16	$ 2,036	$ 2,036
			Pull wire from combiners to inverter		2 EA				14 /MH	$ 107.16	$ 1,500	$ 1,500
			Disconnect and remove wiring at PV panels		240 EA				36 /MH	$ 107.16	$ 3,858	$ 3,858
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		240 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Demo conduit from rack to tie point		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Demo conduit from rack to transformer		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Demo conduit from combiners to inverter		1 EA				34 /MH	$ 107.16	$ 3,643	$ 3,643
			Remove Conduits to inverters		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Remove inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove PV panel and place in dumpster		240 EA				120 /MH	$ 107.16	$ 12,859	$ 12,859
			Remove points where panel is fixed to roof		240 EA				54 /MH	$ 107.16	$ 5,787	$ 5,787
			Remove lightning projection and other auxiliary equipment		1 EA				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Remove transformer		1 LT				9 /MH	$ 107.16	$ 964	$ 964
			Demolition			***$ -***	***$ -***	***$ -***			***$ 38,449***	***$ 38,449***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.17 TN		$ (15)		/MH			$ (15)
			Steel	Service rack components	0.06 TN		$ (5)		/MH			$ (5)
			Steel	Conduit and fittings	0.07 TN		$ (6)		/MH			$ (6)
			Steel	Transformers	1.96 TN		$ (171)		/MH			$ (171)
			Steel	Roof ladder, 1@ 350 lb each	0.02 TN		$ (2)		/MH			$ (2)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	1.63 TN		$ (1,076)		/MH			$ (1,076)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.05 TN		$ (173)		/MH			$ (173)
			Copper	Wire	0.37 TN		$ (1,280)		/MH			$ (1,280)
			Copper	Transformers	0.93 TN		$ (3,218)		/MH			$ (3,218)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	1920 LB		$ (883)		/MH			$ (883)
			Conduit and fittings	100 @ 1 lb each	13.42 LB		$ (6)		/MH			$ (6)
			Scrap Value			***$ -***	***$ (6,835)***	***$ -***			***$ -***	***$ (6,835)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 1,947***	***$ -***	***$ -***			***$ -***	***$ 1,947***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	240 EA	$ 36,000			/MH		$ -	$ 36,000
			Architectual			***$ 36,000***	***$ -***	***$ -***			***$ -***	***$ 36,000***
Direct Costs												*$ 69,562*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 62,947*	*$ (6,835)*	*$ -*			*$ 38,449*	*$ 94,562*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 4,728
		91.10	Contractor's Profit									$ 7,565
												$ 12,293
Direct Costs + Construction Indirect Costs						*$ 62,947*	*$ (6,835)*	*$ -*			*$ 38,449*	*$ 106,855*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 6,411
		93.2	Construction Management Support									$ 2,137
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 12,589						$ 12,589.40
		95.2	Contingency on Scrap Value				$ 1,367					$ 1,367
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 7,690	$ 7,690
		95.5	Contingency on Indirect									$ 1,710
Total						**$ 75,536**	**$ (5,468)**	**$ -**			**$ 46,139**	**$ 138,759**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
7	LRF	Ladera Ranch 555	555 Corporate Drive, Ladera Ranch	Roof	PV	39708	49.20000076	315

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				11	/MH	$ 117.91	$ 1,297	$ 1,297
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Disconnect wiring at inverter		1	EA				3	/MH	$ 107.16	$ 321	$ 321
			Disconnect wiring at combiner boxes, remove boxes		2	EA				25	/MH	$ 107.16	$ 2,679	$ 2,679
			Pull wire from combiners to inverter		2	EA				18	/MH	$ 107.16	$ 1,929	$ 1,929
			Disconnect and remove wiring at PV panels		315	EA				47	/MH	$ 107.16	$ 5,037	$ 5,037
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		315	EA				13	/MH	$ 107.16	$ 1,393	$ 1,393
			Demo conduit from rack to tie point		1	EA				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Demo conduit from rack to transformer		1	EA				8	/MH	$ 107.16	$ 857	$ 857
			Demo conduit from combiners to inverter		1	EA				45	/MH	$ 107.16	$ 4,822	$ 4,822
			Remove Conduits to inverters		1	EA				3	/MH	$ 107.16	$ 321	$ 321
			Remove inverters		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Remove PV panel and place in dumpster		315	EA				158	/MH	$ 107.16	$ 16,931	$ 16,931
			Remove points where panel is fixed to roof		315	EA				70	/MH	$ 107.16	$ 7,501	$ 7,501
			Remove lightning projection and other auxiliary equipment		1	EA				30	/MH	$ 107.16	$ 3,215	$ 3,215
			Remove transformer		1	LT				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Demolition				***$ -***	***$ -***	***$ -***				***$ 50,269***	***$ 50,269***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.22	TN		$ (19)			/MH			$ (19)
			Steel	Service rack components	0.08	TN		$ (7)			/MH			$ (7)
			Steel	Conduit and fittings	0.09	TN		$ (8)			/MH			$ (8)
			Steel	Transformers	2.57	TN		$ (224)			/MH			$ (224)
			Steel	Roof ladder, 1@ 350 lb each	0.03	TN		$ (3)			/MH			$ (3)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	2.14	TN		$ (1,412)			/MH			$ (1,412)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.07	TN		$ (242)			/MH			$ (242)
			Copper	Wire	0.48	TN		$ (1,661)			/MH			$ (1,661)
			Copper	Transformers	1.22	TN		$ (4,221)			/MH			$ (4,221)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	2520	LB		$ (1,159)			/MH			$ (1,159)
			Conduit and fittings	100 @ 1 lb each	17.62	LB		$ (8)			/MH			$ (8)
			Scrap Value				***$ -***	***$ (8,964)***	***$ -***				***$ -***	***$ (8,964)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	2	EA	$ 1,688				/MH			$ 1,688
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 2,791***	***$ -***	***$ -***				***$ -***	***$ 2,791***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	315	EA	$ 47,250				/MH		$ -	$ 47,250
			Architectual				***$ 47,250***	***$ -***	***$ -***				***$ -***	***$ 47,250***
Direct Costs														*$ 91,346*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 75,041*	*$ (8,964)*	*$ -*				*$ 50,269*	*$ 116,346*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 5,817
		91.10	Contractor's Profit											$ 9,308
														$ 15,125
Direct Costs + Construction Indirect Costs							*$ 75,041*	*$ (8,964)*	*$ -*				*$ 50,269*	*$ 131,471*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 7,888.27
		93.2	Construction Management Support											$ 2,629.42
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 15,008							$ 15,008.20
		95.2	Contingency on Scrap Value					$ 1,793						$ 1,793
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 10,054	$ 10,054
		95.5	Contingency on Indirect											$ 2,104
Total							**$ 90,049**	**$ (7,171)**	**$ -**				**$ 60,323**	**$ 170,947**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
8	IOG	Innovative Oil and Gas/Hamann Companies	7350 Britannia Court, San Diego, CA	Roof	PV	39791	504	1872

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				63	/MH	$ 117.91	$ 7,428	$ 7,428
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				67	/MH	$ 107.16	$ 7,180	$ 7,180
			Disconnect wiring at inverter		1	EA				17	/MH	$ 107.16	$ 1,822	$ 1,822
			Disconnect wiring at combiner boxes, remove boxes		14	EA				150	/MH	$ 107.16	$ 16,074	$ 16,074
			Pull wire from combiners to inverter		14	EA				109	/MH	$ 107.16	$ 11,680	$ 11,680
			Disconnect and remove wiring at PV panels		1872	EA				281	/MH	$ 107.16	$ 30,112	$ 30,112
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		1872	EA				75	/MH	$ 107.16	$ 8,037	$ 8,037
			Demo conduit from rack to tie point		1	EA				67	/MH	$ 107.16	$ 7,180	$ 7,180
			Demo conduit from rack to transformer		1	EA				50	/MH	$ 107.16	$ 5,358	$ 5,358
			Demo conduit from combiners to inverter		1	EA				268	/MH	$ 107.16	$ 28,719	$ 28,719
			Remove Conduits to inverters		1	EA				17	/MH	$ 107.16	$ 1,822	$ 1,822
			Remove inverters		1	EA				25	/MH	$ 107.16	$ 2,679	$ 2,679
			Remove PV panel and place in dumpster		1872	EA				936	/MH	$ 107.16	$ 100,302	$ 100,302
			Remove points where panel is fixed to roof		1872	EA				419	/MH	$ 107.16	$ 44,900	$ 44,900
			Remove lightning projection and other auxiliary equipment		1	EA				176	/MH	$ 107.16	$ 18,860	$ 18,860
			Remove transformer		1	LT				68	/MH	$ 107.16	$ 7,287	$ 7,287
			Demolition				***$ -***	***$ -***	***$ -***				***$ 299,439***	***$ 299,439***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	1.31	TN		$ (114)			/MH			$ (114)
			Steel	Service rack components	0.49	TN		$ (43)			/MH			$ (43)
			Steel	Conduit and fittings	0.52	TN		$ (45)			/MH			$ (45)
			Steel	Transformers	15.25	TN		$ (1,327)			/MH			$ (1,327)
			Steel	Roof ladder, 1@ 350 lb each	0.19	TN		$ (17)			/MH			$ (17)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	12.74	TN		$ (8,408)			/MH			$ (8,408)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.42	TN		$ (1,453)			/MH			$ (1,453)
			Copper	Wire	2.85	TN		$ (9,861)			/MH			$ (9,861)
			Copper	Transformers	7.25	TN		$ (25,085)			/MH			$ (25,085)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	14976	LB		$ (6,889)			/MH			$ (6,889)
			Conduit and fittings	100 @ 1 lb each	104.7	LB		$ (48)			/MH			$ (48)
			Scrap Value				***$ -***	***$ (53,290)***	***$ -***				***$ -***	***$ (53,290)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	10	EA	$ 8,440				/MH			$ 8,440
			Dumpster, 40 CY Capacity	Fix point rods	2	EA	$ 1,688				/MH			$ 1,688
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 10,387***	***$ -***	***$ -***				***$ -***	***$ 10,387***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	1872	EA	$ 280,800				/MH	$ -	$ -	$ 280,800
			Architectual				***$ 280,800***	***$ -***	***$ -***				***$ -***	***$ 280,800***
Direct Costs														*$ 537,336*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 316,187*	*$ (53,290)*	*$ -*				*$ 299,439*	*$ 562,336*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 28,117
		91.10	Contractor's Profit											$ 44,987
														$ 73,104
Direct Costs + Construction Indirect Costs							*$ 316,187*	*$ (53,290)*	*$ -*				*$ 299,439*	*$ 635,440*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 38,126
		93.2	Construction Management Support											$ 12,709
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 63,237							$ 63,237.40
		95.2	Contingency on Scrap Value					$ 10,658						$ 10,658
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 59,888	$ 59,888
		95.5	Contingency on Indirect											$ 10,167.04
Total							**$ 379,424**	**$ (42,632)**	**$ -**				**$ 359,327**	**$ 830,226**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
9	HTC	High Tech High Chula Vista	1945 Discovery Falls Drive, Chula Vista	Roof	PV	39853	101	640

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				21	/MH	$ 117.91	$ 2,476	$ 2,476
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				23	/MH	$ 107.16	$ 2,465	$ 2,465
			Disconnect wiring at inverter		1	EA				6	/MH	$ 107.16	$ 643	$ 643
			Disconnect wiring at combiner boxes, remove boxes		5	EA				51	/MH	$ 107.16	$ 5,465	$ 5,465
			Pull wire from combiners to inverter		5	EA				37	/MH	$ 107.16	$ 3,965	$ 3,965
			Disconnect and remove wiring at PV panels		640	EA				96	/MH	$ 107.16	$ 10,287	$ 10,287
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		640	EA				26	/MH	$ 107.16	$ 2,786	$ 2,786
			Demo conduit from rack to tie point		1	EA				23	/MH	$ 107.16	$ 2,465	$ 2,465
			Demo conduit from rack to transformer		1	EA				17	/MH	$ 107.16	$ 1,822	$ 1,822
			Demo conduit from combiners to inverter		1	EA				92	/MH	$ 107.16	$ 9,859	$ 9,859
			Remove Conduits to inverters		1	EA				6	/MH	$ 107.16	$ 643	$ 643
			Remove inverters		1	EA				9	/MH	$ 107.16	$ 964	$ 964
			Remove PV panel and place in dumpster		640	EA				320	/MH	$ 107.16	$ 34,291	$ 34,291
			Remove points where panel is fixed to roof		640	EA				143	/MH	$ 107.16	$ 15,324	$ 15,324
			Remove lightning projection and other auxiliary equipment		1	EA				60	/MH	$ 107.16	$ 6,430	$ 6,430
			Remove transformer		1	LT				23	/MH	$ 107.16	$ 2,465	$ 2,465
			Demolition				***$ -***	***$ -***	***$ -***				***$ 102,349***	***$ 102,349***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.45	TN		$ (39)			/MH			$ (39)
			Steel	Service rack components	0.17	TN		$ (15)			/MH			$ (15)
			Steel	Conduit and fittings	0.18	TN		$ (16)			/MH			$ (16)
			Steel	Transformers	5.22	TN		$ (454)			/MH			$ (454)
			Steel	Roof ladder, 1@ 350 lb each	0.06	TN		$ (5)			/MH			$ (5)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	4.36	TN		$ (2,878)			/MH			$ (2,878)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.14	TN		$ (484)			/MH			$ (484)
			Copper	Wire	0.97	TN		$ (3,356)			/MH			$ (3,356)
			Copper	Transformers	2.48	TN		$ (8,581)			/MH			$ (8,581)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	5120	LB		$ (2,355)			/MH			$ (2,355)
			Conduit and fittings	100 @ 1 lb each	35.79	LB		$ (16)			/MH			$ (16)
			Scrap Value				***$ -***	***$ (18,200)***	***$ -***				***$ -***	***$ (18,200)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	4	EA	$ 3,376				/MH			$ 3,376
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 4,479***	***$ -***	***$ -***				***$ -***	***$ 4,479***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	640	EA	$ 96,000				/MH	$ -	$ -	$ 96,000
			Architectual				***$ 96,000***	***$ -***	***$ -***				***$ -***	***$ 96,000***
Direct Costs														*$ 184,629*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 125,479*	*$ (18,200)*	*$ -*				*$ 102,349*	*$ 209,629*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 10,481
		91.10	Contractor's Profit											$ 16,770
														$ 27,252
Direct Costs + Construction Indirect Costs							*$ 125,479*	*$ (18,200)*	*$ -*				*$ 102,349*	*$ 236,880*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 14,212.82
		93.2	Construction Management Support											$ 4,737.61
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 25,095.80							$ 25,095.80
		95.2	Contingency on Scrap Value					$ 3,640						$ 3,640
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 20,469.85	$ 20,470
		95.5	Contingency on Indirect											$ 3,790
Total							**$ 150,575**	**$ (14,560)**	**$ -**				**$ 122,819**	**$ 308,826**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
10	HGW	Hanna Gabriel Wells	1955 Bacon St. San Diego	Roof	PV	39884	16.29999924	84

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				3	/MH	$ 117.91	$ 354	$ 354
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				3	/MH	$ 107.16	$ 321	$ 321
			Disconnect wiring at inverter		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at combiner boxes, remove boxes		1	EA				7	/MH	$ 107.16	$ 750	$ 750
			Pull wire from combiners to inverter		1	EA				5	/MH	$ 107.16	$ 536	$ 536
			Disconnect and remove wiring at PV panels		84	EA				13	/MH	$ 107.16	$ 1,393	$ 1,393
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		84	EA				3	/MH	$ 107.16	$ 321	$ 321
			Demo conduit from rack to tie point		1	EA				3	/MH	$ 107.16	$ 321	$ 321
			Demo conduit from rack to transformer		1	EA				2	/MH	$ 107.16	$ 214	$ 214
			Demo conduit from combiners to inverter		1	EA				12	/MH	$ 107.16	$ 1,286	$ 1,286
			Remove Conduits to inverters		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Remove inverters		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Remove PV panel and place in dumpster		84	EA				42	/MH	$ 107.16	$ 4,501	$ 4,501
			Remove points where panel is fixed to roof		84	EA				19	/MH	$ 107.16	$ 2,036	$ 2,036
			Remove lightning projection and other auxiliary equipment		1	EA				8	/MH	$ 107.16	$ 857	$ 857
			Remove transformer		1	LT				3	/MH	$ 107.16	$ 321	$ 321
			Demolition				***$ -***	***$ -***	***$ -***				***$ 13,534***	***$ 13,534***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.06	TN		$ (5)			/MH			$ (5)
			Steel	Service rack components	0.02	TN		$ (2)			/MH			$ (2)
			Steel	Conduit and fittings	0.02	TN		$ (2)			/MH			$ (2)
			Steel	Transformers	0.68	TN		$ (59)			/MH			$ (59)
			Steel	Roof ladder, 1@ 350 lb each	0.01	TN		$ (1)			/MH			$ (1)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	0.57	TN		$ (376)			/MH			$ (376)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.02	TN		$ (69)			/MH			$ (69)
			Copper	Wire	0.13	TN		$ (450)			/MH			$ (450)
			Copper	Transformers	0.33	TN		$ (1,142)			/MH			$ (1,142)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	672	LB		$ (309)			/MH			$ (309)
			Conduit and fittings	100 @ 1 lb each	4.7	LB		$ (2)			/MH			$ (2)
			Scrap Value				***$ -***	***$ (2,417)***	***$ -***				***$ -***	***$ (2,417)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	0	EA	$ -				/MH			$ -
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 1,103***	***$ -***	***$ -***				***$ -***	***$ 1,103***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	84	EA	$ 12,600				/MH		$ -	$ 12,600
			Architectual				***$ 12,600***	***$ -***	***$ -***				***$ -***	***$ 12,600***
Direct Costs														*$ 24,820*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 38,703*	*$ (2,417)*	*$ -*				*$ 13,534*	*$ 49,820*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 2,491
		91.10	Contractor's Profit											$ 3,986
														$ 6,477
Direct Costs + Construction Indirect Costs							*$ 38,703*	*$ (2,417)*	*$ -*				*$ 13,534*	*$ 56,297*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 3,377.82
		93.2	Construction Management Support											$ 1,125.94
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 7,740.60							$ 7,740.60
		95.2	Contingency on Scrap Value					$ 483.40						$ 483
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 2,706.88	$ 2,707
		95.5	Contingency on Indirect											$ 901
Total							**$ 46,444**	**$ (1,934)**	**$ -**				**$ 16,241**	**$ 72,632**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
11	SDC	San Diego CC Skills Center	4343 Ocean View Blvd B, San Diego	Roof	PV	40002	56.90000153	360

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				12 /MH	$ 117.91	$ 1,415	$ 1,415
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Disconnect wiring at inverter		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Disconnect wiring at combiner boxes, remove boxes		3 EA				29 /MH	$ 107.16	$ 3,108	$ 3,108
			Pull wire from combiners to inverter		3 EA				21 /MH	$ 107.16	$ 2,250	$ 2,250
			Disconnect and remove wiring at PV panels		360 EA				54 /MH	$ 107.16	$ 5,787	$ 5,787
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		360 EA				14 /MH	$ 107.16	$ 1,500	$ 1,500
			Demo conduit from rack to tie point		1 EA				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Demo conduit from rack to transformer		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Demo conduit from combiners to inverter		1 EA				52 /MH	$ 107.16	$ 5,572	$ 5,572
			Remove Conduits to inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove PV panel and place in dumpster		360 EA				180 /MH	$ 107.16	$ 19,289	$ 19,289
			Remove points where panel is fixed to roof		360 EA				81 /MH	$ 107.16	$ 8,680	$ 8,680
			Remove lightning projection and other auxiliary equipment		1 EA				34 /MH	$ 107.16	$ 3,643	$ 3,643
			Remove transformer		1 LT				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Demolition			***$ -***	***$ -***	***$ -***			***$ 57,674***	***$ 57,674***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.25 TN		$ (22)		/MH			$ (22)
			Steel	Service rack components	0.09 TN		$ (8)		/MH			$ (8)
			Steel	Conduit and fittings	0.1 TN		$ (9)		/MH			$ (9)
			Steel	Transformers	2.93 TN		$ (255)		/MH			$ (255)
			Steel	Roof ladder, 1@ 350 lb each	0.04 TN		$ (3)		/MH			$ (3)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	2.45 TN		$ (1,617)		/MH			$ (1,617)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.08 TN		$ (277)		/MH			$ (277)
			Copper	Wire	0.55 TN		$ (1,903)		/MH			$ (1,903)
			Copper	Transformers	1.39 TN		$ (4,809)		/MH			$ (4,809)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	2880 LB		$ (1,325)		/MH			$ (1,325)
			Conduit and fittings	100 @ 1 lb each	20.13 LB		$ (9)		/MH			$ (9)
			Scrap Value			***$ -***	***$ (10,237)***	***$ -***			***$ -***	***$ (10,237)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	2 EA	$ 1,688			/MH			$ 1,688
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 2,791***	***$ -***	***$ -***			***$ -***	***$ 2,791***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	360 EA	$ 54,000			/MH	$ -		$ 54,000
			Architectual			***$ 54,000***	***$ -***	***$ -***			***$ -***	***$ 54,000***
Direct Costs												*$ 104,228*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 81,791*	*$ (10,237)*	*$ -*			*$ 57,674*	*$ 129,228*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 6,461
		91.10	Contractor's Profit									$ 10,338
												$ 16,800
Direct Costs + Construction Indirect Costs						*$ 81,791*	*$ (10,237)*	*$ -*			*$ 57,674*	*$ 146,028*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 8,762
		93.2	Construction Management Support									$ 2,921
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 16,358						$ 16,358.20
		95.2	Contingency on Scrap Value				$ 2,047.39					$ 2,047
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 11,535	$ 11,535
		95.5	Contingency on Indirect									$ 2,336.44
Total						**$ 98,149**	**$ (8,190)**	**$ -**			**$ 69,209**	**$ 189,987**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
13	BMI	Burnham Institute	10901 North Torrey Pines Rd., La Jolla, CA	Roof	PV	40148	226.3999939	840

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				28	/MH	$ 117.91	$ 3,301	$ 3,301
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				30	/MH	$ 107.16	$ 3,215	$ 3,215
			Disconnect wiring at inverter		1	EA				8	/MH	$ 107.16	$ 857	$ 857
			Disconnect wiring at combiner boxes, remove boxes		6	EA				67	/MH	$ 107.16	$ 7,180	$ 7,180
			Pull wire from combiners to inverter		6	EA				49	/MH	$ 107.16	$ 5,251	$ 5,251
			Disconnect and remove wiring at PV panels		840	EA				126	/MH	$ 107.16	$ 13,502	$ 13,502
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		840	EA				34	/MH	$ 107.16	$ 3,643	$ 3,643
			Demo conduit from rack to tie point		1	EA				30	/MH	$ 107.16	$ 3,215	$ 3,215
			Demo conduit from rack to transformer		1	EA				23	/MH	$ 107.16	$ 2,465	$ 2,465
			Demo conduit from combiners to inverter		1	EA				120	/MH	$ 107.16	$ 12,859	$ 12,859
			Remove Conduits to inverters		1	EA				8	/MH	$ 107.16	$ 857	$ 857
			Remove inverters		1	EA				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Remove PV panel and place in dumpster		840	EA				420	/MH	$ 107.16	$ 45,007	$ 45,007
			Remove points where panel is fixed to roof		840	EA				188	/MH	$ 107.16	$ 20,146	$ 20,146
			Remove lightning projection and other auxiliary equipment		1	EA				79	/MH	$ 107.16	$ 8,466	$ 8,466
			Remove transformer		1	LT				31	/MH	$ 107.16	$ 3,322	$ 3,322
			Demolition				***$ -***	***$ -***	***$ -***				***$ 134,465***	***$ 134,465***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.59	TN		$ (51)			/MH			$ (51)
			Steel	Service rack components	0.22	TN		$ (19)			/MH			$ (19)
			Steel	Conduit and fittings	0.23	TN		$ (20)			/MH			$ (20)
			Steel	Transformers	6.84	TN		$ (595)			/MH			$ (595)
			Steel	Roof ladder, 1@ 350 lb each	0.08	TN		$ (7)			/MH			$ (7)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	5.72	TN		$ (3,775)			/MH			$ (3,775)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.19	TN		$ (657)			/MH			$ (657)
			Copper	Wire	1.28	TN		$ (4,429)			/MH			$ (4,429)
			Copper	Transformers	3.25	TN		$ (11,245)			/MH			$ (11,245)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	6720	LB		$ (3,091)			/MH			$ (3,091)
			Conduit and fittings	100 @ 1 lb each	46.98	LB		$ (22)			/MH			$ (22)
			Scrap Value				***$ -***	***$ (23,912)***	***$ -***				***$ -***	***$ (23,912)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	5	EA	$ 4,220				/MH			$ 4,220
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 5,323***	***$ -***	***$ -***				***$ -***	***$ 5,323***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	840	EA	$ 126,000				/MH		$ -	$ 126,000
			Architectual				***$ 126,000***	***$ -***	***$ -***				***$ -***	***$ 126,000***
Direct Costs														*$ 241,877*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 156,323*	*$ (23,912)*	*$ -*				*$ 134,465*	*$ 266,877*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 13,344
		91.10	Contractor's Profit											$ 21,350
														$ 34,694
Direct Costs + Construction Indirect Costs							*$ 156,323*	*$ (23,912)*	*$ -*				*$ 134,465*	*$ 301,571*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 18,094
		93.2	Construction Management Support											$ 6,031
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 31,264.60							$ 31,264.60
		95.2	Contingency on Scrap Value					$ 4,782						$ 4,782
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 26,893.06	$ 26,893
		95.5	Contingency on Indirect											$ 4,825.13
Total							**$ 187,588**	**$ (19,129)**	**$ -**				**$ 161,358**	**$ 393,461**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
14	LAM	La Maestra	4060 Fairmount Ave., San Diego	Roof	PV	40238	20.70000076	117

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				4 /MH	$ 117.91	$ 472	$ 472
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Disconnect wiring at inverter		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at combiner boxes, remove boxes		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Pull wire from combiners to inverter		1 EA				7 /MH	$ 107.16	$ 750	$ 750
			Disconnect and remove wiring at PV panels		117 EA				18 /MH	$ 107.16	$ 1,929	$ 1,929
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		117 EA				5 /MH	$ 107.16	$ 536	$ 536
			Demo conduit from rack to tie point		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Demo conduit from rack to transformer		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Demo conduit from combiners to inverter		1 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Remove Conduits to inverters		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Remove inverters		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Remove PV panel and place in dumpster		117 EA				59 /MH	$ 107.16	$ 6,322	$ 6,322
			Remove points where panel is fixed to roof		117 EA				26 /MH	$ 107.16	$ 2,786	$ 2,786
			Remove lightning projection and other auxiliary equipment		1 EA				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Remove transformer		1 LT				4 /MH	$ 107.16	$ 429	$ 429
			Demolition			***$ -***	***$ -***	***$ -***			***$ 18,796***	***$ 18,796***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.08 TN		$ (7)		/MH			$ (7)
			Steel	Service rack components	0.03 TN		$ (3)		/MH			$ (3)
			Steel	Conduit and fittings	0.03 TN		$ (3)		/MH			$ (3)
			Steel	Transformers	0.95 TN		$ (83)		/MH			$ (83)
			Steel	Roof ladder, 1@ 350 lb each	0.01 TN		$ (1)		/MH			$ (1)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	0.8 TN		$ (528)		/MH			$ (528)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.03 TN		$ (104)		/MH			$ (104)
			Copper	Wire	0.18 TN		$ (623)		/MH			$ (623)
			Copper	Transformers	0.45 TN		$ (1,557)		/MH			$ (1,557)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	936 LB		$ (431)		/MH			$ (431)
			Conduit and fittings	100 @ 1 lb each	6.54 LB		$ (3)		/MH			$ (3)
			Scrap Value			***$ -***	***$ (3,341)***	***$ -***			***$ -***	***$ (3,341)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 1,947***	***$ -***	***$ -***			***$ -***	***$ 1,947***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	117 EA	$ 17,550			/MH		$ -	$ 17,550
			Architectual			***$ 17,550***	***$ -***	***$ -***			***$ -***	***$ 17,550***
Direct Costs												*$ 34,952*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 44,497*	*$ (3,341)*	*$ -*			*$ 18,796*	*$ 59,952*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 2,998
		91.10	Contractor's Profit									$ 4,796
												$ 7,794
Direct Costs + Construction Indirect Costs						*$ 44,497*	*$ (3,341)*	*$ -*			*$ 18,796*	*$ 67,746*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 4,065
		93.2	Construction Management Support									$ 1,355
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 8,899						$ 8,899
		95.2	Contingency on Scrap Value				$ 668					$ 668
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 3,759	$ 3,759
		95.5	Contingency on Indirect									$ 1,084
Total						**$ 53,396**	**$ (2,673)**	**$ -**			**$ 22,555**	**$ 87,576**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
15	GTA	Grossmont Trolley (Altera)	8717 Fletcher Parkway, La Mesa	Roof	PV	40295	64.69999695	368

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				12 /MH	$ 117.91	$ 1,415	$ 1,415
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Disconnect wiring at inverter		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Disconnect wiring at combiner boxes, remove boxes		3 EA				29 /MH	$ 107.16	$ 3,108	$ 3,108
			Pull wire from combiners to inverter		3 EA				21 /MH	$ 107.16	$ 2,250	$ 2,250
			Disconnect and remove wiring at PV panels		368 EA				55 /MH	$ 107.16	$ 5,894	$ 5,894
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		368 EA				15 /MH	$ 107.16	$ 1,607	$ 1,607
			Demo conduit from rack to tie point		1 EA				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Demo conduit from rack to transformer		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Demo conduit from combiners to inverter		1 EA				53 /MH	$ 107.16	$ 5,679	$ 5,679
			Remove Conduits to inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove PV panel and place in dumpster		368 EA				184 /MH	$ 107.16	$ 19,717	$ 19,717
			Remove points where panel is fixed to roof		368 EA				82 /MH	$ 107.16	$ 8,787	$ 8,787
			Remove lightning projection and other auxiliary equipment		1 EA				35 /MH	$ 107.16	$ 3,751	$ 3,751
			Remove transformer		1 LT				13 /MH	$ 107.16	$ 1,393	$ 1,393
			Demolition			***$ -***	***$ -***	***$ -***			***$ 58,638***	***$ 58,638***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.26 TN		$ (23)		/MH			$ (23)
			Steel	Service rack components	0.1 TN		$ (9)		/MH			$ (9)
			Steel	Conduit and fittings	0.1 TN		$ (9)		/MH			$ (9)
			Steel	Transformers	3 TN		$ (261)		/MH			$ (261)
			Steel	Roof ladder, 1@ 350 lb each	0.04 TN		$ (3)		/MH			$ (3)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	2.5 TN		$ (1,650)		/MH			$ (1,650)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.08 TN		$ (277)		/MH			$ (277)
			Copper	Wire	0.56 TN		$ (1,938)		/MH			$ (1,938)
			Copper	Transformers	1.42 TN		$ (4,913)		/MH			$ (4,913)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	2944 LB		$ (1,354)		/MH			$ (1,354)
			Conduit and fittings	100 @ 1 lb each	20.58 LB		$ (9)		/MH			$ (9)
			Scrap Value			***$ -***	***$ (10,446)***	***$ -***			***$ -***	***$ (10,446)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	2 EA	$ 1,688			/MH			$ 1,688
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 2,791***	***$ -***	***$ -***			***$ -***	***$ 2,791***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	368 EA	$ 55,200			/MH		$ -	$ 55,200
			Architectual			***$ 55,200***	***$ -***	***$ -***			***$ -***	***$ 55,200***
Direct Costs												*$ 106,184*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 82,991*	*$ (10,446)*	*$ -*			*$ 58,638*	*$ 131,184*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 6,559
		91.10	Contractor's Profit									$ 10,495
												$ 17,054
Direct Costs + Construction Indirect Costs						*$ 82,991*	*$ (10,446)*	*$ -*			*$ 58,638*	*$ 148,237*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 8,894
		93.2	Construction Management Support									$ 2,965
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 16,598						$ 16,598
		95.2	Contingency on Scrap Value				$ 2,089					$ 2,089
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 11,728	$ 11,728
		95.5	Contingency on Indirect									$ 2,372
Total						**$ 99,589**	**$ (8,357)**	**$ -**			**$ 70,366**	**$ 192,883**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
16	TJL	Thomas Jefferson School of Law	1155 Island Ave., San Diego	Roof	PV	40556	49.90000153	247

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				8 /MH	$ 117.91	$ 943	$ 943
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Disconnect wiring at inverter		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at combiner boxes, remove boxes		2 EA				20 /MH	$ 107.16	$ 2,143	$ 2,143
			Pull wire from combiners to inverter		2 EA				14 /MH	$ 107.16	$ 1,500	$ 1,500
			Disconnect and remove wiring at PV panels		247 EA				37 /MH	$ 107.16	$ 3,965	$ 3,965
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		247 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Demo conduit from rack to tie point		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Demo conduit from rack to transformer		1 EA				7 /MH	$ 107.16	$ 750	$ 750
			Demo conduit from combiners to inverter		1 EA				35 /MH	$ 107.16	$ 3,751	$ 3,751
			Remove Conduits to inverters		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Remove inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove PV panel and place in dumpster		247 EA				124 /MH	$ 107.16	$ 13,288	$ 13,288
			Remove points where panel is fixed to roof		247 EA				55 /MH	$ 107.16	$ 5,894	$ 5,894
			Remove lightning projection and other auxiliary equipment		1 EA				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Remove transformer		1 LT				9 /MH	$ 107.16	$ 964	$ 964
			Demolition			***$ -***	***$ -***	***$ -***			***$ 39,414***	***$ 39,414***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.17 TN		$ (15)		/MH			$ (15)
			Steel	Service rack components	0.06 TN		$ (5)		/MH			$ (5)
			Steel	Conduit and fittings	0.07 TN		$ (6)		/MH			$ (6)
			Steel	Transformers	2.01 TN		$ (175)		/MH			$ (175)
			Steel	Roof ladder, 1@ 350 lb each	0.02 TN		$ (2)		/MH			$ (2)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	1.68 TN		$ (1,109)		/MH			$ (1,109)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.06 TN		$ (208)		/MH			$ (208)
			Copper	Wire	0.38 TN		$ (1,315)		/MH			$ (1,315)
			Copper	Transformers	0.96 TN		$ (3,322)		/MH			$ (3,322)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	1976 LB		$ (909)		/MH			$ (909)
			Conduit and fittings	100 @ 1 lb each	13.81 LB		$ (6)		/MH			$ (6)
			Scrap Value			***$ -***	***$ (7,071)***	***$ -***			***$ -***	***$ (7,071)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 1,947***	***$ -***	***$ -***			***$ -***	***$ 1,947***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	247 EA	$ 37,050			/MH		$ -	$ 37,050
			Architectual			***$ 37,050***	***$ -***	***$ -***			***$ -***	***$ 37,050***
Direct Costs												*$ 71,340*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 63,997*	*$ (7,071)*	*$ -*			*$ 39,414*	*$ 96,340*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 4,817
		91.10	Contractor's Profit									$ 7,707
												$ 12,524
Direct Costs + Construction Indirect Costs						*$ 63,997*	*$ (7,071)*	*$ -*			*$ 39,414*	*$ 108,864*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 6,532
		93.2	Construction Management Support									$ 2,177
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 12,799						$ 12,799
		95.2	Contingency on Scrap Value				$ 1,414					$ 1,414
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 7,883	$ 7,883
		95.5	Contingency on Indirect									$ 1,742
Total						**$ 76,796**	**$ (5,657)**	**$ -**			**$ 47,296**	**$ 141,411**

Project ID	Code		Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
17	PSD		Port of San Diego	1000 N Harbor Dr., San Diego	Roof	PV	40528	30	156

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				5 /MH	$ 117.91	$ 590	$ 590
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Disconnect wiring at inverter		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at combiner boxes, remove boxes		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Pull wire from combiners to inverter		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Disconnect and remove wiring at PV panels		156 EA				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		156 EA				6 /MH	$ 107.16	$ 643	$ 643
			Demo conduit from rack to tie point		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Demo conduit from rack to transformer		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Demo conduit from combiners to inverter		1 EA				22 /MH	$ 107.16	$ 2,358	$ 2,358
			Remove Conduits to inverters		1 EA				1 /MH	$ 107.16	$ 107	$ 107
			Remove inverters		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Remove PV panel and place in dumpster		156 EA				78 /MH	$ 107.16	$ 8,358	$ 8,358
			Remove points where panel is fixed to roof		156 EA				35 /MH	$ 107.16	$ 3,751	$ 3,751
			Remove lightning projection and other auxiliary equipment		1 EA				15 /MH	$ 107.16	$ 1,607	$ 1,607
			Remove transformer		1 LT				6 /MH	$ 107.16	$ 643	$ 643
			Demolition			***$ -***	***$ -***	***$ -***			***$ 24,808***	***$ 24,808***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.11 TN		$ (10)		/MH			$ (10)
			Steel	Service rack components	0.04 TN		$ (3)		/MH			$ (3)
			Steel	Conduit and fittings	0.04 TN		$ (3)		/MH			$ (3)
			Steel	Transformers	1.27 TN		$ (110)		/MH			$ (110)
			Steel	Roof ladder, 1@ 350 lb each	0.02 TN		$ (2)		/MH			$ (2)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	1.06 TN		$ (700)		/MH			$ (700)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.03 TN		$ (104)		/MH			$ (104)
			Copper	Wire	0.24 TN		$ (830)		/MH			$ (830)
			Copper	Transformers	0.6 TN		$ (2,076)		/MH			$ (2,076)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	1248 LB		$ (574)		/MH			$ (574)
			Conduit and fittings	100 @ 1 lb each	8.72 LB		$ (4)		/MH			$ (4)
			Scrap Value			***$ -***	***$ (4,417)***	***$ -***			***$ -***	***$ (4,417)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 1,947***	***$ -***	***$ -***			***$ -***	***$ 1,947***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	156 EA	$ 23,400			/MH		$ -	$ 23,400
			Architectual			***$ 23,400***	***$ -***	***$ -***			***$ -***	***$ 23,400***
Direct Costs												*$ 45,738*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 50,347*	*$ (4,417)*	*$ -*			*$ 24,808*	*$ 70,738*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 3,537
		91.10	Contractor's Profit									$ 5,659
												$ 9,196
Direct Costs + Construction Indirect Costs						*$ 50,347*	*$ (4,417)*	*$ -*			*$ 24,808*	*$ 79,934*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 4,796
		93.2	Construction Management Support									$ 1,599
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 10,069.40						$ 10,069
		95.2	Contingency on Scrap Value				$ 883					$ 883
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 4,962	$ 4,962
		95.5	Contingency on Indirect									$ 1,279
Total						**$ 60,416**	**$ (3,533)**	**$ -**			**$ 29,769**	**$ 103,522**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
18	WCO	Wilco	2633 Progress St, Vista	Roof	PV	40325	384.2999878	2128

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				71	/MH	$ 117.91	$ 8,372	$ 8,372
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				76	/MH	$ 107.16	$ 8,144	$ 8,144
			Disconnect wiring at inverter		1	EA				19	/MH	$ 107.16	$ 2,036	$ 2,036
			Disconnect wiring at combiner boxes, remove boxes		15	EA				170	/MH	$ 107.16	$ 18,217	$ 18,217
			Pull wire from combiners to inverter		15	EA				124	/MH	$ 107.16	$ 13,288	$ 13,288
			Disconnect and remove wiring at PV panels		2128	EA				319	/MH	$ 107.16	$ 34,184	$ 34,184
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		2128	EA				86	/MH	$ 107.16	$ 9,216	$ 9,216
			Demo conduit from rack to tie point		1	EA				76	/MH	$ 107.16	$ 8,144	$ 8,144
			Demo conduit from rack to transformer		1	EA				57	/MH	$ 107.16	$ 6,108	$ 6,108
			Demo conduit from combiners to inverter		1	EA				305	/MH	$ 107.16	$ 32,684	$ 32,684
			Remove Conduits to inverters		1	EA				19	/MH	$ 107.16	$ 2,036	$ 2,036
			Remove inverters		1	EA				29	/MH	$ 107.16	$ 3,108	$ 3,108
			Remove PV panel and place in dumpster		2128	EA				1064	/MH	$ 107.16	$ 114,018	$ 114,018
			Remove points where panel is fixed to roof		2128	EA				476	/MH	$ 107.16	$ 51,008	$ 51,008
			Remove lightning projection and other auxiliary equipment		1	EA				200	/MH	$ 107.16	$ 21,432	$ 21,432
			Remove transformer		1	LT				77	/MH	$ 107.16	$ 8,251	$ 8,251
			Demolition				***$ -***	***$ -***	***$ -***				***$ 340,246***	***$ 340,246***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	1.49	TN		$ (130)			/MH			$ (130)
			Steel	Service rack components	0.56	TN		$ (49)			/MH			$ (49)
			Steel	Conduit and fittings	0.6	TN		$ (52)			/MH			$ (52)
			Steel	Transformers	17.34	TN		$ (1,509)			/MH			$ (1,509)
			Steel	Roof ladder, 1@ 350 lb each	0.21	TN		$ (18)			/MH			$ (18)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	14.48	TN		$ (9,557)			/MH			$ (9,557)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.48	TN		$ (1,661)			/MH			$ (1,661)
			Copper	Wire	3.24	TN		$ (11,210)			/MH			$ (11,210)
			Copper	Transformers	8.24	TN		$ (28,510)			/MH			$ (28,510)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	17024	LB		$ (7,831)			/MH			$ (7,831)
			Conduit and fittings	100 @ 1 lb each	119.02	LB		$ (55)			/MH			$ (55)
			Scrap Value				***$ -***	***$ (60,582)***	***$ -***				***$ -***	***$ (60,582)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	12	EA	$ 10,128				/MH			$ 10,128
			Dumpster, 40 CY Capacity	Fix point rods	2	EA	$ 1,688				/MH			$ 1,688
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 12,075***	***$ -***	***$ -***				***$ -***	***$ 12,075***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	2128	EA	$ 319,200				/MH		$ -	$ 319,200
			Architectual				***$ 319,200***	***$ -***	***$ -***				***$ -***	***$ 319,200***
Direct Costs														*$ 610,940*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 356,275*	*$ (60,582)*	*$ -*				*$ 340,246*	*$ 635,940*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 31,797
		91.10	Contractor's Profit											$ 50,875
														$ 82,672
Direct Costs + Construction Indirect Costs							*$ 356,275*	*$ (60,582)*	*$ -*				*$ 340,246*	*$ 718,612*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 43,117
		93.2	Construction Management Support											$ 14,372
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 71,255							$ 71,255
		95.2	Contingency on Scrap Value					$ 12,116						$ 12,116
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 68,049	$ 68,049
		95.5	Contingency on Indirect											$ 11,498
Total							**$ 427,530**	**$ (48,465)**	**$ -**				**$ 408,295**	**$ 939,019**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
19	APH	Amylin Pharmaceuticals	9625 Towne Center Drive, San Diego	Roof	PV	40294	200.3999939	1104

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				37	/MH	$ 117.91	$ 4,363	$ 4,363
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				40	/MH	$ 107.16	$ 4,286	$ 4,286
			Disconnect wiring at inverter		1	EA				10	/MH	$ 107.16	$ 1,072	$ 1,072
			Disconnect wiring at combiner boxes, remove boxes		8	EA				88	/MH	$ 107.16	$ 9,430	$ 9,430
			Pull wire from combiners to inverter		8	EA				64	/MH	$ 107.16	$ 6,858	$ 6,858
			Disconnect and remove wiring at PV panels		1104	EA				165	/MH	$ 107.16	$ 17,681	$ 17,681
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		1104	EA				44	/MH	$ 107.16	$ 4,715	$ 4,715
			Demo conduit from rack to tie point		1	EA				40	/MH	$ 107.16	$ 4,286	$ 4,286
			Demo conduit from rack to transformer		1	EA				30	/MH	$ 107.16	$ 3,215	$ 3,215
			Demo conduit from combiners to inverter		1	EA				158	/MH	$ 107.16	$ 16,931	$ 16,931
			Remove Conduits to inverters		1	EA				10	/MH	$ 107.16	$ 1,072	$ 1,072
			Remove inverters		1	EA				15	/MH	$ 107.16	$ 1,607	$ 1,607
			Remove PV panel and place in dumpster		1104	EA				552	/MH	$ 107.16	$ 59,152	$ 59,152
			Remove points where panel is fixed to roof		1104	EA				247	/MH	$ 107.16	$ 26,469	$ 26,469
			Remove lightning projection and other auxiliary equipment		1	EA				104	/MH	$ 107.16	$ 11,145	$ 11,145
			Remove transformer		1	LT				40	/MH	$ 107.16	$ 4,286	$ 4,286
			Demolition				***$ -***	***$ -***	***$ -***				***$ 176,569***	***$ 176,569***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.77	TN		$ (67)			/MH			$ (67)
			Steel	Service rack components	0.29	TN		$ (25)			/MH			$ (25)
			Steel	Conduit and fittings	0.31	TN		$ (27)			/MH			$ (27)
			Steel	Transformers	9	TN		$ (783)			/MH			$ (783)
			Steel	Roof ladder, 1@ 350 lb each	0.11	TN		$ (10)			/MH			$ (10)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	7.51	TN		$ (4,957)			/MH			$ (4,957)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.25	TN		$ (865)			/MH			$ (865)
			Copper	Wire	1.68	TN		$ (5,813)			/MH			$ (5,813)
			Copper	Transformers	4.27	TN		$ (14,774)			/MH			$ (14,774)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	8832	LB		$ (4,063)			/MH			$ (4,063)
			Conduit and fittings	100 @ 1 lb each	61.74	LB		$ (28)			/MH			$ (28)
			Scrap Value				***$ -***	***$ (31,411)***	***$ -***				***$ -***	***$ (31,411)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	6	EA	$ 5,064				/MH			$ 5,064
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 6,167***	***$ -***	***$ -***				***$ -***	***$ 6,167***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	1104	EA	$ 165,600				/MH	$ -	$ -	$ 165,600
			Architectual				***$ 165,600***	***$ -***	***$ -***				***$ -***	***$ 165,600***
Direct Costs														*$ 316,924*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 196,767*	*$ (31,411)*	*$ -*				*$ 176,569*	*$ 341,924*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 17,096
		91.10	Contractor's Profit											$ 27,354
														$ 44,450
Direct Costs + Construction Indirect Costs							*$ 196,767*	*$ (31,411)*	*$ -*				*$ 176,569*	*$ 386,374*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 23,182
		93.2	Construction Management Support											$ 7,727
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 39,353							$ 39,353
		95.2	Contingency on Scrap Value					$ 6,282						$ 6,282
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 35,314	$ 35,314
		95.5	Contingency on Indirect											$ 6,182
Total							**$ 236,120**	**$ (25,129)**	**$ -**				**$ 211,883**	**$ 504,416**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
22	HTN	High Tech High North County	1420 West San Marcos Blvd., San Marcos	Roof	PV	40613	70.19999695	336

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				11 /MH	$ 117.91	$ 1,297	$ 1,297
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Disconnect wiring at inverter		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Disconnect wiring at combiner boxes, remove boxes		2 EA				27 /MH	$ 107.16	$ 2,893	$ 2,893
			Pull wire from combiners to inverter		2 EA				20 /MH	$ 107.16	$ 2,143	$ 2,143
			Disconnect and remove wiring at PV panels		336 EA				50 /MH	$ 107.16	$ 5,358	$ 5,358
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		336 EA				14 /MH	$ 107.16	$ 1,500	$ 1,500
			Demo conduit from rack to tie point		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Demo conduit from rack to transformer		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Demo conduit from combiners to inverter		1 EA				48 /MH	$ 107.16	$ 5,144	$ 5,144
			Remove Conduits to inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove PV panel and place in dumpster		336 EA				168 /MH	$ 107.16	$ 18,003	$ 18,003
			Remove points where panel is fixed to roof		336 EA				75 /MH	$ 107.16	$ 8,037	$ 8,037
			Remove lightning projection and other auxiliary equipment		1 EA				32 /MH	$ 107.16	$ 3,429	$ 3,429
			Remove transformer		1 LT				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Demolition			***$ -***	***$ -***	***$ -***			***$ 53,805***	***$ 53,805***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.23 TN		$ (20)		/MH			$ (20)
			Steel	Service rack components	0.09 TN		$ (8)		/MH			$ (8)
			Steel	Conduit and fittings	0.09 TN		$ (8)		/MH			$ (8)
			Steel	Transformers	2.74 TN		$ (238)		/MH			$ (238)
			Steel	Roof ladder, 1@ 350 lb each	0.03 TN		$ (3)		/MH			$ (3)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	2.29 TN		$ (1,511)		/MH			$ (1,511)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.08 TN		$ (277)		/MH			$ (277)
			Copper	Wire	0.51 TN		$ (1,765)		/MH			$ (1,765)
			Copper	Transformers	1.3 TN		$ (4,498)		/MH			$ (4,498)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	2688 LB		$ (1,236)		/MH			$ (1,236)
			Conduit and fittings	100 @ 1 lb each	18.79 LB		$ (9)		/MH			$ (9)
			Scrap Value			***$ -***	***$ (9,573)***	***$ -***			***$ -***	***$ (9,573)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	2 EA	$ 1,688			/MH			$ 1,688
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 2,791***	***$ -***	***$ -***			***$ -***	***$ 2,791***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	336 EA	$ 50,400			/MH	$ -	$ -	$ 50,400
			Architectual			***$ 50,400***	***$ -***	***$ -***			***$ -***	***$ 50,400***
Direct Costs												*$ 97,424*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 78,191*	*$ (9,573)*	*$ -*			*$ 53,805*	*$ 122,424*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 6,121
		91.10	Contractor's Profit									$ 9,794
												$ 15,915
Direct Costs + Construction Indirect Costs						*$ 78,191*	*$ (9,573)*	*$ -*			*$ 53,805*	*$ 138,339*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 8,300
		93.2	Construction Management Support									$ 2,767
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 15,638						$ 15,638
		95.2	Contingency on Scrap Value				$ 1,915					$ 1,915
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 10,761	$ 10,761
		95.5	Contingency on Indirect									$ 2,213
Total						**$ 93,829**	**$ (7,658)**	**$ -**			**$ 64,566**	**$ 179,933**

Project ID	Code		Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
23	UCO		Urban Corps	3105 Jefferson St, San Diego	Roof	PV	40346	22.79999924	117

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				4	/MH	$ 117.91	$ 472	$ 472
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Disconnect wiring at inverter		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at combiner boxes, remove boxes		1	EA				9	/MH	$ 107.16	$ 964	$ 964
			Pull wire from combiners to inverter		1	EA				7	/MH	$ 107.16	$ 750	$ 750
			Disconnect and remove wiring at PV panels		117	EA				18	/MH	$ 107.16	$ 1,929	$ 1,929
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		117	EA				5	/MH	$ 107.16	$ 536	$ 536
			Demo conduit from rack to tie point		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Demo conduit from rack to transformer		1	EA				3	/MH	$ 107.16	$ 321	$ 321
			Demo conduit from combiners to inverter		1	EA				17	/MH	$ 107.16	$ 1,822	$ 1,822
			Remove Conduits to inverters		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Remove inverters		1	EA				2	/MH	$ 107.16	$ 214	$ 214
			Remove PV panel and place in dumpster		117	EA				59	/MH	$ 107.16	$ 6,322	$ 6,322
			Remove points where panel is fixed to roof		117	EA				26	/MH	$ 107.16	$ 2,786	$ 2,786
			Remove lightning projection and other auxiliary equipment		1	EA				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Remove transformer		1	LT				4	/MH	$ 107.16	$ 429	$ 429
			Demolition				***$ -***	***$ -***	***$ -***				***$ 18,796***	***$ 18,796***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.08	TN		$ (7)			/MH			$ (7)
			Steel	Service rack components	0.03	TN		$ (3)			/MH			$ (3)
			Steel	Conduit and fittings	0.03	TN		$ (3)			/MH			$ (3)
			Steel	Transformers	0.95	TN		$ (83)			/MH			$ (83)
			Steel	Roof ladder, 1@ 350 lb each	0.01	TN		$ (1)			/MH			$ (1)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	0.8	TN		$ (528)			/MH			$ (528)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.03	TN		$ (104)			/MH			$ (104)
			Copper	Wire	0.18	TN		$ (623)			/MH			$ (623)
			Copper	Transformers	0.45	TN		$ (1,557)			/MH			$ (1,557)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	936	LB		$ (431)			/MH			$ (431)
			Conduit and fittings	100 @ 1 lb each	6.54	LB		$ (3)			/MH			$ (3)
			Scrap Value				***$ -***	***$ (3,341)***	***$ -***				***$ -***	***$ (3,341)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1	EA	$ 844				/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 1,947***	***$ -***	***$ -***				***$ -***	***$ 1,947***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	117	EA	$ 17,550				/MH	$ -	$ -	$ 17,550
			Architectual				***$ 17,550***	***$ -***	***$ -***				***$ -***	***$ 17,550***
Direct Costs														*$ 34,952*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 44,497*	*$ (3,341)*	*$ -*				*$ 18,796*	*$ 59,952*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 2,998
		91.10	Contractor's Profit											$ 4,796
														$ 7,794
Direct Costs + Construction Indirect Costs							*$ 44,497*	*$ (3,341)*	*$ -*				*$ 18,796*	*$ 67,746*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 4,065
		93.2	Construction Management Support											$ 1,355
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 8,899							$ 8,899
		95.2	Contingency on Scrap Value					$ 668						$ 668
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 3,759	$ 3,759
		95.5	Contingency on Indirect											$ 1,084
Total							**$ 53,396**	**$ (2,673)**	**$ -**				**$ 22,555**	**$ 87,576**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
24	PRS	Pacific Ridge School	6269 El Fuerte St., Carlsbad	Roof	PV	40570	20.89999962	102

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				3	/MH	$ 117.91	$ 354	$ 354
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Disconnect wiring at inverter		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at combiner boxes, remove boxes		1	EA				8	/MH	$ 107.16	$ 857	$ 857
			Pull wire from combiners to inverter		1	EA				6	/MH	$ 107.16	$ 643	$ 643
			Disconnect and remove wiring at PV panels		102	EA				15	/MH	$ 107.16	$ 1,607	$ 1,607
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		102	EA				4	/MH	$ 107.16	$ 429	$ 429
			Demo conduit from rack to tie point		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Demo conduit from rack to transformer		1	EA				3	/MH	$ 107.16	$ 321	$ 321
			Demo conduit from combiners to inverter		1	EA				15	/MH	$ 107.16	$ 1,607	$ 1,607
			Remove Conduits to inverters		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Remove inverters		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Remove PV panel and place in dumpster		102	EA				51	/MH	$ 107.16	$ 5,465	$ 5,465
			Remove points where panel is fixed to roof		102	EA				23	/MH	$ 107.16	$ 2,465	$ 2,465
			Remove lightning projection and other auxiliary equipment		1	EA				10	/MH	$ 107.16	$ 1,072	$ 1,072
			Remove transformer		1	LT				4	/MH	$ 107.16	$ 429	$ 429
			Demolition				***$ -***	***$ -***	***$ -***				***$ 16,428***	***$ 16,428***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.07	TN		$ (6)			/MH			$ (6)
			Steel	Service rack components	0.03	TN		$ (3)			/MH			$ (3)
			Steel	Conduit and fittings	0.03	TN		$ (3)			/MH			$ (3)
			Steel	Transformers	0.83	TN		$ (72)			/MH			$ (72)
			Steel	Roof ladder, 1@ 350 lb each	0.01	TN		$ (1)			/MH			$ (1)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	0.69	TN		$ (455)			/MH			$ (455)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.02	TN		$ (69)			/MH			$ (69)
			Copper	Wire	0.16	TN		$ (554)			/MH			$ (554)
			Copper	Transformers	0.39	TN		$ (1,349)			/MH			$ (1,349)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	816	LB		$ (375)			/MH			$ (375)
			Conduit and fittings	100 @ 1 lb each	5.7	LB		$ (3)			/MH			$ (3)
			Scrap Value				***$ -***	***$ (2,890)***	***$ -***				***$ -***	***$ (2,890)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1	EA	$ 844				/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 1,947***	***$ -***	***$ -***				***$ -***	***$ 1,947***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	102	EA	$ 15,300				/MH		$ -	$ 15,300
			Architectual				***$ 15,300***	***$ -***	***$ -***				***$ -***	***$ 15,300***
Direct Costs														*$ 30,785*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 42,247*	*$ (2,890)*	*$ -*			*$ 16,428*		*$ 55,785*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 2,789
		91.10	Contractor's Profit											$ 4,463
														$ 7,252
Direct Costs + Construction Indirect Costs							*$ 42,247*	*$ (2,890)*	*$ -*			*$ 16,428*		*$ 63,037*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 3,782
		93.2	Construction Management Support											$ 1,261
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 8,449							$ 8,449
		95.2	Contingency on Scrap Value					$ 578						$ 578
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 3,286	$ 3,286
		95.5	Contingency on Indirect											$ 1,009
Total							**$ 50,696**	**$ (2,312)**	**$ -**				**$ 19,713**	**$ 81,401**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
25	SBR	Sanford Burnham Medical Research	10905 Road to the Cure, La Jolla	Roof	PV	40571	200.1999969	712

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				24 /MH	$ 117.91	$ 2,830	$ 2,830
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				25 /MH	$ 107.16	$ 2,679	$ 2,679
			Disconnect wiring at inverter		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Disconnect wiring at combiner boxes, remove boxes		5 EA				57 /MH	$ 107.16	$ 6,108	$ 6,108
			Pull wire from combiners to inverter		5 EA				41 /MH	$ 107.16	$ 4,394	$ 4,394
			Disconnect and remove wiring at PV panels		712 EA				107 /MH	$ 107.16	$ 11,466	$ 11,466
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		712 EA				29 /MH	$ 107.16	$ 3,108	$ 3,108
			Demo conduit from rack to tie point		1 EA				25 /MH	$ 107.16	$ 2,679	$ 2,679
			Demo conduit from rack to transformer		1 EA				19 /MH	$ 107.16	$ 2,036	$ 2,036
			Demo conduit from combiners to inverter		1 EA				102 /MH	$ 107.16	$ 10,930	$ 10,930
			Remove Conduits to inverters		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove inverters		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Remove PV panel and place in dumpster		712 EA				356 /MH	$ 107.16	$ 38,149	$ 38,149
			Remove points where panel is fixed to roof		712 EA				159 /MH	$ 107.16	$ 17,038	$ 17,038
			Remove lightning projection and other auxiliary equipment		1 EA				67 /MH	$ 107.16	$ 7,180	$ 7,180
			Remove transformer		1 LT				26 /MH	$ 107.16	$ 2,786	$ 2,786
			Demolition			***$ -***	***$ -***	***$ -***			***$ 113,740***	***$ 113,740***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.5 TN		$ (44)		/MH			$ (44)
			Steel	Service rack components	0.19 TN		$ (17)		/MH			$ (17)
			Steel	Conduit and fittings	0.2 TN		$ (17)		/MH			$ (17)
			Steel	Transformers	5.8 TN		$ (505)		/MH			$ (505)
			Steel	Roof ladder, 1@ 350 lb each	0.07 TN		$ (6)		/MH			$ (6)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	4.85 TN		$ (3,201)		/MH			$ (3,201)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.16 TN		$ (554)		/MH			$ (554)
			Copper	Wire	1.08 TN		$ (3,737)		/MH			$ (3,737)
			Copper	Transformers	2.76 TN		$ (9,550)		/MH			$ (9,550)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	5696 LB		$ (2,620)		/MH			$ (2,620)
			Conduit and fittings	100 @ 1 lb each	39.82 LB		$ (18)		/MH			$ (18)
			Scrap Value			***$ -***	***$ (20,268)***	***$ -***			***$ -***	***$ (20,268)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	4 EA	$ 3,376			/MH			$ 3,376
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 4,479***	***$ -***	***$ -***			***$ -***	***$ 4,479***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	712 EA	$ 106,800			/MH		$ -	$ 106,800
			Architectual			***$ 106,800***	***$ -***	***$ -***			***$ -***	***$ 106,800***
Direct Costs												*$ 204,752*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 136,279*	*$ (20,268)*	*$ -*			*$ 113,740*	*$ 229,752*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 11,488
		91.10	Contractor's Profit									$ 18,380
												$ 29,868
Direct Costs + Construction Indirect Costs						*$ 136,279*	*$ (20,268)*	*$ -*			*$ 113,740*	*$ 259,620*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 15,577
		93.2	Construction Management Support									$ 5,192
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 27,256						$ 27,256
		95.2	Contingency on Scrap Value				$ 4,054					$ 4,054
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 22,748	$ 22,748
		95.5	Contingency on Indirect									$ 4,154
Total						**$ 163,535**	**$ (16,214)**	**$ -**			**$ 136,489**	**$ 338,600**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
26	HCK	High Tech High CV K-8	1949 Discovery Falls Drive, Chula Vista	Roof	PV	40763	130.1000061	644

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				22 /MH	$ 117.91	$ 2,594	$ 2,594
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Disconnect wiring at inverter		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Disconnect wiring at combiner boxes, remove boxes		5 EA				52 /MH	$ 107.16	$ 5,572	$ 5,572
			Pull wire from combiners to inverter		5 EA				37 /MH	$ 107.16	$ 3,965	$ 3,965
			Disconnect and remove wiring at PV panels		644 EA				97 /MH	$ 107.16	$ 10,395	$ 10,395
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		644 EA				26 /MH	$ 107.16	$ 2,786	$ 2,786
			Demo conduit from rack to tie point		1 EA				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Demo conduit from rack to transformer		1 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Demo conduit from combiners to inverter		1 EA				92 /MH	$ 107.16	$ 9,859	$ 9,859
			Remove Conduits to inverters		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove inverters		1 EA				9 /MH	$ 107.16	$ 964	$ 964
			Remove PV panel and place in dumpster		644 EA				322 /MH	$ 107.16	$ 34,506	$ 34,506
			Remove points where panel is fixed to roof		644 EA				144 /MH	$ 107.16	$ 15,431	$ 15,431
			Remove lightning projection and other auxiliary equipment		1 EA				61 /MH	$ 107.16	$ 6,537	$ 6,537
			Remove transformer		1 LT				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Demolition			***$ -***	***$ -***	***$ -***			***$ 103,110***	***$ 103,110***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.45 TN		$ (39)		/MH			$ (39)
			Steel	Service rack components	0.17 TN		$ (15)		/MH			$ (15)
			Steel	Conduit and fittings	0.18 TN		$ (16)		/MH			$ (16)
			Steel	Transformers	5.25 TN		$ (457)		/MH			$ (457)
			Steel	Roof ladder, 1@ 350 lb each	0.06 TN		$ (5)		/MH			$ (5)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	4.38 TN		$ (2,891)		/MH			$ (2,891)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.14 TN		$ (484)		/MH			$ (484)
			Copper	Wire	0.98 TN		$ (3,391)		/MH			$ (3,391)
			Copper	Transformers	2.49 TN		$ (8,615)		/MH			$ (8,615)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	5152 LB		$ (2,370)		/MH			$ (2,370)
			Conduit and fittings	100 @ 1 lb each	36.02 LB		$ (17)		/MH			$ (17)
			Scrap Value			***$ -***	***$ (18,299)***	***$ -***			***$ -***	***$ (18,299)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	4 EA	$ 3,376			/MH			$ 3,376
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 4,479***	***$ -***	***$ -***			***$ -***	***$ 4,479***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	644 EA	$ 96,600			/MH		$ -	$ 96,600
			Architectual			***$ 96,600***	***$ -***	***$ -***			***$ -***	***$ 96,600***
Direct Costs												*$ 185,890*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 126,079*	*$ (18,299)*	*$ -*			*$ 103,110*	*$ 210,890*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 10,544
		91.10	Contractor's Profit									$ 16,871
												$ 27,416
Direct Costs + Construction Indirect Costs						*$ 126,079*	*$ (18,299)*	*$ -*			*$ 103,110*	*$ 238,305*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 14,298
		93.2	Construction Management Support									$ 4,766
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 25,216						$ 25,216
		95.2	Contingency on Scrap Value				$ 3,660					$ 3,660
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 20,622	$ 20,622
		95.5	Contingency on Indirect									$ 3,813
Total						***$ 151,295***	***$ (14,640)***	***$ -***			***$ 123,732***	***$ 310,680***

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
27	CPT	Campus Pointe	10300 Campus Pointe Dr, San Diego	Roof	PV	40885	257.3930054	1232

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				41	/MH	$ 117.91	$ 4,834	$ 4,834
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				44	/MH	$ 107.16	$ 4,715	$ 4,715
			Disconnect wiring at inverter		1	EA				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Disconnect wiring at combiner boxes, remove boxes		9	EA				99	/MH	$ 107.16	$ 10,609	$ 10,609
			Pull wire from combiners to inverter		9	EA				72	/MH	$ 107.16	$ 7,716	$ 7,716
			Disconnect and remove wiring at PV panels		1232	EA				185	/MH	$ 107.16	$ 19,825	$ 19,825
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		1232	EA				50	/MH	$ 107.16	$ 5,358	$ 5,358
			Demo conduit from rack to tie point		1	EA				44	/MH	$ 107.16	$ 4,715	$ 4,715
			Demo conduit from rack to transformer		1	EA				33	/MH	$ 107.16	$ 3,536	$ 3,536
			Demo conduit from combiners to inverter		1	EA				176	/MH	$ 107.16	$ 18,860	$ 18,860
			Remove Conduits to inverters		1	EA				11	/MH	$ 107.16	$ 1,179	$ 1,179
			Remove inverters		1	EA				17	/MH	$ 107.16	$ 1,822	$ 1,822
			Remove PV panel and place in dumpster		1232	EA				616	/MH	$ 107.16	$ 66,011	$ 66,011
			Remove points where panel is fixed to roof		1232	EA				276	/MH	$ 107.16	$ 29,576	$ 29,576
			Remove lightning projection and other auxiliary equipment		1	EA				116	/MH	$ 107.16	$ 12,431	$ 12,431
			Remove transformer		1	LT				45	/MH	$ 107.16	$ 4,822	$ 4,822
			Demolition				***$ -***	***$ -***	***$ -***				***$ 197,187***	***$ 197,187***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.86	TN		$ (75)			/MH			$ (75)
			Steel	Service rack components	0.32	TN		$ (28)			/MH			$ (28)
			Steel	Conduit and fittings	0.34	TN		$ (30)			/MH			$ (30)
			Steel	Transformers	10.04	TN		$ (873)			/MH			$ (873)
			Steel	Roof ladder, 1@ 350 lb each	0.12	TN		$ (10)			/MH			$ (10)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	8.39	TN		$ (5,537)			/MH			$ (5,537)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.28	TN		$ (969)			/MH			$ (969)
			Copper	Wire	1.87	TN		$ (6,470)			/MH			$ (6,470)
			Copper	Transformers	4.77	TN		$ (16,504)			/MH			$ (16,504)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	9856	LB		$ (4,534)			/MH			$ (4,534)
			Conduit and fittings	100 @ 1 lb each	68.9	LB		$ (32)			/MH			$ (32)
			Scrap Value				***$ -***	***$ (35,062)***	***$ -***				***$ -***	***$ (35,062)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	7	EA	$ 5,908				/MH			$ 5,908
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 7,011***	***$ -***	***$ -***				***$ -***	***$ 7,011***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	1232	EA	$ 184,800				/MH	$ -	$ -	$ 184,800
			Architectual				***$ 184,800***	***$ -***	***$ -***				***$ -***	***$ 184,800***
Direct Costs														*$ 353,935*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 216,811*	*$ (35,062)*	*$ -*				*$ 197,187*	*$ 378,935*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 18,947
		91.10	Contractor's Profit											$ 30,315
														$ 49,262
Direct Costs + Construction Indirect Costs							*$ 216,811*	*$ (35,062)*	*$ -*				*$ 197,187*	*$ 428,197*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 25,692
		93.2	Construction Management Support											$ 8,564
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 43,362							$ 43,362
		95.2	Contingency on Scrap Value					$ 7,012						$ 7,012
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 39,437	$ 39,437
		95.5	Contingency on Indirect											$ 6,851
Total							**$ 260,173**	**$ (28,050)**	**$ -**				**$ 236,624**	**$ 559,116**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
28	CSM	CSU San Marcos	333 S Twin Oaks Valley Rd, San Marcos	Roof	PV	40927	37.09999847	180

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				6 /MH	$ 117.91	$ 707	$ 707
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Disconnect wiring at inverter		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at combiner boxes, remove boxes		1 EA				14 /MH	$ 107.16	$ 1,500	$ 1,500
			Pull wire from combiners to inverter		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Disconnect and remove wiring at PV panels		180 EA				27 /MH	$ 107.16	$ 2,893	$ 2,893
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		180 EA				7 /MH	$ 107.16	$ 750	$ 750
			Demo conduit from rack to tie point		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Demo conduit from rack to transformer		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Demo conduit from combiners to inverter		1 EA				26 /MH	$ 107.16	$ 2,786	$ 2,786
			Remove Conduits to inverters		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Remove inverters		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Remove PV panel and place in dumpster		180 EA				90 /MH	$ 107.16	$ 9,644	$ 9,644
			Remove points where panel is fixed to roof		180 EA				40 /MH	$ 107.16	$ 4,286	$ 4,286
			Remove lightning projection and other auxiliary equipment		1 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Remove transformer		1 LT				7 /MH	$ 107.16	$ 750	$ 750
			Demolition			***$ -***	***$ -***	***$ -***			***$ 28,676***	***$ 28,676***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.13 TN		$ (11)		/MH			$ (11)
			Steel	Service rack components	0.05 TN		$ (4)		/MH			$ (4)
			Steel	Conduit and fittings	0.05 TN		$ (4)		/MH			$ (4)
			Steel	Transformers	1.47 TN		$ (128)		/MH			$ (128)
			Steel	Roof ladder, 1@ 350 lb each	0.02 TN		$ (2)		/MH			$ (2)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	1.23 TN		$ (812)		/MH			$ (812)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.04 TN		$ (138)		/MH			$ (138)
			Copper	Wire	0.27 TN		$ (934)		/MH			$ (934)
			Copper	Transformers	0.7 TN		$ (2,422)		/MH			$ (2,422)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	1440 LB		$ (662)		/MH			$ (662)
			Conduit and fittings	100 @ 1 lb each	10.07 LB		$ (5)		/MH			$ (5)
			Scrap Value			***$ -***	***$ (5,123)***	***$ -***			***$ -***	***$ (5,123)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 1,947***	***$ -***	***$ -***			***$ -***	***$ 1,947***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	180 EA	$ 27,000			/MH	$ -	$ -	$ 27,000
			Architectual			***$ 27,000***	***$ -***	***$ -***			***$ -***	***$ 27,000***
Direct Costs												*$ 52,500*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 53,947*	*$ (5,123)*	*$ -*			*$ 28,676*	*$ 77,500*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 3,875
		91.10	Contractor's Profit									$ 6,200
												$ 10,075
Direct Costs + Construction Indirect Costs						*$ 53,947*	*$ (5,123)*	*$ -*			*$ 28,676*	*$ 87,575*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 5,255
		93.2	Construction Management Support									$ 1,752
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 10,789						$ 10,789
		95.2	Contingency on Scrap Value				$ 1,025					$ 1,025
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 5,735	$ 5,735
		95.5	Contingency on Indirect									$ 1,401
Total						**$ 64,736**	**$ (4,098)**	**$ -**			**$ 34,411**	**$ 113,532**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
29	EIR	EIC roof top	4760 Clairemont Mesa Blvd, San Diego	Roof	PV	40913	47.33200073	234

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				8	/MH	$ 117.91	$ 943	$ 943
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				8	/MH	$ 107.16	$ 857	$ 857
			Disconnect wiring at inverter		1	EA				2	/MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at combiner boxes, remove boxes		2	EA				19	/MH	$ 107.16	$ 2,036	$ 2,036
			Pull wire from combiners to inverter		2	EA				14	/MH	$ 107.16	$ 1,500	$ 1,500
			Disconnect and remove wiring at PV panels		234	EA				35	/MH	$ 107.16	$ 3,751	$ 3,751
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		234	EA				9	/MH	$ 107.16	$ 964	$ 964
			Demo conduit from rack to tie point		1	EA				8	/MH	$ 107.16	$ 857	$ 857
			Demo conduit from rack to transformer		1	EA				6	/MH	$ 107.16	$ 643	$ 643
			Demo conduit from combiners to inverter		1	EA				34	/MH	$ 107.16	$ 3,643	$ 3,643
			Remove Conduits to inverters		1	EA				2	/MH	$ 107.16	$ 214	$ 214
			Remove inverters		1	EA				3	/MH	$ 107.16	$ 321	$ 321
			Remove PV panel and place in dumpster		234	EA				117	/MH	$ 107.16	$ 12,538	$ 12,538
			Remove points where panel is fixed to roof		234	EA				52	/MH	$ 107.16	$ 5,572	$ 5,572
			Remove lightning projection and other auxiliary equipment		1	EA				22	/MH	$ 107.16	$ 2,358	$ 2,358
			Remove transformer		1	LT				9	/MH	$ 107.16	$ 964	$ 964
			Demolition				***$ -***	***$ -***	***$ -***				***$ 37,378***	***$ 37,378***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.16	TN		$ (14)			/MH			$ (14)
			Steel	Service rack components	0.06	TN		$ (5)			/MH			$ (5)
			Steel	Conduit and fittings	0.07	TN		$ (6)			/MH			$ (6)
			Steel	Transformers	1.91	TN		$ (166)			/MH			$ (166)
			Steel	Roof ladder, 1@ 350 lb each	0.02	TN		$ (2)			/MH			$ (2)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	1.59	TN		$ (1,049)			/MH			$ (1,049)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.05	TN		$ (173)			/MH			$ (173)
			Copper	Wire	0.36	TN		$ (1,246)			/MH			$ (1,246)
			Copper	Transformers	0.91	TN		$ (3,149)			/MH			$ (3,149)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	1872	LB		$ (861)			/MH			$ (861)
			Conduit and fittings	100 @ 1 lb each	13.09	LB		$ (6)			/MH			$ (6)
			Scrap Value				***$ -***	***$ (6,677)***	***$ -***				***$ -***	***$ (6,677)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1	EA	$ 844				/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 1,947***	***$ -***	***$ -***				***$ -***	***$ 1,947***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	234	EA	$ 35,100				/MH	$ -	$ -	$ 35,100
			Architectual				***$ 35,100***	***$ -***	***$ -***				***$ -***	***$ 35,100***
Direct Costs														*$ 67,748*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 62,047*	*$ (6,677)*	*$ -*				*$ 37,378*	*$ 92,748*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 4,637
		91.10	Contractor's Profit											$ 7,420
														$ 12,057
Direct Costs + Construction Indirect Costs							*$ 62,047*	*$ (6,677)*	*$ -*				*$ 37,378*	*$ 104,805*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 6,288
		93.2	Construction Management Support											$ 2,096
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 12,409							$ 12,409
		95.2	Contingency on Scrap Value					$ 1,335						$ 1,335
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 7,476	$ 7,476
		95.5	Contingency on Indirect											$ 1,677
Total							**$ 74,456**	**$ (5,342)**	**$ -**				**$ 44,853**	**$ 136,087**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
31	UCR	UCSD - CDK Apartments	9500 Gilman Dr, La Jolla	Roof	PV	40829	40.70000076	196

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				7 /MH	$ 117.91	$ 825	$ 825
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				7 /MH	$ 107.16	$ 750	$ 750
			Disconnect wiring at inverter		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Disconnect wiring at combiner boxes, remove boxes		1 EA				16 /MH	$ 107.16	$ 1,715	$ 1,715
			Pull wire from combiners to inverter		1 EA				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Disconnect and remove wiring at PV panels		196 EA				29 /MH	$ 107.16	$ 3,108	$ 3,108
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		196 EA				8 /MH	$ 107.16	$ 857	$ 857
			Demo conduit from rack to tie point		1 EA				7 /MH	$ 107.16	$ 750	$ 750
			Demo conduit from rack to transformer		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Demo conduit from combiners to inverter		1 EA				28 /MH	$ 107.16	$ 3,000	$ 3,000
			Remove Conduits to inverters		1 EA				2 /MH	$ 107.16	$ 214	$ 214
			Remove inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove PV panel and place in dumpster		196 EA				98 /MH	$ 107.16	$ 10,502	$ 10,502
			Remove points where panel is fixed to roof		196 EA				44 /MH	$ 107.16	$ 4,715	$ 4,715
			Remove lightning projection and other auxiliary equipment		1 EA				18 /MH	$ 107.16	$ 1,929	$ 1,929
			Remove transformer		1 LT				7 /MH	$ 107.16	$ 750	$ 750
			Demolition			***$ -***	***$ -***	***$ -***			***$ 31,366***	***$ 31,366***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.14 TN		$ (12)		/MH			$ (12)
			Steel	Service rack components	0.05 TN		$ (4)		/MH			$ (4)
			Steel	Conduit and fittings	0.05 TN		$ (4)		/MH			$ (4)
			Steel	Transformers	1.6 TN		$ (139)		/MH			$ (139)
			Steel	Roof ladder, 1@ 350 lb each	0.02 TN		$ (2)		/MH			$ (2)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	1.33 TN		$ (878)		/MH			$ (878)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.04 TN		$ (138)		/MH			$ (138)
			Copper	Wire	0.3 TN		$ (1,038)		/MH			$ (1,038)
			Copper	Transformers	0.76 TN		$ (2,630)		/MH			$ (2,630)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	1568 LB		$ (721)		/MH			$ (721)
			Conduit and fittings	100 @ 1 lb each	10.96 LB		$ (5)		/MH			$ (5)
			Scrap Value			***$ -***	***$ (5,572)***	***$ -***			***$ -***	***$ (5,572)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1 EA	$ 844			/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 1,947***	***$ -***	***$ -***			***$ -***	***$ 1,947***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	196 EA	$ 29,400			/MH		$ -	$ 29,400
			Architectual			***$ 29,400***	***$ -***	***$ -***			***$ -***	***$ 29,400***
Direct Costs												*$ 57,141*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 56,347*	*$ (5,572)*	*$ -*			*$ 31,366*	*$ 82,141*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 4,107
		91.10	Contractor's Profit									$ 6,571
												$ 10,678
Direct Costs + Construction Indirect Costs						*$ 56,347*	*$ (5,572)*	*$ -*			*$ 31,366*	*$ 92,819*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 5,569
		93.2	Construction Management Support									$ 1,856
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 11,269						$ 11,269
		95.2	Contingency on Scrap Value				$ 1,114					$ 1,114
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 6,273	$ 6,273
		95.5	Contingency on Indirect									$ 1,485
Total						**$ 67,616**	**$ (4,458)**	**$ -**			**$ 37,639**	**$ 120,387**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
32	SLD	Soledad	6465 Nancy Ridge Rd, San Diego	Roof	PV	40938	99.58000183	462

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				16 /MH	$ 117.91	$ 1,887	$ 1,887
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Disconnect wiring at inverter		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Disconnect wiring at combiner boxes, remove boxes		3 EA				37 /MH	$ 107.16	$ 3,965	$ 3,965
			Pull wire from combiners to inverter		3 EA				27 /MH	$ 107.16	$ 2,893	$ 2,893
			Disconnect and remove wiring at PV panels		462 EA				69 /MH	$ 107.16	$ 7,394	$ 7,394
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		462 EA				19 /MH	$ 107.16	$ 2,036	$ 2,036
			Demo conduit from rack to tie point		1 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Demo conduit from rack to transformer		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Demo conduit from combiners to inverter		1 EA				66 /MH	$ 107.16	$ 7,073	$ 7,073
			Remove Conduits to inverters		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Remove inverters		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove PV panel and place in dumpster		462 EA				231 /MH	$ 107.16	$ 24,754	$ 24,754
			Remove points where panel is fixed to roof		462 EA				103 /MH	$ 107.16	$ 11,037	$ 11,037
			Remove lightning projection and other auxiliary equipment		1 EA				43 /MH	$ 107.16	$ 4,608	$ 4,608
			Remove transformer		1 LT				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Demolition			***$ -***	***$ -***	***$ -***			***$ 73,898***	***$ 73,898***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.32 TN		$ (28)		/MH			$ (28)
			Steel	Service rack components	0.12 TN		$ (10)		/MH			$ (10)
			Steel	Conduit and fittings	0.13 TN		$ (11)		/MH			$ (11)
			Steel	Transformers	3.76 TN		$ (327)		/MH			$ (327)
			Steel	Roof ladder, 1@ 350 lb each	0.05 TN		$ (4)		/MH			$ (4)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	3.14 TN		$ (2,072)		/MH			$ (2,072)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.1 TN		$ (346)		/MH			$ (346)
			Copper	Wire	0.7 TN		$ (2,422)		/MH			$ (2,422)
			Copper	Transformers	1.79 TN		$ (6,193)		/MH			$ (6,193)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	3696 LB		$ (1,700)		/MH			$ (1,700)
			Conduit and fittings	100 @ 1 lb each	25.84 LB		$ (12)		/MH			$ (12)
			Scrap Value			***$ -***	***$ (13,127)***	***$ -***			***$ -***	***$ (13,127)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	3 EA	$ 2,532			/MH			$ 2,532
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 3,635***	***$ -***	***$ -***			***$ -***	***$ 3,635***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	462 EA	$ 69,300			/MH		$ -	$ 69,300
			Architectual			***$ 69,300***	***$ -***	***$ -***			***$ -***	***$ 69,300***
Direct Costs												*$ 133,706*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 97,935*	*$ (13,127)*	*$ -*			*$ 73,898*	*$ 158,706*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 7,935
		91.10	Contractor's Profit									$ 12,696
												$ 20,632
Direct Costs + Construction Indirect Costs						*$ 97,935*	*$ (13,127)*	*$ -*			*$ 73,898*	*$ 179,338*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 10,760
		93.2	Construction Management Support									$ 3,587
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 19,587						$ 19,587
		95.2	Contingency on Scrap Value				$ 2,625					$ 2,625
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 14,780	$ 14,780
		95.5	Contingency on Indirect									$ 2,869
Total						**$ 117,522**	**$ (10,502)**	**$ -**			**$ 88,678**	**$ 233,546**

Project ID	Code		Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
33	PST		Pacific Station	687 South Coast Highway 101, Encinitas	Roof	PV	41044	109	498

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				17	/MH	$ 117.91	$ 2,004	$ 2,004
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				18	/MH	$ 107.16	$ 1,929	$ 1,929
			Disconnect wiring at inverter		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Disconnect wiring at combiner boxes, remove boxes		4	EA				40	/MH	$ 107.16	$ 4,286	$ 4,286
			Pull wire from combiners to inverter		4	EA				29	/MH	$ 107.16	$ 3,108	$ 3,108
			Disconnect and remove wiring at PV panels		498	EA				75	/MH	$ 107.16	$ 8,037	$ 8,037
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		498	EA				20	/MH	$ 107.16	$ 2,143	$ 2,143
			Demo conduit from rack to tie point		1	EA				18	/MH	$ 107.16	$ 1,929	$ 1,929
			Demo conduit from rack to transformer		1	EA				13	/MH	$ 107.16	$ 1,393	$ 1,393
			Demo conduit from combiners to inverter		1	EA				71	/MH	$ 107.16	$ 7,608	$ 7,608
			Remove Conduits to inverters		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Remove inverters		1	EA				7	/MH	$ 107.16	$ 750	$ 750
			Remove PV panel and place in dumpster		498	EA				249	/MH	$ 107.16	$ 26,683	$ 26,683
			Remove points where panel is fixed to roof		498	EA				111	/MH	$ 107.16	$ 11,895	$ 11,895
			Remove lightning projection and other auxiliary equipment		1	EA				47	/MH	$ 107.16	$ 5,037	$ 5,037
			Remove transformer		1	LT				18	/MH	$ 107.16	$ 1,929	$ 1,929
			Demolition				***$ -***	***$ -***	***$ -***				***$ 79,588***	***$ 79,588***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.35	TN		$ (30)			/MH			$ (30)
			Steel	Service rack components	0.13	TN		$ (11)			/MH			$ (11)
			Steel	Conduit and fittings	0.14	TN		$ (12)			/MH			$ (12)
			Steel	Transformers	4.06	TN		$ (353)			/MH			$ (353)
			Steel	Roof ladder, 1@ 350 lb each	0.05	TN		$ (4)			/MH			$ (4)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	3.39	TN		$ (2,237)			/MH			$ (2,237)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.11	TN		$ (381)			/MH			$ (381)
			Copper	Wire	0.76	TN		$ (2,630)			/MH			$ (2,630)
			Copper	Transformers	1.93	TN		$ (6,678)			/MH			$ (6,678)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	3984	LB		$ (1,833)			/MH			$ (1,833)
			Conduit and fittings	100 @ 1 lb each	27.85	LB		$ (13)			/MH			$ (13)
			Scrap Value				***$ -***	***$ (14,182)***	***$ -***				***$ -***	***$ (14,182)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	3	EA	$ 2,532				/MH			$ 2,532
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 3,635***	***$ -***	***$ -***				***$ -***	***$ 3,635***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	498	EA	$ 74,700				/MH	$ -	$ -	$ 74,700
			Architectual				***$ 74,700***	***$ -***	***$ -***				***$ -***	***$ 74,700***
Direct Costs														*$ 143,741*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 103,335*	*$ (14,182)*	*$ -*				*$ 79,588*	*$ 168,741*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 8,437
		91.10	Contractor's Profit											$ 13,499
														$ 21,936
Direct Costs + Construction Indirect Costs							*$ 103,335*	*$ (14,182)*	*$ -*				*$ 79,588*	*$ 190,677*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 11,441
		93.2	Construction Management Support											$ 3,814
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 20,667							$ 20,667
		95.2	Contingency on Scrap Value					$ 2,836						$ 2,836
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 15,918	$ 15,918
		95.5	Contingency on Indirect											$ 3,051
Total							**$ 124,002**	**$ (11,346)**	**$ -**				**$ 95,506**	**$ 248,403**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
34	UCS	UCSD - Structural & Materials Engr	Voigt Drive and Matthews Lane	Roof	PV	41204	119.9300003	566

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				19 /MH	$ 117.91	$ 2,240	$ 2,240
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				20 /MH	$ 107.16	$ 2,143	$ 2,143
			Disconnect wiring at inverter		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Disconnect wiring at combiner boxes, remove boxes		4 EA				45 /MH	$ 107.16	$ 4,822	$ 4,822
			Pull wire from combiners to inverter		4 EA				33 /MH	$ 107.16	$ 3,536	$ 3,536
			Disconnect and remove wiring at PV panels		566 EA				85 /MH	$ 107.16	$ 9,109	$ 9,109
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		566 EA				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Demo conduit from rack to tie point		1 EA				20 /MH	$ 107.16	$ 2,143	$ 2,143
			Demo conduit from rack to transformer		1 EA				15 /MH	$ 107.16	$ 1,607	$ 1,607
			Demo conduit from combiners to inverter		1 EA				81 /MH	$ 107.16	$ 8,680	$ 8,680
			Remove Conduits to inverters		1 EA				5 /MH	$ 107.16	$ 536	$ 536
			Remove inverters		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Remove PV panel and place in dumpster		566 EA				283 /MH	$ 107.16	$ 30,326	$ 30,326
			Remove points where panel is fixed to roof		566 EA				127 /MH	$ 107.16	$ 13,609	$ 13,609
			Remove lightning projection and other auxiliary equipment		1 EA				53 /MH	$ 107.16	$ 5,679	$ 5,679
			Remove transformer		1 LT				21 /MH	$ 107.16	$ 2,250	$ 2,250
			Demolition			***$ -***	***$ -***	***$ -***			***$ 90,540***	***$ 90,540***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.4 TN		$ (35)		/MH			$ (35)
			Steel	Service rack components	0.15 TN		$ (13)		/MH			$ (13)
			Steel	Conduit and fittings	0.16 TN		$ (14)		/MH			$ (14)
			Steel	Transformers	4.61 TN		$ (401)		/MH			$ (401)
			Steel	Roof ladder, 1@ 350 lb each	0.06 TN		$ (5)		/MH			$ (5)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	3.85 TN		$ (2,541)		/MH			$ (2,541)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.13 TN		$ (450)		/MH			$ (450)
			Copper	Wire	0.86 TN		$ (2,976)		/MH			$ (2,976)
			Copper	Transformers	2.19 TN		$ (7,577)		/MH			$ (7,577)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	4528 LB		$ (2,083)		/MH			$ (2,083)
			Conduit and fittings	100 @ 1 lb each	31.66 LB		$ (15)		/MH			$ (15)
			Scrap Value			***$ -***	***$ (16,109)***	***$ -***			***$ -***	***$ (16,109)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	3 EA	$ 2,532			/MH			$ 2,532
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 3,635***	***$ -***	***$ -***			***$ -***	***$ 3,635***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	566 EA	$ 84,900			/MH		$ -	$ 84,900
			Architectual			***$ 84,900***	***$ -***	***$ -***			***$ -***	***$ 84,900***
Direct Costs												*$ 162,966*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 113,535*	*$ (16,109)*	*$ -*			*$ 90,540*	*$ 187,966*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 9,398
		91.10	Contractor's Profit									$ 15,037
												$ 24,436
Direct Costs + Construction Indirect Costs						*$ 113,535*	*$ (16,109)*	*$ -*			*$ 90,540*	*$ 212,401*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 12,744
		93.2	Construction Management Support									$ 4,248
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 22,707						$ 22,707
		95.2	Contingency on Scrap Value				$ 3,222					$ 3,222
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 18,108	$ 18,108
		95.5	Contingency on Indirect									$ 3,398
Total						**$ 136,242**	**$ (12,887)**	**$ -**			**$ 108,648**	**$ 276,829**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
36	UCM	UCSD MESOM	8880 Biological Grade, La Jolla, CA	Roof	PV/ES	41439	61.09999847	292

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Roof top												
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7 /CY				10 /MH	$ 117.91	$ 1,179	$ 1,179
		11.41.00	*Electrical Equipment*									
			Disconnect wiring and components at service rack		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Disconnect wiring at inverter		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Disconnect wiring at combiner boxes, remove boxes		2 EA				23 /MH	$ 107.16	$ 2,465	$ 2,465
			Pull wire from combiners to inverter		2 EA				17 /MH	$ 107.16	$ 1,822	$ 1,822
			Disconnect and remove wiring at PV panels		292 EA				44 /MH	$ 107.16	$ 4,715	$ 4,715
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		292 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Demo conduit from rack to tie point		1 EA				10 /MH	$ 107.16	$ 1,072	$ 1,072
			Demo conduit from rack to transformer		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Demo conduit from combiners to inverter		1 EA				42 /MH	$ 107.16	$ 4,501	$ 4,501
			Remove Conduits to inverters		1 EA				3 /MH	$ 107.16	$ 321	$ 321
			Remove inverters		1 EA				4 /MH	$ 107.16	$ 429	$ 429
			Remove PV panel and place in dumpster		292 EA				146 /MH	$ 107.16	$ 15,645	$ 15,645
			Remove points where panel is fixed to roof		292 EA				65 /MH	$ 107.16	$ 6,965	$ 6,965
			Remove lightning projection and other auxiliary equipment		1 EA				27 /MH	$ 107.16	$ 2,893	$ 2,893
			Remove transformer		1 LT				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Demolition			***$ -***	***$ -***	***$ -***			***$ 46,722***	***$ 46,722***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Steel	1 EA, inverter 402 kW	0.2 TN		$ (17)		/MH			$ (17)
			Steel	Service rack components	0.08 TN		$ (7)		/MH			$ (7)
			Steel	Conduit and fittings	0.08 TN		$ (7)		/MH			$ (7)
			Steel	Transformers	2.38 TN		$ (207)		/MH			$ (207)
			Steel	Roof ladder, 1@ 350 lb each	0.03 TN		$ (3)		/MH			$ (3)
		18.20.00	*Stainless Steel*									
			Stainless Steel	1788 Racks, 13.61 lbs each	1.99 TN		$ (1,313)		/MH			$ (1,313)
		18.30.00	*Copper*									
			Copper	1 EA, 402 kW inverter	0.07 TN		$ (242)		/MH			$ (242)
			Copper	Wire	0.44 TN		$ (1,522)		/MH			$ (1,522)
			Copper	Transformers	1.13 TN		$ (3,910)		/MH			$ (3,910)
		18.50.00	*Aluminum*									
			PV Module	1788 Modules @ 8 lbs each	2336 LB		$ (1,075)		/MH			$ (1,075)
			Conduit and fittings	100 @ 1 lb each	16.33 LB		$ (8)		/MH			$ (8)
			Scrap Value			***$ -***	***$ (8,311)***	***$ -***			***$ -***	***$ (8,311)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	2 EA	$ 1,688			/MH			$ 1,688
			Dumpster, 40 CY Capacity	Fix point rods	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	7 /CY	$ 259			/MH			$ 259
			Civil Work			***$ 2,791***	***$ -***	***$ -***			***$ -***	***$ 2,791***
	24.00.00		**Architectural**									
		24.37.00	*Roofing*									
			Roof repair at fix points	Installation	292 EA	$ 43,800			/MH		$ -	$ 43,800
			Architectual			***$ 43,800***	***$ -***	***$ -***			***$ -***	***$ 43,800***
Direct Costs												*$ 85,002*
	61.00.00		**Construction Indirect**									
		61.99.00	*Miscellaneous*									
			Downspout / Chute		1 LS	$ 25,000			/MH			$ 25,000
			Construction Indirect			***$ 25,000***	***$ -***	***$ -***			***$ -***	***$ 25,000***
Subtotal						*$ 71,591*	*$ (8,311)*	*$ -*			*$ 46,722*	*$ 110,002*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 5,500
		91.10	Contractor's Profit									$ 8,800
												$ 14,300
Direct Costs + Construction Indirect Costs						*$ 71,591*	*$ (8,311)*	*$ -*			*$ 46,722*	*$ 124,303*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 7,458
		93.2	Construction Management Support									$ 2,486
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 14,318						$ 14,318
		95.2	Contingency on Scrap Value				$ 1,662					$ 1,662
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 9,344	$ 9,344
		95.5	Contingency on Indirect									$ 1,989
Total						**$ 85,909**	**$ (6,649)**	**$ -**			**$ 56,067**	**$ 161,560**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
37	SAP	Suites at Paseo	5565 Lindo Paseo, San Diego, CA	Roof	PV/ES	41445	36.59999847	150

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				5	/MH	$ 117.91	$ 590	$ 590
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				5	/MH	$ 107.16	$ 536	$ 536
			Disconnect wiring at inverter		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Disconnect wiring at combiner boxes, remove boxes		1	EA				12	/MH	$ 107.16	$ 1,286	$ 1,286
			Pull wire from combiners to inverter		1	EA				9	/MH	$ 107.16	$ 964	$ 964
			Disconnect and remove wiring at PV panels		150	EA				22	/MH	$ 107.16	$ 2,358	$ 2,358
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		150	EA				6	/MH	$ 107.16	$ 643	$ 643
			Demo conduit from rack to tie point		1	EA				5	/MH	$ 107.16	$ 536	$ 536
			Demo conduit from rack to transformer		1	EA				4	/MH	$ 107.16	$ 429	$ 429
			Demo conduit from combiners to inverter		1	EA				21	/MH	$ 107.16	$ 2,250	$ 2,250
			Remove Conduits to inverters		1	EA				1	/MH	$ 107.16	$ 107	$ 107
			Remove inverters		1	EA				2	/MH	$ 107.16	$ 214	$ 214
			Remove PV panel and place in dumpster		150	EA				75	/MH	$ 107.16	$ 8,037	$ 8,037
			Remove points where panel is fixed to roof		150	EA				34	/MH	$ 107.16	$ 3,643	$ 3,643
			Remove lightning projection and other auxiliary equipment		1	EA				14	/MH	$ 107.16	$ 1,500	$ 1,500
			Remove transformer		1	LT				5	/MH	$ 107.16	$ 536	$ 536
			Demolition				***$ -***	***$ -***	***$ -***				***$ 23,736***	***$ 23,736***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.1	TN		$ (9)			/MH			$ (9)
			Steel	Service rack components	0.04	TN		$ (3)			/MH			$ (3)
			Steel	Conduit and fittings	0.04	TN		$ (3)			/MH			$ (3)
			Steel	Transformers	1.22	TN		$ (106)			/MH			$ (106)
			Steel	Roof ladder, 1@ 350 lb each	0.02	TN		$ (2)			/MH			$ (2)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	1.02	TN		$ (673)			/MH			$ (673)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.03	TN		$ (104)			/MH			$ (104)
			Copper	Wire	0.23	TN		$ (796)			/MH			$ (796)
			Copper	Transformers	0.58	TN		$ (2,007)			/MH			$ (2,007)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	1200	LB		$ (552)			/MH			$ (552)
			Conduit and fittings	100 @ 1 lb each	8.39	LB		$ (4)			/MH			$ (4)
			Scrap Value				***$ -***	***$ (4,259)***	***$ -***				***$ -***	***$ (4,259)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	1	EA	$ 844				/MH			$ 844
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 1,947***	***$ -***	***$ -***				***$ -***	***$ 1,947***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	150	EA	$ 22,500				/MH		$ -	$ 22,500
			Architectual				***$ 22,500***	***$ -***	***$ -***				***$ -***	***$ 22,500***
Direct Costs														*$ 43,924*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 49,447*	*$ (4,259)*	*$ -*				*$ 23,736*	*$ 68,924*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 3,446
		91.10	Contractor's Profit											$ 5,514
														$ 8,960
Direct Costs + Construction Indirect Costs							*$ 49,447*	*$ (4,259)*	*$ -*				*$ 23,736*	*$ 77,884*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 4,673
		93.2	Construction Management Support											$ 1,558
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 9,889							$ 9,889
		95.2	Contingency on Scrap Value					$ 852						$ 852
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 4,747	$ 4,747
		95.5	Contingency on Indirect											$ 1,246
Total							**$ 59,336**	**$ (3,407)**	**$ -**				**$ 28,483**	**$ 100,850**

Project ID	Code	Customer	Address	PV Location	Tech.	Date Energized	Facility Nameplate (kW)	Panel Qty
38	DLA	Del Lago Academy	1740 Scenic Trail Way, Escondido, CA	Roof	PV/ES	41628	172.8000031	750

Area	Group	Phase	Description	Notes	Quantity		Subcontract Cost	Scrap Value	Material Cost	Man Hours		Crew Rate	Labor Cost	Total Cost
Roof top														
	11.00.00		**Demolition**											
		11.22.00	*Concrete*											
			Concrete	Electrical equipment (Transformer, inverter, etc.) pad	7	/CY				25	/MH	$ 117.91	$ 2,948	$ 2,948
		11.41.00	*Electrical Equipment*											
			Disconnect wiring and components at service rack		1	EA				27	/MH	$ 107.16	$ 2,893	$ 2,893
			Disconnect wiring at inverter		1	EA				7	/MH	$ 107.16	$ 750	$ 750
			Disconnect wiring at combiner boxes, remove boxes		5	EA				60	/MH	$ 107.16	$ 6,430	$ 6,430
			Pull wire from combiners to inverter		5	EA				44	/MH	$ 107.16	$ 4,715	$ 4,715
			Disconnect and remove wiring at PV panels		750	EA				112	/MH	$ 107.16	$ 12,002	$ 12,002
			Disconnect and remove grounding at PV panels and racks, Remove ground rods		750	EA				30	/MH	$ 107.16	$ 3,215	$ 3,215
			Demo conduit from rack to tie point		1	EA				27	/MH	$ 107.16	$ 2,893	$ 2,893
			Demo conduit from rack to transformer		1	EA				20	/MH	$ 107.16	$ 2,143	$ 2,143
			Demo conduit from combiners to inverter		1	EA				107	/MH	$ 107.16	$ 11,466	$ 11,466
			Remove Conduits to inverters		1	EA				7	/MH	$ 107.16	$ 750	$ 750
			Remove inverters		1	EA				10	/MH	$ 107.16	$ 1,072	$ 1,072
			Remove PV panel and place in dumpster		750	EA				375	/MH	$ 107.16	$ 40,185	$ 40,185
			Remove points where panel is fixed to roof		750	EA				168	/MH	$ 107.16	$ 18,003	$ 18,003
			Remove lightning projection and other auxiliary equipment		1	EA				70	/MH	$ 107.16	$ 7,501	$ 7,501
			Remove transformer		1	LT				27	/MH	$ 107.16	$ 2,893	$ 2,893
			Demolition				***$ -***	***$ -***	***$ -***				***$ 119,859***	***$ 119,859***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Steel	1 EA, inverter 402 kW	0.52	TN		$ (45)			/MH			$ (45)
			Steel	Service rack components	0.2	TN		$ (17)			/MH			$ (17)
			Steel	Conduit and fittings	0.21	TN		$ (18)			/MH			$ (18)
			Steel	Transformers	6.11	TN		$ (532)			/MH			$ (532)
			Steel	Roof ladder, 1@ 350 lb each	0.08	TN		$ (7)			/MH			$ (7)
		18.20.00	*Stainless Steel*											
			Stainless Steel	1788 Racks, 13.61 lbs each	5.1	TN		$ (3,366)			/MH			$ (3,366)
		18.30.00	*Copper*											
			Copper	1 EA, 402 kW inverter	0.17	TN		$ (588)			/MH			$ (588)
			Copper	Wire	1.14	TN		$ (3,944)			/MH			$ (3,944)
			Copper	Transformers	2.9	TN		$ (10,034)			/MH			$ (10,034)
		18.50.00	*Aluminum*											
			PV Module	1788 Modules @ 8 lbs each	6000	LB		$ (2,760)			/MH			$ (2,760)
			Conduit and fittings	100 @ 1 lb each	41.95	LB		$ (19)			/MH			$ (19)
			Scrap Value				***$ -***	***$ (21,331)***	***$ -***				***$ -***	***$ (21,331)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	For concrete, PV panels, rubbish	4	EA	$ 3,376				/MH			$ 3,376
			Dumpster, 40 CY Capacity	Fix point rods	1	EA	$ 844				/MH			$ 844
		21.20.00	*Backfill*											
			Foundation backfill, imported material fill	Backfill concrete pads	7	/CY	$ 259				/MH			$ 259
			Civil Work				***$ 4,479***	***$ -***	***$ -***				***$ -***	***$ 4,479***
	24.00.00		**Architectural**											
		24.37.00	*Roofing*											
			Roof repair at fix points	Installation	750	EA	$ 112,500				/MH	$ -	$ -	$ 112,500
			Architectual				***$ 112,500***	***$ -***	***$ -***				***$ -***	***$ 112,500***
Direct Costs														*$ 215,507*
	61.00.00		**Construction Indirect**											
		61.99.00	*Miscellaneous*											
			Downspout / Chute		1	LS	$ 25,000				/MH			$ 25,000
			Construction Indirect				***$ 25,000***	***$ -***	***$ -***				***$ -***	***$ 25,000***
Subtotal							*$ 141,979*	*$ (21,331)*	*$ -*				*$ 119,859*	*$ 240,507*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense											$ 12,025
		91.10	Contractor's Profit											$ 19,241
														$ 31,266
Direct Costs + Construction Indirect Costs							*$ 141,979*	*$ (21,331)*	*$ -*				*$ 119,859*	*$ 271,773*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services											$ 16,306
		93.2	Construction Management Support											$ 5,435
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 28,396							$ 28,396
		95.2	Contingency on Scrap Value					$ 4,266						$ 4,266
		95.3	Contingency on Material						$ -					$ -
		95.4	Contingency on Labor										$ 23,972	$ 23,972
		95.5	Contingency on Indirect											$ 4,348
Total							**$ 170,375**	**$ (17,065)**	**$ -**				**$ 143,831**	**$ 354,497**

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Utility Scale - Pala Project

Item	Removal Costs	Scrap Value
Solar modules	$ 53,872	$ (16,161)
Racking	$ 125,606	$ (100,484)
Inverter	$ 5,000	$ (5,750)
Switchgear	$ 2,500	$ -
Foundations/Stuctural	$ 2,500	$ -
Electrical Infrastructure	$ 119,819	$ (71,891)
Earthwork/Reconturing	$ 9,000	$ -
Revegatation	$ 14,000	$ -
Project Management	$ 27,000	$ -
Total	$ 359,297	$ (194,286)

Total **$ 165,011**

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Sites

	Customer	Location	Includes Contingency: Subcontract Cost	Scrap Value	Material Cost	Labor Cost	G&A & Profit	Engineering, Procurement, & Project Services; Construction Management Support	Contingency on Indirect	Total Cost
Roof Top PV Sites										
1	TKG Engineering (EXP)	Roof	$ 79,856	$ (6,004)	$ -	$ 50,653	$ 13,163	$ 9,153	$ 1,831	$ 148,652
2	Reuben H Fleet (Science Center)	Roof	$ 158,495	$ (15,569)	$ -	$ 131,203	$ 28,854	$ 20,065	$ 4,013	$ 327,061
3	Ladera Ranch 999	Roof	$ 94,909	$ (7,785)	$ -	$ 65,467	$ 16,109	$ 11,202	$ 2,240	$ 182,142
4	Hunter Industries	Roof	$ 143,802	$ (13,829)	$ -	$ 116,377	$ 25,939	$ 18,037	$ 3,607	$ 293,933
5	The Towers at Bressi Ranch	Roof	$ 120,762	$ (10,941)	$ -	$ 91,764	$ 21,246	$ 14,774	$ 2,955	$ 240,560
6	Del Sur Elementary	Roof	$ 75,536	$ (5,468)	$ -	$ 46,139	$ 12,293	$ 8,548	$ 1,710	$ 138,759
7	Ladera Ranch 555	Roof	$ 90,049	$ (7,171)	$ -	$ 60,323	$ 15,125	$ 10,518	$ 2,104	$ 170,947
8	Innovative Oil and Gas/Hamann Companies	Roof	$ 379,424	$ (42,632)	$ -	$ 359,327	$ 73,104	$ 50,835	$ 10,167	$ 830,226
9	High Tech High Chula Vista	Roof	$ 150,575	$ (14,560)	$ -	$ 122,819	$ 27,252	$ 18,950	$ 3,790	$ 308,826
10	Hanna Gabriel Wells	Roof	$ 46,444	$ (1,934)	$ -	$ 16,241	$ 6,477	$ 4,504	$ 901	$ 72,632
11	San Diego CC Skills Center	Roof	$ 98,149	$ (8,190)	$ -	$ 69,209	$ 16,800	$ 11,682	$ 2,336	$ 189,987
13	Burnham Institute	Roof	$ 187,588	$ (19,129)	$ -	$ 161,358	$ 34,694	$ 24,126	$ 4,825	$ 393,461
14	La Maestra	Roof	$ 53,396	$ (2,673)	$ -	$ 22,555	$ 7,794	$ 5,420	$ 1,084	$ 87,576
15	Grossmont Trolley (Altera)	Roof	$ 99,589	$ (8,357)	$ -	$ 70,366	$ 17,054	$ 11,859	$ 2,372	$ 192,883
16	Thomas Jefferson School of Law	Roof	$ 76,796	$ (5,657)	$ -	$ 47,296	$ 12,524	$ 8,709	$ 1,742	$ 141,411
17	Port of San Diego	Roof	$ 60,416	$ (3,533)	$ -	$ 29,769	$ 9,196	$ 6,395	$ 1,279	$ 103,522
18	Wilco	Roof	$ 427,530	$ (48,465)	$ -	$ 408,295	$ 82,672	$ 57,489	$ 11,498	$ 939,019
19	Amylin Pharmaceuticals	Roof	$ 236,120	$ (25,129)	$ -	$ 211,883	$ 44,450	$ 30,910	$ 6,182	$ 504,416
22	High Tech High North County	Roof	$ 93,829	$ (7,658)	$ -	$ 64,566	$ 15,915	$ 11,067	$ 2,213	$ 179,933
23	Urban Corps	Roof	$ 53,396	$ (2,673)	$ -	$ 22,555	$ 7,794	$ 5,420	$ 1,084	$ 87,576
24	Pacific Ridge School	Roof	$ 50,696	$ (2,312)	$ -	$ 19,713	$ 7,252	$ 5,043	$ 1,009	$ 81,401
25	Sanford Burnham Medical Research	Roof	$ 163,535	$ (16,214)	$ -	$ 136,489	$ 29,868	$ 20,770	$ 4,154	$ 338,600
26	High Tech High CV K-8	Roof	$ 151,295	$ (14,640)	$ -	$ 123,732	$ 27,416	$ 19,064	$ 3,813	$ 310,680
27	Campus Pointe	Roof	$ 260,173	$ (28,050)	$ -	$ 236,624	$ 49,262	$ 34,256	$ 6,851	$ 559,116
28	CSU San Marcos	Roof	$ 64,736	$ (4,098)	$ -	$ 34,411	$ 10,075	$ 7,006	$ 1,401	$ 113,532
29	EIC roof top	Roof	$ 74,456	$ (5,342)	$ -	$ 44,853	$ 12,057	$ 8,384	$ 1,677	$ 136,087
31	UCSD - CDK Apartments	Roof	$ 67,616	$ (4,458)	$ -	$ 37,639	$ 10,678	$ 7,426	$ 1,485	$ 120,387
32	Soledad	Roof	$ 117,522	$ (10,502)	$ -	$ 88,678	$ 20,632	$ 14,347	$ 2,869	$ 233,546
33	Pacific Station	Roof	$ 124,002	$ (11,346)	$ -	$ 95,506	$ 21,936	$ 15,254	$ 3,051	$ 248,403
34	UCSD - Structural & Materials Engr	Roof	$ 136,242	$ (12,887)	$ -	$ 108,648	$ 24,436	$ 16,992	$ 3,398	$ 276,829
36	UCSD MESOM	Roof	$ 85,909	$ (6,649)	$ -	$ 56,067	$ 14,300	$ 9,944	$ 1,989	$ 161,560
37	Suites at Paseo	Roof	$ 59,336	$ (3,407)	$ -	$ 28,483	$ 8,960	$ 6,231	$ 1,246	$ 100,850
38	Del Lago Academy	Roof	$ 170,375	$ (17,065)	$ -	$ 143,831	$ 31,266	$ 21,742	$ 4,348	$ 354,497
Subtotal - Roof										***$ 8,569,013***
Canopy PV Sites										
12	Sony Parking Structure	Carport - Canopy	$ 10,972	$ (53,088)	$ -	$ 186,418	$ 12,757	$ 7,851	$ 1,570	**$ 166,479**
20	County Operations Center Parking Structure A	Carport - Canopy	$ 23,178	$ (118,321)	$ -	$ 411,620	$ 27,876	$ 17,154	$ 3,431	**$ 364,939**
30	EIC solar trees	Carport - Free standing - Multiaxis	$ 3,305	$ (17,533)	$ -	$ 63,297	$ 4,366	$ 2,687	$ 537	**$ 56,659**
35	Sharp Rees Stealy Wellness Center	Carport - Canopy	$ 4,362	$ (20,407)	$ -	$ 73,495	$ 5,118	$ 3,150	$ 630	**$ 66,348**
39	San Diego Zoo	Carport - Canopy	$ 5,464	$ (25,727)	$ -	$ 91,563	$ 6,331	$ 3,896	$ 779	**$ 82,305**
40	Caltrans Fast EV Suncharge Del Lago	Carport - Canopy	$ 1,102	$ (3,660)	$ -	$ 15,806	$ 1,237	$ 761	$ 152	**$ 15,398**
41	Agua Hedionda Lagoon Foundation	Carport - Canopy	$ 1,057	$ (1,473)	$ -	$ 8,797	$ 828	$ 510	$ 102	**$ 9,821**
42	Civita Westpark Apartments	Carport	$ 4,406	$ (21,560)	$ -	$ 77,726	$ 5,394	$ 3,319	$ 664	**$ 69,950**
Subtotal - Canopy										***$ 831,898***

Subtotal - Canopy ***$ 831,898***

Site Name	*Solar Modules*	*Racking*	*Inverters*	*Switchgear*	*Foundations / Structural*	*Electrical Infrastructure*	*Earthwork / Recontouring*	*Revegetation*	*Project Management*	*Total Cost*
Utility Scale PV Sites										
PV Utility Scale - Ramona Project										
Removal Costs	$ 116,494	$ 214,448	$ 10,000	$ 2,500	$ 5,000	$ 178,789	$ 18,000	$ 22,000	$ 59,400	$ 626,631
Salvage Costs	$ (34,948)	$ (171,558)	$ (11,500)	$ -	$ -	$ (107,273)	$ -	$ -	$ -	$ (325,279)
										$ 301,352
PV Utility Scale - Pala Project										
Removal Costs	$ 53,872	$ 125,606	$ 5,000	$ 2,500	$ 2,500	$ 119,819	$ 9,000	$ 14,000	$ 27,000	$ 359,297
Salvage Costs	$ (16,161)	$ (100,484)	$ (5,750)	$ -	$ -	$ (71,891)	$ -	$ -	$ -	$ (194,286)
										$ 165,011
Subtotal										***$ 466,363***
TOTAL										**$ 9,867,274**

Appendix B

Conceptual Estimate of Cost — FERC Accounts

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Sites - Canopy Mounted FERC

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
1	TKG Engineering (EXP)	Roof	40.7	264

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	53,809
347	**ASSET RETIREMENT COST**	$	20,345
348	**OTHER PRODUCTION - GENERATION**	$	82,904
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	6,673
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	2,748
	TOTAL PROJECT COST	*$*	*166,479*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
20	County Operations Center Parking Structure A	Carport - Canopy	358.7	1932

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	115,442
347	**ASSET RETIREMENT COST**	$	44,899
348	**OTHER PRODUCTION - GENERATION**	$	184,013
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	14,581
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	6,004
	TOTAL PROJECT COST	*$*	*364,939*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
30	EIC solar trees	Carport - Free standing - Multiaxis	59.4	286

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	19,315
347	**ASSET RETIREMENT COST**	$	6,839
348	**OTHER PRODUCTION - GENERATION**	$	27,281
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	2,284
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	940
	TOTAL PROJECT COST	*$*	*56,659*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
35	Sharp Rees Stealy Wellness Center	Carport - Canopy	74.3	333

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	22,502
347	**ASSET RETIREMENT COST**	$	7,991
348	**OTHER PRODUCTION - GENERATION**	$	32,074
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	2,677
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	1,102
	TOTAL PROJECT COST	*$*	*66,348*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
39	San Diego Zoo	Carport - Canopy	88.4	420

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	27,641
347	**ASSET RETIREMENT COST**	$	9,978
348	**OTHER PRODUCTION - GENERATION**	$	40,012
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	3,311
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	1,364
	TOTAL PROJECT COST	*$*	*82,305*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
40	Caltrans Fast EV Suncharge Del Lago	Carport - Canopy	13.1	60

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	6,709
347	**ASSET RETIREMENT COST**	$	1,731
348	**OTHER PRODUCTION - GENERATION**	$	6,044
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	647
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	266
	TOTAL PROJECT COST	*$*	*15,398*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
41	Agua Hedionda Lagoon Foundation	Carport - Canopy	5.3	24

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	5,643
347	**ASSET RETIREMENT COST**	$	983
348	**OTHER PRODUCTION - GENERATION**	$	2,583
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	433
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	178
	TOTAL PROJECT COST	*$*	*9,821*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
42	Civita Westpark Apartments	Carport	87.0	352

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	23,866
347	**ASSET RETIREMENT COST**	$	8,454
348	**OTHER PRODUCTION - GENERATION**	$	33,646
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	2,822
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	1,162
	TOTAL PROJECT COST	*$*	*69,950*

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Utility Scale - Ramona Project - FERC

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 5,000
347	**ASSET RETIREMENT COST**	$ 40,000
348	**OTHER PRODUCTION - GENERATION**	$ 196,952
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ -
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 59,400
	TOTAL PROJECT COST	*$ 301,352*

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Sites - Roof Mounted - FERC

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
1	TKG Engineering (EXP)	Roof	40.7	264

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	13,956
347	**ASSET RETIREMENT COST**	$	76,738
348	**OTHER PRODUCTION - GENERATION**	$	46,974
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	7,780
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,204
	TOTAL PROJECT COST	*$*	*148,652*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty	
2	Reuben H Fleet (Science Center)	Roof	100.1	684	
FERC ACCT.				**TOTAL**	
341	**STRUCTURES AND IMPROVEMENTS**			$	31,119
347	**ASSET RETIREMENT COST**			$	154,610
348	**OTHER PRODUCTION - GENERATION**			$	117,254
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**			$	17,055
I2	**CONSTRUCTION MANAGEMENT SUPPORT**			$	7,023
	TOTAL PROJECT COST			*$*	*327,061*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
3	Ladera Ranch 999	Roof	50.1	342

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	17,476
347	**ASSET RETIREMENT COST**	$	91,228
348	**OTHER PRODUCTION - GENERATION**	$	59,996
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	9,522
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,921
	TOTAL PROJECT COST	*$*	*182,142*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
4	Hunter Industries	Roof	101.8	608

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	27,509
347	**ASSET RETIREMENT COST**	$	140,453
348	**OTHER PRODUCTION - GENERATION**	$	104,327
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	15,332
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	6,313
	TOTAL PROJECT COST	*$*	*293,933*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
5	The Towers at Bressi Ranch	Roof	80.4	480

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	23,160
347	**ASSET RETIREMENT COST**	$	116,801
348	**OTHER PRODUCTION - GENERATION**	$	82,871
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	12,558
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	5,171
	TOTAL PROJECT COST	*$*	*240,560*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
6	Del Sur Elementary	Roof	42.4	240

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	13,126
347	**ASSET RETIREMENT COST**	$	72,313
348	**OTHER PRODUCTION - GENERATION**	$	43,062
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	7,266
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	2,992
	TOTAL PROJECT COST	*$*	*138,759*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
7	Ladera Ranch 555	Roof	49.2	315

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	16,666
347	**ASSET RETIREMENT COST**	$	86,243
348	**OTHER PRODUCTION - GENERATION**	$	55,416
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	8,940
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,681
	TOTAL PROJECT COST	*$*	*170,947*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
8	Innovative Oil and Gas/Hamann Companies	Roof	504.0	1872

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	78,353
347	**ASSET RETIREMENT COST**	$	374,762
348	**OTHER PRODUCTION - GENERATION**	$	316,108
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	43,210
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	17,792
	TOTAL PROJECT COST	*$*	*830,226*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
9	High Tech High Chula Vista	Roof	101.0	640

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	29,558
347	**ASSET RETIREMENT COST**	$	146,486
348	**OTHER PRODUCTION - GENERATION**	$	110,042
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	16,108
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	6,633
	TOTAL PROJECT COST	*$*	*308,826*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
10	Hanna Gabriel Wells	Roof	16.3	84

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	6,882
347	**ASSET RETIREMENT COST**	$	43,403
348	**OTHER PRODUCTION - GENERATION**	$	16,943
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	3,828
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	1,576
	TOTAL PROJECT COST	*$*	*72,632*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
11	San Diego CC Skills Center	Roof	56.9	360

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	18,165
347	**ASSET RETIREMENT COST**	$	94,580
348	**OTHER PRODUCTION - GENERATION**	$	63,223
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	9,930
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	4,089
	TOTAL PROJECT COST	*$*	*189,987*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
13	Burnham Institute	Roof	226.4	840

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	37,387
347	**ASSET RETIREMENT COST**	$	183,545
348	**OTHER PRODUCTION - GENERATION**	$	143,579
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	20,507
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	8,444
	TOTAL PROJECT COST	*$*	*393,461*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
14	La Maestra	Roof	20.7	117

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	8,930
347	**ASSET RETIREMENT COST**	$	49,590
348	**OTHER PRODUCTION - GENERATION**	$	22,553
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	4,607
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	1,897
	TOTAL PROJECT COST	*$*	*87,576*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
15	Grossmont Trolley (Altera)	Roof	64.7	368

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	18,375
347	**ASSET RETIREMENT COST**	$	96,023
348	**OTHER PRODUCTION - GENERATION**	$	64,254
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	10,080
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	4,151
	TOTAL PROJECT COST	*$*	*192,883*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
16	Thomas Jefferson School of Law	Roof	49.9	247

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	13,320
347	**ASSET RETIREMENT COST**	$	73,590
348	**OTHER PRODUCTION - GENERATION**	$	44,050
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	7,403
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,048
	TOTAL PROJECT COST	*$*	*141,411*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
17	Port of San Diego	Roof	30.0	156

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	10,205
347	**ASSET RETIREMENT COST**	$	56,770
348	**OTHER PRODUCTION - GENERATION**	$	28,873
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	5,436
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	2,238
	TOTAL PROJECT COST	*$*	*103,522*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
18	Wilco	Roof	384.3	2128

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	88,902
347	**ASSET RETIREMENT COST**	$	422,231
348	**OTHER PRODUCTION - GENERATION**	$	358,899
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	48,866
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	20,121
	TOTAL PROJECT COST	*$*	*939,019*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
19	Amylin Pharmaceuticals	Roof	200.4	1104

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	47,363
347	**ASSET RETIREMENT COST**	$	232,400
348	**OTHER PRODUCTION - GENERATION**	$	187,561
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	26,273
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	10,818
	TOTAL PROJECT COST	*$*	*504,416*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
22	High Tech High North County	Roof	70.2	336

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	17,317
347	**ASSET RETIREMENT COST**	$	90,143
348	**OTHER PRODUCTION - GENERATION**	$	59,193
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	9,407
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,873
	TOTAL PROJECT COST	*$*	*179,933*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
23	Urban Corps	Roof	22.8	117

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	8,930
347	**ASSET RETIREMENT COST**	$	49,590
348	**OTHER PRODUCTION - GENERATION**	$	22,553
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	4,607
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	1,897
	TOTAL PROJECT COST	*$*	*87,576*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
24	Pacific Ridge School	Roof	20.9	102

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	8,366.11
347	**ASSET RETIREMENT COST**	$	46,822
348	**OTHER PRODUCTION - GENERATION**	$	20,162
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	4,287
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	1,765
	TOTAL PROJECT COST	*$*	*81,401*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
25	Sanford Burnham Medical Research	Roof	200.2	712

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	32,077
347	**ASSET RETIREMENT COST**	$	159,775
348	**OTHER PRODUCTION - GENERATION**	$	121,825
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	17,654
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	7,269
	TOTAL PROJECT COST	*$*	*338,600*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
26	High Tech High CV K-8	Roof	130.1	644

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	29,815
347	**ASSET RETIREMENT COST**	$	147,238
348	**OTHER PRODUCTION - GENERATION**	$	110,750
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	16,205
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	6,673
	TOTAL PROJECT COST	*$*	*310,680*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
27	Campus Pointe	Roof	257.4	1232

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	52,655
347	**ASSET RETIREMENT COST**	$	256,158
348	**OTHER PRODUCTION - GENERATION**	$	209,196
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	29,117
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	11,990
	TOTAL PROJECT COST	*$*	*559,116*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
28	CSU San Marcos	Roof	37.1	180

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	11,049
347	**ASSET RETIREMENT COST**	$	61,208
348	**OTHER PRODUCTION - GENERATION**	$	32,867
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	5,955
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	2,452
	TOTAL PROJECT COST	*$*	*113,532*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
29	EIC roof top	Roof	47.3	234

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	12,932
347	**ASSET RETIREMENT COST**	$	71,193
348	**OTHER PRODUCTION - GENERATION**	$	41,901
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	7,127
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	2,935
	TOTAL PROJECT COST	*$*	*136,087*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
31	UCSD - CDK Apartments	Roof	40.7	196

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	11,671
347	**ASSET RETIREMENT COST**	$	64,178
348	**OTHER PRODUCTION - GENERATION**	$	35,627
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	6,312
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	2,599
	TOTAL PROJECT COST	*$*	*120,387*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
32	Soledad	Roof	99.6	462

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	22,653
347	**ASSET RETIREMENT COST**	$	113,508
348	**OTHER PRODUCTION - GENERATION**	$	80,169
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	12,195
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	5,021
	TOTAL PROJECT COST	*$*	*233,546*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
33	Pacific Station	Roof	109.0	498

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	23,850
347	**ASSET RETIREMENT COST**	$	120,152
348	**OTHER PRODUCTION - GENERATION**	$	86,096
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	12,966
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	5,339
	TOTAL PROJECT COST	*$*	*248,403*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
34	UCSD - Structural & Materials Engr	Roof	119.9	566

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	26,153
347	**ASSET RETIREMENT COST**	$	132,724
348	**OTHER PRODUCTION - GENERATION**	$	97,561
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	14,443
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	5,947
	TOTAL PROJECT COST	*$*	*276,829*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
36	UCSD MESOM	Roof	61.1	292

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	15,862
347	**ASSET RETIREMENT COST**	$	82,008
348	**OTHER PRODUCTION - GENERATION**	$	51,757
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	8,453
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,480
	TOTAL PROJECT COST	*$*	*161,560*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
37	Suites at Paseo	Roof	36.6	150

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	10,011
347	**ASSET RETIREMENT COST**	$	55,650
348	**OTHER PRODUCTION - GENERATION**	$	27,712
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	5,296
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	2,181
	TOTAL PROJECT COST	*$*	*100,850*

Project ID	Customer	PV Location	Facility Nameplate (kW)	Panel Qty
38	Del Lago Academy	Roof	172.8	750

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	33,354
347	**ASSET RETIREMENT COST**	$	166,800
348	**OTHER PRODUCTION - GENERATION**	$	128,253
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	18,481
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	7,610
	TOTAL PROJECT COST	*$*	*354,497*

San Diego Gas & Electric
Decommissioning Cost Estimates
PV Utility Scale - Ramona Project - FERC

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 2,500
347	**ASSET RETIREMENT COST**	$ 23,000
348	**OTHER PRODUCTION - GENERATION**	$ 112,511
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ -
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 27,000
	TOTAL PROJECT COST	*$ 165,011*

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS Sites - FERC

	Customer	*Location*	*341 - STRUCTURES AND IMPROVEMENTS*	*347 - ASSET RETIREMENT COST*	*348 - OTHER PRODUCTION - GENERATION*	*I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES*	*I2 - CONSTRUCTION MANAGEMENT SUPPORT*	***TOTAL PROJECT COST***
Roof Top PV Sites								
1	TKG Engineering (EXP)	Roof	$ 13,956	$ 76,738	$ 46,974	$ 7,780	$ 3,204	$ 148,652
2	Reuben H Fleet (Science Center)	Roof	$ 31,119	$ 154,610	$ 117,254	$ 17,055	$ 7,023	$ 327,061
3	Ladera Ranch 999	Roof	$ 17,476	$ 91,228	$ 59,996	$ 9,522	$ 3,921	$ 182,142
4	Hunter Industries	Roof	$ 27,509	$ 140,453	$ 104,327	$ 15,332	$ 6,313	$ 293,933
5	The Towers at Bressi Ranch	Roof	$ 23,160	$ 116,801	$ 82,871	$ 12,558	$ 5,171	$ 240,560
6	Del Sur Elementary	Roof	$ 13,126	$ 72,313	$ 43,062	$ 7,266	$ 2,992	$ 138,759
7	Ladera Ranch 555	Roof	$ 16,666	$ 86,243	$ 55,416	$ 8,940	$ 3,681	$ 170,947
8	Innovative Oil and Gas/Hamann Companies	Roof	$ 78,353	$ 374,762	$ 316,108	$ 43,210	$ 17,792	$ 830,226
9	High Tech High Chula Vista	Roof	$ 29,558	$ 146,486	$ 110,042	$ 16,108	$ 6,633	$ 308,826
10	Hanna Gabriel Wells	Roof	$ 6,882	$ 43,403	$ 16,943	$ 3,828	$ 1,576	$ 72,632
11	San Diego CC Skills Center	Roof	$ 18,165	$ 94,580	$ 63,223	$ 9,930	$ 4,089	$ 189,987
13	Burnham Institute	Roof	$ 37,387	$ 183,545	$ 143,579	$ 20,507	$ 8,444	$ 393,461
14	La Maestra	Roof	$ 8,930	$ 49,590	$ 22,553	$ 4,607	$ 1,897	$ 87,576
15	Grossmont Trolley (Altera)	Roof	$ 18,375	$ 96,023	$ 64,254	$ 10,080	$ 4,151	$ 192,883
16	Thomas Jefferson School of Law	Roof	$ 13,320	$ 73,590	$ 44,050	$ 7,403	$ 3,048	$ 141,411
17	Port of San Diego	Roof	$ 10,205	$ 56,770	$ 28,873	$ 5,436	$ 2,238	$ 103,522
18	Wilco	Roof	$ 88,902	$ 422,231	$ 358,899	$ 48,866	$ 20,121	$ 939,019
19	Amylin Pharmaceuticals	Roof	$ 47,363	$ 232,400	$ 187,561	$ 26,273	$ 10,818	$ 504,416
22	High Tech High North County	Roof	$ 17,317	$ 90,143	$ 59,193	$ 9,407	$ 3,873	$ 179,933
23	Urban Corps	Roof	$ 8,930	$ 49,590	$ 22,553	$ 4,607	$ 1,897	$ 87,576
24	Pacific Ridge School	Roof	$ 8,366	$ 46,822	$ 20,162	$ 4,287	$ 1,765	$ 81,401
25	Sanford Burnham Medical Research	Roof	$ 32,077	$ 159,775	$ 121,825	$ 17,654	$ 7,269	$ 338,600
26	High Tech High CV K-8	Roof	$ 29,815	$ 147,238	$ 110,750	$ 16,205	$ 6,673	$ 310,680
27	Campus Pointe	Roof	$ 52,655	$ 256,158	$ 209,196	$ 29,117	$ 11,990	$ 559,116
28	CSU San Marcos	Roof	$ 11,049	$ 61,208	$ 32,867	$ 5,955	$ 2,452	$ 113,532
29	EIC roof top	Roof	$ 12,932	$ 71,193	$ 41,901	$ 7,127	$ 2,935	$ 136,087
31	UCSD - CDK Apartments	Roof	$ 11,671	$ 64,178	$ 35,627	$ 6,312	$ 2,599	$ 120,387
32	Soledad	Roof	$ 22,653	$ 113,508	$ 80,169	$ 12,195	$ 5,021	$ 233,546
33	Pacific Station	Roof	$ 23,850	$ 120,152	$ 86,096	$ 12,966	$ 5,339	$ 248,403
34	UCSD - Structural & Materials Engr	Roof	$ 26,153	$ 132,724	$ 97,561	$ 14,443	$ 5,947	$ 276,829
36	UCSD MESOM	Roof	$ 15,862	$ 82,008	$ 51,757	$ 8,453	$ 3,480	$ 161,560
37	Suites at Paseo	Roof	$ 10,011	$ 55,650	$ 27,712	$ 5,296	$ 2,181	$ 100,850
38	Del Lago Academy	Roof	$ 33,354	$ 166,800	$ 128,253	$ 18,481	$ 7,610	$ 354,497
Subtotal - Roof			*$ 817,148*	*$ 4,128,913*	*$ 2,991,606*	*$ 447,203*	*$ 184,143*	*$ 8,569,013*
Canopy PV Sites								
12	Sony Parking Structure	Carport - Canopy	$ 53,809	$ 20,345	$ 82,904	$ 6,673	$ 2,748	$ 166,479
20	County Operations Center Parking Structure A	Carport - Canopy	$ 115,442	$ 44,899	$ 184,013	$ 14,581	$ 6,004	$ 364,939
30	EIC solar trees	Carport - Free standing - Multiaxis	$ 19,315	$ 6,839	$ 27,281	$ 2,284	$ 940	$ 56,659
35	Sharp Rees Stealy Wellness Center	Carport - Canopy	$ 22,502	$ 7,991	$ 32,074	$ 2,677	$ 1,102	$ 66,348
39	San Diego Zoo	Carport - Canopy	$ 27,641	$ 9,978	$ 40,012	$ 3,311	$ 1,364	$ 82,305
40	Caltrans Fast EV Suncharge Del Lago	Carport - Canopy	$ 6,709	$ 1,731	$ 6,044	$ 647	$ 266	$ 15,398
41	Agua Hedionda Lagoon Foundation	Carport - Canopy	$ 5,643	$ 983	$ 2,583	$ 433	$ 178	$ 9,821
42	Civita Westpark Apartments	Carport	$ 23,866	$ 8,454	$ 33,646	$ 2,822	$ 1,162	$ 69,950
Subtotal - Canopy			*$ 274,927*	*$ 101,219*	*$ 408,558*	*$ 33,428*	*$ 13,765*	*$ 831,898*
Ramona Project		*Utility Scale*	*$ 5,000*	$ 40,000	$ 196,952	$ -	$ 59,400	$ 301,352
Pala Project		*Utility Scale*	$ 2,500	$ 23,000	$ 112,511	$ -	$ 27,000	$ 165,011
Subtotal - Utility			$ 7,500	$ 63,000	$ 309,463	$ -	$ 86,400	$ 466,363
TOTAL			**$ 1,099,576**	**$ 4,293,131**	**$ 3,709,628**	**$ 480,632**	**$ 284,307**	**$ 9,867,274**

Appendix C

Benchmarking Peer Group Dataset

ABB Velocity Suite Database
Peer Group
PV Sites with Nameplate Rating between 0 - 510 kW

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
1	Illinois	PV	0.021	Operating	10/25/2007			9	1	Y	SUN
2	California	PV	0.131	Operating	10/1/2001			15	1	Y	SUN
3	New Mexico	PV	0.411	Operating	5/23/2012			4	1	Y	SUN
4	North Carolina	PV	0.003	Operating	4/30/2008			8	1	Y	SUN
5	North Carolina	PV	0.010	Operating	12/15/2008			7	1	Y	SUN
6	North Carolina	PV	0.002	Operating	3/1/2009			7	1	Y	SUN
7	North Carolina	PV	0.002	Operating	8/1/2008			8	1	Y	SUN
8	North Carolina	PV	0.004	Operating	10/15/2008			8	1	Y	SUN
9	Nevada	PV	0.030	Operating	8/1/2007			9	1	Y	SUN
10	North Carolina	PV	0.500	Operating	6/1/2014			2	1	Y	SUN
11	North Carolina	PV	0.500	Operating	6/1/2014			2	1	Y	SUN
12	North Carolina	PV	0.500	Operating	6/1/2014			2	1	Y	SUN
13	North Carolina	PV	0.500	Operating	6/1/2014			2	1	Y	SUN
14	Arizona	PV	0.075	Operating	5/1/2011			5	1	Y	SUN
15	Arizona	PV	0.080	Operating	1/1/1997			19	1	Y	SUN
16	Arizona	PV	0.120	Operating	1/1/1999			17	1	Y	SUN
17	Arizona	PV	0.178	Operating	4/1/2001			15	1	Y	SUN
18	Arizona	PV	0.026	Operating	7/31/2000			16	1	Y	SUN
19	Arizona	PV	0.100	Operating	1/1/1999			17	1	Y	SUN
20	Arizona	PV	0.100	Operating	3/1/1998			18	1	Y	SUN
21	Arizona	PV	0.100	Operating	10/1/1999			17	1	Y	SUN
22	Arizona	PV	0.400	Operating	4/1/1988			28	1	Y	SUN
23	Arizona	PV	0.400	Operating	10/18/2002			14	1	Y	SUN
24	Arizona	PV	0.190	Operating	4/1/2001			15	1	Y	SUN
25	Arizona	PV	0.030	Operating	1/1/1999			17	1	Y	SUN
26	Arizona	PV	0.210	Operating	1/1/2000			16	1	Y	SUN
27	Arizona	PV	0.180	Operating	1/1/1998			18	1	Y	SUN
28	Arizona	PV	0.180	Operating	3/5/2012			4	1	Y	SUN
29	Arizona	PV	0.120	Operating	10/1/2001			15	1	Y	SUN
30	Delaware	PV	0.500	Operating	12/1/2011			4		Y	SUN

ABB Velocity Suite Database
Peer Group
PV Sites with Nameplate Rating between 2 - 5 MW

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
1	North Carolina	PV	2.740	Operating	10/6/2015			1	1	Y	SUN
2	New Jersey	PV	4.939	Operating	3/1/2012			4	1	Y	SUN
3	Arizona	PV	3.300	Operating	12/31/2009			6	45000	Y	SUN
4	Arizona	PV	2.700	Operating	12/27/2010			5	35000	Y	SUN
5	Massachusetts	PV	3.493	Operating	10/25/2013			3	1	Y	SUN
6	California	PV	3.000	Operating	11/10/2009			6	1	Y	SUN
7	California	PV	2.700	Operating	6/3/2010			6	1	Y	SUN
8	North Carolina	PV	5.000	Operating	7/1/2015			1	1	Y	SUN
9	Ontario	PV	5.000	Operating	9/30/2013			3		Y	SUN
10	North Carolina	PV	5.000	Operating	6/1/2013			3	1	Y	SUN
11	New Jersey	PV	4.000	Operating	9/30/2011			5		Y	SUN
12	Ohio	PV	3.600	Operating	6/1/2016			0	1	Y	SUN
13	Ohio	PV	3.500	Operating	1/1/2012			4	24	N	SUN
14	North Carolina	PV	3.724	Operating	4/1/2016			0	1	Y	SUN
15	California	PV	2.400	Operating	8/28/2014			2	1	Y	SUN
16	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
17	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
18	North Carolina	PV	5.000	Operating	12/31/2013			2	1	Y	SUN
19	Arizona	PV	4.100	Operating	12/7/2012			3	1	Y	SUN
20	North Carolina	PV	3.500	Operating	10/1/2012			4		Y	SUN
21	New York	PV	2.800	Operating	12/22/2015			0	1	Y	SUN
22	Arizona	PV	5.000	Operating	2/1/2012			4	1	Y	SUN
23	North Carolina	PV	5.000	Operating	11/30/2012			3		Y	SUN
24	North Carolina	PV	4.000	Operating	3/1/2015			1	1	Y	SUN
25	North Carolina	PV	5.000	Operating	11/1/2015			0	1	Y	SUN
26	North Carolina	PV	3.724	Operating	12/1/2013			2	1	Y	SUN
27	California	PV	2.200	Operating	7/26/2012			4	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
28	North Carolina	PV	4.900	Operating	12/1/2015			0	1	Y	SUN
29	Connecticut	PV	2.200	Operating	4/30/2016			0	1	Y	SUN
30	New Jersey	PV	3.800	Operating	4/30/2011			5		Y	SUN
31	New Jersey	PV	2.000	Operating	4/30/2011			5		Y	SUN
32	Massachusetts	PV	2.000	Operating	6/21/2012			4		Y	SUN
33	Massachusetts	PV	2.357	Operating	6/23/2014			2	1	Y	SUN
34	North Carolina	PV	5.000	Operating	11/30/2013			2	1	Y	SUN
35	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
36	North Carolina	PV	5.000	Operating	5/1/2016			0	1	Y	SUN
37	North Carolina	PV	3.500	Operating	12/1/2013			2	1	Y	SUN
38	North Carolina	PV	4.800	Operating	12/1/2014			1	1	Y	SUN
39	New Jersey	PV	2.100	Operating	12/23/2010			5	5	N	SUN
40	North Carolina	PV	4.000	Operating	12/1/2012			3		Y	SUN
41	Massachusetts	PV	3.000	Operating	7/1/2013			3	1	Y	SUN
42	Utah	PV	3.000	Operating	8/31/2015			1	1	Y	SUN
43	North Carolina	PV	5.000	Operating	12/31/2013			2	1	Y	SUN
44	North Carolina	PV	4.990	Operating	12/1/2015			0	1	Y	SUN
45	North Carolina	PV	4.900	Operating	11/1/2015			0	1	Y	SUN
46	North Carolina	PV	2.400	Operating	12/1/2012			3		Y	SUN
47	North Carolina	PV	5.000	Operating	9/1/2014			2	1	Y	SUN
48	North Carolina	PV	5.000	Operating	9/24/2013			3	1	Y	SUN
49	Florida	PV	5.000	Operating	3/26/2012			4		Y	SUN
50	Florida	PV	3.000	Operating	3/26/2012			4		Y	SUN
51	North Carolina	PV	5.000	Operating	1/1/2016			0	1	Y	SUN
52	North Carolina	PV	5.000	Operating	7/1/2013			3	1	Y	SUN
53	Massachusetts	PV	2.000	Operating	4/21/2012			4		Y	SUN
54	Massachusetts	PV	4.000	Operating	11/30/2013			2	1	Y	SUN
55	New York	PV	3.900	Operating	12/31/2015			0	1	Y	SUN
56	Vermont	PV	2.600	Operating	8/15/2014			2	1	Y	SUN
57	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
58	New Jersey	PV	2.400	Operating	12/1/2009			6	1	Y	SUN
59	New York	PV	4.000	Operating	9/20/2016			0	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
60	Massachusetts	PV	2.870	Operating	3/23/2015			1	1	Y	SUN
61	North Carolina	PV	2.000	Operating	11/11/2012			3	1	Y	SUN
62	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
63	New Jersey	PV	5.000	Operating	11/1/2014			1	1	Y	SUN
64	New Jersey	PV	2.000	Operating	6/30/2015			1	1	Y	SUN
65	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
66	Ohio	PV	2.100	Operating	1/17/2012			4	1	Y	SUN
67	Utah	PV	3.000	Operating	12/31/2015			0	1	Y	SUN
68	North Carolina	PV	4.000	Operating	11/1/2015			0	1	Y	SUN
69	Indiana	PV	2.500	Operating	12/22/2014			1	1	Y	SUN
70	California	PV	3.500	Operating	6/30/2011			5	15000	Y	SUN
71	Massachusetts	PV	4.108	Operating	7/21/2015			1	1	Y	SUN
72	Massachusetts	PV	2.000	Operating	12/31/2013			2	1	Y	SUN
73	New Jersey	PV	2.300	Operating	9/21/2009			7	1	Y	SUN
74	California	PV	5.000	Operating	5/12/2010			6		Y	SUN
75	Massachusetts	PV	4.000	Operating	4/1/2012			4		Y	SUN
76	Massachusetts	PV	2.000	Operating	4/25/2012			4	1	Y	SUN
77	North Carolina	PV	2.500	Operating	3/30/2014			2	1	Y	SUN
78	New York	PV	3.000	Operating	3/8/2012			4	1	Y	SUN
79	New York	PV	3.500	Operating	12/1/2012			3		Y	SUN
80	New York	PV	2.500	Operating	12/1/2012			3		Y	SUN
81	New York	PV	5.000	Operating	8/6/2014			2	1	Y	SUN
82	Massachusetts	PV	4.999	Operating	9/1/2014			2	1	Y	SUN
83	New Jersey	PV	2.990	Operating	10/26/2012			4	1	N	SUN
84	New Jersey	PV	2.990	Operating	10/26/2012			4	1	N	SUN
85	North Carolina	PV	5.000	Operating	11/1/2015			0	1	Y	SUN
86	Utah	PV	3.000	Operating	12/31/2015			0	1	Y	SUN
87	Ohio	PV	4.000	Operating	4/10/2013			3	1	Y	SUN
88	North Carolina	PV	2.000	Operating	9/30/2013			3	1	Y	SUN
89	Massachusetts	PV	4.171	Operating	10/1/2015			1	1	Y	SUN
90	Massachusetts	PV	5.000	Operating	9/12/2014			2	1	Y	SUN
91	Massachusetts	PV	4.491	Operating	8/1/2014			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
92	North Carolina	PV	5.000	Operating	1/3/2013			3	1	Y	SUN
93	Vermont	PV	2.800	Operating	10/19/2015			1	1	Y	SUN
94	North Carolina	PV	5.000	Operating	11/1/2015			0	1	Y	SUN
95	Vermont	PV	2.200	Operating	1/1/2015			1	1	Y	SUN
96	Massachusetts	PV	4.400	Operating	12/31/2014			1	1	Y	SUN
97	North Carolina	PV	4.900	Operating	6/1/2014			2	1	Y	SUN
98	Maryland	PV	4.000	Operating	12/31/2012			3		Y	SUN
99	Vermont	PV	2.200	Operating	10/1/2013			3	1	Y	SUN
100	California	PV	2.650	Operating	1/31/2008			8	1	N	SUN
101	Massachusetts	PV	3.000	Operating	12/27/2013			2	1	Y	SUN
102	Massachusetts	PV	2.000	Operating	1/1/2015			1	1	Y	SUN
103	Vermont	PV	2.200	Operating	6/15/2011			5		Y	SUN
104	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
105	North Carolina	PV	5.000	Operating	5/14/2016			0	1	Y	SUN
106	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
107	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
108	California	PV	5.000	Operating	12/11/2015			0	1	Y	SUN
109	Vermont	PV	2.200	Operating	10/1/2014			2	1	Y	SUN
110	Vermont	PV	2.470	Operating	7/2/2014			2	1	Y	SUN
111	New York	PV	2.000	Operating	12/18/2014			1	1	Y	SUN
112	Massachusetts	PV	2.200	Operating	5/6/2015			1	1	Y	SUN
113	New Jersey	PV	2.500	Operating	12/31/2011			4		Y	SUN
114	North Carolina	PV	4.900	Operating	1/1/2016			0	1	Y	SUN
115	North Carolina	PV	4.900	Operating	1/1/2016			0	1	Y	SUN
116	California	PV	2.500	Operating	8/26/2015			1	1	Y	SUN
117	Baja California	PV	5.000	Operating	1/8/2013			3	1	Y	SUN
118	New Jersey	PV	5.000	Operating	5/1/2016			0	1	Y	SUN
119	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
120	Massachusetts	PV	2.000	Operating	9/20/2016			0	1	Y	SUN
121	Massachusetts	PV	2.000	Operating	12/1/2012			3	1	Y	SUN
122	Massachusetts	PV	3.500	Operating	12/18/2013			2	1	Y	SUN
123	Massachusetts	PV	2.000	Operating	6/1/2013			3	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
124	Ohio	PV	2.400	Operating	10/31/2015			0	1	Y	SUN
125	Arizona	PV	3.300	Operating	12/2/2011			4	1	Y	SUN
126	New Jersey	PV	3.900	Operating	10/3/2011			5	1	Y	SUN
127	Maryland	PV	2.800	Operating	4/1/2013			3	1	Y	SUN
128	Maryland	PV	2.698	Operating	12/1/2015			0	1	Y	SUN
129	Maryland	PV	2.701	Operating	12/1/2015			0	1	Y	SUN
130	Maryland	PV	2.698	Operating	12/1/2015			0	1	Y	SUN
131	Maryland	PV	2.501	Operating	12/1/2015			0	1	Y	SUN
132	Maryland	PV	2.501	Operating	12/1/2015			0	1	Y	SUN
133	Maryland	PV	2.501	Operating	12/1/2015			0	1	Y	SUN
134	Maryland	PV	2.501	Operating	12/1/2015			0	1	Y	SUN
135	Maryland	PV	2.745	Operating	12/1/2015			0	1	Y	SUN
136	New Jersey	PV	4.000	Operating	3/31/2011			5		Y	SUN
137	New Jersey	PV	2.400	Operating	8/11/2011			5		Y	SUN
138	New Jersey	PV	2.300	Operating	11/9/2011			4		Y	SUN
139	New Jersey	PV	3.700	Operating	11/9/2011			4		Y	SUN
140	New York	PV	2.700	Operating	10/15/2013			3	1	Y	SUN
141	Michigan	PV	3.000	Operating	4/18/2016			0	1	Y	SUN
142	New Jersey	PV	3.000	Operating	3/31/2013			3	1	Y	SUN
143	Ontario	PV	3.000	Operating	7/1/2015			1	1	Y	SUN
144	Texas	PV	2.000	Operating	12/1/2015			0	1	Y	SUN
145	Vermont	PV	2.166	Operating	10/19/2012			4	1	Y	SUN
146	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
147	Vermont	PV	2.000	Operating	11/1/2013			2	1	Y	SUN
148	Arizona	PV	2.400	Operating	10/28/2010			6		Y	SUN
149	Arizona	PV	5.000	Operating	2/21/2013			3		Y	SUN
150	North Carolina	PV	5.000	Operating	3/27/2014			2	1	Y	SUN
151	Delaware	PV	4.000	Operating	8/21/2013			3		Y	SUN
152	North Carolina	PV	5.000	Operating	9/1/2013			3	1	Y	SUN
153	Colorado	PV	3.400	Operating	7/28/2011			5	1	Y	SUN
154	Colorado	PV	3.100	Operating	6/18/2014			2	1	Y	SUN
155	Massachusetts	PV	3.000	Operating	12/1/2014			1	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
156	North Carolina	PV	4.800	Operating	11/1/2014			1	1	Y	SUN
157	New York	PV	2.480	Operating	3/7/2016			0	1	Y	SUN
158	North Carolina	PV	5.000	Operating	4/1/2013			3	1	Y	SUN
159	New York	PV	2.000	Operating	12/1/2015			0	1	Y	SUN
160	North Carolina	PV	4.635	Operating	12/1/2011			4		Y	SUN
161	New Jersey	PV	2.500	Operating	12/1/2010			5		Y	SUN
162	North Carolina	PV	4.990	Operating	11/1/2015			0	1	Y	SUN
163	North Carolina	PV	5.000	Operating	10/1/2014			2	1	Y	SUN
164	Georgia	PV	4.400	Operating	3/13/2015			1	1	Y	SUN
165	Florida	PV	3.800	Operating	3/1/2016			0	1	Y	SUN
166	Florida	PV	4.950	Operating	4/12/2016			0	1	Y	SUN
167	North Carolina	PV	5.000	Operating	6/1/2014			2	1	Y	SUN
168	North Carolina	PV	5.000	Operating	12/1/2013			2	1	Y	SUN
169	North Carolina	PV	3.500	Operating	12/1/2015			0	1	Y	SUN
170	New York	PV	2.084	Operating	10/6/2014			2	1	Y	SUN
171	New Jersey	PV	2.900	Operating	12/31/2011			4		Y	SUN
172	North Carolina	PV	5.000	Operating	8/19/2014			2	1	Y	SUN
173	Massachusetts	PV	2.500	Operating	2/1/2013			3	1	Y	SUN
174	Vermont	PV	2.300	Operating	9/1/2013			3	1	Y	SUN
175	North Carolina	PV	5.000	Operating	10/1/2015			1	1	Y	SUN
176	North Carolina	PV	2.001	Operating	12/15/2012			3	1	Y	SUN
177	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
178	New Mexico	PV	2.000	Operating	5/7/2013			3	1	Y	SUN
179	Ontario	PV	5.000	Operating	12/31/2010			5		Y	SUN
180	Nevada	PV	2.000	Operating	1/26/2015			1	1	Y	SUN
181	North Carolina	PV	2.448	Operating	8/31/2012			4	1	Y	SUN
182	North Carolina	PV	5.000	Operating	8/15/2014			2	1	Y	SUN
183	Vermont	PV	2.200	Operating	10/1/2014			2	1	Y	SUN
184	North Carolina	PV	5.000	Operating	7/1/2015			1	1	Y	SUN
185	North Carolina	PV	2.800	Operating	2/28/2016			0	1	Y	SUN
186	North Carolina	PV	5.000	Operating	7/1/2015			1	1	Y	SUN
187	New Jersey	PV	2.000	Operating	11/9/2011			4	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
188	New Jersey	PV	2.000	Operating	11/9/2011			4	1	Y	SUN
189	North Carolina	PV	5.000	Operating	4/1/2015			1	1	Y	SUN
190	California	PV	2.000	Operating	5/31/2014			2	1	Y	SUN
191	California	PV	2.000	Operating	5/31/2014			2	1	Y	SUN
192	New Jersey	PV	3.000	Operating	9/30/2014			2	1	Y	SUN
193	Massachusetts	PV	2.000	Operating	6/30/2014			2	1	Y	SUN
194	Massachusetts	PV	2.850	Operating	12/23/2013			2	1	Y	SUN
195	North Carolina	PV	5.000	Operating	11/1/2015			0	1	Y	SUN
196	New Jersey	PV	3.000	Operating	12/31/2011			4		Y	SUN
197	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
198	Florida	PV	2.000	Operating	1/1/2010			6		Y	SUN
199	North Carolina	PV	5.000	Operating	7/1/2016			0	1	Y	SUN
200	North Carolina	PV	4.500	Operating	12/1/2015			0	1	Y	SUN
201	North Carolina	PV	4.000	Operating	12/31/2013			2	1	Y	SUN
202	North Carolina	PV	4.320	Operating	10/18/2014			2	1	Y	SUN
203	North Carolina	PV	4.320	Operating	12/1/2014			1	1	Y	SUN
204	North Carolina	PV	4.800	Operating	5/1/2015			1	1	Y	SUN
205	North Carolina	PV	5.000	Operating	8/1/2015			1	1	Y	SUN
206	Rhode Island	PV	3.000	Operating	10/1/2013			3		Y	SUN
207	Arizona	PV	4.000	Operating	12/1/2013			2		Y	SUN
208	North Carolina	PV	5.000	Operating	8/1/2015			1	1	Y	SUN
209	Massachusetts	PV	5.000	Operating	3/23/2015			1	1	Y	SUN
210	New Jersey	PV	3.000	Operating	1/1/2012			4		Y	SUN
211	New Jersey	PV	3.000	Operating	7/28/2011			5		Y	SUN
212	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
213	North Carolina	PV	3.000	Operating	12/1/2015			0	1	Y	SUN
214	California	PV	3.000	Operating	4/2/2015			1	1	Y	SUN
215	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
216	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
217	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
218	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
219	North Carolina	PV	3.500	Operating	12/1/2015			0	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
220	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
221	Colorado	PV	3.300	Operating	12/20/2010			5	1	Y	SUN
222	New Jersey	PV	2.000	Operating	6/30/2014			2	1	Y	SUN
223	Massachusetts	PV	2.000	Operating	6/1/2014			2	1	Y	SUN
224	Massachusetts	PV	2.500	Operating	5/27/2014			2	1	Y	SUN
225	California	PV	4.000	Operating	12/23/2014			1	1	Y	SUN
226	North Carolina	PV	5.000	Operating	2/15/2014			2	1	Y	SUN
227	North Carolina	PV	4.999	Operating	4/1/2016			0	1	Y	SUN
228	Vermont	PV	2.100	Operating	12/12/2012			3		Y	SUN
229	North Carolina	PV	4.999	Operating	4/1/2016			0	1	Y	SUN
230	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
231	Arizona	PV	5.000	Operating	5/14/2012			4		Y	SUN
232	Ohio	PV	2.200	Operating	12/31/2014			1	1	Y	SUN
233	California	PV	2.000	Operating	4/1/2012			4	1	Y	SUN
234	California	PV	2.000	Operating	3/30/2012			4		Y	SUN
235	Arizona	PV	2.500	Operating	9/30/2011			5	1	Y	SUN
236	Pennsylvania	PV	2.600	Operating	1/1/2011			5		Y	SUN
237	Massachusetts	PV	3.229	Operating	3/27/2013			3	1	Y	SUN
238	Massachusetts	PV	4.730	Operating	1/1/2012			4	7	Y	SUN
239	Massachusetts	PV	2.620	Operating	8/26/2013			3	1	Y	SUN
240	Massachusetts	PV	2.200	Operating	12/1/2012			3	1	Y	SUN
241	New Jersey	PV	2.000	Operating	12/1/2010			5		Y	SUN
242	New Jersey	PV	2.400	Operating	12/1/2012			3		Y	SUN
243	Colorado	PV	2.000	Operating	8/4/2015			1	1	Y	SUN
244	California	PV	2.000	Operating	6/30/2016			0	1	Y	SUN
245	North Carolina	PV	4.800	Operating	12/1/2014			1	1	Y	SUN
246	Utah	PV	3.000	Operating	8/31/2015			1	1	Y	SUN
247	North Carolina	PV	2.500	Operating	12/31/2012			3	1	Y	SUN
248	Connecticut	PV	4.000	Operating	6/6/2014			2		Y	SUN
249	Vermont	PV	2.000	Operating	7/1/2015			1	1	Y	SUN
250	Utah	PV	2.200	Operating	10/31/2015			0	1	Y	SUN
251	New York	PV	2.800	Operating	6/15/2016			0	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
252	Massachusetts	PV	3.200	Operating	9/30/2012			4	1	Y	SUN
253	New Mexico	PV	2.300	Operating	2/12/2013			3	16	Y	SUN
254	Massachusetts	PV	2.585	Operating	5/1/2016			0	1	Y	SUN
255	Massachusetts	PV	3.168	Operating	7/31/2015			1	1	Y	SUN
256	Indiana	PV	3.400	Operating	12/31/2014			1	1	Y	SUN
257	Indiana	PV	2.700	Operating	12/31/2014			1	1	Y	SUN
258	Indiana	PV	2.700	Operating	12/31/2014			1	1	Y	SUN
259	Pennsylvania	PV	2.000	Operating	11/1/2011			4		Y	SUN
260	Wisconsin	PV	2.250	Operating	6/24/2016			0	1	Y	SUN
261	North Carolina	PV	5.000	Operating	1/1/2016			0	1	Y	SUN
262	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
263	New Jersey	PV	3.500	Operating	3/31/2012			4		Y	SUN
264	New Jersey	PV	4.000	Operating	3/31/2012			4		Y	SUN
265	New Mexico	PV	5.000	Operating	7/8/2011			5		Y	SUN
266	Hawaii	PV	3.000	Operating	2/26/2015			1	1	Y	SUN
267	North Carolina	PV	5.000	Operating	12/1/2013			2	1	Y	SUN
268	North Carolina	PV	5.000	Operating	9/1/2013			3	1	Y	SUN
269	North Carolina	PV	2.600	Operating	12/1/2015			0	1	Y	SUN
270	North Carolina	PV	5.000	Operating	12/1/2014			1		Y	SUN
271	New Jersey	PV	2.700	Operating	12/1/2011			4	1	Y	SUN
272	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
273	North Carolina	PV	4.900	Operating	12/1/2015			0	1	Y	SUN
274	Ohio	PV	4.200	Operating	3/8/2016			0	1	Y	SUN
275	Nebraska	PV	5.000	Operating	6/30/2016			0		Y	SUN
276	Massachusetts	PV	2.700	Operating	12/20/2011			4	1	Y	SUN
277	New York	PV	2.600	Operating	4/17/2015			1	1	Y	SUN
278	North Carolina	PV	4.900	Operating	12/1/2015			0	1	Y	SUN
279	Massachusetts	PV	3.500	Operating	5/1/2014			2		Y	SUN
280	California	PV	3.475	Operating	5/4/2012			4	1	Y	SUN
281	Massachusetts	PV	2.000	Operating	9/6/2013			3	1	Y	SUN
282	North Carolina	PV	5.000	Operating	9/1/2014			2	1	Y	SUN
283	North Carolina	PV	4.998	Operating	12/1/2014			1	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
284	Maryland	PV	2.100	Operating	2/1/2013			3	1	Y	SUN
285	Maryland	PV	2.440	Operating	7/1/2014			2	1	Y	SUN
286	Indiana	PV	2.500	Operating	12/31/2015			0	1	Y	SUN
287	Indiana	PV	5.000	Operating	9/1/2016			0	1	Y	SUN
288	Indiana	PV	2.600	Operating	8/18/2016			0	1	Y	SUN
289	Indiana	PV	3.000	Operating	9/22/2015			1	1	Y	SUN
290	Indiana	PV	2.000	Operating	11/6/2015			0	1	Y	SUN
291	Indiana	PV	3.000	Operating	8/18/2015			1	1	Y	SUN
292	Indiana	PV	4.000	Operating	9/15/2016			0	1	Y	SUN
293	North Carolina	PV	2.000	Operating	10/1/2015			1	1	Y	SUN
294	North Carolina	PV	2.572	Operating	10/19/2015			1	1	Y	SUN
295	North Carolina	PV	4.900	Operating	11/1/2015			0	1	Y	SUN
296	North Carolina	PV	4.900	Operating	11/1/2015			0	1	Y	SUN
297	Massachusetts	PV	3.000	Operating	12/18/2013			2	1	Y	SUN
298	Massachusetts	PV	2.600	Operating	12/20/2013			2	1	Y	SUN
299	California	PV	4.000	Operating	12/1/2012			3	1	Y	SUN
300	New Jersey	PV	5.000	Operating	9/1/2014			2		Y	SUN
301	North Carolina	PV	4.990	Operating	11/1/2014			1	1	Y	SUN
302	New Jersey	PV	2.700	Operating	12/1/2011			4		Y	SUN
303	New Jersey	PV	4.100	Operating	9/23/2010			6		Y	SUN
304	New Jersey	PV	2.800	Operating	8/29/2011			5		Y	SUN
305	Hawaii	PV	5.000	Operating	11/22/2013			2	1	Y	SUN
306	Hawaii	PV	5.000	Operating	12/1/2012			3	1	Y	SUN
307	Missouri	PV	3.000	Operating	7/12/2016			0	1	Y	SUN
308	New Jersey	PV	2.200	Operating	5/1/2012			4	1	Y	SUN
309	New Jersey	PV	2.300	Operating	9/17/2012			4	1	Y	SUN
310	New Jersey	PV	4.000	Operating	9/21/2016			0		Y	SUN
311	New Jersey	PV	2.000	Operating	11/21/2011			4	1	Y	SUN
312	New Jersey	PV	3.000	Operating	12/20/2011			4		Y	SUN
313	New Jersey	PV	4.100	Operating	5/7/2013			3		Y	SUN
314	New Jersey	PV	3.400	Operating	4/1/2013			3	1	Y	SUN
315	Massachusetts	PV	2.000	Operating	5/29/2014			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
316	Massachusetts	PV	4.800	Operating	6/30/2014			2	1	Y	SUN
317	Massachusetts	PV	3.000	Operating	11/18/2013			2	1	Y	SUN
318	North Carolina	PV	5.000	Operating	1/1/2015			1	1	Y	SUN
319	North Carolina	PV	5.000	Operating	1/1/2016			0	1	Y	SUN
320	New Jersey	PV	4.500	Operating	10/15/2012			4	1	Y	SUN
321	Pennsylvania	PV	5.000	Operating	9/17/2012			4	1	Y	SUN
322	North Carolina	PV	5.000	Operating	11/1/2012			3	1	Y	SUN
323	North Carolina	PV	5.000	Operating	9/20/2015			1	1	Y	SUN
324	Pennsylvania	PV	3.000	Operating	12/1/2010			5		Y	SUN
325	Georgia	PV	2.500	Operating	5/31/2013			3	1	Y	SUN
326	Massachusetts	PV	4.000	Operating	12/26/2013			2	1	Y	SUN
327	Massachusetts	PV	2.500	Operating	12/9/2013			2	1	Y	SUN
328	North Carolina	PV	2.468	Operating	10/6/2015			1	1	Y	SUN
329	Utah	PV	3.000	Operating	7/1/2015			1	1	Y	SUN
330	Indiana	PV	2.000	Operating	8/1/2013			3	1	Y	SUN
331	Indiana	PV	2.000	Operating	8/31/2013			3	1	Y	SUN
332	California	PV	5.000	Operating	11/1/2014			1	1	Y	SUN
333	California	PV	5.000	Operating	12/31/2014			1	1	Y	SUN
334	Nevada	PV	3.300	Operating	3/4/2013			3	1	Y	SUN
335	New Jersey	PV	2.000	Operating	12/31/2011			4		Y	SUN
336	California	PV	3.100	Operating	5/1/2014			2	1	Y	SUN
337	North Carolina	PV	5.000	Operating	5/1/2013			3	1	Y	SUN
338	North Carolina	PV	5.000	Operating	6/1/2013			3	1	Y	SUN
339	Massachusetts	PV	4.500	Operating	6/17/2014			2	1	Y	SUN
340	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
341	California	PV	2.500	Operating	4/2/2013			3	1	Y	SUN
342	Vermont	PV	2.200	Operating	7/31/2013			3	1	Y	SUN
343	California	PV	2.100	Operating	2/29/2016			0	1	Y	SUN
344	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
345	Florida	PV	3.000	Operating	8/1/2016			0	1	Y	SUN
346	North Carolina	PV	5.000	Operating	8/22/2015			1	1	Y	SUN
347	Kentucky	PV	3.600	Operating	4/22/2016			0	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
348	North Carolina	PV	2.000	Operating	7/31/2013			3	1	Y	SUN
349	Arizona	PV	3.500	Operating	12/1/2010			5		Y	SUN
350	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
351	Massachusetts	PV	2.590	Operating	12/27/2013			2	1	Y	SUN
352	Indiana	PV	3.800	Operating	11/30/2015			0	1	Y	SUN
353	North Carolina	PV	4.900	Operating	10/1/2014			2	1	Y	SUN
354	North Carolina	PV	5.000	Operating	1/15/2014			2	1	Y	SUN
355	North Carolina	PV	3.000	Operating	3/31/2014			2	1	Y	SUN
356	Massachusetts	PV	5.000	Operating	5/1/2014			2	1	Y	SUN
357	New Jersey	PV	2.000	Operating	12/1/2011			4		Y	SUN
358	Missouri	PV	2.800	Operating	7/7/2015			1	1	Y	SUN
359	New Jersey	PV	2.600	Operating	12/1/2011			4		Y	SUN
360	North Carolina	PV	5.000	Operating	1/15/2014			2	1	Y	SUN
361	Missouri	PV	2.800	Operating	3/11/2014			2	1	Y	SUN
362	Missouri	PV	2.800	Operating	5/18/2016			0	1	Y	SUN
363	Missouri	PV	2.800	Operating	10/26/2015			1	1	Y	SUN
364	Missouri	PV	2.800	Operating	7/31/2016			0	1	Y	SUN
365	North Carolina	PV	4.990	Operating	12/1/2015			0	1	Y	SUN
366	North Carolina	PV	5.000	Operating	8/1/2015			1	1	Y	SUN
367	Minnesota	PV	2.300	Operating	12/1/2015			0		Y	SUN
368	California	PV	2.000	Operating	6/30/2016			0	1	N	SUN
369	Pennsylvania	PV	3.000	Operating	11/24/2008			7	1	Y	SUN
370	North Carolina	PV	5.000	Operating	6/1/2014			2	1	Y	SUN
371	Utah	PV	3.800	Operating	5/27/2015			1	1	Y	SUN
372	Massachusetts	PV	3.000	Operating	4/9/2014			2	1	Y	SUN
373	California	PV	2.500	Operating	1/29/2015			1	1	Y	SUN
374	North Carolina	PV	5.000	Operating	10/5/2015			1	1	Y	SUN
375	North Carolina	PV	3.724	Operating	1/1/2016			0	1	Y	SUN
376	North Carolina	PV	3.724	Operating	12/1/2013			2	1	Y	SUN
377	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
378	North Carolina	PV	5.000	Operating	11/1/2012			3		Y	SUN
379	Arizona	PV	4.000	Operating	4/23/2015			1	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
380	North Carolina	PV	5.000	Operating	3/31/2014			2	1	Y	SUN
381	North Carolina	PV	5.000	Operating	2/12/2014			2	1	Y	SUN
382	North Carolina	PV	5.000	Operating	9/1/2013			3	1	Y	SUN
383	Colorado	PV	2.000	Operating	1/12/2008			8		Y	SUN
384	Oregon	PV	2.000	Operating	4/23/2014			2	1	Y	SUN
385	North Carolina	PV	5.000	Operating	5/1/2015			1	2	Y	SUN
386	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN
387	North Carolina	PV	5.000	Operating	4/30/2013			3	1	Y	SUN
388	North Carolina	PV	5.000	Operating	11/1/2013			2	1	Y	SUN
389	North Carolina	PV	5.000	Operating	8/19/2014			2	1	Y	SUN
390	North Carolina	PV	5.000	Operating	3/29/2016			0	1	Y	SUN
391	North Carolina	PV	2.000	Operating	12/15/2012			3	1	Y	SUN
392	New Jersey	PV	2.482	Operating	6/15/2011			5		Y	SUN
393	New Jersey	PV	3.159	Operating	12/1/2011			4		Y	SUN
394	Arizona	PV	3.322	Operating	5/31/2012			4	1	Y	SUN
395	North Carolina	PV	2.468	Operating	8/1/2015			1	1	Y	SUN
396	North Carolina	PV	5.000	Operating	4/1/2014			2	1	Y	SUN
397	New Jersey	PV	3.000	Operating	5/8/2012			4		Y	SUN
398	Massachusetts	PV	2.000	Operating	4/25/2012			4	1	Y	SUN
399	New York	PV	2.600	Operating	12/31/2015			0	1	Y	SUN
400	New York	PV	2.600	Operating	12/31/2015			0	1	Y	SUN
401	Indiana	PV	4.000	Operating	7/28/2014			2		Y	SUN
402	North Carolina	PV	5.000	Operating	7/1/2015			1	1	Y	SUN
403	New Jersey	PV	3.900	Operating	10/1/2010			6	4	Y	SUN
404	New Jersey	PV	5.000	Operating	9/1/2015			1	1	Y	SUN
405	New Jersey	PV	3.000	Operating	6/1/2015			1		Y	SUN
406	New Jersey	PV	3.500	Operating	9/30/2011			5		Y	SUN
407	New Jersey	PV	5.000	Operating	1/1/2015			1	1	Y	SUN
408	New Jersey	PV	2.700	Operating	5/1/2016			0	1	Y	SUN
409	New Jersey	PV	4.300	Operating	9/30/2011			5		Y	SUN
410	New Jersey	PV	2.375	Operating	12/2/2012			3	1	Y	SUN
411	New Jersey	PV	3.000	Operating	5/1/2016			0	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
412	New Jersey	PV	4.400	Operating	5/1/2016			0		Y	SUN
413	Massachusetts	PV	3.600	Operating	6/14/2014			2	1	Y	SUN
414	North Carolina	PV	4.900	Operating	12/1/2013			2	1	Y	SUN
415	California	PV	2.500	Operating	4/30/2012			4	1	Y	SUN
416	California	PV	4.000	Operating	12/15/2011			4	1	Y	SUN
417	North Carolina	PV	5.000	Operating	11/1/2015			0	1	Y	SUN
418	New Jersey	PV	2.285	Operating	12/1/2015			0	1	Y	SUN
419	Pennsylvania	PV	2.900	Operating	1/31/2013			3	1	Y	SUN
420	Arizona	PV	3.249	Operating	10/11/2011			5		Y	SUN
421	Massachusetts	PV	2.979	Operating	7/2/2014			2	1	Y	SUN
422	North Carolina	PV	5.000	Operating	9/1/2014			2	1	Y	SUN
423	Ohio	PV	2.000	Operating	11/1/2012			3	1	Y	SUN
424	Texas	PV	4.400	Operating	3/12/2014			2	1	Y	SUN
425	New Jersey	PV	3.100	Operating	3/12/2012			4		Y	SUN
426	Oklahoma	PV	2.500	Operating	8/31/2015			1	1	Y	SUN
427	North Carolina	PV	2.000	Operating	4/1/2013			3	1	Y	SUN
428	Maryland	PV	3.200	Operating	6/30/2015			1	1	Y	SUN
429	Oregon	PV	2.500	Operating	9/27/2015			1	1	Y	SUN
430	California	PV	2.333	Operating	7/3/2015			1	1	Y	SUN
431	California	PV	3.300	Operating	6/28/2012			4	13480	Y	SUN
432	Vermont	PV	2.448	Operating	5/1/2014			2	1	Y	SUN
433	North Carolina	PV	5.000	Operating	4/1/2016			0	1	Y	SUN
434	California	PV	2.000	Operating	6/23/2010			6	1	Y	SUN
435	Oregon	PV	2.000	Operating	11/9/2012			3	1	Y	SUN
436	North Carolina	PV	5.000	Operating	12/1/2013			2	1	Y	SUN
437	Ontario	PV	3.000	Operating	7/1/2015			1	1	Y	SUN
438	Virginia	PV	2.450	Operating	3/1/2016			0	1	Y	SUN
439	North Carolina	PV	5.000	Operating	11/1/2013			2	1	Y	SUN
440	North Carolina	PV	2.500	Operating	9/30/2012			4		Y	SUN
441	North Carolina	PV	3.646	Operating	1/1/2013			3	1	Y	SUN
442	New Jersey	PV	2.000	Operating	6/30/2014			2		Y	SUN
443	North Carolina	PV	5.000	Operating	12/31/2011			4		Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
444	Pennsylvania	PV	3.000	Operating	8/1/2010			6		Y	SUN
445	Hawaii	PV	3.000	Operating	10/31/2011			4	1	Y	SUN
446	North Carolina	PV	5.000	Operating	8/1/2015			1	1	Y	SUN
447	Arizona	PV	2.000	Operating	4/28/2012			4	1	Y	SUN
448	New York	PV	2.000	Operating	9/5/2015			1	1	Y	SUN
449	North Carolina	PV	4.400	Operating	10/25/2012			4		Y	SUN
450	North Carolina	PV	3.500	Operating	10/22/2012			4		Y	SUN
451	North Carolina	PV	3.500	Operating	10/1/2012			4		Y	SUN
452	New Jersey	PV	2.200	Operating	11/9/2009			6	1	Y	SUN
453	New Mexico	PV	5.000	Operating	10/19/2011			5	1	Y	SUN
454	New Mexico	PV	2.000	Operating	4/8/2011			5	1	Y	SUN
455	New Mexico	PV	5.000	Operating	8/3/2011			5	1	Y	SUN
456	New Mexico	PV	4.000	Operating	12/1/2013			2	1	Y	SUN
457	New Mexico	PV	5.000	Operating	11/1/2011			4	1	Y	SUN
458	New Mexico	PV	5.000	Operating	6/1/2011			5		Y	SUN
459	New Mexico	PV	2.000	Operating	11/18/2013			2	1	Y	SUN
460	New Jersey	PV	2.500	Operating	12/31/2010			5		Y	SUN
461	New Jersey	PV	3.500	Operating	10/1/2012			4		Y	SUN
462	New Jersey	PV	2.500	Operating	4/2/2012			4	1	Y	SUN
463	New Jersey	PV	2.700	Operating	3/2/2011			5		Y	SUN
464	New Jersey	PV	2.600	Operating	6/1/2011			5		Y	SUN
465	New Jersey	PV	3.500	Operating	11/1/2011			4		Y	SUN
466	New Jersey	PV	2.500	Operating	12/1/2011			4		Y	SUN
467	New Jersey	PV	3.600	Operating	3/2/2011			5		Y	SUN
468	California	PV	2.000	Operating	11/4/2014			1	1	Y	SUN
469	North Carolina	PV	4.000	Operating	11/1/2015			0	1	Y	SUN
470	North Carolina	PV	2.890	Operating	11/11/2013			2	1	Y	SUN
471	North Carolina	PV	5.000	Operating	11/30/2012			3		Y	SUN
472	North Carolina	PV	4.950	Operating	11/15/2014			1	1	Y	SUN
473	North Carolina	PV	5.000	Operating	10/26/2012			4		Y	SUN
474	Ontario	PV	5.000	Operating	10/31/2014			1	1	Y	SUN
475	North Carolina	PV	5.000	Operating	12/1/2014			1	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
476	Arizona	PV	4.500	Operating	8/1/2011			5		Y	SUN
477	California	PV	5.000	Operating	12/22/2011			4	1	Y	SUN
478	California	PV	5.000	Operating	1/13/2012			4	1	Y	SUN
479	California	PV	5.000	Operating	1/13/2012			4	1	Y	SUN
480	New Jersey	PV	5.000	Operating	9/30/2011			5	4	Y	SUN
481	California	PV	3.000	Operating	12/26/2011			4	1	Y	SUN
482	California	PV	3.000	Operating	12/26/2011			4	1	Y	SUN
483	California	PV	3.000	Operating	12/26/2011			4	1	Y	SUN
484	California	PV	5.000	Operating	1/15/2012			4	1	Y	SUN
485	California	PV	5.000	Operating	1/31/2012			4	1	Y	SUN
486	California	PV	5.000	Operating	1/31/2012			4	1	Y	SUN
487	California	PV	5.000	Operating	11/1/2012			3	1	Y	SUN
488	California	PV	5.000	Operating	11/1/2012			3	1	Y	SUN
489	California	PV	5.000	Operating	11/1/2012			3	1	Y	SUN
490	California	PV	5.000	Operating	11/1/2012			3	1	Y	SUN
491	California	PV	5.000	Operating	11/1/2012			3	1	Y	SUN
492	California	PV	5.000	Operating	11/1/2012			3	1	Y	SUN
493	Ontario	PV	5.000	Operating	12/1/2013			2		Y	SUN
494	Ontario	PV	5.000	Operating	12/1/2013			2		Y	SUN
495	California	PV	5.000	Operating	12/1/2013			2	1	Y	SUN
496	California	PV	4.500	Operating	12/7/2010			5	24000	Y	SUN
497	Ontario	PV	5.000	Operating	3/31/2013			3	1	Y	SUN
498	North Carolina	PV	5.000	Operating	2/9/2015			1	1	Y	SUN
499	North Carolina	PV	2.000	Operating	12/1/2015			0	1	Y	SUN
500	North Carolina	PV	2.000	Operating	3/1/2015			1	1	Y	SUN
501	Massachusetts	PV	2.000	Operating	12/23/2013			2	1	Y	SUN
502	New York	PV	2.000	Operating	4/22/2015			1	1	Y	SUN
503	North Carolina	PV	5.000	Operating	5/31/2013			3	1	Y	SUN
504	Illinois	PV	2.600	Operating	10/31/2012			3	1	Y	SUN
505	Indiana	PV	2.800	Operating	4/30/2014			2	1	Y	SUN
506	Indiana	PV	2.700	Operating	8/1/2014			2	1	Y	SUN
507	North Carolina	PV	3.500	Operating	12/1/2014			1	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
508	California	PV	2.700	Operating	11/16/2012			3	1	Y	SUN
509	North Carolina	PV	5.000	Operating	3/14/2014			2	1	Y	SUN
510	North Carolina	PV	5.000	Operating	5/7/2014			2	1	Y	SUN
511	North Carolina	PV	4.900	Operating	8/1/2015			1	1	Y	SUN
512	Massachusetts	PV	2.500	Operating	8/15/2016			0	1	Y	SUN
513	Ohio	PV	2.100	Operating	7/25/2014			2	1	Y	SUN
514	California	PV	3.415	Operating	9/1/2012			4	1	Y	SUN
515	California	PV	3.000	Operating	4/11/2011			5	1	Y	SUN
516	California	PV	2.900	Operating	12/9/2011			4	1	Y	SUN
517	California	PV	3.650	Operating	12/20/2011			4	1	Y	SUN
518	California	PV	3.650	Operating	12/20/2011			4	1	Y	SUN
519	California	PV	3.650	Operating	12/20/2011			4	1	Y	SUN
520	California	PV	3.650	Operating	12/20/2011			4	1	Y	SUN
521	California	PV	3.650	Operating	12/20/2011			4	1	Y	SUN
522	California	PV	3.650	Operating	12/20/2011			4	1	Y	SUN
523	California	PV	2.900	Operating	12/9/2011			4	1	Y	SUN
524	North Carolina	PV	2.000	Operating	6/30/2013			3	1	Y	SUN
525	California	PV	3.300	Operating	2/17/2015			1	1	Y	SUN
526	New Jersey	PV	2.000	Operating	10/13/2010			6		Y	SUN
527	North Carolina	PV	5.000	Operating	7/1/2015			1	1	Y	SUN
528	New Jersey	PV	3.200	Operating	12/31/2010			5		Y	SUN
529	Massachusetts	PV	2.500	Operating	10/7/2013			3	1	Y	SUN
530	Georgia	PV	2.400	Operating	12/1/2013			2		Y	SUN
531	North Carolina	PV	4.999	Operating	6/1/2016			0	1	Y	SUN
532	North Carolina	PV	5.000	Operating	9/1/2014			2	1	Y	SUN
533	California	PV	2.320	Operating	6/13/2011			5	1	Y	SUN
534	California	PV	4.000	Operating	5/15/2016			0	1	Y	SUN
535	New Mexico	PV	2.000	Operating	7/11/2013			3	1	Y	SUN
536	North Carolina	PV	4.800	Operating	1/1/2015			1	1	Y	SUN
537	North Carolina	PV	5.000	Operating	6/30/2012			4		Y	SUN
538	Massachusetts	PV	2.500	Operating	9/30/2012			4	1	Y	SUN
539	North Carolina	PV	5.000	Operating	4/21/2014			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
540	New Mexico	PV	4.200	Operating	1/16/2013			3	1	Y	SUN
541	North Carolina	PV	5.000	Operating	3/1/2014			2	1	Y	SUN
542	Colorado	PV	4.000	Operating	1/8/2016			0	1	Y	SUN
543	Colorado	PV	4.080	Operating	3/2/2016			0	1	Y	SUN
544	Colorado	PV	4.000	Operating	1/8/2016			0	1	Y	SUN
545	California	PV	2.000	Operating	12/31/2013			2	1	Y	SUN
546	Ontario	PV	4.750	Operating	10/2/2009			7	1	Y	SUN
547	Ontario	PV	4.560	Operating	11/1/2010			5		Y	SUN
548	Ontario	PV	4.500	Operating	11/1/2010			5		Y	SUN
549	Ontario	PV	4.250	Operating	12/31/2011			4		Y	SUN
550	Massachusetts	PV	3.000	Operating	6/25/2014			2	1	Y	SUN
551	Massachusetts	PV	4.356	Operating	5/1/2014			2	1	Y	SUN
552	North Carolina	PV	5.000	Operating	2/26/2016			0	1	Y	SUN
553	Pennsylvania	PV	3.500	Operating	6/21/2011			5	1	Y	SUN
554	California	PV	2.400	Operating	7/31/2015			1	1	Y	SUN
555	California	PV	2.000	Operating	12/31/2013			2	1	Y	SUN
556	California	PV	5.000	Operating	12/31/2013			2	1	Y	SUN
557	California	PV	2.500	Operating	12/31/2013			2	1	Y	SUN
558	California	PV	5.000	Operating	12/31/2013			2	1	Y	SUN
559	North Carolina	PV	2.499	Operating	12/31/2012			3	1	Y	SUN
560	North Carolina	PV	2.499	Operating	12/31/2012			3	1	Y	SUN
561	North Carolina	PV	5.000	Operating	9/1/2013			3	1	Y	SUN
562	North Carolina	PV	5.000	Operating	7/8/2015			1	1	Y	SUN
563	Arizona	PV	3.758	Operating	12/9/2013			2	1	Y	SUN
564	California	PV	2.000	Operating	1/1/2012			4	4	Y	SUN
565	California	PV	3.030	Operating	9/20/2014			2	1	Y	SUN
566	California	PV	3.500	Operating	11/13/2014			1	1	Y	SUN
567	Nevada	PV	4.900	Operating	10/12/2007			9	1	Y	SUN
568	Nevada	PV	3.900	Operating	12/17/2007			8	1	Y	SUN
569	California	PV	2.300	Operating	10/7/2008			8	1	Y	SUN
570	Massachusetts	PV	2.000	Operating	6/1/2013			3		Y	SUN
571	Colorado	PV	3.000	Operating	8/11/2016			0	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
572	California	PV	4.500	Operating	4/29/2016			0	1	N	SUN
573	Connecticut	PV	4.700	Operating	8/11/2016			0	1	Y	SUN
574	Massachusetts	PV	3.000	Operating	2/29/2016			0	1	Y	SUN
575	New York	PV	2.700	Operating	11/16/2015			0	1	Y	SUN
576	Oregon	PV	2.000	Operating	8/4/2016			0		Y	SUN
577	Maryland	PV	2.370	Operating	12/1/2013			2	1	Y	SUN
578	Massachusetts	PV	2.200	Operating	2/29/2016			0	1	Y	SUN
579	North Carolina	PV	5.000	Operating	6/1/2015			1	1	Y	SUN
580	North Carolina	PV	5.000	Operating	8/1/2015			1	1	Y	SUN
581	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
582	North Carolina	PV	5.000	Operating	5/1/2015			1	1	Y	SUN
583	North Carolina	PV	5.000	Operating	10/1/2015			1	1	Y	SUN
584	Massachusetts	PV	2.000	Operating	1/10/2013			3		Y	SUN
585	Massachusetts	PV	3.000	Operating	6/18/2014			2	1	Y	SUN
586	Massachusetts	PV	4.000	Operating	6/18/2014			2	1	Y	SUN
587	Massachusetts	PV	2.239	Operating	6/18/2014			2	1	Y	SUN
588	North Carolina	PV	5.000	Operating	6/1/2014			2	1	Y	SUN
589	North Carolina	PV	5.000	Operating	8/19/2014			2	1	Y	SUN
590	Connecticut	PV	5.000	Operating	11/22/2013			2		Y	SUN
591	North Carolina	PV	5.000	Operating	1/1/2016			0	1	Y	SUN
592	North Carolina	PV	3.500	Operating	4/1/2015			1	1	Y	SUN
593	North Carolina	PV	2.212	Operating	12/31/2013			2	1	Y	SUN
594	South Carolina	PV	2.600	Operating	12/2/2011			4		Y	SUN
595	North Carolina	PV	5.000	Operating	6/27/2012			4		Y	SUN
596	Massachusetts	PV	3.500	Operating	12/13/2013			2	1	Y	SUN
597	California	PV	2.500	Operating	11/20/2014			1	1	Y	SUN
598	Virgin Islands	PV	4.000	Operating	10/29/2014			1		Y	SUN
599	North Carolina	PV	5.000	Operating	7/1/2014			2	1	Y	SUN
600	Massachusetts	PV	2.591	Operating	12/31/2015			0	1	Y	SUN
601	Missouri	PV	4.900	Operating	6/26/2014			2	1	Y	SUN
602	Mississippi	PV	3.060	Operating	7/12/2016			0	1	Y	SUN
603	Vermont	PV	2.000	Operating	10/30/2013			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
604	North Carolina	PV	4.999	Operating	5/1/2015			1	1	Y	SUN
605	Kentucky	PV	2.000	Operating	9/1/2011			5		Y	SUN
606	Massachusetts	PV	2.424	Operating	1/11/2013			3	1	Y	SUN
607	North Carolina	PV	5.000	Operating	8/1/2015			1	1	Y	SUN
608	North Carolina	PV	5.000	Operating	11/1/2014			1	1	Y	SUN
609	North Carolina	PV	5.000	Operating	3/31/2013			3	1	Y	SUN
610	North Carolina	PV	5.000	Operating	2/28/2013			3		Y	SUN
611	Vermont	PV	2.448	Operating	4/1/2016			0	1	Y	SUN
612	New York	PV	2.150	Operating	4/22/2015			1	1	Y	SUN
613	California	PV	2.000	Operating	7/1/2014			2	1	Y	SUN
614	California	PV	2.000	Operating	12/31/2014			1	1	Y	SUN
615	Arizona	PV	2.500	Operating	12/4/2013			2	1	N	SUN
616	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
617	North Carolina	PV	4.500	Operating	12/22/2010			5	1	Y	SUN
618	North Carolina	PV	3.000	Operating	12/20/2010			5	1	Y	SUN
619	California	PV	2.600	Operating	8/28/2014			2	1	Y	SUN
620	California	PV	5.000	Operating	12/27/2012			3	1	Y	SUN
621	California	PV	4.000	Operating	12/1/2012			3		Y	SUN
622	Texas	PV	4.950	Operating	5/30/2012			4	1	Y	SUN
623	California	PV	2.500	Operating	12/30/2013			2	1	Y	SUN
624	California	PV	2.000	Operating	12/30/2013			2	1	Y	SUN
625	Ohio	PV	2.232	Operating	12/5/2012			3	1	Y	SUN
626	Massachusetts	PV	2.000	Operating	11/1/2015			0	1	Y	SUN
627	Massachusetts	PV	3.334	Operating	12/4/2015			0	1	Y	SUN
628	Utah	PV	3.000	Operating	12/31/2015			0	1	Y	SUN
629	Massachusetts	PV	3.000	Operating	5/27/2016			0	1	Y	SUN
630	North Carolina	PV	3.500	Operating	12/23/2009			6	1	Y	SUN
631	North Carolina	PV	3.000	Operating	12/14/2010			5	1	Y	SUN
632	California	PV	4.725	Operating	9/28/2012			4	1	Y	SUN
633	California	PV	2.383	Operating	1/25/2013			3	1	Y	SUN
634	Florida	PV	3.500	Operating	9/15/2012			4		Y	SUN
635	Massachusetts	PV	3.186	Operating	9/19/2014			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
636	Massachusetts	PV	2.900	Operating	12/11/2014			1	1	Y	SUN
637	Massachusetts	PV	3.154	Operating	6/23/2014			2	1	Y	SUN
638	Massachusetts	PV	5.000	Operating	7/11/2014			2	1	Y	SUN
639	Massachusetts	PV	3.748	Operating	12/31/2014			1	1	Y	SUN
640	Massachusetts	PV	4.593	Operating	2/25/2015			1	2	Y	SUN
641	Utah	PV	3.000	Operating	9/29/2015			1		Y	SUN
642	Utah	PV	3.000	Operating	9/29/2015			1		Y	SUN
643	Utah	PV	3.000	Operating	12/31/2015			0	1	Y	SUN
644	Florida	PV	2.700	Operating	12/21/2011			4		Y	SUN
645	Maryland	PV	2.200	Operating	3/9/2011			5		Y	SUN
646	North Carolina	PV	4.000	Operating	12/21/2009			6	1	Y	SUN
647	Ontario	PV	4.750	Operating	10/2/2009			7	1	Y	SUN
648	Ontario	PV	4.560	Operating	11/1/2010			5		Y	SUN
649	Ontario	PV	4.500	Operating	11/1/2010			5		Y	SUN
650	Ontario	PV	4.250	Operating	12/31/2011			4		Y	SUN
651	North Carolina	PV	3.000	Operating	12/31/2013			2	1	Y	SUN
652	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
653	New Jersey	PV	2.900	Operating	11/1/2013			2	1	Y	SUN
654	Massachusetts	PV	2.983	Operating	12/19/2014			1	1	Y	SUN
655	New Mexico	PV	2.200	Operating	5/9/2011			5	1	Y	SUN
656	North Carolina	PV	5.000	Operating	10/6/2015			1	1	Y	SUN
657	Arizona	PV	3.000	Operating	1/1/2010			6	1	Y	SUN
658	New York	PV	2.400	Operating	11/19/2015			0	1	Y	SUN
659	California	PV	2.000	Operating	12/28/2015			0		Y	SUN
660	North Carolina	PV	2.000	Operating	12/31/2013			2	1	Y	SUN
661	New York	PV	5.000	Operating	12/31/2014			1	1	Y	SUN
662	Vermont	PV	2.200	Operating	12/1/2012			3	1	Y	SUN
663	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
664	Massachusetts	PV	4.900	Operating	12/12/2013			2	1	Y	SUN
665	Massachusetts	PV	2.500	Operating	4/1/2015			1	1	Y	SUN
666	Massachusetts	PV	2.200	Operating	10/1/2015			1	1	Y	SUN
667	Massachusetts	PV	4.800	Operating	12/31/2015			0	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
668	Massachusetts	PV	2.000	Operating	12/25/2013			2	1	Y	SUN
669	Durango	PV	3.500	Operating	4/22/2016			0	1	Y	SUN
670	North Carolina	PV	4.999	Operating	1/1/2016			0	1	Y	SUN
671	North Carolina	PV	5.000	Operating	6/1/2016			0	1	Y	SUN
672	Arizona	PV	5.000	Operating	12/28/2012			3	1	Y	SUN
673	Maryland	PV	2.000	Operating	4/2/2015			1	1	Y	SUN
674	Maryland	PV	2.100	Operating	4/2/2015			1	1	Y	SUN
675	Massachusetts	PV	3.872	Operating	4/16/2015			1	1	Y	SUN
676	Ohio	PV	3.900	Operating	8/6/2012			4		Y	SUN
677	North Carolina	PV	2.000	Operating	8/31/2013			3	1	Y	SUN
678	South Carolina	PV	2.500	Operating	12/21/2013			2	1	Y	SUN
679	Massachusetts	PV	2.000	Operating	5/1/2014			2	1	Y	SUN
680	Massachusetts	PV	4.800	Operating	8/1/2012			4	1	Y	SUN
681	Arizona	PV	5.000	Operating	11/30/2014			1	1	Y	SUN
682	Arizona	PV	5.000	Operating	2/20/2013			3	1	Y	SUN
683	Arizona	PV	4.200	Operating	12/31/2010			5	1	Y	SUN
684	Arizona	PV	2.800	Operating	1/1/2012			4	1	Y	SUN
685	Arizona	PV	2.800	Operating	1/1/2012			4	1	Y	SUN
686	North Carolina	PV	5.000	Operating	9/1/2014			2	1	Y	SUN
687	North Carolina	PV	4.500	Operating	12/1/2015			0	1	Y	SUN
688	North Carolina	PV	5.000	Operating	5/1/2016			0	1	Y	SUN
689	California	PV	2.000	Operating	4/1/2015			1	1	Y	SUN
690	Massachusetts	PV	2.750	Operating	7/2/2014			2	1	Y	SUN
691	Colorado	PV	2.280	Operating	12/5/2012			3	1	Y	SUN
692	North Carolina	PV	3.900	Operating	12/1/2014			1	1	Y	SUN
693	Tennessee	PV	4.200	Operating	3/1/2012			4		Y	SUN
694	Texas	PV	2.300	Operating	1/23/2013			3	1	Y	SUN
695	Texas	PV	2.600	Operating	12/31/2011			4		Y	SUN
696	California	PV	3.500	Operating	8/31/2012			4	1	Y	SUN
697	Arizona	PV	2.900	Operating	1/1/2010			6	1	Y	SUN
698	California	PV	2.300	Operating	4/5/2011			5	1	Y	SUN
699	California	PV	2.700	Operating	12/1/2013			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
700	Indiana	PV	2.000	Operating	7/14/2011			5	1	Y	SUN
701	Colorado	PV	3.200	Operating	12/15/2010			5	1	Y	SUN
702	Colorado	PV	3.500	Operating	11/18/2011			4	1	Y	SUN
703	Virgin Islands	PV	4.999	Operating	11/18/2015			0	1	Y	SUN
704	Massachusetts	PV	2.850	Operating	8/16/2013			3	1	Y	SUN
705	North Carolina	PV	5.000	Operating	1/1/2015			1	1	Y	SUN
706	North Carolina	PV	4.900	Operating	1/1/2016			0	1	Y	SUN
707	New York	PV	2.200	Operating	11/30/2014			1	1	Y	SUN
708	Vermont	PV	3.968	Operating	5/5/2015			1	1	Y	SUN
709	Vermont	PV	2.030	Operating	5/16/2016			0	1	Y	SUN
710	North Carolina	PV	2.000	Operating	8/1/2014			2	1	Y	SUN
711	North Carolina	PV	5.000	Operating	5/1/2015			1	1	Y	SUN
712	California	PV	5.000	Operating	8/26/2015			1	1	Y	SUN
713	California	PV	5.000	Operating	8/25/2015			1	1	Y	SUN
714	North Carolina	PV	5.000	Operating	11/1/2013			2		Y	SUN
715	North Carolina	PV	5.000	Operating	1/15/2014			2	1	Y	SUN
716	Massachusetts	PV	2.400	Operating	4/1/2014			2	1	Y	SUN
717	North Carolina	PV	4.000	Operating	12/1/2012			3	1	Y	SUN
718	North Carolina	PV	5.000	Operating	12/31/2013			2	1	Y	SUN
719	North Carolina	PV	5.000	Operating	12/31/2013			2	1	Y	SUN
720	North Carolina	PV	5.000	Operating	6/30/2012			4		Y	SUN
721	North Carolina	PV	5.000	Operating	3/15/2014			2	1	Y	SUN
722	North Carolina	PV	5.000	Operating	6/1/2014			2	1	Y	SUN
723	North Carolina	PV	5.000	Operating	6/1/2014			2	1	Y	SUN
724	North Carolina	PV	5.000	Operating	6/1/2014			2	1	Y	SUN
725	Maryland	PV	2.500	Operating	8/31/2015			1	1	Y	SUN
726	Vermont	PV	2.000	Operating	9/1/2014			2	1	Y	SUN
727	California	PV	3.000	Operating	12/31/2015			0	1	Y	SUN
728	North Carolina	PV	5.000	Operating	9/1/2015			1	1	Y	SUN
729	Massachusetts	PV	2.200	Operating	4/1/2014			2	1	Y	SUN
730	Massachusetts	PV	2.300	Operating	12/21/2011			4		Y	SUN
731	Massachusetts	PV	3.200	Operating	5/1/2014			2		Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
732	California	PV	2.000	Operating	5/7/2016			0	1	Y	SUN
733	California	PV	2.000	Operating	7/26/2016			0		Y	SUN
734	Massachusetts	PV	3.000	Operating	10/4/2013			3	1	Y	SUN
735	Massachusetts	PV	3.000	Operating	11/12/2013			2	1	Y	SUN
736	Massachusetts	PV	2.400	Operating	7/30/2013			3	1	Y	SUN
737	Massachusetts	PV	3.400	Operating	4/24/2013			3	1	Y	SUN
738	New York	PV	2.000	Operating	12/1/2015			0	1	Y	SUN
739	North Carolina	PV	5.000	Operating	7/1/2016			0	1	Y	SUN
740	North Carolina	PV	5.000	Operating	9/1/2013			3	1	Y	SUN
741	California	PV	3.330	Operating	2/28/2016			0	1	Y	SUN
742	North Carolina	PV	2.740	Operating	10/19/2015			1	1	Y	SUN
743	North Carolina	PV	4.990	Operating	12/1/2014			1	1	Y	SUN
744	North Carolina	PV	5.000	Operating	6/1/2013			3	1	Y	SUN
745	Puerto Rico	PV	3.195	Operating	6/28/2011			5	1	Y	SUN
746	North Carolina	PV	5.000	Operating	12/31/2013			2	1	Y	SUN
747	North Carolina	PV	4.990	Operating	12/1/2014			1	1	Y	SUN
748	North Carolina	PV	4.999	Operating	2/1/2016			0	1	Y	SUN
749	North Carolina	PV	5.000	Operating	12/1/2015			0	1	Y	SUN
750	North Carolina	PV	4.999	Operating	4/1/2016			0	1	Y	SUN
751	New Jersey	PV	4.200	Operating	11/17/2011			4		Y	SUN
752	Rhode Island	PV	2.000	Operating	12/6/2013			2	1	Y	SUN
753	North Carolina	PV	3.000	Operating	6/1/2015			1	1	Y	SUN
754	North Carolina	PV	3.500	Operating	12/1/2015			0	1	Y	SUN
755	North Carolina	PV	4.900	Operating	12/1/2015			0	1	Y	SUN
756	North Carolina	PV	5.000	Operating	12/1/2013			2	1	Y	SUN
757	North Carolina	PV	5.000	Operating	4/1/2015			1	1	Y	SUN
758	California	PV	2.500	Operating	7/1/2013			3	1	Y	SUN
759	California	PV	2.500	Operating	7/31/2013			3	1	Y	SUN
760	California	PV	3.800	Operating	12/31/2013			2	1	Y	SUN
761	North Carolina	PV	2.116	Operating	10/6/2015			1	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
31	Delaware	PV	0.300	Operating	12/1/2011			4		Y	SUN
32	Delaware	PV	0.500	Operating	12/1/2011			4		Y	SUN
33	New Jersey	PV	0.277	Operating	12/19/2005			10	1	Y	SUN
34	New Jersey	PV	0.223	Operating	7/1/2006			10	1	Y	SUN
35	Texas	PV	0.300	Retired	7/1/1987	6/30/2001		14	1	Y	SUN
36	North Carolina	PV	0.002	Operating	10/31/2008			7	1	Y	SUN
37	North Carolina	PV	0.075	Operating	12/31/2008			7	1	Y	SUN
38	California	PV	0.500	Operating	2/5/2014			2	1	Y	SUN
39	California	PV	0.500	Operating	2/5/2014			2	1	Y	SUN
40	North Carolina	PV	0.002	Operating	5/19/2008			8	1	Y	SUN
41	New Mexico	PV	0.007	Operating	3/31/2009			7	1	Y	SUN
42	North Carolina	PV	0.004	Operating	8/1/2008			8	1	Y	SUN
43	North Carolina	PV	0.500	Operating	11/30/2012			3		Y	SUN
44	Florida	PV	0.120	Operating	6/30/2010			6		Y	SUN
45	Nevada	PV	0.110	Operating	12/31/2011			4	1	Y	SUN
46	California	PV	0.080	Operating	6/30/2008			8	1	Y	SUN
47	North Carolina	PV	0.004	Operating	3/31/2009			7	1	Y	SUN
48	Massachusetts	PV	0.456	Operating	4/1/2011			5		Y	SUN
49	North Carolina	PV	0.004	Operating	2/1/2009			7	1	Y	SUN
50	North Carolina	PV	0.002	Operating	5/1/2008			8	1	Y	SUN
51	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
52	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
53	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
54	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
55	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
56	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
57	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
58	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
59	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
60	Iowa	PV	0.240	Operating	7/27/2013			3	1	Y	SUN
61	California	PV	0.200	Operating	2/20/2003			13	1	Y	SUN
62	California	PV	0.300	Operating	12/1/2005			10	1	Y	SUN
63	California	PV	0.345	Operating	6/1/2007			9	1	Y	SUN
64	California	PV	0.250	Operating	8/1/2010			6	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
65	California	PV	0.300	Operating	1/1/2012			4	1	N	SUN
66	California	PV	0.300	Operating	1/1/2012			4	1	N	SUN
67	California	PV	0.300	Operating	1/1/2012			4	1	N	SUN
68	Pennsylvania	PV	0.400	Operating	10/1/2010			6		Y	SUN
69	North Carolina	PV	0.008	Operating	12/1/2008			7	1	Y	SUN
70	North Carolina	PV	0.002	Operating	9/27/2007			9	1	Y	SUN
71	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
72	California	PV	0.350	Operating	7/20/2011			5	1	Y	SUN
73	New York	PV	0.500	Operating	3/11/2012			4	1	Y	SUN
74	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
75	North Carolina	PV	0.468	Operating	5/1/2007			9	1	Y	SUN
76	New Mexico	PV	0.005	Operating	12/20/2007			8	1	Y	SUN
77	New Mexico	PV	0.004	Operating	1/2/2009			7	1	Y	SUN
78	North Carolina	PV	0.002	Operating	8/1/2007			9	1	Y	SUN
79	Colorado	PV	0.496	Operating	4/1/2013			3	1	Y	SUN
80	Colorado	PV	0.496	Operating	1/1/2015			1	1	Y	SUN
81	Colorado	PV	0.499	Operating	10/1/2013			3	1	Y	SUN
82	Colorado	PV	0.499	Operating	10/1/2013			3	1	Y	SUN
83	Colorado	PV	0.497	Operating	1/1/2011			5	1	Y	SUN
84	Colorado	PV	0.499	Operating	10/1/2013			3	1	Y	SUN
85	Colorado	PV	0.400	Operating	5/28/2015			1	1	Y	SUN
86	Oregon	PV	0.403	Operating	4/27/2016			0	1	Y	SUN
87	New Mexico	PV	0.003	Operating	3/27/2009			7	1	Y	SUN
88	North Dakota	PV	0.002	Operating	5/20/2009			7	1	Y	SUN
89	North Carolina	PV	0.003	Operating	12/1/2007			8	1	Y	SUN
90	Ohio	PV	0.002	Operating	7/1/2004			12	2	Y	SUN
91	Maryland	PV	0.300	Operating	4/25/2012			4	1	Y	SUN
92	Massachusetts	PV	0.400	Operating	12/31/2008			7	1	Y	SUN
93	Arizona	PV	0.410	Operating	11/12/2012			3	1	Y	SUN
94	California	PV	0.051	Operating	3/1/2014			2	1	Y	SUN
95	California	PV	0.500	Operating	11/1/2011			4	1	N	SUN
96	North Carolina	PV	0.005	Operating	4/1/2009			7	1	Y	SUN
97	North Carolina	PV	0.003	Operating	2/29/2008			8	1	Y	SUN
98	South Carolina	PV	0.002	Operating	3/1/2008			8	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
99	North Carolina	PV	0.002	Operating	12/31/2008			7	1	Y	SUN
100	North Carolina	PV	0.003	Operating	12/31/2008			7	1	Y	SUN
101	North Carolina	PV	0.027	Operating	1/1/2008			8	1	Y	SUN
102	North Carolina	PV	0.055	Operating	12/15/2007			8	1	Y	SUN
103	Texas	PV	0.003	Operating	4/1/2008			8	1	Y	SUN
104	North Carolina	PV	0.210	Operating	1/1/2007			9	1	Y	SUN
105	Texas	PV	0.004	Operating	12/27/2007			8	1	Y	SUN
106	North Carolina	PV	0.002	Operating	9/1/2007			9	1	Y	SUN
107	Michigan	PV	0.220	Operating	1/1/2011			5	1	Y	SUN
108	Michigan	PV	0.060	Operating	1/1/2010			6	1	Y	SUN
109	Michigan	PV	0.400	Operating	1/1/2012			4	1	Y	SUN
110	Michigan	PV	0.391	Operating	1/1/2011			5	1	Y	SUN
111	Michigan	PV	0.250	Operating	3/11/2011			5		Y	SUN
112	North Carolina	PV	0.004	Operating	11/15/2008			7	1	Y	SUN
113	Pennsylvania	PV	0.300	Operating	6/30/2011			5	1	Y	SUN
114	North Carolina	PV	0.004	Operating	11/1/2008			7	1	Y	SUN
115	North Carolina	PV	0.001	Operating	3/1/2008			8	1	Y	SUN
116	Texas	PV	0.014	Operating	2/1/2012			4	1	Y	SUN
117	Texas	PV	0.060	Operating	1/1/2009			7	1	Y	SUN
118	New Mexico	PV	0.060	Operating	1/1/2009			7	1	Y	SUN
119	Texas	PV	0.031	Operating	1/1/2012			4	1	Y	SUN
120	Texas	PV	0.015	Operating	8/28/2013			3	1	Y	SUN
121	Texas	PV	0.048	Operating	10/1/2011			5	1	Y	SUN
122	Iowa	PV	0.003	Operating	10/31/2008			7	1	Y	SUN
123	North Carolina	PV	0.010	Operating	2/28/2009			7	1	Y	SUN
124	North Carolina	PV	0.002	Operating	3/1/2009			7	1	Y	SUN
125	California	PV	0.059	Operating	1/3/2009			7	1	N	SUN
126	North Carolina	PV	0.001	Operating	9/1/2008			8	1	Y	SUN
127	Michigan	PV	0.250	Operating	3/11/2011			5		Y	SUN
128	Massachusetts	PV	0.300	Operating	12/1/2011			4	1	Y	SUN
129	North Carolina	PV	0.002	Operating	3/27/2008			8	1	Y	SUN
130	Colorado	PV	0.500	Operating	11/19/2014			1	1	Y	SUN
131	North Carolina	PV	0.001	Operating	10/1/2008			8	1	Y	SUN
132	North Carolina	PV	0.002	Operating	4/25/2008			8	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
133	California	PV	0.322	Operating	9/1/2009			7	1	N	SUN
134	North Carolina	PV	0.002	Operating	12/1/2008			7	1	Y	SUN
135	Georgia	PV	0.350	Operating	4/6/2011			5	1	Y	SUN
136	Georgia	PV	0.350	Operating	4/1/2012			4	1	Y	SUN
137	North Carolina	PV	0.004	Operating	9/1/2008			8	1	Y	SUN
138	North Carolina	PV	0.005	Operating	2/15/2009			7	1	Y	SUN
139	California	PV	0.500	Operating	12/1/2010			5		Y	SUN
140	North Carolina	PV	0.002	Operating	5/20/2008			8	1	Y	SUN
141	North Carolina	PV	0.058	Operating	11/15/2008			7	1	Y	SUN
142	Colorado	PV	0.500	Operating	6/11/2015			1	1	Y	SUN
143	Colorado	PV	0.497	Operating	6/11/2015			1	1	Y	SUN
144	Colorado	PV	0.500	Operating	11/29/2011			4	1	Y	SUN
145	North Carolina	PV	0.002	Operating	1/23/2009			7	1	Y	SUN
146	Missouri	PV	0.089	Operating	10/23/2009			6		Y	SUN
147	Vermont	PV	0.050	Operating	1/1/2013			3	1	Y	SUN
148	New Mexico	PV	0.001	Operating	12/15/2008			7	1	Y	SUN
149	North Carolina	PV	0.004	Operating	1/1/2008			8	1	Y	SUN
150	North Carolina	PV	0.010	Operating	12/1/2007			8	1	Y	SUN
151	North Carolina	PV	0.002	Operating	12/1/2007			8	1	Y	SUN
152	North Carolina	PV	0.002	Operating	3/1/2008			8	1	Y	SUN
153	Iowa	PV	0.004	Operating	6/1/2008			8	1	Y	SUN
154	North Carolina	PV	0.003	Operating	10/31/2008			7	1	Y	SUN
155	North Carolina	PV	0.008	Operating	3/1/2008			8	1	Y	SUN
156	Colorado	PV	0.498	Operating	5/17/2011			5	1	Y	SUN
157	California	PV	0.290	Operating	4/13/2011			5	1	Y	SUN
158	Michigan	PV	0.240	Operating	1/27/2016			0	1	Y	SUN
159	California	PV	0.248	Operating	8/3/2011			5	1	Y	SUN
160	California	PV	0.451	Operating	9/28/2011			5	1	Y	SUN
161	California	PV	0.302	Operating	6/22/2011			5	1	Y	SUN
162	California	PV	0.251	Operating	8/23/2011			5	1	Y	SUN
163	North Carolina	PV	0.004	Operating	10/31/2008			7	1	Y	SUN
164	North Carolina	PV	0.004	Operating	2/28/2008			8	1	Y	SUN
165	North Carolina	PV	0.002	Operating	4/25/2008			8	1	Y	SUN
166	North Carolina	PV	0.004	Operating	3/15/2009			7	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
167	North Carolina	PV	0.002	Operating	6/15/2008			8	1	Y	SUN
168	New Mexico	PV	0.003	Operating	10/24/2008			7	1	Y	SUN
169	North Carolina	PV	0.002	Operating	3/31/2008			8	1	Y	SUN
170	North Carolina	PV	0.003	Operating	8/1/2008			8	1	Y	SUN
171	North Carolina	PV	0.003	Operating	10/31/2008			7	1	Y	SUN
172	North Carolina	PV	0.010	Operating	5/1/2009			7	1	Y	SUN
173	North Carolina	PV	0.007	Operating	10/28/2008			7	1	Y	SUN
174	North Carolina	PV	0.076	Operating	2/1/2008			8	1	Y	SUN
175	North Carolina	PV	0.004	Operating	4/1/2009			7	1	Y	SUN
176	North Carolina	PV	0.003	Operating	4/30/2009			7	1	Y	SUN
177	Texas	PV	0.003	Operating	8/14/2008			8	1	Y	SUN
178	North Carolina	PV	0.004	Operating	6/1/2008			8	1	Y	SUN
179	New Mexico	PV	0.004	Operating	3/30/2009			7	1	Y	SUN
180	North Carolina	PV	0.023	Operating	12/15/2008			7	1	Y	SUN
181	North Carolina	PV	0.003	Operating	12/31/2007			8	1	Y	SUN
182	North Carolina	PV	0.004	Operating	1/12/2009			7	1	Y	SUN
183	North Carolina	PV	0.002	Operating	6/1/2008			8	1	Y	SUN
184	North Carolina	PV	0.001	Operating	1/1/2008			8	1	Y	SUN
185	North Carolina	PV	0.002	Operating	8/1/2007			9	1	Y	SUN
186	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
187	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
188	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
189	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
190	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
191	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
192	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
193	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
194	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
195	California	PV	0.100	Operating	1/1/2009			7	1	Y	SUN
196	Arizona	PV	0.500	Operating	9/18/2011			5	1	Y	SUN
197	New Mexico	PV	0.500	Operating	1/1/2010			6	1	Y	SUN
198	New Mexico	PV	0.100	Operating	2/1/2011			5	1	N	SUN
199	New Mexico	PV	0.500	Operating	8/1/2009			7	1	N	SUN
200	North Carolina	PV	0.003	Operating	10/15/2008			8	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
201	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
202	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
203	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
204	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
205	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
206	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
207	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
208	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
209	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
210	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
211	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
212	Hawaii	PV	0.125	Operating	12/31/2008			7	1	Y	SUN
213	North Carolina	PV	0.002	Operating	12/12/2007			8	1	Y	SUN
214	Nevada	PV	0.353	Operating	7/31/2006			10	1695	Y	SUN
215	Nevada	PV	0.330	Operating	9/30/2006			10	1590	Y	SUN
216	Nevada	PV	0.409	Operating	7/2/2007			9	2200	Y	SUN
217	North Carolina	PV	0.004	Operating	9/15/2008			8	1	Y	SUN
218	North Carolina	PV	0.002	Operating	4/30/2008			8	1	Y	SUN
219	California	PV	0.500	Operating	12/31/2015			0	1	Y	SUN
220	California	PV	0.400	Operating	4/1/2011			5		Y	SUN
221	North Carolina	PV	0.004	Operating	11/15/2008			7	1	Y	SUN
222	North Carolina	PV	0.004	Operating	1/1/2009			7	1	Y	SUN
223	North Carolina	PV	0.004	Operating	10/1/2007			9	2	Y	SUN
224	North Carolina	PV	0.002	Operating	2/28/2007			9	1	Y	SUN
225	New Mexico	PV	0.001	Operating	7/1/2008			8	1	Y	SUN
226	Massachusetts	PV	0.100	Operating	5/1/2008			8		Y	SUN
227	Massachusetts	PV	0.180	Operating	11/30/2009			6		Y	SUN
228	North Carolina	PV	0.008	Operating	3/13/2008			8	1	Y	SUN
229	Illinois	PV	0.003	Operating	12/1/2007			8	1	Y	SUN
230	Arizona	PV	0.500	Operating	11/1/2011			4	1	Y	SUN
231	Arizona	PV	0.500	Operating	11/1/2011			4	1	Y	SUN
232	North Carolina	PV	0.003	Operating	1/15/2008			8	1	Y	SUN
233	North Carolina	PV	0.001	Operating	3/4/2008			8	1	Y	SUN
234	New Jersey	PV	0.500	Operating	12/1/2013			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
235	Colorado	PV	0.200	Operating	10/10/2008			8	1	Y	SUN
236	Colorado	PV	0.200	Operating	10/10/2008			8	1	Y	SUN
237	Colorado	PV	0.200	Operating	10/10/2008			8	1	Y	SUN
238	Colorado	PV	0.500	Operating	10/10/2008			8	1	Y	SUN
239	Colorado	PV	0.500	Operating	10/10/2008			8	1	Y	SUN
240	California	PV	0.500	Operating	12/1/2007			8	1	Y	SUN
241	California	PV	0.500	Operating	12/1/2007			8	1	Y	SUN
242	California	PV	0.300	Operating	10/1/2008			8	1	Y	SUN
243	California	PV	0.300	Operating	10/1/2008			8	1	Y	SUN
244	California	PV	0.300	Operating	10/1/2008			8	1	Y	SUN
245	California	PV	0.300	Operating	10/1/2008			8	1	Y	SUN
246	California	PV	0.500	Operating	5/1/2008			8		Y	SUN
247	California	PV	0.500	Operating	5/1/2008			8		Y	SUN
248	California	PV	0.161	Operating	7/11/2008			8	1	N	SUN
249	California	PV	0.134	Operating	9/3/2008			8	1	N	SUN
250	California	PV	0.227	Operating	9/20/2008			8	1	N	SUN
251	California	PV	0.405	Operating	9/20/2008			8	1	N	SUN
252	California	PV	0.259	Operating	5/21/2008			8	1	N	SUN
253	California	PV	0.046	Operating	9/20/2008			8	1	N	SUN
254	California	PV	0.278	Operating	9/20/2008			8	1	N	SUN
255	California	PV	0.475	Operating	9/20/2008			8	1	N	SUN
256	California	PV	0.193	Operating	7/9/2008			8	1	N	SUN
257	California	PV	0.207	Operating	7/31/2008			8	1	N	SUN
258	California	PV	0.407	Operating	5/28/2008			8	1	N	SUN
259	California	PV	0.216	Operating	7/29/2008			8	1	N	SUN
260	California	PV	0.350	Operating	10/1/2008			8	1	N	SUN
261	California	PV	0.362	Operating	12/19/2008			7	1	Y	SUN
262	California	PV	0.210	Operating	12/19/2008			7	1	Y	SUN
263	California	PV	0.262	Operating	12/19/2008			7	1	Y	SUN
264	California	PV	0.300	Operating	11/17/2008			7	1	Y	SUN
265	California	PV	0.300	Operating	11/17/2008			7	1	Y	SUN
266	California	PV	0.300	Operating	11/17/2008			7	1	Y	SUN
267	California	PV	0.300	Operating	11/17/2008			7	1	Y	SUN
268	North Carolina	PV	0.002	Operating	3/4/2008			8	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
269	Missouri	PV	0.042	Operating	4/30/2007			9		Y	SUN
270	California	PV	0.101	Operating	2/14/2008			8	1	Y	SUN
271	California	PV	0.078	Operating	2/14/2008			8	1	Y	SUN
272	California	PV	0.325	Operating	12/19/2008			7	1	Y	SUN
273	Massachusetts	PV	0.101	Operating	12/31/2007			8	1	Y	SUN
274	Colorado	PV	0.500	Operating	9/1/2011			5	1	Y	SUN
275	Colorado	PV	0.500	Operating	12/1/2010			5	1	Y	SUN
276	Colorado	PV	0.400	Operating	2/1/2012			4	1	Y	SUN
277	Colorado	PV	0.100	Operating	6/1/2009			7	1	Y	SUN
278	Colorado	PV	0.500	Operating	9/1/2011			5	1	Y	SUN
279	Tennessee	PV	0.470	Operating	1/18/2011			5		Y	SUN
280	New Jersey	PV	0.105	Operating	11/17/2007			8	1	Y	SUN
281	New Jersey	PV	0.300	Operating	12/16/2008			7	1	Y	SUN
282	New Jersey	PV	0.100	Operating	12/16/2008			7	1	Y	SUN
283	Connecticut	PV	0.300	Operating	12/10/2008			7	1	Y	SUN
284	New Jersey	PV	0.121	Operating	9/4/2007			9	1	Y	SUN
285	North Carolina	PV	0.003	Operating	4/10/2008			8	1	Y	SUN
286	Nevada	PV	0.019	Operating	1/1/2005			11	1	Y	SUN
287	Nevada	PV	0.120	Operating	1/1/2005			11	1	Y	SUN
288	New Jersey	PV	0.412	Operating	2/23/2009			7	1	Y	SUN
289	New York	PV	0.480	Out of Service	6/1/1996			20	1	Y	SUN
290	Utah	PV	0.500	Operating	5/24/2012			4		Y	SUN
291	Michigan	PV	0.030	Operating	4/1/2007			9	1	Y	SUN
292	North Carolina	PV	0.500	Operating	4/30/2012			4	1	Y	SUN
293	North Carolina	PV	0.500	Operating	4/30/2012			4	1	Y	SUN
294	North Carolina	PV	0.500	Operating	4/30/2012			4	1	Y	SUN
295	North Carolina	PV	0.500	Operating	4/30/2012			4	1	Y	SUN
296	North Carolina	PV	0.500	Operating	2/1/2013			3	1	Y	SUN
297	North Carolina	PV	0.500	Operating	2/1/2013			3	1	Y	SUN
298	North Carolina	PV	0.500	Operating	2/1/2013			3	1	Y	SUN
299	North Carolina	PV	0.500	Operating	2/1/2013			3	1	Y	SUN
300	Minnesota	PV	0.000	Operating	1/1/1995			21	1	N	SUN
301	New Jersey	PV	0.200	Operating	5/1/2007			9	1	Y	SUN
302	Virginia	PV	0.002	Retired	12/1/1985	3/31/1995		9	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
303	Virginia	PV	0.002	Retired	12/1/1985	3/31/1995		9	1	Y	SUN
304	Virginia	PV	0.002	Retired	12/1/1985	3/31/1995		9	1	Y	SUN
305	North Carolina	PV	0.007	Operating	9/15/2008			8	1	Y	SUN
306	California	PV	0.122	Operating	6/29/2007			9	1	Y	SUN
307	California	PV	0.203	Operating	8/1/2007			9	1	Y	SUN
308	California	PV	0.500	Retired	1/1/1980	6/1/1993		13	1	N	SUN
309	North Carolina	PV	0.005	Operating	8/31/2007			9	1	Y	SUN
310	North Carolina	PV	0.004	Operating	3/1/2008			8	24	Y	SUN
311	North Carolina	PV	0.003	Operating	3/1/2008			8	1	Y	SUN
312	New York	PV	0.005	Operating	3/9/2007			9	1	Y	SUN
313	New Jersey	PV	0.500	Operating	3/5/2009			7	1	Y	SUN
314	New Jersey	PV	0.500	Operating	3/5/2009			7		Y	SUN
315	New Jersey	PV	0.500	Operating	3/5/2009			7		Y	SUN
316	New Jersey	PV	0.500	Operating	3/5/2009			7		Y	SUN
317	California	PV	0.385	Operating	2/28/2011			5	1	Y	SUN
318	North Carolina	PV	0.003	Operating	8/30/2008			8	1	Y	SUN
319	Hawaii	PV	0.243	Operating	12/1/2008			7	1	Y	SUN
320	North Carolina	PV	0.002	Operating	3/1/2009			7	1	Y	SUN
321	Pennsylvania	PV	0.500	Operating	5/1/2010			6		Y	SUN
322	Pennsylvania	PV	0.400	Operating	2/1/2012			4		Y	SUN
323	Pennsylvania	PV	0.400	Operating	2/1/2012			4		Y	SUN
324	New Mexico	PV	0.500	Operating	9/21/2011			5	1	Y	SUN
325	New Jersey	PV	0.500	Operating	3/16/2011			5		Y	SUN
326	Washington	PV	0.500	Operating	10/31/2007			8	1	Y	SUN
327	North Carolina	PV	0.003	Operating	8/15/2008			8	1	Y	SUN
328	North Carolina	PV	0.002	Operating	10/9/2007			9	1	Y	SUN
329	California	PV	0.400	Operating	12/26/2011			4	1	Y	SUN
330	Illinois	PV	0.002	Operating	2/5/2007			9	1	Y	SUN
331	New Jersey	PV	0.500	Operating	10/1/2009			7	1	Y	SUN
332	New Jersey	PV	0.200	Operating	4/1/2009			7	1	Y	SUN
333	New Jersey	PV	0.200	Operating	4/1/2009			7	1	Y	SUN
334	New Jersey	PV	0.300	Operating	2/1/2009			7	1	Y	SUN
335	Virginia	PV	0.008	Operating	2/28/2009			7	1	Y	SUN
336	New Mexico	PV	0.003	Operating	1/19/2009			7	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
337	Mississippi	PV	0.003	Operating	10/30/2008			7	1	Y	SUN
338	Illinois	PV	0.066	Operating	5/1/2008			8	1	Y	SUN
339	Illinois	PV	0.300	Operating	11/1/2014			1	1	Y	SUN
340	North Carolina	PV	0.002	Operating	2/28/2008			8	1	Y	SUN
341	North Carolina	PV	0.005	Operating	2/18/2008			8	1	Y	SUN
342	North Carolina	PV	0.004	Operating	1/31/2009			7	1	Y	SUN
343	North Carolina	PV	0.002	Operating	8/1/2008			8	1	Y	SUN
344	North Carolina	PV	0.005	Operating	2/28/2007			9	1	Y	SUN
345	California	PV	0.200	Operating	6/1/1994			22	1	Y	SUN
346	Arizona	PV	0.200	Operating	6/1/2001			15	1	Y	SUN
347	Arizona	PV	0.100	Operating	9/1/1998			18	1	Y	SUN
348	Arizona	PV	0.100	Operating	3/1/1999			17	1	Y	SUN
349	North Carolina	PV	0.007	Operating	1/1/2008			8	1	Y	SUN
350	North Carolina	PV	0.004	Operating	6/1/2008			8	1	Y	SUN
351	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
352	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
353	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
354	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
355	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
356	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
357	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
358	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
359	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
360	North Carolina	PV	0.500	Operating	12/1/2014			1	1	Y	SUN
361	New Mexico	PV	0.002	Operating	7/1/2007			9	1	Y	SUN
362	North Carolina	PV	0.002	Operating	3/26/2009			7	1	Y	SUN
363	North Carolina	PV	0.500	Operating	12/17/2008			7	1	Y	SUN
364	North Carolina	PV	0.500	Operating	12/17/2008			7		Y	SUN
365	North Carolina	PV	0.500	Operating	3/31/2010			6		Y	SUN
366	North Carolina	PV	0.500	Operating	3/31/2010			6		Y	SUN
367	North Carolina	PV	0.008	Operating	5/13/2008			8	1	Y	SUN
368	North Carolina	PV	0.002	Operating	12/1/2007			8	1	Y	SUN
369	North Carolina	PV	0.001	Operating	12/1/2007			8	1	Y	SUN
370	New Mexico	PV	0.350	Operating	1/16/2013			3	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
371	Nevada	PV	0.076	Operating	1/1/2007			9	1	Y	SUN
372	California	PV	0.112	Operating	8/29/2014			2		Y	SUN
373	California	PV	0.390	Operating	11/30/2007			8	1	Y	SUN
374	California	PV	0.500	Operating	12/29/2008			7	1	Y	SUN
375	Massachusetts	PV	0.417	Operating	1/15/2016			0	1	Y	SUN
376	Massachusetts	PV	0.301	Operating	3/23/2016			0	1	Y	SUN
377	California	PV	0.500	Operating	1/1/2010			6	1	N	SUN
378	California	PV	0.500	Operating	1/1/2010			6	1	N	SUN
379	Oregon	PV	0.435	Operating	12/31/2012			3	1	Y	SUN
380	Oregon	PV	0.300	Operating	12/31/2012			3	1	Y	SUN
381	California	PV	0.400	Operating	5/1/2009			7	1	Y	SUN
382	California	PV	0.500	Retired	8/7/2008	11/30/2011		3	1	Y	SUN
383	California	PV	0.500	Retired	8/7/2008	11/30/2011		3	1	Y	SUN
384	California	PV	0.500	Retired	8/7/2008	11/30/2011		3	1	Y	SUN
385	California	PV	0.500	Retired	8/7/2008	11/30/2011		3	1	Y	SUN
386	California	PV	0.500	Operating	9/24/2009			7	1	Y	SUN
387	California	PV	0.500	Operating	9/24/2009			7	1	Y	SUN
388	California	PV	0.500	Operating	7/19/2010			6	1	Y	SUN
389	California	PV	0.500	Operating	7/19/2010			6	1	Y	SUN
390	California	PV	0.500	Operating	12/27/2010			5	1	Y	SUN
391	California	PV	0.500	Operating	12/27/2010			5	1	Y	SUN
392	California	PV	0.500	Operating	12/27/2010			5	1	Y	SUN
393	California	PV	0.500	Operating	12/27/2010			5	1	Y	SUN
394	California	PV	0.500	Operating	12/27/2010			5	1	Y	SUN
395	California	PV	0.500	Operating	1/10/2011			5	1	Y	SUN
396	California	PV	0.500	Operating	1/10/2011			5	1	Y	SUN
397	California	PV	0.500	Operating	1/10/2011			5	1	Y	SUN
398	California	PV	0.500	Operating	1/10/2011			5	1	Y	SUN
399	California	PV	0.500	Operating	12/29/2010			5	1	Y	SUN
400	California	PV	0.500	Operating	12/29/2010			5	1	Y	SUN
401	California	PV	0.500	Operating	12/29/2010			5	1	Y	SUN
402	California	PV	0.500	Operating	12/29/2010			5	1	Y	SUN
403	California	PV	0.500	Operating	12/29/2010			5	1	Y	SUN
404	California	PV	0.500	Operating	12/30/2010			5	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
405	California	PV	0.500	Operating	12/30/2010			5	1	Y	SUN
406	California	PV	0.500	Operating	12/30/2010			5	1	Y	SUN
407	California	PV	0.500	Operating	12/30/2010			5	1	Y	SUN
408	California	PV	0.500	Operating	1/10/2011			5	1	Y	SUN
409	California	PV	0.500	Operating	1/10/2011			5	1	Y	SUN
410	California	PV	0.500	Operating	5/18/2011			5	1	Y	SUN
411	California	PV	0.500	Operating	5/18/2011			5	1	Y	SUN
412	California	PV	0.500	Operating	5/18/2011			5	1	Y	SUN
413	California	PV	0.500	Operating	11/10/2011			4	1	Y	SUN
414	California	PV	0.500	Operating	11/10/2011			4	1	Y	SUN
415	California	PV	0.500	Operating	11/10/2011			4	1	Y	SUN
416	California	PV	0.500	Operating	11/10/2011			4	1	Y	SUN
417	California	PV	0.500	Operating	11/10/2011			4	1	Y	SUN
418	California	PV	0.500	Operating	11/10/2011			4	1	Y	SUN
419	California	PV	0.500	Operating	11/10/2011			4	1	Y	SUN
420	California	PV	0.500	Operating	12/29/2010			5	1	Y	SUN
421	California	PV	0.500	Operating	9/15/2011			5	1	Y	SUN
422	California	PV	0.500	Operating	9/15/2011			5	1	Y	SUN
423	California	PV	0.500	Operating	9/15/2011			5	1	Y	SUN
424	California	PV	0.500	Operating	9/15/2011			5	1	Y	SUN
425	California	PV	0.500	Operating	9/15/2011			5	1	Y	SUN
426	California	PV	0.500	Operating	9/15/2011			5	1	Y	SUN
427	California	PV	0.500	Operating	9/15/2011			5	1	Y	SUN
428	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
429	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
430	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
431	California	PV	0.500	Operating	1/1/2013			3	1	Y	SUN
432	California	PV	0.500	Operating	1/1/2013			3	1	Y	SUN
433	California	PV	0.500	Operating	1/1/2013			3	1	Y	SUN
434	California	PV	0.500	Operating	1/1/2013			3	1	Y	SUN
435	California	PV	0.500	Operating	5/18/2011			5	1	Y	SUN
436	California	PV	0.500	Operating	5/18/2011			5	1	Y	SUN
437	California	PV	0.500	Operating	5/18/2011			5	1	Y	SUN
438	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
439	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
440	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
441	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
442	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
443	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
444	California	PV	0.500	Operating	12/16/2011			4	1	Y	SUN
445	California	PV	0.500	Operating	5/23/2011			5	1	Y	SUN
446	California	PV	0.500	Operating	5/23/2011			5	1	Y	SUN
447	California	PV	0.500	Operating	5/23/2011			5	1	Y	SUN
448	California	PV	0.500	Operating	11/15/2010			5	1	Y	SUN
449	California	PV	0.500	Operating	11/15/2010			5	1	Y	SUN
450	California	PV	0.500	Operating	11/15/2010			5	1	Y	SUN
451	California	PV	0.500	Operating	11/15/2010			5	1	Y	SUN
452	California	PV	0.500	Operating	5/12/2011			5	1	Y	SUN
453	California	PV	0.500	Operating	5/12/2011			5	1	Y	SUN
454	California	PV	0.500	Operating	5/12/2011			5	1	Y	SUN
455	California	PV	0.500	Operating	5/12/2011			5	1	Y	SUN
456	California	PV	0.500	Operating	5/12/2011			5	1	Y	SUN
457	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
458	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
459	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
460	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
461	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
462	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
463	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
464	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
465	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
466	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
467	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
468	California	PV	0.500	Operating	8/26/2011			5	1	Y	SUN
469	California	PV	0.500	Operating	11/27/2012			3	1	Y	SUN
470	California	PV	0.500	Operating	11/27/2012			3	1	Y	SUN
471	California	PV	0.500	Operating	11/27/2012			3	1	Y	SUN
472	California	PV	0.500	Operating	11/27/2012			3	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
473	California	PV	0.500	Operating	12/20/2011			4	1	Y	SUN
474	California	PV	0.500	Operating	12/20/2011			4	1	Y	SUN
475	California	PV	0.500	Operating	12/20/2011			4	1	Y	SUN
476	California	PV	0.500	Operating	12/20/2011			4	1	Y	SUN
477	California	PV	0.500	Operating	12/20/2011			4	1	Y	SUN
478	California	PV	0.500	Operating	12/20/2011			4	1	Y	SUN
479	California	PV	0.500	Operating	12/20/2011			4	1	Y	SUN
480	California	PV	0.500	Operating	12/22/2011			4	1	Y	SUN
481	California	PV	0.500	Operating	12/22/2011			4	1	Y	SUN
482	California	PV	0.500	Operating	12/22/2011			4	1	Y	SUN
483	California	PV	0.500	Operating	12/12/2011			4	1	Y	SUN
484	California	PV	0.500	Operating	12/12/2011			4	1	Y	SUN
485	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
486	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
487	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
488	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
489	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
490	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
491	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
492	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
493	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
494	California	PV	0.500	Operating	12/28/2010			5	1	Y	SUN
495	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
496	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
497	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
498	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
499	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
500	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
501	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
502	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
503	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
504	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
505	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
506	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
507	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
508	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
509	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
510	California	PV	0.500	Operating	9/14/2012			4	1	Y	SUN
511	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
512	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
513	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
514	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
515	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
516	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
517	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
518	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
519	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
520	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
521	California	PV	0.500	Operating	12/1/2013			2	1	Y	SUN
522	California	PV	0.173	Operating	12/26/2008			7	1	N	SUN
523	California	PV	0.099	Operating	12/30/2008			7	1	N	SUN
524	California	PV	0.099	Operating	12/30/2008			7	1	N	SUN
525	California	PV	0.099	Operating	12/30/2008			7	1	N	SUN
526	California	PV	0.203	Operating	12/30/2008			7	1	N	SUN
527	California	PV	0.193	Operating	12/30/2008			7	1	N	SUN
528	California	PV	0.048	Operating	12/30/2008			7	1	N	SUN
529	California	PV	0.136	Operating	12/30/2008			7	1	N	SUN
530	California	PV	0.206	Operating	12/30/2008			7	1	N	SUN
531	California	PV	0.178	Operating	12/30/2008			7	1	N	SUN
532	California	PV	0.172	Operating	12/30/2008			7	1	N	SUN
533	California	PV	0.300	Operating	12/30/2008			7	1	N	SUN
534	California	PV	0.225	Operating	12/30/2008			7	1	N	SUN
535	California	PV	0.201	Operating	12/30/2008			7	1	N	SUN
536	California	PV	0.060	Operating	1/1/2004			12	1	Y	SUN
537	California	PV	0.040	Operating	1/1/2008			8	1	Y	SUN
538	California	PV	0.060	Operating	1/1/2010			6	1	Y	SUN
539	California	PV	0.320	Operating	1/1/2011			5	1	Y	SUN
540	California	PV	0.192	Operating	1/1/2011			5	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
541	North Carolina	PV	0.005	Operating	5/1/2009			7	1	Y	SUN
542	North Carolina	PV	0.002	Operating	11/30/2008			7	1	Y	SUN
543	North Carolina	PV	0.020	Operating	3/1/2009			7	1	Y	SUN
544	Arizona	PV	0.149	Operating	4/1/2010			6	8	N	SUN
545	Arizona	PV	0.460	Operating	9/1/2010			6	3	N	SUN
546	Arizona	PV	0.092	Operating	3/1/2011			5	1	N	SUN
547	Arizona	PV	0.224	Operating	4/1/2011			5	1	N	SUN
548	Arizona	PV	0.223	Operating	7/1/2011			5	3	N	SUN
549	Arizona	PV	0.094	Operating	8/1/2011			5	1	N	SUN
550	Arizona	PV	0.477	Operating	9/3/2011			5	5	N	SUN
551	Arizona	PV	0.142	Operating	12/1/2009			6	12	N	SUN
552	California	PV	0.049	Operating	5/11/2007			9	1	N	SUN
553	California	PV	0.400	Operating	9/20/2007			9	1	Y	SUN
554	California	PV	0.140	Operating	12/14/2007			8	1	Y	SUN
555	Oregon	PV	0.200	Operating	10/24/2008			7	1	Y	SUN
556	California	PV	0.417	Operating	12/10/2007			8	1	Y	SUN
557	California	PV	0.381	Operating	11/10/2007			8	1	Y	SUN
558	California	PV	0.230	Operating	10/23/2008			7	1	N	SUN
559	California	PV	0.124	Operating	12/25/2008			7	1	N	SUN
560	California	PV	0.400	Operating	1/10/2008			8	1	Y	SUN
561	California	PV	0.342	Operating	10/25/2007			8	1	Y	SUN
562	California	PV	0.268	Operating	6/25/2008			8	1	Y	SUN
563	California	PV	0.225	Operating	11/30/2007			8	1	Y	SUN
564	New Jersey	PV	0.285	Operating	6/6/2008			8	1	Y	SUN
565	California	PV	0.349	Operating	11/30/2007			8	1	Y	SUN
566	California	PV	0.322	Operating	3/24/2008			8	1	Y	SUN
567	California	PV	0.121	Operating	5/20/2008			8	1	Y	SUN
568	California	PV	0.344	Operating	9/5/2007			9	1	Y	SUN
569	California	PV	0.400	Operating	4/20/2008			8	1	Y	SUN
570	California	PV	0.300	Operating	10/24/2008			7	1	Y	SUN
571	California	PV	0.300	Operating	8/25/2008			8	1	Y	SUN
572	California	PV	0.347	Operating	9/13/2007			9	1	Y	SUN
573	California	PV	0.262	Operating	8/25/2008			8	1	Y	SUN
574	California	PV	0.189	Operating	10/10/2008			8	1	N	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
575	California	PV	0.284	Operating	10/25/2007			8	1	Y	SUN
576	California	PV	0.286	Operating	10/25/2007			8	1	Y	SUN
577	California	PV	0.214	Operating	3/28/2008			8	1	Y	SUN
578	California	PV	0.325	Operating	2/21/2008			8	1	Y	SUN
579	California	PV	0.126	Operating	10/10/2008			8	1	N	SUN
580	California	PV	0.323	Operating	3/10/2008			8	1	Y	SUN
581	New Jersey	PV	0.300	Operating	8/18/2008			8	1	Y	SUN
582	California	PV	0.200	Operating	10/18/2007			9	1	N	SUN
583	Connecticut	PV	0.213	Operating	6/26/2008			8	1	N	SUN
584	California	PV	0.316	Operating	10/24/2008			7	1	N	SUN
585	California	PV	0.370	Operating	7/25/2008			8	1	Y	SUN
586	California	PV	0.204	Operating	5/20/2008			8	1	N	SUN
587	California	PV	0.197	Operating	7/25/2008			8	1	N	SUN
588	California	PV	0.198	Operating	11/10/2007			8	1	Y	SUN
589	California	PV	0.323	Operating	2/21/2008			8	1	Y	SUN
590	California	PV	0.193	Operating	4/20/2008			8	1	N	SUN
591	California	PV	0.106	Operating	6/20/2008			8	1	N	SUN
592	California	PV	0.400	Operating	6/20/2008			8	1	Y	SUN
593	California	PV	0.349	Operating	11/10/2007			8	1	Y	SUN
594	New Jersey	PV	0.300	Operating	6/20/2008			8	1	Y	SUN
595	New Jersey	PV	0.286	Operating	7/25/2008			8	1	N	SUN
596	California	PV	0.302	Operating	7/25/2008			8	1	N	SUN
597	California	PV	0.417	Operating	6/6/2008			8	1	Y	SUN
598	California	PV	0.327	Operating	8/30/2007			9	1	Y	SUN
599	California	PV	0.295	Operating	8/25/2008			8	1	Y	SUN
600	California	PV	0.271	Operating	11/30/2007			8	1	Y	SUN
601	California	PV	0.352	Operating	3/28/2008			8	1	N	SUN
602	California	PV	0.195	Operating	8/21/2008			8	1	N	SUN
603	Wisconsin	PV	0.122	Operating	9/20/2008			8	1	N	SUN
604	Maryland	PV	0.215	Operating	11/4/2008			7	1	N	SUN
605	New Jersey	PV	0.300	Operating	5/20/2008			8	1	Y	SUN
606	Florida	PV	0.200	Operating	3/31/2010			6	1	Y	SUN
607	New Jersey	PV	0.237	Operating	12/26/2008			7	1	N	SUN
608	Maryland	PV	0.213	Operating	12/26/2008			7	1	N	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
609	Maryland	PV	0.077	Operating	2/17/2009			7	1	Y	SUN
610	Maryland	PV	0.110	Operating	12/26/2008			7	1	Y	SUN
611	Oregon	PV	0.184	Operating	11/14/2008			7	1	N	SUN
612	California	PV	0.371	Operating	11/14/2008			7	1	N	SUN
613	California	PV	0.176	Operating	11/14/2008			7	1	N	SUN
614	California	PV	0.200	Operating	11/14/2008			7	1	Y	SUN
615	New Jersey	PV	0.124	Operating	8/8/2006			10	1	Y	SUN
616	Colorado	PV	0.063	Operating	11/14/2008			7	1	N	SUN
617	Colorado	PV	0.200	Operating	11/14/2008			7	1	Y	SUN
618	Colorado	PV	0.008	Operating	11/14/2008			7	1	Y	SUN
619	Colorado	PV	0.500	Operating	2/1/2009			7		Y	SUN
620	California	PV	0.086	Operating	11/30/2007			8	1	Y	SUN
621	California	PV	0.055	Operating	11/7/2008			7	1	N	SUN
622	California	PV	0.042	Operating	10/23/2008			7	1	N	SUN
623	California	PV	0.065	Operating	11/30/2007			8	1	Y	SUN
624	California	PV	0.071	Operating	6/1/2008			8	1	N	SUN
625	California	PV	0.500	Operating	7/13/2007			9	1	Y	SUN
626	California	PV	0.056	Operating	11/13/2008			7	1	N	SUN
627	California	PV	0.041	Operating	9/4/2008			8	1	N	SUN
628	California	PV	0.044	Operating	9/4/2008			8	1	N	SUN
629	California	PV	0.037	Operating	10/10/2008			8	1	N	SUN
630	California	PV	0.044	Operating	7/25/2008			8	1	N	SUN
631	California	PV	0.053	Operating	11/7/2008			7	1	N	SUN
632	California	PV	0.441	Operating	12/26/2008			7	1	Y	SUN
633	New Jersey	PV	0.038	Operating	10/25/2007			8	1	Y	SUN
634	Oregon	PV	0.048	Operating	11/7/2008			7	1	Y	SUN
635	New Jersey	PV	0.030	Operating	10/18/2007			9	1	Y	SUN
636	Oregon	PV	0.031	Operating	12/26/2008			7	1	Y	SUN
637	Oregon	PV	0.029	Operating	2/16/2009			7	1	Y	SUN
638	Oregon	PV	0.031	Operating	2/16/2009			7	1	Y	SUN
639	California	PV	0.044	Operating	12/10/2007			8	1	Y	SUN
640	California	PV	0.046	Operating	7/25/2008			8	1	Y	SUN
641	California	PV	0.053	Operating	11/30/2007			8	1	Y	SUN
642	Oregon	PV	0.026	Operating	1/20/2009			7	1	N	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
643	Oregon	PV	0.022	Operating	1/20/2009			7	1	N	SUN
644	Oregon	PV	0.026	Operating	11/14/2008			7	1	N	SUN
645	New Jersey	PV	0.050	Operating	10/18/2007			9	1	Y	SUN
646	Oregon	PV	0.037	Operating	11/15/2008			7	1	N	SUN
647	Oregon	PV	0.026	Operating	11/4/2008			7	1	N	SUN
648	New Jersey	PV	0.037	Operating	3/24/2009			7	1	Y	SUN
649	New Jersey	PV	0.049	Operating	11/5/2007			8	1	Y	SUN
650	Connecticut	PV	0.030	Operating	11/14/2008			7	1	N	SUN
651	Oregon	PV	0.037	Operating	2/17/2009			7	1	Y	SUN
652	New Jersey	PV	0.037	Operating	3/24/2009			7	1	Y	SUN
653	Oregon	PV	0.038	Operating	2/17/2009			7	1	Y	SUN
654	Oregon	PV	0.031	Operating	12/1/2008			7	1	Y	SUN
655	Oregon	PV	0.034	Operating	2/16/2009			7	1	Y	SUN
656	New Jersey	PV	0.053	Operating	2/4/2007			9	1	Y	SUN
657	New Jersey	PV	0.053	Operating	2/4/2007			9	1	Y	SUN
658	New Jersey	PV	0.053	Operating	2/4/2007			9	1	Y	SUN
659	New Jersey	PV	0.063	Operating	6/20/2007			9	1	Y	SUN
660	New Jersey	PV	0.063	Operating	6/20/2007			9	1	Y	SUN
661	Hawaii	PV	0.212	Operating	12/20/2007			8	1	Y	SUN
662	California	PV	0.500	Operating	12/14/2007			8	1	Y	SUN
663	California	PV	0.150	Operating	3/24/2009			7	1	Y	SUN
664	California	PV	0.118	Operating	3/24/2009			7	1	Y	SUN
665	California	PV	0.118	Operating	3/24/2009			7	1	Y	SUN
666	California	PV	0.049	Operating	3/24/2009			7	1	Y	SUN
667	California	PV	0.092	Operating	3/24/2009			7	1	Y	SUN
668	California	PV	0.056	Operating	3/24/2009			7	1	Y	SUN
669	California	PV	0.056	Operating	3/24/2009			7	1	Y	SUN
670	California	PV	0.056	Operating	3/24/2009			7	1	Y	SUN
671	Hawaii	PV	0.212	Operating	2/25/2008			8	1	Y	SUN
672	New Mexico	PV	0.500	Operating	5/9/2011			5	1	Y	SUN
673	New Mexico	PV	0.200	Operating	5/9/2011			5	1	Y	SUN
674	Oregon	PV	0.498	Operating	12/31/2008			7	1	Y	SUN
675	Oregon	PV	0.277	Operating	12/31/2008			7	1	Y	SUN
676	South Carolina	PV	0.002	Operating	6/30/2008			8	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
677	North Carolina	PV	0.009	Operating	9/1/2008			8	1	Y	SUN
678	New Jersey	PV	0.200	Operating	6/1/2006			10	1	Y	SUN
679	New Jersey	PV	0.200	Operating	6/1/2006			10	1	Y	SUN
680	New Jersey	PV	0.100	Operating	12/1/2007			8	1	Y	SUN
681	New Jersey	PV	0.200	Operating	12/1/2007			8	1	Y	SUN
682	New Jersey	PV	0.100	Operating	12/1/2007			8	1	Y	SUN
683	New Jersey	PV	0.200	Operating	12/1/2007			8	1	Y	SUN
684	New Jersey	PV	0.200	Operating	12/1/2007			8	1	Y	SUN
685	New Jersey	PV	0.200	Operating	12/1/2007			8	1	Y	SUN
686	New Jersey	PV	0.100	Operating	12/1/2007			8	1	Y	SUN
687	New Jersey	PV	0.377	Operating	12/31/2008			7	1	Y	SUN
688	New Jersey	PV	0.500	Operating	6/1/2012			4	1	Y	SUN
689	New Jersey	PV	0.500	Operating	6/1/2012			4	1	Y	SUN
690	New Jersey	PV	0.500	Operating	6/1/2012			4	1	Y	SUN
691	New Jersey	PV	0.500	Operating	6/1/2012			4	1	Y	SUN
692	California	PV	0.106	Operating	12/31/2008			7	1	Y	SUN
693	North Carolina	PV	0.003	Operating	1/1/2008			8	1	Y	SUN
694	North Carolina	PV	0.002	Operating	8/1/2008			8	1	Y	SUN
695	California	PV	0.176	Operating	12/16/2008			7	1	N	SUN
696	California	PV	0.306	Operating	12/15/2008			7	1	Y	SUN
697	South Carolina	PV	0.005	Operating	2/20/2009			7	1	Y	SUN
698	North Carolina	PV	0.002	Operating	2/1/2009			7	1	Y	SUN
699	California	PV	0.500	Operating	1/31/2014			2	1	Y	SUN
700	Pennsylvania	PV	0.500	Operating	5/1/2010			6		Y	SUN
701	Pennsylvania	PV	0.400	Operating	2/1/2012			4		Y	SUN
702	Pennsylvania	PV	0.400	Operating	2/1/2012			4		Y	SUN
703	California	PV	0.178	Operating	7/2/2007			9	268	Y	SUN
704	California	PV	0.142	Operating	8/30/2007			9	1	Y	SUN
705	South Carolina	PV	0.001	Operating	5/31/2008			8	1	Y	SUN
706	Arizona	PV	0.255	Operating	1/1/2009			7	1	Y	SUN
707	North Carolina	PV	0.002	Operating	9/25/2008			8	1	Y	SUN
708	North Carolina	PV	0.002	Operating	2/28/2009			7	1	Y	SUN
709	North Carolina	PV	0.002	Operating	12/1/2007			8	1	Y	SUN
710	California	PV	0.500	Operating	4/30/2014			2	1	Y	SUN

	Plant State	Prime Mover Code	Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)	Primary Fuel Code
711	California	PV	0.500	Operating	4/30/2014			2	1	Y	SUN
712	Virginia	PV	0.018	Retired	12/1/1985	3/31/1995		9	1	Y	SUN
713	Virginia	PV	0.018	Retired	12/1/1985	3/31/1995		9	1	Y	SUN
714	Virginia	PV	0.018	Retired	12/1/1985	3/31/1995		9	1	Y	SUN
715	Hawaii	PV	0.500	Operating	4/7/2014			2	1	Y	SUN
716	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
717	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
718	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
719	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
720	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
721	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
722	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
723	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
724	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
725	Hawaii	PV	0.500	Operating	6/30/2016			0	1	Y	SUN
726	Hawaii	PV	0.500	Operating	7/30/2016			0	1	Y	SUN
727	Hawaii	PV	0.500	Operating	7/30/2016			0	1	Y	SUN
728	Hawaii	PV	0.500	Operating	7/30/2016			0	1	Y	SUN
729	North Carolina	PV	0.002	Operating	1/31/2009			7	1	Y	SUN
730	North Carolina	PV	0.005	Operating	8/12/2008			8	1	Y	SUN
731	North Carolina	PV	0.002	Operating	2/26/2008			8	1	Y	SUN
732	North Carolina	PV	0.003	Operating	10/31/2008			7	1	Y	SUN
733	New Mexico	PV	0.003	Operating	1/14/2008			8	1	Y	SUN
734	New Mexico	PV	0.005	Operating	7/15/2008			8	1	Y	SUN
735	North Carolina	PV	0.007	Operating	5/27/2010			6		Y	SUN
736	North Carolina	PV	0.012	Operating	10/19/2008			8	1	Y	SUN
737	Massachusetts	PV	0.135	Operating	11/28/2008			7	1	Y	SUN
738	North Carolina	PV	0.004	Operating	5/1/2008			8	1	Y	SUN

Prepared by

Sargent & Lundy LLC
Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

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Battery Energy Storage System (BESS) Sites

Decommissioning Study

Prepared for
San Diego Gas & Electric Company

Report SL-013559.F

Project 12699-004
February 2017

SDGE
A Sempra Energy utility®

F I N A L

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Battery Energy Storage Systems (BESS) Decommissioning Study

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TABLES & FIGURES

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ACRONYMS AND ABBREVIATIONS

Term	Definition or Clarification
AC	Alternating current
ASL	Average Service Life
BESS(s)	Battery energy storage system(s)
BMS	Battery management system
DC	Direct current
FERC	Federal Energy Regulatory Commission
kg	Kilograms
kW	Kilowatts
kWh	Kilowatt hours
MW	Megawatts
Owner	San Diego Gas & Electric Company
PCS	Power conditioning system
PV	Photovoltaic
S&L	Sargent & Lundy LLC
SDG&E	San Diego Gas & Electric Company
Wh	Watt hours

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EXECUTIVE SUMMARY

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual cost estimate and Average Service Life (ASL) estimate for SDG&E's portfolio of battery energy storage systems (BESSs). The work scope included a review of drawings, documents, and a descriptive list of the sites; a site visit to a representative small-scale storage system; and the development of a conceptual demolition cost estimate and report as well as the ASL.

METHODOLOGY

The S&L methodology for developing the cost estimate consisted of three elements: 1) our experience in developing plant demolition costs and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities. The cost estimate was developed based on the drawings, documents, and data provided by the Owner. These drawings and documents were used to estimate the building foundation sizes, building volumes, steel quantities, and quantity of equipment. A site walkdown was performed to conduct a review of a typical small-scale site for dismantlement and to determine any unique site-specific requirements. This information was used with unit cost factors developed by S&L based on industry data and our experience. Unit cost factors for concrete removal, steel removal, cutting costs, and so forth were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

CONCEPTUAL COST ESTIMATE

Battery Energy Storage System Sites

The summary of the cost estimate for decommissioning the SDG&E BESS sites is shown in Table ES-1. The cost estimate broken into Federal Energy Regulatory Commission (FERC) accounts is shown in Table ES-2. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

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Table ES-1 — Cost Estimate Summary for BESS Sites

				Includes Contingency							
Project ID	*Location*	*Capacity (kW)*	*Energy (kWh)*	Subcontract Cost	Scrap Value	Material Cost	Labor Cost	G&A & Profit	Procurement, & Project Services; Construction Management Support	Contingency on Indirect	Total Cost
Small Scale Sites											
3	Mission Valley- Skills Training Center	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
4	Clairemont	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
5	Poway	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
6	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
7	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
8	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
9	Century Park CES	50	82	$ 6,128	$ (64)	$ -	$ 6,166	$ 1,322	$ 919	$ 184	$ 14,655
10	Energy Inovation Center- Indoor	4.5	10.7	$ 1,680	$ (8)	$ -	$ 2,365	$ 437	$ 304	$ 61	$ 4,838
11	Energy Inovation Center- Outdoor	10	10	$ 1,013	$ (8)	$ -	$ 2,262	$ 353	$ 246	$ 49	$ 3,915
12	San Diego Zoo	100	130	$ 9,123	$ (101)	$ -	$ 8,426	$ 1,885	$ 1,311	$ 262	$ 20,905
13	UCSD MESOM	6	10.7	$ 1,680	$ (8)	$ -	$ 2,365	$ 437	$ 304	$ 61	$ 4,838
14	Suites at Paseo (SDSU Private Dormitories)	18	32.1	$ 3,015	$ (25)	$ -	$ 3,186	$ 668	$ 464	$ 93	$ 7,402
15	Del Lago Academy	100	200	$ 14,503	$ (155)	$ -	$ 12,535	$ 2,904	$ 2,019	$ 404	$ 32,209
21	Santa Ysabel Substation	6	11	$ 1,699	$ (9)	$ -	$ 2,365	$ 439	$ 305	$ 61	$ 4,860
22	Santa Ysabel Substation	30	36	$ 3,259	$ (28)	$ -	$ 3,803	$ 760	$ 529	$ 106	$ 8,429
23	Caltrans Park-N-Ride Del Lago (OPRA)	200	400	$ 27,993	$ (311)	$ -	$ 23,219	$ 5,497	$ 3,823	$ 765	$ 60,986
24	ITF (OPRA)	200	400	$ 27,993	$ (311)	$ -	$ 23,219	$ 5,497	$ 3,823	$ 765	$ 60,986
25	Civita Microgrid	125	200	$ 14,503	$ (155)	$ -	$ 12,535	$ 2,904	$ 2,019	$ 404	$ 32,209
Subtotal - Small Scale Sites											*$ 326,738*
Utility Scale Sites											
1	Borrego Microgrid Yard- SES1	500	1500	$ 95,513	$ (1,712)	$ 11,722	$ 68,607	$ 21,659	$ 13,284	$ 266	$ 209,339
2	Pala Energy Storage Yard	500	1500	$ 75,263	$ (1,382)	$ 5,239	$ 36,772	$ 14,400	$ 8,832	$ 1,766	$ 140,891
16	Ortega Highway (Quest) 1243 Unit 1	1000	3000	$ 149,513	$ (2,479)	$ 11,722	$ 76,902	$ 15,628	$ 16,878	$ 3,376	$ 271,539
17	Ortega Highway (Quest)1243 Unit 2	1000	3000	$ 149,513	$ (2,479)	$ 11,722	$ 76,902	$ 15,628	$ 16,878	$ 3,376	$ 271,539
18	Pala Unit 2	1000	2000	$ 127,013	$ (1,583)	$ 7,814	$ 52,361	$ 12,321	$ 13,307	$ 2,661	$ 213,893
19	Carmel Valley (Canyon Crest)	1000	3000	$ 190,013	$ (2,479)	$ 11,722	$ 81,222	$ 18,616	$ 20,105	$ 4,021	$ 323,219
20	Borrego Microgrid Yard- SES2	1000	3000	$ 190,013	$ (2,701)	$ 15,629	$ 100,182	$ 20,118	$ 21,728	$ 4,346	$ 349,313
27	El Cajon BESS 1	7500	30000	$ 2,521,013	$ (24,931)	$ 156,288	$ 966,064	$ 240,398	$ 259,630	$ 51,926	$ 4,170,388
28	Escondido BESS 1	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
29	Escondido BESS 2	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
30	Escondido BESS 3	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
Subtotal - Utility Scale Sites											*$ 18,526,157*
Flow Battery Site											
26	San Miguel VRF	2000-2300	8000	$ 85,013	$ (7,452)	$ 35,165	$ 212,667	$ 40,208	$ 24,661	$ 4,932	$ 395,194
Subtotal - Flow Battery Site											*$ 395,194*
TOTAL											***$ 19,248,089***

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Table ES-2 — BESS Sites Cost Estimate Summary by FERC Account

	Location	Capacity (kW)	Energy (kWh)	341 - STRUCTURES AND IMPROVEMENTS	348 - OTHER PRODUCTION - GENERATION	351 - TRANSMISSION	363 - DISTRIBUTION STORAGE BATTERY EQUIPMENT	I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT	TOTAL PROJECT COST
Small Scale Sites										
3	Mission Valley- Skills Training Center	25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$ 13,301
4	Clairemont	25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$ 13,301
5	Poway	25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$ 13,301
6	Borrego Springs CES	25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$ 10,200
7	Borrego Springs CES	25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$ 10,200
8	Borrego Springs CES	25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$ 10,200
9	Century Park CES	50	82	$ 1,691	$ 3,954	$ 3,954	$ 3,954	$ 781	$ 322	$ 14,655
10	Energy Inovation Center- Indoor	4.5	10.7	$ 1,122	$ 1,117	$ 1,117	$ 1,117	$ 258	$ 106	$ 4,838
11	Energy Inovation Center- Outdoor	10	10	$ 1,069	$ 850	$ 850	$ 850	$ 209	$ 86	$ 3,915
12	San Diego Zoo	100	130	$ 2,053	$ 5,760	$ 5,760	$ 5,760	$ 1,114	$ 459	$ 20,905
13	UCSD MESOM	6	10.7	$ 1,122	$ 1,117	$ 1,117	$ 1,117	$ 258	$ 106	$ 4,838
14	Suites at Paseo (SDSU Private Dormitories)	18	32.1	$ 1,271	$ 1,858	$ 1,858	$ 1,858	$ 395	$ 163	$ 7,402
15	Del Lago Academy	100	200	$ 3,550	$ 8,745	$ 8,745	$ 8,745	$ 1,716	$ 707	$ 32,209
21	Santa Ysabel Substation	6	11	$ 1,124	$ 1,123	$ 1,123	$ 1,123	$ 259	$ 107	$ 4,860
22	Santa Ysabel Substation	30	36	$ 1,330	$ 2,155	$ 2,155	$ 2,155	$ 449	$ 185	$ 8,429
23	Caltrans Park-N-Ride Del Lago (OPRA)	200	400	$ 6,060	$ 16,780	$ 16,780	$ 16,780	$ 3,249	$ 1,338	$ 60,986
24	ITF (OPRA)	200	400	$ 6,060	$ 16,780	$ 16,780	$ 16,780	$ 3,249	$ 1,338	$ 60,986
25	Civita Microgrid	125	200	$ 3,550	$ 8,745	$ 8,745	$ 8,745	$ 1,716	$ 707	$ 32,209
Subtotal - Small Scale Sites				$ 39,136	$ 87,672	$ 87,672	$ 87,672	$ 17,414	$ 7,171	$ 326,738
Utility Scale Sites										
1	Borrego Microgrid Yard- SES1	500	1500	$ 69,536	$ 42,084	$ 42,084	$ 42,084	$ 10,096	$ 3,454	$ 209,339
2	Pala Energy Storage Yard	500	1500	$ 33,745	$ 32,182	$ 32,182	$ 32,182	$ 7,507	$ 3,091	$ 140,891
16	Ortega Highway (Quest) 1243 Unit 1	1000	3000	$ 70,671	$ 60,205	$ 60,205	$ 60,205	$ 14,346	$ 5,907	$ 271,539
17	Ortega Highway (Quest)1243 Unit 2	1000	3000	$ 70,671	$ 60,205	$ 60,205	$ 60,205	$ 14,346	$ 5,907	$ 271,539
18	Pala Unit 2	1000	2000	$ 48,770	$ 49,718	$ 49,718	$ 49,718	$ 11,311	$ 4,657	$ 213,893
19	Carmel Valley (Canyon Crest)	1000	3000	$ 73,286	$ 75,269	$ 75,269	$ 75,269	$ 17,089	$ 7,037	$ 323,219
20	Borrego Microgrid Yard- SES2	1000	3000	$ 93,406	$ 76,611	$ 76,611	$ 76,611	$ 18,468	$ 7,605	$ 349,313
27	El Cajon BESS 1	7500	30000	$ 967,762	$ 963,690	$ 963,690	$ 963,690	$ 220,685	$ 90,870	$ 4,170,388
28	Escondido BESS 1	10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$ 4,192,012
29	Escondido BESS 2	10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$ 4,192,012
30	Escondido BESS 3	10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$ 4,192,012
Subtotal - Utility Scale Sites				*$ 4,335,973*	*$ 4,269,621*	*$ 4,269,621*	*$ 4,269,621*	*$ 978,934*	*$ 402,387*	*$ 18,526,157*
Flow Battery Site										
26	San Miguel VRF	2000-2300	8000	$ 203,625	$ 53,992	$ 53,992	$ 53,992	$ 20,962	$ 8,631	$ 395,194
Subtotal - Flow Battery Site				$ 203,625	$ 53,992	$ 53,992	$ 53,992	$ 20,962	$ 8,631	$ 395,194
TOTAL				$ 4,578,734	$ 4,411,285	$ 4,411,285	$ 4,411,285	$1,017,311	$ 418,189	$ 19,248,089

AVERAGE SERVICE LIFE

The average service life of the BESS sites (small scale, utility scale, and flow battery) in SDG&E's portfolio are limited by battery service life to approximately 10 years. The related electrical pieces of equipment are expected to have longer service lives. For example, inverters and transformers are expected to operate for 10 to 15 years and 15 to 20 years, respectively. The overall system life may be extended by replacing components; however, this process equates to system replacement over time.

In general, with proper maintenance, careful storage, and good maintenance, a BESS facility is expected to have a useful life of approximately 10 years.

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SARGENT & LUNDY LLC

Prepared by

Bradley E. Toon
Senior Management Consultant

Emile Jabre
Management Consultant

Reviewed by

Matt N. Ozan
Manager
Cost Information Division

Robert. P. Charles
Senior Principal Consultant &
Project Manager

Approved by

Robert. P. Charles
Senior Principal Consultant &
Project Manager

February 1, 2017
Date

LAST PAGE OF EXECUTIVE SUMMARY.

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1. SCOPE OF WORK

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual cost estimate and Average Service Life (ASL) estimate for SDG&E's portfolio of battery energy storage systems (BESSs). The work scope included a review of drawings, documents, and a descriptive list of the sites; a site visit to a representative small-scale storage system; and the development of a conceptual demolition cost estimate and report as well as the ASL.

Sargent & Lundy has been dedicated to providing complete engineering and environmental services exclusively to the power industry since 1891. Through our work with various utilities, lending institutions, and developers, over the years Sargent & Lundy Consulting has become one of the premier power project consultants in the power industry. This commitment to quality is proven by the successful completion of our International Organization for Standardization (ISO) 9000 certification audit. Our experience encompasses independent engineer services, including decommissioning cost estimation and average service life evaluation for both global and domestic electric power assets. S&L has recently completed decommissioning studies for a number of clients.

Sargent & Lundy has engineered over 958 power plant units. We have both the benefit of extensive design experience with feedback from operating plants as well as individuals with extensive plant operations experience to support our consulting services.

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2. GENERAL DESCRIPTION

2.1 BATTERY ENERGY STORAGE SYSTEMS (BESS)

SDG&E's portfolio of BESS sites includes small-scale (0–500 kilowatts [kW]), utility-scale (>500 kW), and flow-battery storage sites.

- Small-scale BESS sites typically include lithium- or lead-acid-based batteries housed in steel enclosures resting on racks with related cables, conduits, and other electrical equipment. Typically, the battery enclosures are found inside electrical or mechanical service rooms of commercial buildings or in fenced areas near SDG&E's infrastructure.
- Utility-scale BESS sites typically consist of lithium-based batteries housed in steel cargo-like containers. The containers rest on concrete pedestal foundations and are surrounded by fencing and related electrical equipment. SDG&E's portfolio includes a number of sites that had not been constructed at the time this report was written (November 2016).
- SDG&E's flow-battery site has not been constructed; however, it is assumed that it will be similar to existing flow-battery sites and the other utility-scale sites in SDG&E's portfolio.

A list of the BESS sites in the SDG&E portfolio is shown Table 2-1 below. The table includes the location, capacity (kW), energy (kW-hours [kWh]), construction status, battery manufacturer, battery type, and date energized.

Table 2-1 — SDG&E BESS Portfolio

Name	Capacity (kW)	Energy (kWh)	Status	Battery Type	Date Energized
Borrego Microgrid Yard	500	1500	Complete	Li Ni Co Al	
Pala Energy Storage Yard	500	1500	Complete	Lithium Manganese Oxide	12/1/2012
Mission Valley- Skills Training Center	25	72	Complete	Li Ni Co Al	2/1/2014
Clairemont	25	72	Complete	Li Ni Co Al	2/1/2014
Poway	25	72	Complete	Li Ni Co Al	2/1/2014
Borrego Springs CES	25	50	Complete	Lithium Polymer	7/1/2012
Borrego Springs CES	25	50	Complete	Lithium Polymer	9/1/2012
Borrego Springs CES	25	50	Complete	Lithium Polymer	9/1/2012
Century Park CES	50	82	Complete	Lithium Iron Phosphate	
Energy Innovation Center-	4.5	10.7	Complete	Lithium Polymer	

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Name	Capacity (kW)	Energy (kWh)	Status	Battery Type	Date Energized
Indoor					
Energy Innovation Center-Outdoor	10	10	Complete	Lead Acid	
San Diego Zoo	100	130	Complete	Lithium Polymer	4/21/2013
UCSD MESOM	6	10.7	Complete	Lithium Polymer	6/14/2013
Suites at Paseo (SDSU Private Dormitories)	18	32.1	Complete	Lithium Polymer	6/20/2013
Del Lago Academy	100	200	Complete	Lithium Polymer	12/20/2013
Ortega Highway (Quest) 1243 Unit 1	1000	3000	In Progress	Lithium Manganese Oxide	5/1/2015
Ortega Highway (Quest)1243 Unit 2	1000	3000	In Progress	Lithium Manganese Oxide	10/1/2015
Pala Unit 2	1000	2000	In Progress	Lithium Polymer	8/1/2015
Carmel Valley (Canyon Crest)	1000	3000	Complete	Lithium Ion-Doped Nickel Oxide (NCA)	10/1/2014
Borrego Microgrid Yard-SES2	1000	3000	Complete	Li Ni Co Al	2/1/2014
Santa Ysabel Substation	6	11	Complete	Li-Ion	
Santa Ysabel Substation	30	36	Complete	Li-Ion	
Caltrans Park-N-Ride Del Lago (OPRA)	200	400	Complete	Lithium Ion	11/1/2014
ITF (OPRA)	200	400	Complete	Lithium Ion	11/1/2014
Civita Microgrid	125	200	Complete	Lithium Ion	4/4/2016
San Miguel VRF	2000-2300	8000	Under Construction	Vanadium Redox	
El Cajon BESS 1	7500	30000	Under Construction	Lithium Ion NMC	
Escondido BESS 1	10000	40000	Under Construction	Lithium Ion NMC	
Escondido BESS 2	10000	40000	Under Construction	Lithium Ion NMC	
Escondido BESS 3	10000	40000	Under Construction	Lithium Ion NMC	

LAST PAGE OF SECTION 2.

3. COST ESTIMATE

3.1 METHODOLOGY

The methodology used for developing the cost estimate includes a combination of stochastic and deterministic methods. Deterministic methods were used based on the quantity and size of equipment (e.g., the number of foundations, equipment, and etc.). Stochastic methods were also used if quantities information (e.g., misc. electrical equipment) was not available.

The cost estimate was developed based on documents and data provided by the Owner and publically available information. These drawings and documents were used to estimate the foundation sizes, steel quantities, and other equipment.

The S&L methodology for developing the cost estimate consisted of three elements: 1) our experience in developing plant demolition cost and our existing database for numerous other projects, 2) the use of unit cost factor methodology, and 3) quotes from previous projects for similar activities.

Cost estimates were created using the S&L cost model format and the S&L cost database. The estimates developed include details for each type of work performed, indirect costs, and contingencies.

An inventory of equipment, concrete, cable trays, and other equipment was developed based on review of drawings and data provided. Mr. Borko Andric and Mr. Brad Toon of S&L visited a representative small-scale site and performed a site walkdown to conduct a review of the site for dismantlement and determine any unique site-specific requirements. Design information for a utility-scale site from SDG&E and representative data from S&L was used as well. This information was used with unit cost factors developed by S&L based on industry data and from our experience. Unit cost factors for concrete removal and other tasks were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

3.2 COST ESTIMATE SUMMARY

3.2.1 BESS

The summary of the cost estimate for decommissioning the SDG&E BESSs is shown in Table 3-1 below. The commercial and technical basis for the estimate is included in Section 4. The detailed estimate is included in Appendix A. The breakdown into Federal Energy Regulatory Commission (FERC) accounts is shown in Table 3-2. The allocation of FERC accounts is shown in Appendix B. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

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Table 3-1 — Cost Estimate Summary for BESS Sites

				Includes Contingency							
Project ID	*Location*	*Capacity (kW)*	*Energy (kWh)*	Subcontract Cost	Scrap Value	Material Cost	Labor Cost	G&A & Profit	Procurement, & Project Services; Construction Management Support	Contingency on Indirect	Total Cost
Small Scale Sites											
3	Mission Valley- Skills Training Center	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
4	Clairemont	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
5	Poway	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
6	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
7	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
8	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
9	Century Park CES	50	82	$ 6,128	$ (64)	$ -	$ 6,166	$ 1,322	$ 919	$ 184	$ 14,655
10	Energy Inovation Center- Indoor	4.5	10.7	$ 1,680	$ (8)	$ -	$ 2,365	$ 437	$ 304	$ 61	$ 4,838
11	Energy Inovation Center- Outdoor	10	10	$ 1,013	$ (8)	$ -	$ 2,262	$ 353	$ 246	$ 49	$ 3,915
12	San Diego Zoo	100	130	$ 9,123	$ (101)	$ -	$ 8,426	$ 1,885	$ 1,311	$ 262	$ 20,905
13	UCSD MESOM	6	10.7	$ 1,680	$ (8)	$ -	$ 2,365	$ 437	$ 304	$ 61	$ 4,838
14	Suites at Paseo (SDSU Private Dormitories)	18	32.1	$ 3,015	$ (25)	$ -	$ 3,186	$ 668	$ 464	$ 93	$ 7,402
15	Del Lago Academy	100	200	$ 14,503	$ (155)	$ -	$ 12,535	$ 2,904	$ 2,019	$ 404	$ 32,209
21	Santa Ysabel Substation	6	11	$ 1,699	$ (9)	$ -	$ 2,365	$ 439	$ 305	$ 61	$ 4,860
22	Santa Ysabel Substation	30	36	$ 3,259	$ (28)	$ -	$ 3,803	$ 760	$ 529	$ 106	$ 8,429
23	Caltrans Park-N-Ride Del Lago (OPRA)	200	400	$ 27,993	$ (311)	$ -	$ 23,219	$ 5,497	$ 3,823	$ 765	$ 60,986
24	ITF (OPRA)	200	400	$ 27,993	$ (311)	$ -	$ 23,219	$ 5,497	$ 3,823	$ 765	$ 60,986
25	Civita Microgrid	125	200	$ 14,503	$ (155)	$ -	$ 12,535	$ 2,904	$ 2,019	$ 404	$ 32,209
Subtotal - Small Scale Sites											*$ 326,738*
Utility Scale Sites											
1	Borrego Microgrid Yard- SES1	500	1500	$ 95,513	$ (1,712)	$ 11,722	$ 68,607	$ 21,659	$ 13,284	$ 266	$ 209,339
2	Pala Energy Storage Yard	500	1500	$ 75,263	$ (1,382)	$ 5,239	$ 36,772	$ 14,400	$ 8,832	$ 1,766	$ 140,891
16	Ortega Highway (Quest) 1243 Unit 1	1000	3000	$ 149,513	$ (2,479)	$ 11,722	$ 76,902	$ 15,628	$ 16,878	$ 3,376	$ 271,539
17	Ortega Highway (Quest)1243 Unit 2	1000	3000	$ 149,513	$ (2,479)	$ 11,722	$ 76,902	$ 15,628	$ 16,878	$ 3,376	$ 271,539
18	Pala Unit 2	1000	2000	$ 127,013	$ (1,583)	$ 7,814	$ 52,361	$ 12,321	$ 13,307	$ 2,661	$ 213,893
19	Carmel Valley (Canyon Crest)	1000	3000	$ 190,013	$ (2,479)	$ 11,722	$ 81,222	$ 18,616	$ 20,105	$ 4,021	$ 323,219
20	Borrego Microgrid Yard- SES2	1000	3000	$ 190,013	$ (2,701)	$ 15,629	$ 100,182	$ 20,118	$ 21,728	$ 4,346	$ 349,313
27	El Cajon BESS 1	7500	30000	$ 2,521,013	$ (24,931)	$ 156,288	$ 966,064	$ 240,398	$ 259,630	$ 51,926	$ 4,170,388
28	Escondido BESS 1	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
29	Escondido BESS 2	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
30	Escondido BESS 3	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
Subtotal - Utility Scale Sites											*$ 18,526,157*
Flow Battery Site											
26	San Miguel VRF	2000-2300	8000	$ 85,013	$ (7,452)	$ 35,165	$ 212,667	$ 40,208	$ 24,661	$ 4,932	$ 395,194
Subtotal - Flow Battery Site											*$ 395,194*
TOTAL											***$ 19,248,089***

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Table 3-2 — Cost Estimate Summary by FERC Account for BESS Sites

	Location	Capacity (kW)	Energy (kWh)	341 - STRUCTURES AND IMPROVEMENTS	348 - OTHER PRODUCTION - GENERATION	351 - TRANSMISSION	363 - DISTRIBUTION STORAGE BATTERY EQUIPMENT	I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT	TOTAL PROJECT COST
Small Scale Sites										
3	Mission Valley- Skills Training Center	25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$ 13,301
4	Clairemont	25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$ 13,301
5	Poway	25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$ 13,301
6	Borrego Springs CES	25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$ 10,200
7	Borrego Springs CES	25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$ 10,200
8	Borrego Springs CES	25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$ 10,200
9	Century Park CES	50	82	$ 1,691	$ 3,954	$ 3,954	$ 3,954	$ 781	$ 322	$ 14,655
10	Energy Inovation Center- Indoor	4.5	10.7	$ 1,122	$ 1,117	$ 1,117	$ 1,117	$ 258	$ 106	$ 4,838
11	Energy Inovation Center- Outdoor	10	10	$ 1,069	$ 850	$ 850	$ 850	$ 209	$ 86	$ 3,915
12	San Diego Zoo	100	130	$ 2,053	$ 5,760	$ 5,760	$ 5,760	$ 1,114	$ 459	$ 20,905
13	UCSD MESOM	6	10.7	$ 1,122	$ 1,117	$ 1,117	$ 1,117	$ 258	$ 106	$ 4,838
14	Suites at Paseo (SDSU Private Dormitories)	18	32.1	$ 1,271	$ 1,858	$ 1,858	$ 1,858	$ 395	$ 163	$ 7,402
15	Del Lago Academy	100	200	$ 3,550	$ 8,745	$ 8,745	$ 8,745	$ 1,716	$ 707	$ 32,209
21	Santa Ysabel Substation	6	11	$ 1,124	$ 1,123	$ 1,123	$ 1,123	$ 259	$ 107	$ 4,860
22	Santa Ysabel Substation	30	36	$ 1,330	$ 2,155	$ 2,155	$ 2,155	$ 449	$ 185	$ 8,429
23	Caltrans Park-N-Ride Del Lago (OPRA)	200	400	$ 6,060	$ 16,780	$ 16,780	$ 16,780	$ 3,249	$ 1,338	$ 60,986
24	ITF (OPRA)	200	400	$ 6,060	$ 16,780	$ 16,780	$ 16,780	$ 3,249	$ 1,338	$ 60,986
25	Civita Microgrid	125	200	$ 3,550	$ 8,745	$ 8,745	$ 8,745	$ 1,716	$ 707	$ 32,209
Subtotal - Small Scale Sites				$ 39,136	$ 87,672	$ 87,672	$ 87,672	$ 17,414	$ 7,171	$ 326,738
Utility Scale Sites										
1	Borrego Microgrid Yard- SES1	500	1500	$ 69,536	$ 42,084	$ 42,084	$ 42,084	$ 10,096	$ 3,454	$ 209,339
2	Pala Energy Storage Yard	500	1500	$ 33,745	$ 32,182	$ 32,182	$ 32,182	$ 7,507	$ 3,091	$ 140,891
16	Ortega Highway (Quest) 1243 Unit 1	1000	3000	$ 70,671	$ 60,205	$ 60,205	$ 60,205	$ 14,346	$ 5,907	$ 271,539
17	Ortega Highway (Quest)1243 Unit 2	1000	3000	$ 70,671	$ 60,205	$ 60,205	$ 60,205	$ 14,346	$ 5,907	$ 271,539
18	Pala Unit 2	1000	2000	$ 48,770	$ 49,718	$ 49,718	$ 49,718	$ 11,311	$ 4,657	$ 213,893
19	Carmel Valley (Canyon Crest)	1000	3000	$ 73,286	$ 75,269	$ 75,269	$ 75,269	$ 17,089	$ 7,037	$ 323,219
20	Borrego Microgrid Yard- SES2	1000	3000	$ 93,406	$ 76,611	$ 76,611	$ 76,611	$ 18,468	$ 7,605	$ 349,313
27	El Cajon BESS 1	7500	30000	$ 967,762	$ 963,690	$ 963,690	$ 963,690	$ 220,685	$ 90,870	$ 4,170,388
28	Escondido BESS 1	10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$ 4,192,012
29	Escondido BESS 2	10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$ 4,192,012
30	Escondido BESS 3	10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$ 4,192,012
Subtotal - Utility Scale Sites				*$ 4,335,973*	*$ 4,269,621*	*$ 4,269,621*	*$ 4,269,621*	*$ 978,934*	*$ 402,387*	*$ 18,526,157*
Flow Battery Site										
26	San Miguel VRF	2000-2300	8000	$ 203,625	$ 53,992	$ 53,992	$ 53,992	$ 20,962	$ 8,631	$ 395,194
Subtotal - Flow Battery Site				$ 203,625	$ 53,992	$ 53,992	$ 53,992	$ 20,962	$ 8,631	$ 395,194
TOTAL				$ 4,578,734	$ 4,411,285	$ 4,411,285	$ 4,411,285	$1,017,311	$ 418,189	$ 19,248,089

LAST PAGE OF SECTION 3.

4. BASIS OF ESTIMATE

The decommissioning cost estimates in Appendix A are for the dismantlement and removal of 30 different BESS sites. In general, the sites can be categorized into three groups: small scale (0–500 kW, housed inside buildings or small enclosures), utility scale (>500 kW, housed in cargo containers), and the flow-battery site (San Miguel).

The cost estimate is based primarily on S&L's experience on similar projects. Detailed engineering has not been performed to firm up the project details, and specific site characteristics have not been fully analyzed. We have assigned allowances where necessary to cover issues that are likely to arise but are not clearly quantified.

4.1 PROCEDURE

In general, the procedure to decommission the BESS sites is as follows:

- Small-Scale BESS
  - Dismantle and remove all mechanical and electrical equipment. (Per SDG&E's direction, all transmission/distribution equipment is excluded and only the batteries and directly-related components, such as racks and enclosures, are included with the estimate. Site features, such as fencing and switchyards, are not included.)
  - Remove batteries and ship to recycling center.
  - Remove racking.
  - Remove inverter, combiner box, and electrical box aboveground conduits and wiring.
  - Remove transformers.
  - Metals are collected for scrap value.
  - All other materials are disposed in a landfill.

- Utility-Scale & Flow BESS
  - Dismantle and remove all mechanical and electrical equipment. (Per SDG&E's direction, all transmission/distribution equipment is excluded and only the batteries and directly-related components, such as racks and enclosures, are included with the estimate. Site features, such as fencing and switchyards, are not included.)
  - Remove batteries and ship to recycling center.
  - Remove racking.
  - Demolish cargo containers for scrap.
  - Remove inverter, combiner box, and electrical box aboveground conduits and wiring.
  - Remove transformers.
  - Remove cargo containers' foundations.
  - Metals are collected for scrap value.
  - All other materials are disposed in a landfill.

4.1.1 Pricing and Quantities

Quantities were provided by SDG&E in the form of a BESS portfolio database. The database includes the capacity (kW) and energy (kWh), the weight of the batteries at the site, and the type of batteries. Photos and notes from S&L's visit to SDG&E Energy Innovation Center were used to establish the typical components for decommissioning. Images from maps.google.com were also used to review large-scale BESS sites.

A. Labor Wage Rates

- Craft labor wage rates selected for the estimates are based on prevailing rates published in *RSMeans Labor Rates for the Construction Industry*, 2016 edition, for San Diego, CA.
- The labor estimate is based on a 40-hour workweek; no per diem or other labor incentives.

B. Labor Crews

- Scrap metals are a globally traded commodity and are part of the larger metals industry. The value of scrap metal is subject to constantly changing economic conditions, as such the price of mixed steel, stainless steel, copper, and aluminum can vary greatly over time as a result of global supply and demand. The value of scrap for this study was determined by a three-month average from 'Scrap Metals MarketWatch'(July, August, and September of 2016) for the West Coast (Zone 1) of the United States. The 'Scrap Metals MarketWatch' can be found on the following website:

- www.americanrecycler.com

- The values obtained are delivered prices expressed as cost per gross ton or pound to account for separation, preparation and shipping costs to the mills. Metal recycling is a cyclical industry. The costs used in this study represent market prices in mid-2016, and cannot be used to estimate the value of scrap in the future. Estimated scrap prices are listed in Table 4-2.

Table 4-1 — Example Crew Rates – Small Scale Sites

San Diego, CA		Demo Equipment	
		$/hr	Percentage
Crew Base		$ 32.74	38%
Crew Fringes		$ 19.34	23%
Crew FICA		$ 2.50	3%
Crew SUI		$ 0.42	0%
Crew FUI		$ 0.04	0%
Crew Workers Comp. Ins		$ 7.50	9%
Other *		$ 1.64	2%
Site OH		$ 21.43	25%
Total		$ 85.61	100%
* Expendables/Small Tools, Show up Time, Working Foreman, General Liability Insurance			

Table 4-2 — Example Crew Rates – Utility-Scale and Flow-Battery Sites

San Diego, CA		Demo Equipment		Demo Concrete	
		$/hr	Percentage	$/hr	Percentage
Crew Base		$ 32.74	31%	$38.33	33%
Crew Fringes		$ 19.34	18%	$21.11	18%
Crew FICA		$ 2.50	2%	$2.93	2%
Crew SUI		$ 0.42	0%	$0.42	0%
Crew FUI		$ 0.04	0%	$0.04	0%
Crew Workers Comp. Ins		$ 7.50	7%	$8.78	7%
Other *		$ 1.64	2%	$1.92	2%
Equipment		$ 21.55	20%	$20.80	18%
Site OH		$ 21.43	20%	$23.58	20%
Total		$ 107.16	100%	$117.91	100%
* Expendables/Small Tools, Show up Time, Working Foreman, General Liability Insurance					

C. Productivity

- The labor productivity is estimated to be 1.2[1] for the San Diego area based on Compass International data relating to productivity experienced on demolition and productivity for the area. For reference, the Houston area has a labor productivity factor of 1.
- No allowances have been made to cover items such as loss in productivity because of inclement weather conditions.

D. Quantity Sources

- Quantities of pieces of equipment and/or bulk material commodities used in this cost estimate were developed from engineering-supplied information from the sites.
- Scrap value for recoverable metals is included in the estimate as a credit. No resale of equipment or material is included. Battery enclosure weight is based on the Kokam enclosures at the San Diego Zoo site. Cargo container weight is based on a typical 40' high cube container (39'6.5" l x 7'8.25" w x 8'5.5" d) at 2,900 kilograms (kg) / 6,393 lbs. (www.freightgate.com). The weight of enclosure is adjusted for each site is based on the number of batteries. The number of cargo containers was determined by satellite image when possible and estimated by the number of batteries when it could not be determined otherwise.

E. Scrap

- Scrap metals are a globally traded commodity and are part of the larger metals industry. The value of scrap metal is subject to constantly changing economic conditions, as such the price of mixed steel, stainless steel, copper, and aluminum can vary greatly over time as a result of global supply and demand. The value of scrap for this study was determined by a three-month average from 'Scrap Metals MarketWatch'(July, August, and September of 2016) for the West Coast (Zone 1) of the United States. The 'Scrap Metals MarketWatch' can be found on the following website:
- www.americanrecycler.com
- The values obtained are delivered prices expressed as cost per gross ton or pound to account for separation, preparation and shipping costs to the mills. Metal recycling is a cyclical industry. The costs used in this study represent market prices in mid-2016, and cannot be used to estimate the value of scrap in the future. Estimated scrap prices are listed in Table 4-2.

[1] Productivity index calculated as (Specific City Labor Rate) ÷ (National Average Labor Rate) × 100

Table 4-3 — Estimated Scrap Prices

	#1 & 2 Mixed Steel	#1 Copper	Aluminum	Stainless Steel
	$ / Gross Ton	$/lb.	$/lb.	$/lb.
Date				
July 1, 2016	185	1.95	0.45	0.55
August 1, 2016	185	1.94	0.46	0.57
September 1, 2016	184	1.97	0.47	0.55
3 Month Average	*184.67*	*1.95*	*0.46*	*0.56*
Converted to $/tons	$165 / ton	$3,907 / ton	$920 / ton	$1,113 / ton
Scrap dealer costs - deduct	$78 / ton	$440 / ton	$260 / ton	$200 / ton
Net Value to Utility	**$87 / ton**	**$3,467 / ton**	**$660 / ton**	**$913 / ton**

- The cost to dispose of the batteries through recycling is based on a quote provided by SDG&E from Kinsbursky Brothers, Inc. The cost to recycle various types of batteries is as follows:
  - All lithium-based batteries (except LiMnO2): $3.50/lb.
  - Lithium manganese dioxide (LiMnO2): $2.75/lb.
  - All lead-acid-based batteries: $0/lb.
  - Several battery manufacturers and recyclers were contacted to provide the estimated cost to recycle or dispose of vanadium redox (flow battery). Presently, a cost for recycling vanadium redox could not be found. Therefore, this study assumed the recycling/disposal cost to be the same as lithium-based batteries.

F. Contractor Costs

- Contractors' general and administrative (G&A) cost is included at 5% of labor and material.
- Contractors' profit is included at 8% of labor and material.

G. Indirect Expenses

- Project indirect expenses are based on percent total direct construction labor only.
- Engineering costs are included to cover engineering services associated with planning decommissioning activities.
- Construction management and field engineering is estimated to be 2%. This covers oversight of demolition activities but not full-time construction management.
- Owner's costs are not included.

H. Escalation Rates

- Not included.

I. Sales and Use Taxes

- Sales and use taxes are not included.

J. Contingency

- A 20% contingency is applied for material, labor, and indirect expenses.
- A -20% contingency is applied for scrap value, as a drop in scrap value will result in an increase in project cost.

K. Contract Basis for Estimate

- The estimate is based on a multiple lump sum.

L. Assumptions

- The battery type was not specified for the Civita Microgrid project. The battery type is assumed to be lithium-type for disposal (recycling) costs.
- BESS facilities at photovoltaic (PV) sites are included with this estimate and are excluded from the PV site decommissioning study (SL-013559.E).
- All electrical equipment and wiring is de-energized by others.
- According to Don Balfour of SDG&E in an email dated October 17, 2016, battery site decommissioning shall include only the battery facility. Surrounding switchgear, fencing, and interconnection equipment is included with separate costs.
- Quotes from the Kinsbursky Brothers, Inc. (October 1, 2016) are for recycling/processing fee only. This fee does not include the collection or transport of batteries. (Per email from Andrew Friedl of SDG&E on October 14, 2016).
- Kinsbursky Brothers, Inc., fees are applied to the cost estimate per SDG&E's direction. The Kinsbursky Brothers facility is located in the greater Los Angeles area far from most of the SDG&E BESS sites. With respect to the transportation cost for battery disposal/recycling, the decommissioning cost estimate assumes batteries will be shipped to nearby recycling facilities in the greater San Diego area. Several battery recyclers exist in the San Diego area.
- Based on aerial images, the utility-scale BESS sites are typically supported by six or eight cylindrical foundations. Cylindrical foundations were assumed to be 3 feet in diameter and 3 feet high, with 2 feet below ground level based on similar foundations on S&L projects.

  The number of columns is based on aerial images. For sites that have not been constructed, the number of foundation columns is based on the Ortega Highway (Quest) BESS site.

  Volume of typical column = 22 cubic feet.
- All chemicals will be removed from the facilities to be demolished by the utility before demolition.
- No extraordinary environmental costs for demolition will be needed.
- There will be no polychlorinated biphenyls (PCBs) on site at the time of demolition.

- Switchyards within the plant boundaries are not part of the scope, nor are access roads to these facilities.
- All items above grade and to a depth of 1 foot will be demolished. All foundations will be removed. Any other items buried more than 1 foot deep will remain in place.
- All demolished materials are considered debris, except for metals that have scrap value.
- The basis for salvage estimating is for scrap value only. No resale of equipment or material is included.
- Disturbed areas will be buried under 6 inches of topsoil, then mulched and seeded with grass; no other landscaping is included.
- All fill material is assumed to be from off-site sources.
- The material and labor cost for fill soil is estimated to be $37 per cubic yard for the San Diego area.

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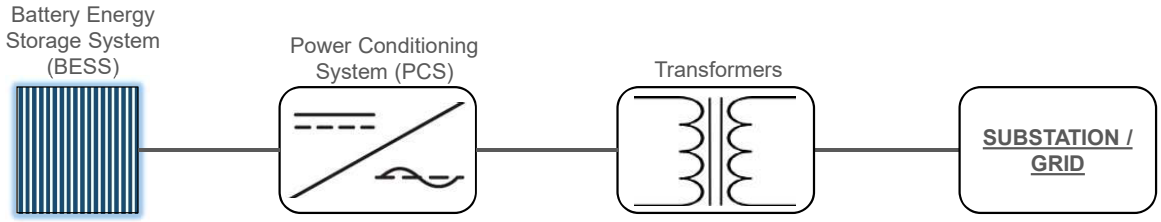
5. AVERAGE SERVICE LIFE EVALUATION

5.1 DESCRIPTION OF FACILITY

BESS sites typically consist of the battery system; the power conditioning system (PCS), which consists of bidirectional rectifiers or bidirectional inverters; and transformers. When charging, the alternating current (AC) grid voltage is stepped down by transformers and converted to direct current (DC) by rectifiers to feed the BESS. During discharge mode, the BESS DC output is converted to AC via inverters (or bidirectional rectifiers), then stepped up to the required grid voltage via transformers.

Figure 5-1 below represents a simplified BESS facility. The PCS requires a large amount of cooling under high load conditions to minimize losses, thus increasing electric conversion efficiency. A BESS facility is connected to the grid via circuit breakers. To ensure protection and control, battery banks, typically enclosed in containers, are frequently monitored via a battery management system (BMS) are connected to the overall supervisory control and data acquisition (SCADA) system.

Figure 5-1 — BESS Facility Simple Diagram



BESSs come in various types, including but not limited to:

- Lead Acid Battery (LA)
- Nickel Cadmium and Nickel Metal Hydride Battery (NiCd, NiMH)
- Lithium Ion Battery (Li-Ion)
- Metal Air Battery (Me-Air)
- Sodium Sulfur Battery (NaS)
- Sodium Nickel Chloride Battery (NaNiCl)
- Redox Flow Battery (RFB)
- Hybrid Flow Battery

The types of BESS used in SDG&E's portfolio are lithium ion, lead acid, and flow batteries (vanadium redox). Widely used lithium-ion batteries are known to have a higher energy density and efficiency as well as a longer cycle life than other advanced batteries. They are, however, more expensive due to special packaging and internal overcharge protection circuits. Lead-acid batteries, on the other hand, commonly used in uninterruptible power supplies, are marginally economic and have substantial space and maintenance requirements. They also have lower energy density. Redox-flow batteries are different than the others in terms of having their electrolyte stored in external tanks and pumped through their electrochemical cell, whereby the energy depends on the size of the tanks; these flow batteries can be rechargeable. Table 5-1 below summarizes the main differences between these types of batteries.

Table 5-1 — BESS Technical Data Comparison Overview

Battery Technology	Response Time	Typical Discharge Time	Energy Density (Wh/kg)	Energy Efficiency (%)	Typical Cycle Lifetimes (cycles)
Lead Acid	< seconds	hours	30 - 45	75 – 90	250 – 1500
Lithium-Ion	< seconds	hours	60 – 200	85 – 98	500 – 10,000
Vanadium Redox (Flow Battery)	seconds	hours	- 50	60 – 75	> 10,000

The SDGE's BESS portfolio includes 27 projects based on lithium-ion technology, one based on lead acid, and one based on vanadium redox (flow battery). Table 5-2 below lists the BESS projects in SDG&E's portfolio by type.

Table 5-2 — SDG&E BESS Portfolio

Location	Capacity (kW)	Energy (kWh)	Type	Installation Date
Borrego Microgrid Yard- SES1	500	1,500	Lithium Nickel Cobalt Aluminum	9/1/2012
Pala Energy Storage Yard	500	1,500	Lithium Manganese Oxide	12/1/2012
Mission Valley- Skills Training Cente	25	72	Lithium Nickel Cobalt Aluminum	11/2/2012
Clairemont	25	72	Lithium Nickel Cobalt Aluminum	11/3/2012
Poway	25	72	Lithium Nickel Cobalt Aluminum	11/4/2012
Borrego Springs CES	25	50	Lithium Polymer	3/1/2013
Borrego Springs CES	25	50	Lithium Polymer	3/2/2013
Borrego Springs CES	25	50	Lithium Polymer	3/3/2013
Century Park CES	50	82	Lithium Iron Phosphate	3/1/2013
Energy Inovation Center- Indoor	5	11	Lithium Polymer	1/12/2012
Energy Inovation Center- Outdoor	10	10	Lead Acid	3/12/2013
San Diego Zoo	100	130	Lithium Polymer	11/1/2012
UCSD MESOM	6	11	Lithium Polymer	4/1/2013
Suites at Paseo (SDSU Private Dormi	18	32	Lithium Polymer	6/1/2013
Del Lago Academy	100	200	Lithium Polymer	11/1/2013
Ortega Highway (Quest) 1243 Unit 1	1,000	3,000	Lithium Manganese Oxide	9/1/2013
Ortega Highway (Quest)1243 Unit 2	1,000	3,000	Lithium Manganese Oxide	9/1/2013
Pala Unit 2	1,000	2,000	Lithium Polymer	9/1/2013
Carmel Valley (Canyon Crest)	1,000	3,000	Lithiun Ion-doped nickel oxide(NCA)	9/1/2013
Borrego Microgrid Yard- SES2	1,000	3,000	Lithium Nickel Cobalt Aluminum	2/1/2013
Santa Ysabel Substation	6	11	Li-Ion	11/13/2013
Santa Ysabel Substation	30	36	Li-Ion	11/14/2013
Caltrans Park-N-Ride Del Lago (OPRA	200	400	Lithium Ion	9/1/2014
ITF (OPRA)	200	400	Lithium Ion	9/1/2014
Civita Microgrid	125	200		
San Miguel VRF	2000-2300	8,000	Vanadium Redox	11/16/2016
El Cajon BESS 1	7,500	30,000	Lithium Ion NMC	
Escondido BESS 1	10,000	40,000	Lithium Ion NMC	
Escondido BESS 2	10,000	40,000	Lithium Ion NMC	
Escondido BESS 3	10,000	40,000	Lithium Ion NMC	

5.2 BENCHMARKING ANALYSIS

The ABB Velocity Suite database was used to collect benchmarking information for this study. The database utilizes data reported to FERC from the electricity industry. A peer group for the BESS sites was established using the criteria shown in Table 5-3 below.

Table 5-3 — Desert Star Benchmarking Peer Group Criteria

Criteria	Peer Group Selection
Plant Type	All energy storage sites with batteries as the primary equipment

The benchmarking analysis considered all energy storage facilities that use batteries as the primary equipment. The database showed 54 sites. The largest and smallest sites by nameplate capacity are 36 megawatts (MW) and 250 kW, respectively. The average and median nameplate capacities are 8.59 MW and 3.5 MW, respectively. The SDG&E portfolio contains 10 sites rated 1 MW or more; 20 sites are smaller than 1 MW.

The oldest and youngest sites in the group entered commercial operation in 1978 and 2016, respectively. The installation listed as entering service in 1978 is a battery energy storage facility at an oil-fired plant in Maine. It is possible that this data point is not up-to-date, since the battery storage facility would have been in service for 38 years by 2016. The second oldest energy storage site in the database is 12 years old and located in Alaska. Many of the sites entered operation in 2016. The average age of the energy storage sites is 2.3 years, with a median of one year, when the 38-year-old site is excluded. Only one of the sites was retired after only one year of operation; it is likely that this site was a research or demonstration project.

The benchmarking analysis shows that most of the energy storage sites in the database were installed in the past few years. As such, the database cannot offer much indication of the average service life of BESSs. Nonetheless, the benchmarking analysis shows that the BESS sites in the SDG&E portfolio are similar in age and size to many facilities in North America.

5.3 AVERAGE SERVICE LIFE

The average service lives of the BESS types used in SDGE's portfolio are shown in Table 5-4 below. Vanadium redox flow batteries have the highest service life, followed by lithium-ion batteries. Lead-acid batteries showed the lowest service life.

Table 5-4 — Battery Technology Lifetime Comparison

Battery Technology	Lifetime (Years)
Lead Acid	3 to 15
Lithium-Ion	5 to 15
Vanadium Redox (Flow battery)	5 to 20

Reference: Fraunhofer ISE, IEC "Electrical Energy Storage," 2011.

Some of the key factors affecting battery life as follows:

- **Storage:** Storage of batteries for long periods of time may lead to shorter runtimes and reduced capacity. To avoid potential hidden damage and lifetime reduction, batteries should be properly stored in cool and dry places (climate controlled with proper ventilation using high-efficiency particulate arresting [HEPA] filters) prior to usage, for a minimum of six months as a rule of thumb.
- **Ambient temperature:** Generally, batteries are rated at an ambient temperature of 25°C. Any increase in temperature of approximately 10°C can lead to a 50% battery lifetime reduction. Also, temperatures lower than 25°C may cause battery backup time reduction. The solution is, therefore, to maintain the ambient temperature inside the battery bank container to 25°C.
- **Cycling:** Generally, every charge and discharge cycle reduces and degrades the battery's relative capacity by a very small amount. The length of one cycle (i.e., discharge) can also result in a slight battery capacity reduction. The depth of discharge can also affect the life of the battery. SDG&E assumes that a BESS will experience 100 charge/discharge cycles per year of normal operation. The number of cycles during the service life of a battery depends heavily on the application. Some utility-scale batteries are rated for 500 to 1,200 cycles, for example.
- **Maintenance:** Lastly, a maintenance plan with regular checks and corrective action will play a key role in prolonging battery lifetime. A BMS will indicate whether batteries are operating as designed. Individual batteries may be replaced to extend the life of an overall system. Ventilation systems should be cleaned and checked to ensure temperatures are properly maintained.

Generally, battery manufacturers will guarantee a 10-year life for a BESS.

5.4 CONCLUSION

The average service life of the small-scale, utility-scale, and flow-battery BESS sites in SDG&E's portfolio is limited by the battery service life to approximately 10 years. Related electrical pieces of equipment are expected to have longer service lives. For example, inverters and transformers are expected to operate for 10 to 15 years

and 15 to 20 years, respectively. Overall system life may be extended by replacing components; however, this process equates to system replacement over time.

In general, with proper maintenance, careful storage, and good maintenance, a BESS is expected to have a useful life of approximately 10 years.

LAST PAGE OF SECTION 5.

6. REFERENCES

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Appendix A

Conceptual Estimate of Cost to Dismantle
Battery Energy Storage Systems (BESS) Sites

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS Sites

Project ID	Location	Capacity (kW)	Energy (kWh)	Includes Contingency: Subcontract Cost	Scrap Value	Material Cost	Labor Cost	G&A & Profit	Procurement, & Project Services; Construction Management Support	Contingency on Indirect	Total Cost
Small Scale Sites											
3	Mission Valley- Skills Training Center	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
4	Clairemont	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
5	Poway	25	72	$ 5,505	$ (56)	$ -	$ 5,652	$ 1,200	$ 834	$ 167	$ 13,301
6	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
7	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
8	Borrego Springs CES	25	50	$ 4,132	$ (39)	$ -	$ 4,419	$ 920	$ 640	$ 128	$ 10,200
9	Century Park CES	50	82	$ 6,128	$ (64)	$ -	$ 6,166	$ 1,322	$ 919	$ 184	$ 14,655
10	Energy Inovation Center- Indoor	4.5	10.7	$ 1,680	$ (8)	$ -	$ 2,365	$ 437	$ 304	$ 61	$ 4,838
11	Energy Inovation Center- Outdoor	10	10	$ 1,013	$ (8)	$ -	$ 2,262	$ 353	$ 246	$ 49	$ 3,915
12	San Diego Zoo	100	130	$ 9,123	$ (101)	$ -	$ 8,426	$ 1,885	$ 1,311	$ 262	$ 20,905
13	UCSD MESOM	6	10.7	$ 1,680	$ (8)	$ -	$ 2,365	$ 437	$ 304	$ 61	$ 4,838
14	Suites at Paseo (SDSU Private Dormitories)	18	32.1	$ 3,015	$ (25)	$ -	$ 3,186	$ 668	$ 464	$ 93	$ 7,402
15	Del Lago Academy	100	200	$ 14,503	$ (155)	$ -	$ 12,535	$ 2,904	$ 2,019	$ 404	$ 32,209
21	Santa Ysabel Substation	6	11	$ 1,699	$ (9)	$ -	$ 2,365	$ 439	$ 305	$ 61	$ 4,860
22	Santa Ysabel Substation	30	36	$ 3,259	$ (28)	$ -	$ 3,803	$ 760	$ 529	$ 106	$ 8,429
23	Caltrans Park-N-Ride Del Lago (OPRA)	200	400	$ 27,993	$ (311)	$ -	$ 23,219	$ 5,497	$ 3,823	$ 765	$ 60,986
24	ITF (OPRA)	200	400	$ 27,993	$ (311)	$ -	$ 23,219	$ 5,497	$ 3,823	$ 765	$ 60,986
25	Civita Microgrid	125	200	$ 14,503	$ (155)	$ -	$ 12,535	$ 2,904	$ 2,019	$ 404	$ 32,209
Subtotal - Small Scale Sites											*$ 326,738*
Utility Scale Sites											
1	Borrego Microgrid Yard- SES1	500	1500	$ 95,513	$ (1,712)	$ 11,722	$ 68,607	$ 21,659	$ 13,284	$ 266	$ 209,339
2	Pala Energy Storage Yard	500	1500	$ 75,263	$ (1,382)	$ 5,239	$ 36,772	$ 14,400	$ 8,832	$ 1,766	$ 140,891
16	Ortega Highway (Quest) 1243 Unit 1	1000	3000	$ 149,513	$ (2,479)	$ 11,722	$ 76,902	$ 15,628	$ 16,878	$ 3,376	$ 271,539
17	Ortega Highway (Quest)1243 Unit 2	1000	3000	$ 149,513	$ (2,479)	$ 11,722	$ 76,902	$ 15,628	$ 16,878	$ 3,376	$ 271,539
18	Pala Unit 2	1000	2000	$ 127,013	$ (1,583)	$ 7,814	$ 52,361	$ 12,321	$ 13,307	$ 2,661	$ 213,893
19	Carmel Valley (Canyon Crest)	1000	3000	$ 190,013	$ (2,479)	$ 11,722	$ 81,222	$ 18,616	$ 20,105	$ 4,021	$ 323,219
20	Borrego Microgrid Yard- SES2	1000	3000	$ 190,013	$ (2,701)	$ 15,629	$ 100,182	$ 20,118	$ 21,728	$ 4,346	$ 349,313
27	El Cajon BESS 1	7500	30000	$ 2,521,013	$ (24,931)	$ 156,288	$ 966,064	$ 240,398	$ 259,630	$ 51,926	$ 4,170,388
28	Escondido BESS 1	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
29	Escondido BESS 2	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
30	Escondido BESS 3	10000	40000	$ 2,521,013	$ (30,136)	$ 156,288	$ 990,369	$ 241,498	$ 260,818	$ 52,164	$ 4,192,012
Subtotal - Utility Scale Sites											*$ 18,526,157*
Flow Battery Site											
26	San Miguel VRF	2000-2300	8000	$ 85,013	$ (7,452)	$ 35,165	$ 212,667	$ 40,208	$ 24,661	$ 4,932	$ 395,194
Subtotal - Flow Battery Site											*$ 395,194*
TOTAL											***$ 19,248,089***

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS - Small Scale

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
3	Mission Valley- Skills Training Center	9070 Friars Rd, San Diego	701	25	72	Complete	Saft	Lithium Nickel Cobalt Aluminum

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		1,069 LBS	$ 3,743			/MH			$ 3,743
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		477.97 lb				9 /MH	$ 85.61	$ 770	$ 770
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				5 /MH	$ 85.61	$ 428	$ 428
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment- BESS inverters, other electrical equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment - BESS batteries		1,069 LBS	``			18 /MH	$ 85.61	$ 1,541	$ 1,541
			Demolition			***$ 3,743***	***$ -***	***$ -***			***$ 4,710***	***$ 8,453***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		476 LBS		$ (21)		/MH			$ (21)
			Electrical equipment- Inverters, controllers, auxiliary equipment		28 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		28 LBS		$ (48)		/MH			$ (48)
			Scrap Value			***$ -***	***$ (70)***	***$ -***			***$ -***	***$ (70)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 4,587*	*$ (70)*	*$ -*			*$ 4,710*	*$ 9,227*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 461
		91.10	Contractor's Profit									$ 738
												$ 1,200
Direct Costs + Construction Indirect Costs						*$ 4,587*	*$ (70)*	*$ -*			*$ 4,710*	*$ 10,427*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 626
		93.2	Construction Management Support									$ 209
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 917.43						$ 917
		95.2	Contingency on Scrap Value				$ 14					$ 14
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 942	$ 942
		95.5	Contingency on Indirect									$ 166.83
Total						**$ 5,505**	**$ (56)**	**$ -**			**$ 5,652**	**$ 13,301**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
4	Clairemont	5199 Clairemont Mesa Boulevard	278	25	72	Complete	Saft	Lithium Nickel Cobalt Aluminum

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		1,069 LBS	$ 3,743			/MH			$ 3,743
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		477.97 lb				9 /MH	$ 85.61	$ 770	$ 770
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				5 /MH	$ 85.61	$ 428	$ 428
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment - BESS batteries		1,069 LBS				18 /MH	$ 85.61	$ 1,541	$ 1,541
			Demolition			***$ 3,743***	***$ -***	***$ -***			***$ 4,710***	***$ 8,453***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		476 LBS		$ (21)		/MH			$ (21)
			Electrical equipment - Inverters, controllers, auxiliary equipment		28 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		28 LBS		$ (48)		/MH			$ (48)
			Scrap Value			***$ -***	***$ (70)***	***$ -***			***$ -***	***$ (70)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 4,587*	*$ (70)*	*$ -*			*$ 4,710*	*$ 9,227*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 461
		91.10	Contractor's Profit									$ 738
												$ 1,200
Direct Costs + Construction Indirect Costs						*$ 4,587*	*$ (70)*	*$ -*			*$ 4,710*	*$ 10,427*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 626
		93.2	Construction Management Support									$ 209
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 917						$ 917
		95.2	Contingency on Scrap Value				$ 14					$ 14
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 942	$ 942
		95.5	Contingency on Indirect									$ 167
Total						**$ 5,505**	**$ (56)**	**$ -**			**$ 5,652**	**$ 13,301**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
5	Poway	18515 Old Coach Way	175	25	72	Complete	Saft	Lithium Nickel Cobalt Aluminum

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		1,069 LBS	$ 3,743			/MH			$ 3,743
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		477.97 lb				9 /MH	$ 85.61	$ 770	$ 770
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				5 /MH	$ 85.61	$ 428	$ 428
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment - BESS batteries		1,069 LBS				18 /MH	$ 85.61	$ 1,541	$ 1,541
			Demolition			***$ 3,743***	***$ -***	***$ -***			***$ 4,710***	***$ 8,453***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		476 LBS		$ (21)		/MH			$ (21)
			Electrical equipment - Inverters, controllers, auxiliary equipment		28 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		28 LBS		$ (48)		/MH			$ (48)
			Scrap Value			***$ -***	***$ (70)***	***$ -***			***$ -***	***$ (70)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 4,587*	*$ (70)*	*$ -*			*$ 4,710*	*$ 9,227*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 461
		91.10	Contractor's Profit									$ 738
												$ 1,200
Direct Costs + Construction Indirect Costs						*$ 4,587*	*$ (70)*	*$ -*			*$ 4,710*	*$ 10,427*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 626
		93.2	Construction Management Support									$ 209
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 917						$ 917
		95.2	Contingency on Scrap Value				$ 14					$ 14
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 942	$ 942
		95.5	Contingency on Indirect									$ 167
Total						**$ 5,505**	**$ (56)**	**$ -**			**$ 5,652**	**$ 13,301**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
6	Borrego Springs CES	2059 Saint Vincent rd, Borrego Spring s	170	25	50	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		743 LBS	$ 2,599			/MH			$ 2,599
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		331.92 lb				7 /MH	$ 85.61	$ 599	$ 599
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				4 /MH	$ 85.61	$ 342	$ 342
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment - BESS batteries		743 LBS				12 /MH	$ 85.61	$ 1,027	$ 1,027
			Demolition			***$ 2,599***	***$ -***	***$ -***			***$ 3,683***	***$ 6,282***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		331 LBS		$ (14)		/MH			$ (14)
			Electrical equipment - Inverters, controllers, auxiliary equipment		19 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		19 LBS		$ (33)		/MH			$ (33)
			Scrap Value			***$ -***	***$ (49)***	***$ -***			***$ -***	***$ (49)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 3,443*	*$ (49)*	*$ -*			*$ 3,683*	*$ 7,078*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 354
		91.10	Contractor's Profit									$ 566
												$ 920
Direct Costs + Construction Indirect Costs						*$ 3,443*	*$ (49)*	*$ -*			*$ 3,683*	*$ 7,998*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 480
		93.2	Construction Management Support									$ 160
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 689						$ 689
		95.2	Contingency on Scrap Value				$ 10					$ 10
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 737	$ 737
		95.5	Contingency on Indirect									$ 128
Total						**$ 4,132**	**$ (39)**	**$ -**			**$ 4,419**	**$ 10,200**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
7	Borrego Springs CES	1478 Yaqui Rd, Borrego Springs	170	25	50	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		743 LBS	$ 2,599			/MH			$ 2,599
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		331.92 lb				7 /MH	$ 85.61	$ 599	$ 599
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				4 /MH	$ 85.61	$ 342	$ 342
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment - BESS batteries		743 LBS				12 /MH	$ 85.61	$ 1,027	$ 1,027
			Demolition			***$ 2,599***	***$ -***	***$ -***			***$ 3,683***	***$ 6,282***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		331 LBS		$ (14)		/MH			$ (14)
			Electrical equipment - Inverters, controllers, auxiliary equipment		19 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		19 LBS		$ (33)		/MH			$ (33)
			Scrap Value			***$ -***	***$ (49)***	***$ -***			***$ -***	***$ (49)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 3,443*	*$ (49)*	*$ -*			*$ 3,683*	*$ 7,078*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 354
		91.10	Contractor's Profit									$ 566
												$ 920
Direct Costs + Construction Indirect Costs						*$ 3,443*	*$ (49)*	*$ -*			*$ 3,683*	*$ 7,998*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 480
		93.2	Construction Management Support									$ 160
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 689						$ 689
		95.2	Contingency on Scrap Value				$ 10					$ 10
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 737	$ 737
		95.5	Contingency on Indirect									$ 128
Total						**$ 4,132**	**$ (39)**	**$ -**			**$ 4,419**	**$ 10,200**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
8	Borrego Springs CES	383 Santa Fe Trail, Borrego Springs	170	25	50	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		743 LBS	$ 2,599			/MH			$ 2,599
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		331.92 lb				7 /MH	$ 85.61	$ 599	$ 599
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				4 /MH	$ 85.61	$ 342	$ 342
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment - BESS batteries		743 LBS				12 /MH	$ 85.61	$ 1,027	$ 1,027
			Demolition			***$ 2,599***	***$ -***	***$ -***			***$ 3,683***	***$ 6,282***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		331 LBS		$ (14)		/MH			$ (14)
			Electrical equipment - Inverters, controllers, auxiliary equipment		19 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		19 LBS		$ (33)		/MH			$ (33)
			Scrap Value			***$ -***	***$ (49)***	***$ -***			***$ -***	***$ (49)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 3,443*	*$ (49)*	*$ -*			*$ 3,683*	*$ 7,078*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 354
		91.10	Contractor's Profit									$ 566
												$ 920
Direct Costs + Construction Indirect Costs						*$ 3,443*	*$ (49)*	*$ -*			*$ 3,683*	*$ 7,998*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 480
		93.2	Construction Management Support									$ 160
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 689						$ 689
		95.2	Contingency on Scrap Value				$ 10					$ 10
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 737	$ 737
		95.5	Contingency on Indirect									$ 128
Total						**$ 4,132**	**$ (39)**	**$ -**			**$ 4,419**	**$ 10,200**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
9	Century Park CES	8326 Century Park Ct.	713	50	82	Complete	International Bat t	Lithium Iron Phosphate

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		1,218 LBS	$ 4,263			/MH			$ 4,263
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		544.35 lb				11 /MH	$ 85.61	$ 942	$ 942
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				6 /MH	$ 85.61	$ 514	$ 514
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Electrical equipment - BESS batteries		1,218 LBS				20 /MH	$ 85.61	$ 1,712	$ 1,712
			Demolition			***$ 4,263***	***$ -***	***$ -***			***$ 5,138***	***$ 9,401***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		542 LBS		$ (24)		/MH			$ (24)
			Electrical equipment - Inverters, controllers, auxiliary equipment		32 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		32 LBS		$ (55)		/MH			$ (55)
			Scrap Value			***$ -***	***$ (80)***	***$ -***			***$ -***	***$ (80)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 5,107*	*$ (80)*	*$ -*			*$ 5,138*	*$ 10,165*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 508
		91.10	Contractor's Profit									$ 813
												$ 1,322
Direct Costs + Construction Indirect Costs						*$ 5,107*	*$ (80)*	*$ -*			*$ 5,138*	*$ 11,487*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 689
		93.2	Construction Management Support									$ 230
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 1,021						$ 1,021
		95.2	Contingency on Scrap Value				$ 16					$ 16
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 1,028	$ 1,028
		95.5	Contingency on Indirect									$ 184
Total						**$ 6,128**	**$ (64)**	**$ -**			**$ 6,166**	**$ 14,655**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
10	Energy Inovation Center- Indoor	4760 Clairemont Mesa Blvd	279	4.5	10.7	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		159 LBS	$ 556			/MH			$ 556
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		71.03 lb				2 /MH	$ 85.61	$ 171	$ 171
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment - BESS batteries		159 LBS				3 /MH	$ 85.61	$ 257	$ 257
			Demolition			***$ 556***	***$ -***	***$ -***			***$ 1,970***	***$ 2,527***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		71 LBS		$ (3)		/MH			$ (3)
			Electrical equipment - Inverters, controllers, auxiliary equipment		4 LBS		$ (0)		/MH			$ (0)
		18.30.00	*Copper*									
			Cable - BESS wiring		4 LBS		$ (7)		/MH			$ (7)
			Scrap Value			***$ -***	***$ (10)***	***$ -***			***$ -***	***$ (10)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 1,400*	*$ (10)*	*$ -*			*$ 1,970*	*$ 3,360*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 168
		91.10	Contractor's Profit									$ 269
												$ 437
Direct Costs + Construction Indirect Costs						*$ 1,400*	*$ (10)*	*$ -*			*$ 1,970*	*$ 3,797*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 228
		93.2	Construction Management Support									$ 76
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 280						$ 280
		95.2	Contingency on Scrap Value				$ 2					$ 2
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 394	$ 394
		95.5	Contingency on Indirect									$ 61
Total						**$ 1,680**	**$ (8)**	**$ -**			**$ 2,365**	**$ 4,838**

Project ID			Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry				
11			Energy Inovation Center- Outdoor	4760 Clairemont Mesa Blvd	279	10	10	Complete	GS Yuasa	Lead Acid				
Area	**Group**	**Phase**	**Description**	**Notes**	**Quantity**		**Subcontract Cost**	**Scrap Value**	**Material Cost**	**Man Hours**	**Crew Rate**	**Labor Cost**	**Total Cost**	
Indoor/Outdoor Rack														
	11.00.00		**Demolition**											
		11.10.00	*Miscellaneous*											
			Scrap value - battery recycling - Lead Acid		149	LBS	$ -			/MH			$	-
			Tranportation to recycling center, truck & driver							8 /MH	$ 150.00	$ 1,200	$	1,200
		11.24.00	*Architectural*											
			BESS Enclosure		66.38	lb				2 /MH	$ 85.61	$ 171	$	171
		11.41.00	*Electrical Equipment*											
			Remove wiring from batteries and other equipment		1	EA				1 /MH	$ 85.61	$ 86	$	86
			Remove grounding wires, lightning projection and other auxiliary equipment		1	EA				1 /MH	$ 85.61	$ 86	$	86
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1	EA				1 /MH	$ 85.61	$ 86	$	86
			Electrical equipment - BESS inverters, other electrical equipment		1	EA				1 /MH	$ 85.61	$ 86	$	86
			Electrical equipment - BESS batteries		149	LBS				2 /MH	$ 85.61	$ 171	$	171
			Demolition				***$ -***	***$ -***	***$ -***			***$ 1,885***	***$***	***1,885***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Mechanical Equipment - BESS enclosure, and auxilaries		66	LBS		$ (3)		/MH			$	(3)
			Electrical equipment - Inverters, controllers, auxiliary equipment		4	LBS		$ (0)		/MH			$	(0)
		18.30.00	*Copper*											
			Cable - BESS wiring		4	LBS		$ (7)		/MH			$	(7)
			Scrap Value				***$ -***	***$ (10)***	***$ -***			***$ -***	***$***	***(10)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	Rubbish	1	EA	$ 844			/MH			$	844
			Civil Work				***$ 844***	***$ -***	***$ -***			***$ -***	***$***	***844***
Subtotal							*$ 844*	*$ (10)*	*$ -*			*$ 1,885*	*$*	*2,719*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense										$	136
		91.10	Contractor's Profit										$	218
													$	**353**
Direct Costs + Construction Indirect Costs							*$ 844*	*$ (10)*	*$ -*			*$ 1,885*	*$*	*3,073*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services										$	184
		93.2	Construction Management Support										$	61
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 169						$	169
		95.2	Contingency on Scrap Value					$ 2					$	2
		95.3	Contingency on Material						$ -				$	-
		95.4	Contingency on Labor									$ 377	$	377
		95.5	Contingency on Indirect										$	49
Total							**$ 1,013**	**$ (8)**	**$ -**			**$ 2,262**	**$**	**3,915**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
12	San Diego Zoo	2902 Park Blvd, San Diego 92101	426	100	130	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		1,931 LBS	$ 6,759			/MH			$ 6,759
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		863.00 lb				16 /MH	$ 85.61	$ 1,370	$ 1,370
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				8 /MH	$ 85.61	$ 685	$ 685
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				4 /MH	$ 85.61	$ 342	$ 342
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				4 /MH	$ 85.61	$ 342	$ 342
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				4 /MH	$ 85.61	$ 342	$ 342
			Electrical equipment - BESS batteries		1,931 LBS				32 /MH	$ 85.61	$ 2,740	$ 2,740
			Demolition			***$ 6,759***	***$ -***	***$ -***			***$ 7,021***	***$ 13,780***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		860 LBS		$ (37)		/MH			$ (37)
			Electrical equipment - Inverters, controllers, auxiliary equipment		50 LBS		$ (2)		/MH			$ (2)
		18.30.00	*Copper*									
			Cable - BESS wiring		50 LBS		$ (87)		/MH			$ (87)
			Scrap Value			***$ -***	***$ (126)***	***$ -***			***$ -***	***$ (126)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 7,603*	*$ (126)*	*$ -*			*$ 7,021*	*$ 14,498*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 725
		91.10	Contractor's Profit									$ 1,160
												$ 1,885
Direct Costs + Construction Indirect Costs						*$ 7,603*	*$ (126)*	*$ -*			*$ 7,021*	*$ 16,382*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 983
		93.2	Construction Management Support									$ 328
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 1,521						$ 1,521
		95.2	Contingency on Scrap Value				$ 25					$ 25
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 1,404	$ 1,404
		95.5	Contingency on Indirect									$ 262
Total						**$ 9,123**	**$ (101)**	**$ -**			**$ 8,426**	**$ 20,905**

Project ID		Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
13		UCSD MESOM	8880 Biological Grade, La Jolla 92037	UCM	6	10.7	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		159 LBS	$ 556			/MH			$ 556
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		71.03 lb				2 /MH	$ 85.61	$ 171	$ 171
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment - BESS batteries		159 LBS				3 /MH	$ 85.61	$ 257	$ 257
			Demolition			***$ 556***	***$ -***	***$ -***			***$ 1,970***	***$ 2,527***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		71 LBS		$ (3)		/MH			$ (3)
			Electrical equipment - Inverters, controllers, auxiliary equipment		4 LBS		$ (0)		/MH			$ (0)
		18.30.00	*Copper*									
			Cable - BESS wiring		4 LBS		$ (7)		/MH			$ (7)
			Scrap Value			***$ -***	***$ (10)***	***$ -***			***$ -***	***$ (10)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 1,400*	*$ (10)*	*$ -*			*$ 1,970*	*$ 3,360*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 168
		91.10	Contractor's Profit									$ 269
												$ 437
Direct Costs + Construction Indirect Costs						*$ 1,400*	*$ (10)*	*$ -*			*$ 1,970*	*$ 3,797*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 228
		93.2	Construction Management Support									$ 76
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 280						$ 280
		95.2	Contingency on Scrap Value				$ 2					$ 2
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 394	$ 394
		95.5	Contingency on Indirect									$ 61
Total						**$ 1,680**	**$ (8)**	**$ -**			**$ 2,365**	**$ 4,838**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
14	Suites at Paseo (SDSU Private Dormitories)	5565 Lindo Paseo, San Diego 92115	169	18	32.1	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		477 LBS	$ 1,669			/MH			$ 1,669
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		213.09 lb				4 /MH	$ 85.61	$ 342	$ 342
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment - BESS batteries		477 LBS				8 /MH	$ 85.61	$ 685	$ 685
			Demolition			***$ 1,669***	***$ -***	***$ -***			***$ 2,655***	***$ 4,324***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		212 LBS		$ (9)		/MH			$ (9)
			Electrical equipment - Inverters, controllers, auxiliary equipment		12 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		12 LBS		$ (21)		/MH			$ (21)
			Scrap Value			***$ -***	***$ (31)***	***$ -***			***$ -***	***$ (31)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 2,513*	*$ (31)*	*$ -*			*$ 2,655*	*$ 5,137*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 257
		91.10	Contractor's Profit									$ 411
												$ 668
Direct Costs + Construction Indirect Costs						*$ 2,513*	*$ (31)*	*$ -*			*$ 2,655*	*$ 5,805*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 348
		93.2	Construction Management Support									$ 116
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 503						$ 503
		95.2	Contingency on Scrap Value				$ 6					$ 6
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 531	$ 531
		95.5	Contingency on Indirect									$ 93
Total						**$ 3,015**	**$ (25)**	**$ -**			**$ 3,186**	**$ 7,402**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
15	Del Lago Academy	1740 Scenic Trail Way, Escondido 92029	1250	100	200	Complete	Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		2,971 LBS	$ 10,398			/MH			$ 10,398
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		1327.69 lb				25 /MH	$ 85.61	$ 2,140	$ 2,140
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				13 /MH	$ 85.61	$ 1,113	$ 1,113
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				7 /MH	$ 85.61	$ 599	$ 599
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				7 /MH	$ 85.61	$ 599	$ 599
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				7 /MH	$ 85.61	$ 599	$ 599
			Electrical equipment - BESS batteries		2,971 LBS				49 /MH	$ 85.61	$ 4,195	$ 4,195
			Demolition			***$ 10,398***	***$ -***	***$ -***			***$ 10,446***	***$ 20,844***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		1323 LBS		$ (58)		/MH			$ (58)
			Electrical equipment - Inverters, controllers, auxiliary equipment		77 LBS		$ (3)		/MH			$ (3)
		18.30.00	*Copper*									
			Cable - BESS wiring		77 LBS		$ (133)		/MH			$ (133)
			Scrap Value			***$ -***	***$ (194)***	***$ -***			***$ -***	***$ (194)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	2 EA	$ 1,688			/MH			$ 1,688
			Civil Work			***$ 1,688***	***$ -***	***$ -***			***$ -***	***$ 1,688***
Subtotal						*$ 12,086*	*$ (194)*	*$ -*			*$ 10,446*	*$ 22,337*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 1,117
		91.10	Contractor's Profit									$ 1,787
												$ 2,904
Direct Costs + Construction Indirect Costs						*$ 12,086*	*$ (194)*	*$ -*			*$ 10,446*	*$ 25,241*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 1,514
		93.2	Construction Management Support									$ 505
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 2,417						$ 2,417
		95.2	Contingency on Scrap Value				$ 39					$ 39
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 2,089	$ 2,089
		95.5	Contingency on Indirect									$ 404
Total						**$ 14,503**	**$ (155)**	**$ -**			**$ 12,535**	**$ 32,209**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
21	Santa Ysabel Substation	30410 Highway 78. 600 ft East of Doudleys Bakery. Santa Ysabel, CA	221	6	11	Complete	SunVerge	Li -Ion

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		163 LBS	$ 572			/MH			$ 572
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		73.02 lb				2 /MH	$ 85.61	$ 171	$ 171
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment- BESS inverters, other electrical equipment		1 EA				1 /MH	$ 85.61	$ 86	$ 86
			Electrical equipment - BESS batteries		163 LBS				3 /MH	$ 85.61	$ 257	$ 257
			Demolition			***$ 572***	***$ -***	***$ -***			***$ 1,970***	***$ 2,542***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		73 LBS		$ (3)		/MH			$ (3)
			Electrical equipment- Inverters, controllers, auxiliary equipment		4 LBS		$ (0)		/MH			$ (0)
		18.30.00	*Copper*									
			Cable - BESS wiring		4 LBS		$ (7)		/MH			$ (7)
			Scrap Value			***$ -***	***$ (11)***	***$ -***			***$ -***	***$ (11)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 1,416*	*$ (11)*	*$ -*			*$ 1,970*	*$ 3,376*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 169
		91.10	Contractor's Profit									$ 270
												$ 439
Direct Costs + Construction Indirect Costs						*$ 1,41 6*	*$ (11)*	*$ -*			*$ 1,970*	*$ 3,815*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 229
		93.2	Construction Management Support									$ 76
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 283						$ 283
		95.2	Contingency on Scrap Value				$ 2					$ 2
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 394	$ 394
		95.5	Contingency on Indirect									$ 61
Total						**$ 1,699**	**$ (9)**	**$ -**			**$ 2,365**	**$ 4,860**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
22	Santa Ysabel Substation	30411 Highway 78. 600 ft East of Doudleys Bakery. Santa Ysabel, CA	221	30	36	Complete	Saft	Li -Ion

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		535 LBS	$ 1,872			/MH			$ 1,872
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		238.98 lb				5 /MH	$ 85.61	$ 428	$ 428
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				3 /MH	$ 85.61	$ 257	$ 257
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment- BESS inverters, other electrical equipment		1 EA				2 /MH	$ 85.61	$ 171	$ 171
			Electrical equipment - BESS batteries		535 LBS				9 /MH	$ 85.61	$ 770	$ 770
			Demolition			***$ 1,872***	***$ -***	***$ -***			***$ 3,169***	***$ 5,041***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		238 LBS		$ (10)		/MH			$ (10)
			Electrical equipment- Inverters, controllers, auxiliary equipment		14 LBS		$ (1)		/MH			$ (1)
		18.30.00	*Copper*									
			Cable - BESS wiring		14 LBS		$ (24)		/MH			$ (24)
			Scrap Value			***$ -***	***$ (35)***	***$ -***			***$ -***	***$ (35)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
			Civil Work			***$ 844***	***$ -***	***$ -***			***$ -***	***$ 844***
Subtotal						*$ 2,716*	*$ (35)*	*$ -*			*$ 3,169*	*$ 5,850*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 292
		91.10	Contractor's Profit									$ 468
												$ 760
Direct Costs + Construction Indirect Costs						*$ 2,716*	*$ (35)*	*$ -*			*$ 3,169*	*$ 6,610*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 397
		93.2	Construction Management Support									$ 132
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 543						$ 543
		95.2	Contingency on Scrap Value				$ 7					$ 7
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 634	$ 634
		95.5	Contingency on Indirect									$ 106
Total						**$ 3,259**	**$ (28)**	**$ -**			**$ 3,803**	**$ 8,429**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
23	Caltrans Park-N-Ride Del Lago (OPRA)	Del Lago Transit Station, Del Lago Blvd, Escondido	790	200	400	Complete	Tesla	Lithium Ion

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Scrap value - battery recycling		5,942 LBS	$ 20,795			/MH			$ 20,795
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		2655.38 lb				50 /MH	$ 85.61	$ 4,281	$ 4,281
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				25 /MH	$ 85.61	$ 2,140	$ 2,140
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				13 /MH	$ 85.61	$ 1,113	$ 1,113
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				13 /MH	$ 85.61	$ 1,113	$ 1,113
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				13 /MH	$ 85.61	$ 1,113	$ 1,113
			Electrical equipment - BESS batteries		5,942 LBS				98 /MH	$ 85.61	$ 8,390	$ 8,390
			Demolition			***$ 20,795***	***$ -***	***$ -***			***$ 19,349***	***$ 40,145***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		2646 LBS		$ (115)		/MH			$ (115)
			Electrical equipment - Inverters, controllers, auxiliary equipment		154 LBS		$ (7)		/MH			$ (7)
		18.30.00	*Copper*									
			Cable - BESS wiring		154 LBS		$ (267)		/MH			$ (267)
			Scrap Value			***$ -***	***$ (388)***	***$ -***			***$ -***	***$ (388)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	3 EA	$ 2,532			/MH			$ 2,532
			Civil Work			***$ 2,532***	***$ -***	***$ -***			***$ -***	***$ 2,532***
Subtotal						*$ 23,327*	*$ (388)*	*$ -*			*$ 19,349*	*$ 42,288*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 2,114
		91.10	Contractor's Profit									$ 3,383
												$ 5,497
Direct Costs + Construction Indirect Costs						*$ 23,327*	*$ (388)*	*$ -*			*$ 19,349*	*$ 47,786*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 2,867
		93.2	Construction Management Support									$ 956
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 4,665						$ 4,665
		95.2	Contingency on Scrap Value				$ 78					$ 78
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 3,870	$ 3,870
		95.5	Contingency on Indirect									$ 765
Total						**$ 27,993**	**$ (311)**	**$ -**			**$ 23,219**	**$ 60,986**

Project ID			Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry				
24			ITF (OPRA)		0	200	400	Complete	Tesla	Lithium Ion				
Area	**Group**	**Phase**	**Description**	**Notes**	**Quantity**		**Subcontract Cost**	**Scrap Value**	**Material Cost**	**Man Hours**	**Crew Rate**	**Labor Cost**	**Total Cost**	
Indoor/Outdoor Rack														
	11.00.00		**Demolition**											
		11.10.00	*Miscellaneous*											
			Scrap value - battery recycling		5,942	LBS	$ 20,795			/MH			$	20,795
			Tranportation to recycling center, truck & driver							8 /MH	$ 150.00	$ 1,200	$	1,200
		11.24.00	*Architectural*											
			BESS Enclosure		2655.38	lb				50 /MH	$ 85.61	$ 4,281	$	4,281
		11.41.00	*Electrical Equipment*											
			Remove wiring from batteries and other equipment		1	EA				25 /MH	$ 85.61	$ 2,140	$	2,140
			Remove grounding wires, lightning projection and other auxiliary equipment		1	EA				13 /MH	$ 85.61	$ 1,113	$	1,113
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1	EA				13 /MH	$ 85.61	$ 1,113	$	1,113
			Electrical equipment - BESS inverters, other electrical equipment		1	EA				13 /MH	$ 85.61	$ 1,113	$	1,113
			Electrical equipment - BESS batteries		5,942	LBS				98 /MH	$ 85.61	$ 8,390	$	8,390
			Demolition				***$ 20,795***	***$ -***	***$ -***			***$ 19,349***	***$***	***40,145***
	18.00.00		**Scrap Value**											
		18.10.00	*Mixed Steel*											
			Mechanical Equipment - BESS enclosure, and auxilaries		2646	LBS		$ (115)		/MH			$	(115)
			Electrical equipment - Inverters, controllers, auxiliary equipment		154	LBS		$ (7)		/MH			$	(7)
		18.30.00	*Copper*											
			Cable - BESS wiring		154	LBS		$ (267)		/MH			$	(267)
			Scrap Value				***$ -***	***$ (388)***	***$ -***			***$ -***	***$***	***(388)***
	21.00.00		**Civil Work**											
		21.19.00	*Disposal*											
			Dumpster, 40 CY Capacity	Rubbish	3	EA	$ 2,532			/MH			$	2,532
			Civil Work				***$ 2,532***	***$ -***	***$ -***			***$ -***	***$***	***2,532***
Subtotal							*$ 23,327*	*$ (388)*	*$ -*			*$ 19,349*	*$*	*42,288*
	91.00.00		**Other Direct & Construction Indirect Costs**											
		91.09	Contractor's General and Administration Expense										$	2,114
		91.10	Contractor's Profit										$	3,383
													$	**5,497**
Direct Costs + Construction Indirect Costs							*$ 23,327*	*$ (388)*	*$ -*			*$ 19,349*	*$*	*47,786*
	93.00.00		**Indirect Costs**											
		93.1	Engineering, Procurement, & Project Services										$	2,867
		93.2	Construction Management Support										$	956
	95.00.00		**Contingency**											
		95.1	Contingency on Subcontractor				$ 4,665						$	4,665
		95.2	Contingency on Scrap Value					$ 78					$	78
		95.3	Contingency on Material						$ -				$	-
		95.4	Contingency on Labor									$ 3,870	$	3,870
		95.5	Contingency on Indirect										$	765
Total							**$ 27,993**	**$ (311)**	**$ -**			**$ 23,219**	**$**	**60,986**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
25	Civita Microgrid	7777 Westside Dr. San Diego, 92108	0	125	200	Complete	Kokam	Lithium Ion

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Indoor/Outdoor Rack												
	11.00.00		**Demolition**									
		11.xx	*Miscellaneous*									
			Scrap value - battery recycling		2,971 LBS	$ 10,398			/MH			$ 10,398
			Tranportation to recycling center, truck & driver						8 /MH	$ 150.00	$ 1,200	$ 1,200
		11.24.00	*Architectural*									
			BESS Enclosure		1327.69 lb				25 /MH	$ 85.61	$ 2,140	$ 2,140
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				13 /MH	$ 85.61	$ 1,113	$ 1,113
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				7 /MH	$ 85.61	$ 599	$ 599
			Remove conduit, cable racks, service panels, disconnects, control systems, etc.		1 EA				7 /MH	$ 85.61	$ 599	$ 599
			Electrical equipment - BESS inverters, other electrical equipment		1 EA				7 /MH	$ 85.61	$ 599	$ 599
			Electrical equipment - BESS batteries		2,971 LBS				49 /MH	$ 85.61	$ 4,195	$ 4,195
			Demolition			***$ 10,398***	***$ -***	***$ -***			***$ 10,446***	***$ 20,844***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			Mechanical Equipment - BESS enclosure, and auxilaries		1323 LBS		$ (58)		/MH			$ (58)
			Electrical equipment - Inverters, controllers, auxiliary equipment		77 LBS		$ (3)		/MH			$ (3)
		18.30.00	*Copper*									
			Cable - BESS wiring		77 LBS		$ (133)		/MH			$ (133)
			Scrap Value			***$ -***	***$ (194)***	***$ -***			***$ -***	***$ (194)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	2 EA	$ 1,688			/MH			$ 1,688
			Civil Work			***$ 1,688***	***$ -***	***$ -***			***$ -***	***$ 1,688***
Subtotal						*$ 12,086*	*$ (194)*	*$ -*			*$ 10,446*	*$ 22,337*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 1,117
		91.10	Contractor's Profit									$ 1,787
												$ 2,904
Direct Costs + Construction Indirect Costs						*$ 12,086*	*$ (194)*	*$ -*			*$ 10,446*	*$ 25,241*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 1,514
		93.2	Construction Management Support									$ 505
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 2,417						$ 2,417
		95.2	Contingency on Scrap Value				$ 39					$ 39
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 2,089	$ 2,089
		95.5	Contingency on Indirect									$ 404
Total						**$ 14,503**	**$ (155)**	**$ -**			**$ 12,535**	**$ 32,209**

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS - Utility Scale

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
1	Borrego Microgrid Yard- SES1	2100 Borrego Valley Rd, Borrego Springs	170	500	1500	Complete	Saft	Lithium Nickel Cobalt Aluminum

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		11.3 TN	$ 78,750			/MH			$ 78,750
			Tranportation to recycling center, truck & driver						16 /MH	$ 150.00	$ 2,400	$ 2,400
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	396 /CY				397 /MH	$ 117.91	$ 46,810	$ 46,810
		11.24.00	*Architectural*									
			BESS Containers		19,179 LB				8 /MH	$ 117.91	$ 943	$ 943
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		1.05 TN				5 /MH	$ 117.91	$ 590	$ 590
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove conduit, cable racks, and other supports		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Electrical equipment - BESS inverters		2.0 TN				6 /MH	$ 107.16	$ 643	$ 643
			Electrical equipment - BESS batteries		11.3 TN				36 /MH	$ 107.16	$ 3,858	$ 3,858
			Demolition			***$ 78,750***	***$ -***	***$ -***			***$ 57,173***	***$ 135,923***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		9.59 TN		$ (834)		/MH			$ (834)
			Mechanical Equipment - BESS misc. and AC Systems		1.05 TN		$ (91)		/MH			$ (91)
			Electrical equipment - BESS inverters		2.0 TN		$ (174)		/MH			$ (174)
		18.30.00	*Copper*									
			Cable - BESS wiring		0.3 TN		$ (1,040)		/MH			$ (1,040)
			Scrap Value			***$ -***	***$ (2,140)***	***$ -***			***$ -***	***$ (2,140)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	264 /CY			$ 9,768	/MH			$ 9,768
			Civil Work			***$ 844***	***$ -***	***$ 9,768***			***$ -***	***$ 10,612***
Subtotal						*$ 79,594*	*$ (2,140)*	*$ 9,768*			*$ 57,173*	*$ 144,395*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 10,107.65
		91.10	Contractor's Profit									$ 11,552
												$ 21,659
Direct Costs + Construction Indirect Costs						*$ 79,594*	*$ (2,140)*	*$ 9,768*			*$ 57,173*	*$ 166,054*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 9,963
		93.2	Construction Management Support									$ 3,321
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 15,919						$ 15,919
		95.2	Contingency on Scrap Value				$ 428					$ 428
		95.3	Contingency on Material					$ 1,954				$ 1,954
		95.4	Contingency on Labor								$ 11,435	$ 11,435
		95.5	Contingency on Indirect									$ 266
Total						**$ 95,513**	**$ (1,712)**	**$ 11,722**			**$ 68,607**	**$ 209,339**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
2	Pala Energy Storage Yard	HWY 76 & PALA DEL NORTE 4 MI E/OF 1-15 N/SIDE RD. Pala, CA 92059	1233	500	1500	Complete	Winston	Lithium Manganese Oxide

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		11.3 TN	$ 61,875			/MH			$ 61,875
			Tranportation to recycling center, truck & driver						16 /MH	$ 150.00	$ 2,400	$ 2,400
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	176 /CY				176 /MH	$ 117.91	$ 20,752	$ 20,752
		11.24.00	*Architectural*									
			BESS Containers		9,590 LB				4 /MH	$ 117.91	$ 472	$ 472
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		1.1 TN				5 /MH	$ 117.91	$ 590	$ 590
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Remove conduit, cable racks, and other supports		1 EA				6 /MH	$ 107.16	$ 643	$ 643
			Electrical equipment - BESS inverters		2.0 TN				6 /MH	$ 107.16	$ 643	$ 643
			Electrical equipment - BESS batteries		11.3 TN				36 /MH	$ 107.16	$ 3,858	$ 3,858
			Demolition			***$ 61,875***	***$ -***	***$ -***			***$ 30,643***	***$ 92,518***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		4.79 TN		$ (417)		/MH			$ (417)
			Mechanical Equipment - BESS misc. and AC Systems		1.1 TN		$ (96)		/MH			$ (96)
			Electrical equipment - BESS inverters		2.0 TN		$ (174)		/MH			$ (174)
		18.30.00	*Copper*									
			Cable - BESS wiring		0.3 TN		$ (1,040)		/MH			$ (1,040)
			Scrap Value			***$ -***	***$ (1,727)***	***$ -***			***$ -***	***$ (1,727)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	118 /CY			$ 4,366	/MH			$ 4,366
			Civil Work			***$ 844***	***$ -***	***$ 4,366***			***$ -***	***$ 5,210***
Subtotal						*$ 62,719*	*$ (1,727)*	*$ 4,366*			*$ 30,643*	*$ 96,001*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 6,720
		91.10	Contractor's Profit									$ 7,680
												$ 14,400
Direct Costs + Construction Indirect Costs						*$ 62,719*	*$ (1,727)*	*$ 4,366*			*$ 30,643*	*$ 110,401*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 6,624
		93.2	Construction Management Support									$ 2,208
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 12,544						$ 12,544
		95.2	Contingency on Scrap Value				$ 345					$ 345
		95.3	Contingency on Material					$ 873				$ 873
		95.4	Contingency on Labor								$ 6,129	$ 6,129
		95.5	Contingency on Indirect									$ 1,766
Total						**$ 75,263**	**$ (1,382)**	**$ 5,239**			**$ 36,772**	**$ 140,891**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
16	Ortega Highway (Quest) 1243 Unit 1	33608 Ortega Hwy, San Juan Capistrano, CA 92675	1243	1000	3000	In Progress	Samsung DSI	Lithium Manganese Oxide

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		22.5 TN	$ 123,750			/MH			$ 123,750
			Tranportation to recycling center, truck & driver						16 /MH	$ 150.00	$ 2,400	$ 2,400
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	396 /CY				397 /MH	$ 117.91	$ 46,810	$ 46,810
		11.24.00	*Architectural*									
			BESS Containers		19,179 LB				8 /MH	$ 117.91	$ 943	$ 943
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN				10 /MH	$ 117.91	$ 1,179	$ 1,179
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove conduit, cable racks, and other supports		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Electrical equipment - BESS inverters		4.0 TN				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Electrical equipment - BESS batteries		22.5 TN				72 /MH	$ 107.16	$ 7,716	$ 7,716
			Demolition			***$ 123,750***	***$ -***	***$ -***			***$ 64,085***	***$ 187,835***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		9.59 TN		$ (834)		/MH			$ (834)
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN		$ (183)		/MH			$ (183)
			Electrical equipment - BESS inverters		4.0 TN		$ (348)		/MH			$ (348)
		18.30.00	*Copper*									
			Cable - BESS wiring		0.5 TN		$ (1,734)		/MH			$ (1,734)
			Scrap Value			***$ -***	***$ (3,098)***	***$ -***			***$ -***	***$ (3,098)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	264 /CY			$ 9,768	/MH			$ 9,768
			Civil Work			***$ 844***	***$ -***	***$ 9,768***			***$ -***	***$ 10,612***
Subtotal						*$ 124,594*	*$ (3,098)*	*$ 9,768*			*$ 64,085*	*$ 195,348*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 11,721
		91.10	Contractor's Profit									$ 3,907
												$ 15,628
Direct Costs + Construction Indirect Costs						*$ 124,594*	*$ (3,098)*	*$ 9,768*			*$ 64,085*	*$ 210,976*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 12,659
		93.2	Construction Management Support									$ 4,220
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 24,919						$ 24,919
		95.2	Contingency on Scrap Value				$ 620					$ 620
		95.3	Contingency on Material					$ 1,954				$ 1,954
		95.4	Contingency on Labor								$ 12,817	$ 12,817
		95.5	Contingency on Indirect									$ 3,376
Total						**$ 149,513**	**$ (2,479)**	**$ 11,722**			**$ 76,902**	**$ 271,539**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
17	Ortega Highway (Quest)1243 Unit 2	33608 Ortega Hwy, San Juan Capistrano, CA 92675	1243	1000	3000	In Progress	Samsung DSI	Lithium Manganese Oxide

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		22.5 TN	$ 123,750			/MH			$ 123,750
			Tranportation to recycling center, truck & driver						16 /MH	$ 150.00	$ 2,400	$ 2,400
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	396 /CY				397 /MH	$ 117.91	$ 46,810	$ 46,810
		11.24.00	*Architectural*									
			BESS Containers		19,179 LB				8 /MH	$ 117.91	$ 943	$ 943
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN				10 /MH	$ 117.91	$ 1,179	$ 1,179
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove conduit, cable racks, and other supports		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Electrical equipment - BESS inverters		4.0 TN				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Electrical equipment - BESS batteries		22.5 TN				72 /MH	$ 107.16	$ 7,716	$ 7,716
			Demolition			***$ 123,750***	***$ -***	***$ -***			***$ 64,085***	***$ 187,835***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		9.59 TN		$ (834)		/MH			$ (834)
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN		$ (183)		/MH			$ (183)
			Electrical equipment - BESS inverters		4.0 TN		$ (348)		/MH			$ (348)
		18.30.00	*Copper*									
			Cable - BESS wiring		0.5 TN		$ (1,734)		/MH			$ (1,734)
			Scrap Value				***$ (3,098)***					***$ (3,098)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	264 /CY			$ 9,768	/MH			$ 9,768
			Civil Work			***$ 844***	***$ -***	***$ 9,768***			***$ -***	***$ 10,612***
Subtotal						*$ 124,594*	*$ (3,098)*	*$ 9,768*			*$ 64,085*	*$ 195,348*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 11,721
		91.10	Contractor's Profit									$ 3,907
												$ 15,628
Direct Costs + Construction Indirect Costs						*$ 124,594*	*$ (3,098)*	*$ 9,768*			*$ 64,085*	*$ 210,976*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 12,659
		93.2	Construction Management Support									$ 4,220
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 24,919						$ 24,919
		95.2	Contingency on Scrap Value				$ 620					$ 620
		95.3	Contingency on Material					$ 1,954				$ 1,954
		95.4	Contingency on Labor								$ 12,817	$ 12,817
		95.5	Contingency on Indirect									$ 3,376
Total						**$ 149,513**	**$ (2,479)**	**$ 11,722**			**$ 76,902**	**$ 271,539**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
18	Pala Unit 2	HWY 76 & PALA DEL NORTE 4 MI E/OF 1-15 N/SIDE RD. Pala, CA 92059	0	1000	2000	In Progress	Dow Kokam	Lithium Polymer

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		15.0 TN	$ 105,000			/MH			$ 105,000
			Tranportation to recycling center, truck & driver						16 /MH	$ 150.00	$ 2,400	$ 2,400
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	264 /CY				265 /MH	$ 117.91	$ 31,246	$ 31,246
		11.24.00	*Architectural*									
			BESS Containers		12,786 LB				5 /MH	$ 117.91	$ 590	$ 590
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		1.40 TN				7 /MH	$ 117.91	$ 825	$ 825
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Remove conduit, cable racks, and other supports		1 EA				8 /MH	$ 107.16	$ 857	$ 857
			Electrical equipment - BESS inverters		3.0 TN				8 /MH	$ 107.16	$ 857	$ 857
			Electrical equipment - BESS batteries		15.0 TN				48 /MH	$ 107.16	$ 5,144	$ 5,144
			Demolition			***$ 105,000***	***$ -***	***$ -***			***$ 43,634***	***$ 148,634***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		6.39 TN		$ (556)		/MH			$ (556)
			Mechanical Equipment - BESS misc. and AC Systems		1.40 TN		$ (122)		/MH			$ (122)
			Electrical equipment - BESS inverters		3.0 TN		$ (261)		/MH			$ (261)
		18.30.00	*Copper*									
			Cable - BESS wiring		0.3 TN		$ (1,040)		/MH			$ (1,040)
			Scrap Value				***$ (1,979)***					***$ (1,979)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	176 /CY			$ 6,512	/MH			$ 6,512
			Civil Work			***$ 844***	***$ -***	***$ 6,512***			***$ -***	***$ 7,356***
Subtotal						*$ 105,844*	*$ (1,979)*	*$ 6,512*			*$ 43,634*	*$ 154,011*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 9,241
		91.10	Contractor's Profit									$ 3,080
												$ 12,321
Direct Costs + Construction Indirect Costs						*$ 105,844*	*$ (1,979)*	*$ 6,512*			*$ 43,634*	*$ 166,332*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 9,980
		93.2	Construction Management Support									$ 3,327
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 21,169						$ 21,169
		95.2	Contingency on Scrap Value				$ 396					$ 396
		95.3	Contingency on Material					$ 1,302				$ 1,302
		95.4	Contingency on Labor								$ 8,727	$ 8,727
		95.5	Contingency on Indirect									$ 2,661
Total						**$ 127,013**	**$ (1,583)**	**$ 7,814**			**$ 52,361**	**$ 213,893**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
19	Carmel Valley (Canyon Crest)	5951 E Village Center Loop Rd San Diego, CA 92130	0	1000	3000	Complete	Saft	Lithiun Ion-doped nickel oxide(NCA)

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		22.5 TN	$ 157,500			/MH			$ 157,500
			Tranportation to recycling center, truck & driver						40 /MH	$ 150.00	$ 6,000	$ 6,000
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	396 /CY				397 /MH	$ 117.91	$ 46,810	$ 46,810
		11.24.00	*Architectural*									
			BESS Containers		19,179 LB				8 /MH	$ 117.91	$ 943	$ 943
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN				10 /MH	$ 117.91	$ 1,179	$ 1,179
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove conduit, cable racks, and other supports		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Electrical equipment - BESS inverters		4.0 TN				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Electrical equipment - BESS batteries		22.5 TN				72 /MH	$ 107.16	$ 7,716	$ 7,716
			Demolition			***$ 157,500***	***$ -***	***$ -***			***$ 67,685***	***$ 225,185***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		9.59 TN		$ (834)		/MH			$ (834)
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN		$ (183)		/MH			$ (183)
			Electrical equipment - BESS inverters		4.0 TN		$ (348)		/MH			$ (348)
		18.30.00	*Copper*									
			Cable - BESS wiring		0.5 TN		$ (1,734)		/MH			$ (1,734)
			Scrap Value			***$ -***	***$ (3,098)***	***$ -***			***$ -***	***$ (3,098)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	264 /CY			$ 9,768	/MH			$ 9,768
			Civil Work			***$ 844***	***$ -***	***$ 9,768***			***$ -***	***$ 10,612***
Subtotal						*$ 158,344*	*$ (3,098)*	*$ 9,768*			*$ 67,685*	*$ 232,698*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 13,962
		91.10	Contractor's Profit									$ 4,654
												$ 18,616
Direct Costs + Construction Indirect Costs						*$ 158,344*	*$ (3,098)*	*$ 9,768*			*$ 67,685*	*$ 251,314*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 15,079
		93.2	Construction Management Support									$ 5,026
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 31,669						$ 31,669
		95.2	Contingency on Scrap Value				$ 620					$ 620
		95.3	Contingency on Material					$ 1,954				$ 1,954
		95.4	Contingency on Labor								$ 13,537	$ 13,537
		95.5	Contingency on Indirect									$ 4,021
Total						**$ 190,013**	**$ (2,479)**	**$ 11,722**			**$ 81,222**	**$ 323,219**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
20	Borrego Microgrid Yard- SES2	2100 Borrego Valley Rd, Borrego Springs	170	1000	3000	Complete	Saft	Lithium Nickel Cobalt Aluminum

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		22.5 TN	$ 157,500			/MH			$ 157,500
			Tranportation to recycling center, truck & driver						40 /MH	$ 150.00	$ 6,000	$ 6,000
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	528 /CY				529 /MH	$ 117.91	$ 62,374	$ 62,374
		11.24.00	*Architectural*									
			BESS Containers		25,572 LB				10 /MH	$ 117.91	$ 1,179	$ 1,179
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN				10 /MH	$ 117.91	$ 1,179	$ 1,179
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Remove conduit, cable racks, and other supports		1 EA				12 /MH	$ 107.16	$ 1,286	$ 1,286
			Electrical equipment - BESS inverters		4.0 TN				11 /MH	$ 107.16	$ 1,179	$ 1,179
			Electrical equipment - BESS batteries		22.5 TN				72 /MH	$ 107.16	$ 7,716	$ 7,716
			Demolition			***$ 157,500***	***$ -***	***$ -***			***$ 83,485***	***$ 240,985***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		12.79 TN		$ (1,112)		/MH			$ (1,112)
			Mechanical Equipment - BESS misc. and AC Systems		2.10 TN		$ (183)		/MH			$ (183)
			Electrical equipment - BESS inverters		4.0 TN		$ (348)		/MH			$ (348)
		18.30.00	*Copper*									
			Cable - BESS wiring		0.5 TN		$ (1,734)		/MH			$ (1,734)
			Scrap Value			***$ -***	***$ (3,377)***	***$ -***			***$ -***	***$ (3,377)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	352 /CY			$ 13,024	/MH			$ 13,024
			Civil Work			***$ 844***	***$ -***	***$ 13,024***			***$ -***	***$ 13,868***
Subtotal						*$ 158,344*	*$ (3,377)*	*$ 13,024*			*$ 83,485*	*$ 251,476*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 15,089
		91.10	Contractor's Profit									$ 5,030
												$ 20,118
Direct Costs + Construction Indirect Costs						*$ 158,344*	*$ (3,377)*	*$ 13,024*			*$ 83,485*	*$ 271,594*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 16,296
		93.2	Construction Management Support									$ 5,432
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 31,669						$ 31,669
		95.2	Contingency on Scrap Value				$ 675					$ 675
		95.3	Contingency on Material					$ 2,605				$ 2,605
		95.4	Contingency on Labor								$ 16,697	$ 16,697
		95.5	Contingency on Indirect									$ 4,346
Total						**$ 190,013**	**$ (2,701)**	**$ 15,629**			**$ 100,182**	**$ 349,313**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
27	El Cajon BESS 1	104 N. Johnson Ave, El Cajon, CA 92020	555	7500	30000	Under Construction	Samsung	Lithium Ion NMC

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		300.0 TN	$ 2,100,000			/MH			$ 2,100,000
			Tranportation to recycling center, truck & driver						40 /MH	$ 150.00	$ 6,000	$ 6,000
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	5280 /CY				5291 /MH	$ 117.91	$ 623,862	$ 623,862
		11.24.00	*Architectural*									
			BESS Containers		255,720 LB				96 /MH	$ 117.91	$ 11,319	$ 11,319
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		21.00 TN				92 /MH	$ 117.91	$ 10,848	$ 10,848
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				120 /MH	$ 107.16	$ 12,859	$ 12,859
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				120 /MH	$ 107.16	$ 12,859	$ 12,859
			Remove conduit, cable racks, and other supports		1 EA				120 /MH	$ 107.16	$ 12,859	$ 12,859
			Electrical equipment - BESS inverters		34.0 TN				108 /MH	$ 107.16	$ 11,573	$ 11,573
			Electrical equipment - BESS batteries		300.0 TN				960 /MH	$ 107.16	$ 102,874	$ 102,874
			Demolition			***$ 2,100,000***	***$ -***	***$ -***			***$ 805,053***	***$ 2,905,053***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		127.86 TN		$ (11,124)		/MH			$ (11,124)
			Mechanical Equipment - BESS misc. and AC Systems		21.00 TN		$ (1,827)		/MH			$ (1,827)
			Electrical equipment - BESS inverters		34.0 TN		$ (2,958)		/MH			$ (2,958)
		18.30.00	*Copper*									
			Cable - BESS wiring		4.4 TN		$ (15,255)		/MH			$ (15,255)
			Scrap Value			***$ -***	***$ (31,164)***	***$ -***			***$ -***	***$ (31,164)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	3520 /CY			$ 130,240	/MH			$ 130,240
			Civil Work			***$ 844***	***$ -***	***$ 130,240***			***$ -***	***$ 131,084***
Subtotal						*$ 2,100,844*	*$ (31,164)*	*$ 130,240*			*$ 805,053*	*$ 3,004,974*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 180,298
		91.10	Contractor's Profit									$ 60,099
												$ 240,398
Direct Costs + Construction Indirect Costs						*$ 2,100,844*	*$ (31,164)*	*$ 130,240*			*$ 805,053*	*$ 3,245,372*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 194,722
		93.2	Construction Management Support									$ 64,907
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 420,169						$ 420,169
		95.2	Contingency on Scrap Value				$ 6,233					$ 6,233
		95.3	Contingency on Material					$ 26,048				$ 26,048
		95.4	Contingency on Labor								$ 161,011	$ 161,011
		95.5	Contingency on Indirect									$ 51,926
Total						**$ 2,521,013**	**$ (24,931)**	**$ 156,288**			**$ 966,064**	**$ 4,170,388**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
28	Escondido BESS 1	571 Enterprise Str, Escondido, CA 92029	1011	10000	40000	Under Construction	Samsung	Lithium Ion NMC

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		300.0 TN	$ 2,100,000			/MH			$ 2,100,000
			Tranportation to recycling center, truck & driver						40 /MH	$ 150.00	$ 6,000	$ 6,000
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	5280 /CY				5291 /MH	$ 117.91	$ 623,862	$ 623,862
		11.24.00	*Architectural*									
			BESS Containers		255,720 LB				96 /MH	$ 117.91	$ 11,319	$ 11,319
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		28.00 TN				122 /MH	$ 117.91	$ 14,385	$ 14,385
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Remove conduit, cable racks, and other supports		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Electrical equipment - BESS inverters		46.0 TN				144 /MH	$ 107.16	$ 15,431	$ 15,431
			Electrical equipment - BESS batteries		300.0 TN				960 /MH	$ 107.16	$ 102,874	$ 102,874
			Demolition			***$ 2,100,000***	***$ -***	***$ -***			***$ 825,308***	***$ 2,925,308***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		127.86 TN		$ (11,124)		/MH			$ (11,124)
			Mechanical Equipment - BESS misc. and AC Systems		28.00 TN		$ (2,436)		/MH			$ (2,436)
			Electrical equipment - BESS inverters		46.0 TN		$ (4,002)		/MH			$ (4,002)
		18.30.00	*Copper*									
			Cable - BESS wiring		5.8 TN		$ (20,109)		/MH			$ (20,109)
			Scrap Value			***$ -***	***$ (37,670)***	***$ -***			***$ -***	***$ (37,670)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	3520 /CY			$ 130,240	/MH			$ 130,240
			Civil Work			***$ 844***	***$ -***	***$ 130,240***			***$ -***	***$ 131,084***
Subtotal						*$ 2,100,844*	*$ (37,670)*	*$ 130,240*			*$ 825,308*	*$ 3,018,721*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 181,123
		91.10	Contractor's Profit									$ 60,374
												$ 241,498
Direct Costs + Construction Indirect Costs						*$ 2,100,844*	*$ (37,670)*	*$ 130,240*			*$ 825,308*	*$ 3,260,219*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 195,613
		93.2	Construction Management Support									$ 65,204
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 420,169						$ 420,169
		95.2	Contingency on Scrap Value				$ 7,534					$ 7,534
		95.3	Contingency on Material					$ 26,048				$ 26,048
		95.4	Contingency on Labor								$ 165,062	$ 165,062
		95.5	Contingency on Indirect									$ 52,164
Total						**$ 2,521,013**	**$ (30,136)**	**$ 156,288**			**$ 990,369**	**$ 4,192,012**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
29	Escondido BESS 2	571 Enterprise Str, Escondido, CA 92029	1012	10000	40000	Under Construction	Samsung	Lithium Ion NMC

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		300.0 TN	$ 2,100,000			/MH			$ 2,100,000
			Tranportation to recycling center, truck & driver						40 /MH	$ 150.00	$ 6,000	$ 6,000
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	5280 /CY				5291 /MH	$ 117.91	$ 623,862	$ 623,862
		11.24.00	*Architectural*									
			BESS Containers		255,720 LB				96 /MH	$ 117.91	$ 11,319	$ 11,319
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		28.00 TN				122 /MH	$ 117.91	$ 14,385	$ 14,385
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Remove conduit, cable racks, and other supports		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Electrical equipment - BESS inverters		46.0 TN				144 /MH	$ 107.16	$ 15,431	$ 15,431
			Electrical equipment - BESS batteries		300.0 TN				960 /MH	$ 107.16	$ 102,874	$ 102,874
			Demolition			***$ 2,100,000***	***$ -***	***$ -***			***$ 825,308***	***$ 2,925,308***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		127.86 TN		$ (11,124)		/MH			$ (11,124)
			Mechanical Equipment - BESS misc. and AC Systems		28.00 TN		$ (2,436)		/MH			$ (2,436)
			Electrical equipment - BESS inverters		46.0 TN		$ (4,002)		/MH			$ (4,002)
		18.30.00	*Copper*									
			Cable - BESS wiring		5.8 TN		$ (20,109)		/MH			$ (20,109)
			Scrap Value			***$ -***	***$ (37,670)***	***$ -***			***$ -***	***$ (37,670)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	3520 /CY			$ 130,240	/MH			$ 130,240
			Civil Work			***$ 844***	***$ -***	***$ 130,240***			***$ -***	***$ 131,084***
Subtotal						*$ 2,100,844*	*$ (37,670)*	*$ 130,240*			*$ 825,308*	*$ 3,018,721*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 181,123
		91.10	Contractor's Profit									$ 60,374
												$ 241,498
Direct Costs + Construction Indirect Costs						*$ 2,100,844*	*$ (37,670)*	*$ 130,240*			*$ 825,308*	*$ 3,260,219*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 195,613
		93.2	Construction Management Support									$ 65,204
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 420,169						$ 420,169
		95.2	Contingency on Scrap Value				$ 7,534					$ 7,534
		95.3	Contingency on Material					$ 26,048				$ 26,048
		95.4	Contingency on Labor								$ 165,062	$ 165,062
		95.5	Contingency on Indirect									$ 52,164
Total						**$ 2,521,013**	**$ (30,136)**	**$ 156,288**			**$ 990,369**	**$ 4,192,012**

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry
30	Escondido BESS 3	571 Enterprise Str, Escondido, CA 92029	1013	10000	40000	Under Construction	Samsung	Lithium Ion NMC

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		300.0 TN	$ 2,100,000			/MH			$ 2,100,000
			Tranportation to recycling center, truck & driver						40 /MH	$ 150.00	$ 6,000	$ 6,000
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remov	5280 /CY				5291 /MH	$ 117.91	$ 623,862	$ 623,862
		11.24.00	*Architectural*									
			BESS Containers		255,720 LB				96 /MH	$ 117.91	$ 11,319	$ 11,319
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		28.00 TN				122 /MH	$ 117.91	$ 14,385	$ 14,385
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Remove conduit, cable racks, and other supports		1 EA				160 /MH	$ 107.16	$ 17,146	$ 17,146
			Electrical equipment - BESS inverters		46.0 TN				144 /MH	$ 107.16	$ 15,431	$ 15,431
			Electrical equipment - BESS batteries		300.0 TN				960 /MH	$ 107.16	$ 102,874	$ 102,874
			Demolition			***$ 2,100,000***	***$ -***	***$ -***			***$ 825,308***	***$ 2,925,308***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		127.86 TN		$ (11,124)		/MH			$ (11,124)
			Mechanical Equipment - BESS misc. and AC Systems		28.00 TN		$ (2,436)		/MH			$ (2,436)
			Electrical equipment - BESS inverters		46.0 TN		$ (4,002)		/MH			$ (4,002)
		18.30.00	*Copper*									
			Cable - BESS wiring		5.8 TN		$ (20,109)		/MH			$ (20,109)
			Scrap Value			***$ -***	***$ (37,670)***	***$ -***			***$ -***	***$ (37,670)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	3520 /CY			$ 130,240	/MH			$ 130,240
			Civil Work			***$ 844***	***$ -***	***$ 130,240***			***$ -***	***$ 131,084***
Subtotal						*$ 2,100,844*	*$ (37,670)*	*$ 130,240*			*$ 825,308*	*$ 3,018,721*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 181,123
		91.10	Contractor's Profit									$ 60,374
												$ 241,498
Direct Costs + Construction Indirect Costs						*$ 2,100,844*	*$ (37,670)*	*$ 130,240*			*$ 825,308*	*$ 3,260,219*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 195,613
		93.2	Construction Management Support									$ 65,204
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 420,169						$ 420,169
		95.2	Contingency on Scrap Value				$ 7,534					$ 7,534
		95.3	Contingency on Material					$ 26,048				$ 26,048
		95.4	Contingency on Labor								$ 165,062	$ 165,062
		95.5	Contingency on Indirect									$ 52,164
Total						**$ 2,521,013**	**$ (30,136)**	**$ 156,288**			**$ 990,369**	**$ 4,192,012**

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS - Utility Scale Flow Battery

Project ID	Location	Address	Circuit	Capacity (kW)	Energy (kWh)	Status	Battery Mfg	Chemistry Vanadium Redox
26	San Miguel VRF	7310 San Miguel Rd. Bonita, CA	591	2000-2300	8000	Under Construction	Sumitomo	

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
Shipping Container												
	11.00.00		**Demolition**									
		11.10.00	*Miscellaneous*									
			Disposal cost - battery recycling		10 TN	$ 70,000			/MH			$ 70,000
			Tranportation to recycling center, truck & driver						16 /MH	$ 150.00	$ 2,400	$ 2,400
		11.22.00	*Concrete*									
			Concrete	BESS Foundations based on site, remove	1188 /CY				1200 /MH	$ 117.91	$ 141,492	$ 141,492
		11.24.00	*Architectural*									
			BESS Enclosure		57537 LB				93 /MH	$ 117.91	$ 10,966	$ 10,966
		11.31.00	*Mechanical Equipment*									
			Mechanical Equipment - BESS misc. and AC Systems		6.3 TN				27 /MH	$ 117.91	$ 3,184	$ 3,184
		11.41.00	*Electrical Equipment*									
			Remove wiring from batteries and other equipment		1 EA				36 /MH	$ 107.16	$ 3,858	$ 3,858
			Remove grounding wires, lightning projection and other auxiliary equipment		1 EA				36 /MH	$ 107.16	$ 3,858	$ 3,858
			Remove conduit, cable racks, and other supports		1 EA				36 /MH	$ 107.16	$ 3,858	$ 3,858
			Electrical equipment - BESS inverters		12 TN				39 /MH	$ 107.16	$ 4,179	$ 4,179
			Electrical equipment - BESS batteries		10 TN				32 /MH	$ 107.16	$ 3,429	$ 3,429
			Demolition			***$ 70,000***	***$ -***	***$ -***			***$ 177,223***	***$ 247,223***
	18.00.00		**Scrap Value**									
		18.10.00	*Mixed Steel*									
			BESS Containers		29 TN		$ (2,523)					$ (2,523)
			Mechanical Equipment - BESS misc. and AC Systems		6.3 TN		$ (548)					$ (548)
			Electrical equipment - BESS inverters		12 TN		$ (1,044)					$ (1,044)
		18.30.00	*Copper*									
			Cable - BESS wiring		1.5 TN		$ (5,201)					$ (5,201)
			Scrap Value			***$ -***	***$ (9,316)***	***$ -***			***$ -***	***$ (9,316)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*									
			Dumpster, 40 CY Capacity	Rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	*Backfill*									
			Foundation backfill, imported material fill	Backfill concrete pads	792 /CY			$ 29,304	/MH			$ 29,304
			Civil Work			***$ 844***	***$ -***	***$ 29,304***			***$ -***	***$ 30,148***
Subtotal						*$ 70,844*	*$ (9,316)*	*$ 29,304*			*$ 177,223*	*$ 268,055*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 18,764
		91.10	Contractor's Profit									$ 21,444
												$ 40,208
Direct Costs + Construction Indirect Costs						*$ 70,844*	*$ (9,316)*	*$ 29,304*			*$ 177,223*	*$ 308,264*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 18,496
		93.2	Construction Management Support									$ 6,165
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 14,169						$ 14,169
		95.2	Contingency on Scrap Value				$ 1,863					$ 1,863
		95.3	Contingency on Material					$ 5,861				$ 5,861
		95.4	Contingency on Labor								$ 35,445	$ 35,445
		95.5	Contingency on Indirect									$ 4,932
Total						**$ 85,013**	**$ (7,452)**	**$ 35,165**			**$ 212,667**	**$ 395,194**

Appendix B

Conceptual Estimate of Cost — FERC Accounts

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS Sites - FERC

		Location	Capacity (kW)	Energy (kWh)	341 - STRUCTURES AND IMPROVEMENTS	348 - OTHER PRODUCTION - GENERATION	351 - TRANSMISSION	363 - DISTRIBUTION - STORAGE BATTERY EQUIPMENT	I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT		TOTAL PROJECT COST
Small Scale Sites												
3	Mission Valley- Skills Training Center		25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$	13,301
4	Clairemont		25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$	13,301
5	Poway		25	72	$ 1,612	$ 3,563	$ 3,563	$ 3,563	$ 709	$ 292	$	13,301
6	Borrego Springs CES		25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$	10,200
7	Borrego Springs CES		25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$	10,200
8	Borrego Springs CES		25	50	$ 1,433	$ 2,667	$ 2,667	$ 2,667	$ 544	$ 224	$	10,200
9	Century Park CES		50	82	$ 1,691	$ 3,954	$ 3,954	$ 3,954	$ 781	$ 322	$	14,655
10	Energy Inovation Center- Indoor		4.5	10.7	$ 1,122	$ 1,117	$ 1,117	$ 1,117	$ 258	$ 106	$	4,838
11	Energy Inovation Center- Outdoor		10	10	$ 1,069	$ 850	$ 850	$ 850	$ 209	$ 86	$	3,915
12	San Diego Zoo		100	130	$ 2,053	$ 5,760	$ 5,760	$ 5,760	$ 1,114	$ 459	$	20,905
13	UCSD MESOM		6	10.7	$ 1,122	$ 1,117	$ 1,117	$ 1,117	$ 258	$ 106	$	4,838
14	Suites at Paseo (SDSU Private Dormitories)		18	32.1	$ 1,271	$ 1,858	$ 1,858	$ 1,858	$ 395	$ 163	$	7,402
15	Del Lago Academy		100	200	$ 3,550	$ 8,745	$ 8,745	$ 8,745	$ 1,716	$ 707	$	32,209
21	Santa Ysabel Substation		6	11	$ 1,124	$ 1,123	$ 1,123	$ 1,123	$ 259	$ 107	$	4,860
22	Santa Ysabel Substation		30	36	$ 1,330	$ 2,155	$ 2,155	$ 2,155	$ 449	$ 185	$	8,429
23	Caltrans Park-N-Ride Del Lago (OPRA)		200	400	$ 6,060	$ 16,780	$ 16,780	$ 16,780	$ 3,249	$ 1,338	$	60,986
24	ITF (OPRA)		200	400	$ 6,060	$ 16,780	$ 16,780	$ 16,780	$ 3,249	$ 1,338	$	60,986
25	Civita Microgrid		125	200	$ 3,550	$ 8,745	$ 8,745	$ 8,745	$ 1,716	$ 707	$	32,209
Subtotal - Small Scale Sites					$ 39,136	$ 87,672	$ 87,672	$ 87,672	$ 17,414	$ 7,171	$	326,738
Utility Scale Sites												
1	Borrego Microgrid Yard- SES1		500	1500	$ 69,536	$ 42,084	$ 42,084	$ 42,084	$ 10,096	$ 3,454	$	209,339
2	Pala Energy Storage Yard		500	1500	$ 33,745	$ 32,182	$ 32,182	$ 32,182	$ 7,507	$ 3,091	$	140,891
16	Ortega Highway (Quest) 1243 Unit 1		1000	3000	$ 70,671	$ 60,205	$ 60,205	$ 60,205	$ 14,346	$ 5,907	$	271,539
17	Ortega Highway (Quest)1243 Unit 2		1000	3000	$ 70,671	$ 60,205	$ 60,205	$ 60,205	$ 14,346	$ 5,907	$	271,539
18	Pala Unit 2		1000	2000	$ 48,770	$ 49,718	$ 49,718	$ 49,718	$ 11,311	$ 4,657	$	213,893
19	Carmel Valley (Canyon Crest)		1000	3000	$ 73,286	$ 75,269	$ 75,269	$ 75,269	$ 17,089	$ 7,037	$	323,219
20	Borrego Microgrid Yard- SES2		1000	3000	$ 93,406	$ 76,611	$ 76,611	$ 76,611	$ 18,468	$ 7,605	$	349,313
27	El Cajon BESS 1		7500	30000	$ 967,762	$ 963,690	$ 963,690	$ 963,690	$ 220,685	$ 90,870	$	4,170,388
28	Escondido BESS 1		10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$	4,192,012
29	Escondido BESS 2		10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$	4,192,012
30	Escondido BESS 3		10000	40000	$ 969,375	$ 969,885	$ 969,885	$ 969,885	$ 221,695	$ 91,286	$	4,192,012
Subtotal - Utility Scale Sites					*$ 4,335,973*	*$ 4,269,621*	*$ 4,269,621*	*$ 4,269,621*	*$ 978,934*	*$ 402,387*	*$*	*18,526,157*
Flow Battery Site												
26	San Miguel VRF		2000-2300	8000	$ 203,625	$ 53,992	$ 53,992	$ 53,992	$ 20,962	$ 8,631	$	395,194
Subtotal - Flow Battery Site					$ 203,625	$ 53,992	$ 53,992	$ 53,992	$ 20,962	$ 8,631	$	395,194
TOTAL					$ 4,578,734	$ 4,411,285	$ 4,411,285	$ 4,411,285	$ 1,017,311	$ 418,189	$	19,248,089

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS - Small Scale

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
3	Mission Valley- Skills Training Center	25	72	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,612
348	**OTHER PRODUCTION - GENERATION**	$ 3,563
351	**TRANSMISSION**	$ 3,563
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 3,563
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 709
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 292
	TOTAL PROJECT COST	*$ 13,301*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
4	Clairemont	25	72	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,612
348	**OTHER PRODUCTION - GENERATION**	$ 3,563
351	**TRANSMISSION**	$ 3,563
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 3,563
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 709
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 292
	TOTAL PROJECT COST	*$ 13,301*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
5	Poway	25	72	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,612
348	**OTHER PRODUCTION - GENERATION**	$ 3,563
351	**TRANSMISSION**	$ 3,563
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 3,563
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 709
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 292
	TOTAL PROJECT COST	*$ 13,301*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
6	Borrego Springs CES	25	50	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,433
348	**OTHER PRODUCTION - GENERATION**	$ 2,667
351	**TRANSMISSION**	$ 2,667
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 2,667
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 544
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 224
	TOTAL PROJECT COST	*$ 10,200*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
7	Borrego Springs CES	25	50	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,433
348	**OTHER PRODUCTION - GENERATION**	$ 2,667
351	**TRANSMISSION**	$ 2,667
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 2,667
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 544
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 224
	TOTAL PROJECT COST	*$ 10,200*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
8	Borrego Springs CES	25	50	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,433
348	**OTHER PRODUCTION - GENERATION**	$ 2,667
351	**TRANSMISSION**	$ 2,667
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 2,667
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 544
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 224
	TOTAL PROJECT COST	*$ 10,200*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
9	Century Park CES	50	82	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,691
348	**OTHER PRODUCTION - GENERATION**	$ 3,954
351	**TRANSMISSION**	$ 3,954
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 3,954
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 781
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 322
	TOTAL PROJECT COST	*$ 14,655*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
10	Energy Inovation Center- Indoor	4.5	10.7	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,122
348	**OTHER PRODUCTION - GENERATION**	$ 1,117
351	**TRANSMISSION**	$ 1,117
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 1,117
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 258
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 106
	TOTAL PROJECT COST	*$ 4,838*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
11	Energy Inovation Center- Outdoor	10	10	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,069
348	**OTHER PRODUCTION - GENERATION**	$ 850
351	**TRANSMISSION**	$ 850
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 850
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 209
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 86
	TOTAL PROJECT COST	*$ 3,915*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
12	San Diego Zoo	100	130	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 2,053
348	**OTHER PRODUCTION - GENERATION**	$ 5,760
351	**TRANSMISSION**	$ 5,760
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 5,760
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 1,114
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 459
	TOTAL PROJECT COST	*$ 20,905*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
13	UCSD MESOM	6	10.7	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,122
348	**OTHER PRODUCTION - GENERATION**	$ 1,117
351	**TRANSMISSION**	$ 1,117
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 1,117
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 258
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 106
	TOTAL PROJECT COST	*$ 4,838*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
14	Suites at Paseo (SDSU Private Dormitories)	18	32.1	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,271
348	**OTHER PRODUCTION - GENERATION**	$ 1,858
351	**TRANSMISSION**	$ 1,858
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 1,858
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 395
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 163
	TOTAL PROJECT COST	*$ 7,402*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
15	Del Lago Academy	100	200	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 3,550
348	**OTHER PRODUCTION - GENERATION**	$ 8,745
351	**TRANSMISSION**	$ 8,745
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 8,745
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 1,716
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 707
	TOTAL PROJECT COST	*$ 32,209*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
21	Santa Ysabel Substation	6	11	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,124
348	**OTHER PRODUCTION - GENERATION**	$ 1,123
351	**TRANSMISSION**	$ 1,123
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 1,123
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 259
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 107
	TOTAL PROJECT COST	*$ 4,860*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
22	Santa Ysabel Substation	30	36	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 1,330
348	**OTHER PRODUCTION - GENERATION**	$ 2,155
351	**TRANSMISSION**	$ 2,155
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 2,155
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 449
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 185
	TOTAL PROJECT COST	*$ 8,429*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
23	Caltrans Park-N-Ride Del Lago (OPRA)	200	400	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 6,060
348	**OTHER PRODUCTION - GENERATION**	$ 16,780
351	**TRANSMISSION**	$ 16,780
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 16,780
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 3,249
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 1,338
	TOTAL PROJECT COST	*$ 60,986*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
24	ITF (OPRA)	200	400	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 6,060
348	**OTHER PRODUCTION - GENERATION**	$ 16,780
351	**TRANSMISSION**	$ 16,780
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 16,780
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 3,249
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 1,338
	TOTAL PROJECT COST	*$ 60,986*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
25	Civita Microgrid	125	200	Complete

FERC ACCT.		TOTAL
341	**STRUCTURES AND IMPROVEMENTS**	$ 3,550
348	**OTHER PRODUCTION - GENERATION**	$ 8,745
351	**TRANSMISSION**	$ 8,745
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$ 8,745
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$ 1,716
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$ 707
	TOTAL PROJECT COST	*$ 32,209*

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS - Utility Scale

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
1	Borrego Microgrid Yard- SES1	500	1500	Complete

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	69,536
348	**OTHER PRODUCTION - GENERATION**	$	42,084
351	**TRANSMISSION**	$	42,084
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	42,084
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	10,096
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,454
	TOTAL PROJECT COST	*$*	*209,339*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
	Pala Energy Storage Yard	500	1500	Complete

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	33,745
348	**OTHER PRODUCTION - GENERATION**	$	32,182
351	**TRANSMISSION**	$	32,182
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	32,182
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	7,507
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	3,091
	TOTAL PROJECT COST	*$*	*140,891*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
16	Ortega Highway (Quest) 1243 Unit 1	1000	3000	In Progress

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	70,671
348	**OTHER PRODUCTION - GENERATION**	$	60,205
351	**TRANSMISSION**	$	60,205
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	60,205
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	14,346
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	5,907
	TOTAL PROJECT COST	*$*	*271,539*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
17	Ortega Highway (Quest)1243 Unit 2	1000	3000	In Progress

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	70,671
348	**OTHER PRODUCTION - GENERATION**	$	60,205
351	**TRANSMISSION**	$	60,205
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	60,205
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	14,346
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	5,907
	TOTAL PROJECT COST	*$*	*271,539*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
18	Pala Unit 2	1000	2000	In Progress

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	48,770
348	**OTHER PRODUCTION - GENERATION**	$	49,718
351	**TRANSMISSION**	$	49,718
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	49,718
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	11,311
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	4,657
	TOTAL PROJECT COST	*$*	*213,893*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
19	Carmel Valley (Canyon Crest)	1000	3000	Complete

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	73,286
348	**OTHER PRODUCTION - GENERATION**	$	75,269
351	**TRANSMISSION**	$	75,269
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	75,269
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	17,089
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	7,037
	TOTAL PROJECT COST	*$*	*323,219*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
20	Borrego Microgrid Yard- SES2	1000	3000	Complete

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	93,406
348	**OTHER PRODUCTION - GENERATION**	$	76,611
351	**TRANSMISSION**	$	76,611
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	76,611
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	18,468
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	7,605
	TOTAL PROJECT COST	*$*	*349,313*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
27	El Cajon BESS 1	7500	30000	Under Construction

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	967,762
348	**OTHER PRODUCTION - GENERATION**	$	963,690
351	**TRANSMISSION**	$	963,690
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	963,690
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	220,685
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	90,870
	TOTAL PROJECT COST	*$*	*4,170,388*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
28	Escondido BESS 1	10000	40000	Under Construction

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	969,375
348	**OTHER PRODUCTION - GENERATION**	$	969,885
351	**TRANSMISSION**	$	969,885
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	969,885
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	221,695
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	91,286
	TOTAL PROJECT COST	*$*	*4,192,012*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
29	Escondido BESS 2	10000	40000	Under Construction

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	969,375
348	**OTHER PRODUCTION - GENERATION**	$	969,885
351	**TRANSMISSION**	$	969,885
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	969,885
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	221,695
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	91,286
	TOTAL PROJECT COST	*$*	*4,192,012*

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
30	Escondido BESS 3	10000	40000	Under Construction

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	969,375
348	**OTHER PRODUCTION - GENERATION**	$	969,885
351	**TRANSMISSION**	$	969,885
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	969,885
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	221,695
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	91,286
	TOTAL PROJECT COST	*$*	*4,192,012*

San Diego Gas & Electric
Decommissioning Cost Estimates
BESS - Utility Scale Flow Battery

Project ID	Location	Capacity (kW)	Energy (kWh)	Status
26	San Miguel VRF	2000-2300	8000	Under Construction

FERC ACCT.		TOTAL	
341	**STRUCTURES AND IMPROVEMENTS**	$	203,625
348	**OTHER PRODUCTION - GENERATION**	$	53,992
351	**TRANSMISSION**	$	53,992
363	**DISTRIBUTION - STORAGE BATTERY EQUIPMENT**	$	53,992
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	20,962
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	8,631
	TOTAL PROJECT COST	*$*	*395,194*

Appendix C

Benchmarking Peer Group Dataset

ABB Velocity Suite Database
Peer Group
All Energy Storage Sites with Batteries as the primary equipment

	Plant State	Prime Mover Code	Prime Mover Category	EIA 860 Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)
1	Ohio	BA	ES	0.250	Operating	5/26/2015			1	1	Y
2	Ohio	BA	ES	0.250	Operating	11/30/2015			0	1	Y
3	West Virginia	BA	ES	32.000	Operating	10/28/2011			4	8	Y
4	Ohio	BA	ES	20.000	Operating	9/30/2013			3	10	Y
5	Maryland	BA	ES	11.000	Operating	12/1/2015			0	5	Y
6	California	BA	ES	2.000	Operating	7/15/2012			4	1	N
7	West Virginia	BA	ES	2.000	Operating	11/1/2009			6	1	Y
8	Alberta	BA	ES		Operating	12/31/2004			11	1	Y
9	Alberta	BA	ES		Operating	12/31/2009			6	1	Y
10	Hawaii	BA	ES	11.000	Operating	12/27/2012			3	1	Y
11	New Jersey	BA	ES		Operating	3/31/2015			1	1	Y
12	Ohio	BA	ES	4.000	Operating	3/31/2014			2	1	Y
13	British Columbia	BA	ES		Operating	7/11/2013			3	1	Y
14	West Virginia	BA	ES	31.500	Operating	11/3/2015			0	18	Y
15	Maine	BA	ES		Operating	5/5/2015			1	1	Y
16	Ohio	BA	ES	1.000	Operating	5/26/2015			1	1	Y
17	Ohio	BA	ES	1.000	Operating	11/30/2015			0	1	Y
18	Ohio	BA	ES	0.750	Operating	5/26/2015			1	1	Y
19	Ohio	BA	ES	0.750	Operating	11/30/2015			0	1	Y
20	Texas	BA	ES	4.000	Operating	12/1/2010			5	1	Y
21	Michigan	BA	ES		Operating	3/11/2011			5	1	Y
22	Maine	BA	ES		Operating	1/1/1978				1	Y
23	California	BA	ES	2.500	Operating	10/8/2015			1	1	Y
24	Alaska	BA	ES	27.000	Operating	12/1/2003			12	1	Y
25	Vermont	BA	ES		Operating	7/1/2015			1	1	Y
26	Ohio	BA	ES		Operating	3/9/2016			0	1	Y
27	Hawaii	BA	ES		Operating	9/23/2016			0	1	Y
28	Indiana	BA	ES		Operating	6/17/2016			0	1	Y
29	Illinois	BA	ES	19.800	Operating	11/12/2015			0	9	Y

	Plant State	Prime Mover Code	Prime Mover Category	EIA 860 Nameplate Capacity MW	Unit Status	Commercial Online Date	Retirement Date	Proposed Retirement Date	Unit Age (Years)	Number of Units	Grid Connected (Y/N)
30	Hawaii	BA	ES		Operating	5/24/2012			4	1	Y
31	Hawaii	BA	ES	15.000	Retired	3/24/2011	7/31/2012		1	1	Y
32	Missouri	BA	ES	1.000	Operating	12/1/2012			3	1	Y
33	Hawaii	BA	ES		Operating	12/7/2012			3	1	Y
34	Alaska	BA	ES	3.000	Operating	9/14/2012			4	1	Y
35	Hawaii	BA	ES		Operating	4/19/2012			4	1	Y
36	New Mexico	BA	ES	0.800	Operating	9/1/2012			4	1	Y
37	Illinois	BA	ES		Operating	12/20/2015			0	9	Y
38	Pennsylvania	BA	ES		Operating	12/31/2015			0	1	Y
39	Minnesota	BA	ES	1.100	Operating	1/1/2013			3	1	Y
40	Texas	BA	ES	36.000	Operating	12/1/2012			3	1	Y
41	California	BA	ES	2.000	Operating	8/1/2012			4	1	Y
42	California	BA	ES	4.000	Operating	5/23/2013			3	1	Y
43	Hawaii	BA	ES		Operating	10/31/2011			4	1	Y
44	Oregon	BA	ES	5.000	Operating	12/1/2013			2	1	Y
45	New Mexico	BA	ES	0.800	Operating	9/21/2011			5	8	Y
46	Washington	BA	ES	1.000	Operating	7/31/2015			1	1	Y
47	Washington	BA	ES		Operating	12/31/2015			0	1	Y
48	Washington	BA	ES		Operating	12/31/2015			0	1	Y
49	Ontario	BA	ES		Operating	8/5/2014			2	1	Y
50	Hawaii	BA	ES	6.000	Operating	8/1/2015			1	1	Y
51	Connecticut	BA	ES		Operating	8/11/2016			0	1	Y
52	California	BA	ES		Operating	4/8/2016			0	1	Y
53	Illinois	BA	ES	19.800	Operating	11/12/2015			0	9	Y
54	Ohio	BA	ES		Operating	1/15/2016			0	3	Y

Prepared by

Sargent & Lundy LLC
Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

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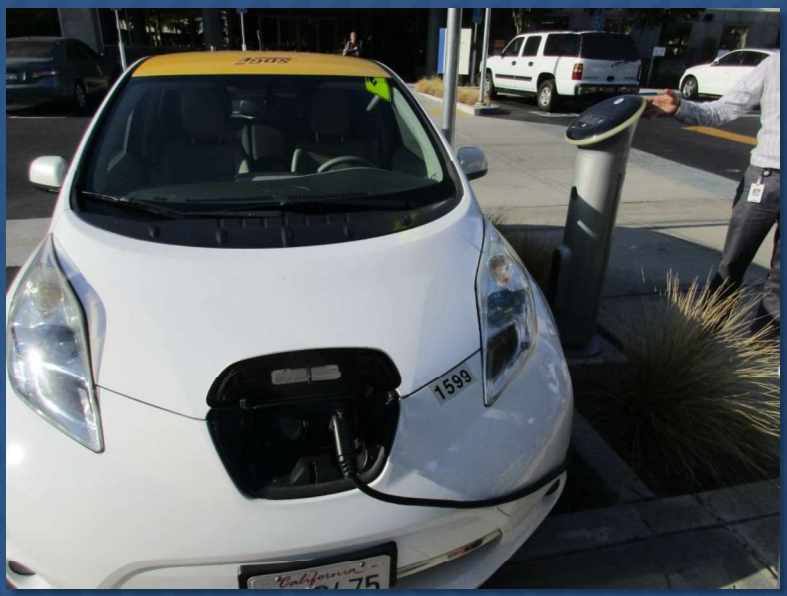

Electric Vehicle (EV) Charging Stations

Decommissioning Study

Prepared for
San Diego Gas & Electric Company

Report SL-013559.G

Project 12699-004
February 2017

SDGE
A Sempra Energy utility®

F I N A L

Electric Vehicle (EV) Charging Stations
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Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

Project 12699-004

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Electric Vehicle (EV) Charging Stations Decommissioning Study

CONTENTS

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TABLES & FIGURES

ACRONYMS AND ABBREVIATIONS

Term	Definition or Clarification
AC	Alternating current
ASL	Average Service Life
EV	Electric vehicle
Owner	San Diego Gas & Electric Company
S&L	Sargent & Lundy LLC
SDG&E	San Diego Gas & Electric Company
W	Watts

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EXECUTIVE SUMMARY

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual decommissioning cost estimate and Average Service Life (ASL) estimate for the SDG&E portfolio of electric vehicle (EV) charging stations. SDG&E indicated that the cost estimate should assume all the charging stations are pedestal-mounted and are one of the three typical models found in SDG&E's portfolio of charging stations: General Electric (GE) WattStation, Clipper Creek, or ChargePoint. The charging stations are located throughout the SDG&E service area.

METHODOLOGY

The S&L methodology for developing the cost estimate consisted of 1) our experience in developing demolition costs and our existing database from numerous other projects, and 2) use of unit cost factor methodology. The cost estimate was developed based on information provided by SDG&E and publically available information about the EV charging stations. This information was used to estimate the foundation sizes, quantity of steel, and other components. S&L performed a site walkdown at the SDG&E headquarters to review typical charging stations. This information was used with cost factors developed by S&L based on industry data and our experience. We estimated the quantities of metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

CONCEPTUAL COST ESTIMATE

Electric Vehicle Charging Stations

The estimate assumes that EV charging stations are decommissioned in batches of 25 stations at a time. The total number of stations is 206. The summary of the cost estimate for decommissioning the SDG&E EV charging stations is shown in Table ES-1 below. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

Table ES-1 — Cost Estimate Summary for EV Charging Stations

	Includes Contingency							
	Subcontract Cost	*Scrap Value*	*Material Cost*	*Labor Cost*	*G&A & Profit*	*Engineering, Procurement, & Project Services; Construction Management Support*	*Contingency on Indirect*	*Total Cost*
Number of EV Charging Stations Decommissioned at a Time 25	*$ 1,013*	*$ (730)*	*$ 4,333*	*$ 106,448*	*$ 11,992*	*$ 8,339*	*$ 1,668*	*$ 133,063*
Current Number of EV Charging Stations in the SDG&E Portfolio 206	$ 8,345	$ (6,018)	$ 35,706	$ 877,129	$ 98,816	$ 68,715	$ 13,743	$ 1,096,436

The total cost to decommission 206 existing EV charging stations is $1,112,845; therefore, the average or blended cost is approximately $5,400 per unit. The actual decommission cost will vary with respect to the type of EV charging station, type of foundation, number of units at a single location, and other factors listed in the cost estimate.

AVERAGE SERVICE LIFE

The expected average service life of an SDG&E EV charging station is five years. Historically, some EV charging stations' electronic control systems have been shown to fail or become obsolete before that time. However, EV charging stations may last longer than five years with investments to maintain the units and regular upgrades to electronic systems.

A symmetrical type S3 Iowa curve may be appropriate for the depreciation of EV charging station assets (for further information on this, see Section 5.2.2).

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SARGENT & LUNDY LLC

Prepared by

Bradley E. Toon
Senior Management Consultant

Emile Jabre
Management Consultant

Reviewed by

Matt N. Ozan
Manager
Cost Information Division

Robert. P. Charles
Senior Principal Consultant &
Project Manager

Approved by

Robert. P. Charles
Senior Principal Consultant &
Project Manager

February 1, 2017
Date

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1. SCOPE OF WORK

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual decommissioning cost estimate and Average Service Life (ASL) estimate for the SDG&E portfolio of electric vehicle (EV) charging stations. SDG&E indicated that the cost estimate should assume all the charging stations are pedestal-mounted and are one of the three typical models found in SDG&E's portfolio of charging stations: General Electric (GE) WattStation, Clipper Creek, or ChargePoint. The charging stations are located throughout the SDG&E service area.

Sargent & Lundy has been dedicated to providing complete engineering and environmental services exclusively to the power industry since 1891. Through our work with various utilities, lending institutions, and developers, over the years Sargent & Lundy Consulting has become one of the premier power project consultants in the power industry. This commitment to quality is proven by the successful completion of our International Organization for Standardization (ISO) 9000 certification audit. Our experience encompasses independent engineer services, including decommissioning cost estimation and average service life evaluation for both global and domestic electric power assets. S&L has recently completed decommissioning studies for a number of clients.

Sargent & Lundy has engineered over 958 power plant units. We have both the benefit of extensive design experience with feedback from operating plants as well as individuals with extensive plant operations experience to support our consulting services.

LAST PAGE OF SECTION 1.

2. GENERAL DESCRIPTION

2.1 ELECTRICAL VEHICLE (EV) CHARGING STATIONS

EVs were first widely introduced in the US in the early 1900s, when 4% of the 4,192 cars manufactured at that time were electric. However, this was short-lived with the rise and consequent mass production of gasoline-powered cars. However, 110 years later, EVs are becoming more prevalent. Several car manufacturers have increased EV production over the past few years. This development has resulted in growth in the number of EV charging stations, which has already reached approximately three million units globally.

EV charging stations supply and meter electric power to individual EVs. The main components of an EV charging stations are:

- **Power source:** Supplies the electricity needed for the charging station.
- C**harging device:** Inside the charging station is a charging device responsible for converting and transferring the electricity from the power source to the EV. Some systems include electronics that integrate payment systems with the metering of power. The charging device can be standing (i.e., pedestal) or wall-mounted.
- **Cabling and plugs:** Used to connect EVs to charging stations. Charging stations that swap banks of batteries or charge wirelessly are not widespread and are not part of the SDG&E portfolio.
- **Controls**: Includes the electric equipment and software necessary to control, monitor, and optimize the flow of electricity to rapidly charge/recharge EVs.

SDG&E's portfolio is comprised of 206 EV charging stations. The main three pedestal chargers are:

- **GE WattStation Pedestal**: These charging stations are manufactured by GE and come with retractable cords. It includes "advanced network management" software tools to help the user monitor and manage the charging station remotely. The GE WattStation comes with a three-years part warranty. Its standby power is typically 5 watts (W), while its alternating current (AC) charging power output is 7,200 W. The stand is powder-coated stainless steel.

Figure 2-1 — Example of a GE WattStation EV Charging Station

- **ClipperCreek Pedestal**: These charging stations are manufactured by ClipperCreek in the US. They feature a slim profile with a powder-coated stainless steel enclosure for environmental durability. ClipperCreek pedestal charging stations come with a three-year parts warranty.

Figure 2-2 — Example of Clipper Creek EV Charging Station

- **ChargePoint Pedestal**: ChargePoint pedestal stations come with extended parts and labor warranty coverage for up to five additional years. Its standby power is typically 8 W, while its AC charging power output is up to 7,200 W.

Figure 2-3 — Example of ChargePoint EV Charging Station

3. COST ESTIMATE

3.1 METHODOLOGY

The methodology used for developing the cost estimate includes a combination of stochastic and deterministic methods. Deterministic methods were used based on the quantity and size of equipment (e.g., the number of foundations, equipment, and etc.). Stochastic methods were also used if quantity information (e.g., misc. electrical equipment) was not available.

The cost estimate was developed based on drawings, documents, and data provided by the Owner and publically available. These drawings and documents were used to estimate the foundation sizes, unit volumes, metal quantities, and quantity of other equipment.

The S&L methodology for developing the cost estimate consisted of 1) our experience in developing demolition costs and our existing database for numerous other projects, and 2) the use of unit cost factor methodology.

Cost estimates were created using the S&L cost model format and the S&L cost database. The estimates developed include details for each type of work performed, indirect costs, and contingencies.

An inventory of charging stations, concrete, and other equipment was developed based on a review of station inventory and data provided by the Owner. Mr. Borko Andric and Mr. Brad Toon of S&L visited representative charging stations at the SDG&E headquarters to determine any unique site-specific requirements. This information was used with cost factors developed by S&L based on industry data and our experience. Cost factors for concrete removal and other tasks were developed from labor and material cost information. We estimated the quantities of recoverable metals that could be recovered and sold for scrap. The estimate includes the value of scrap metals; however, equipment is assumed to have no resale or other salvage value besides the value of scrap metal at the end of its life.

3.2 COST ESTIMATE SUMMARY

3.2.1 EV Charging Stations

The estimate assumes that EV charging stations are decommissioned 25 stations at a time. The total number of stations is 206. The summary of the cost estimate for decommissioning the SDG&E EV stations is shown in

Table 3-1. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

The commercial and technical basis for the estimate is included in Section 4. The detailed estimate is included in Appendix A.

Table 3-1 — Cost Estimate Summary for Electric Vehicle Charging Stations

	Includes Contingency							
	Subcontract Cost	*Scrap Value*	*Material Cost*	*Labor Cost*	*G&A & Profit*	*Engineering, Procurement, & Project Services; Construction Management Support*	*Contingency on Indirect*	*Total Cost*
Number of EV Charging Stations Decommissioned at a Time								
25	*$ 1,013*	*$ (730)*	*$ 4,333*	*$ 106,448*	*$ 11,992*	*$ 8,339*	*$ 1,668*	*$ 133,063*
Current Number of EV Charging Stations in the SDG&E Portfolio								
206	**$ 8,345**	**$ (6,018)**	**$ 35,706**	**$ 877,129**	**$ 98,816**	**$ 68,715**	**$ 13,743**	**$ 1,096,436**

The total cost to decommission 206 existing EV charging stations is $1,112,845; therefore, the average or blended cost is approximately $5,400 per unit. The actual decommission cost will vary with respect to the type of EV charging station, type of foundation, number of units at a single location, and other factors listed in the cost estimate.

LAST PAGE OF SECTION 3.

4. BASIS OF ESTIMATE

The basis for the cost estimate is as follows:

The decommissioning cost estimates in Appendix A are for the dismantlement and removal of 206 pedestal-type, EV charging stations. SDG&E has indicated that all charging stations are assumed to be pedestal-type, of which there are three models: GE WattStation, ClipperCreek, and ChargePoint.

The cost estimate is based primarily on S&L's experience on similar equipment. Detailed engineering has not been performed to firm up the project details, and specific site characteristics have not been fully analyzed. We have assigned allowances where necessary to cover issues that are likely to arise but are not clearly quantified at this time.

4.1 PROCEDURE

In general, the procedure to decommission an EV charging station fixed to existing pavement or concrete is as follows:

- Charging station will be de-energized and disconnected by others.
- Charging station pedestal will be unbolted or otherwise removed from base.
- In-ground conduit and cable will be cut, capped, and abandoned in place.
- Internal electronics, cables, conduits, wires, controls, and other related items will be separated from the station metal pedestal and disposed.
- Pedestal will be demolished for stainless steel recycling.
- Bolts or other connections left in existing pavement or concrete will be cut and removed.
- Damage to existing pavement or concrete will be repaired using appropriate patch repair material.
- Any bollards will be completely cut out, removed from site, and disposed.
- Holes left from bollard removal will be filled with concrete.

In general, the procedure to decommission an EV charging station fixed to a free-standing foundation is as follows:

- Charging station will be de-energized and disconnected by others.
- Charging station pedestal will be unbolted or otherwise removed from base.
- Any bollards will be completely cut out, removed from site, and disposed.
- Holes left from bollard removal will be filled with concrete.

4.1.1 Pricing and Quantities

Quantities were provided by SDG&E in the form of an EV charging station portfolio database. Our review of actual charging stations from our site visit to SDG&E headquarters was used to establish the typical components for decommissioning.

A. Labor Wage Rates

- Craft labor wage rates selected for the estimates are based on those published in *RSMeans Prevailing Labor Rates for the Construction Industry*, 2016 edition, for San Diego, CA.
- The labor estimate is based on a 40-hour workweek; no per diem or other labor incentives.

B. Labor Crews

- The craft rates are incorporated into work crews appropriate for the activities by adding allowances for small tools, construction equipment, insurance, payment bonds, and site overheads to arrive at the crew rates used in the cost estimate.
- An example of crew rates for demolition of equipment and demolition of concrete is shown in Table 4-1 below:

Table 4-1 — Example Crew Rates

San Diego, CA		Demo Equipment		Demo Concrete	
		$/hr	Percentage	$/hr	Percentage
Crew Base		$ 32.74	31%	$38.33	33%
Crew Fringes		$ 19.34	18%	$21.11	18%
Crew FICA		$ 2.50	2%	$2.93	2%
Crew SUI		$ 0.42	0%	$0.42	0%
Crew FUI		$ 0.04	0%	$0.04	0%
Crew Workers Comp. Ins		$ 7.50	7%	$8.78	7%
Other *		$ 1.64	2%	$1.92	2%
Equipment		$ 21.55	20%	$20.80	18%
Site OH		$ 21.43	20%	$23.58	20%
Total		$ 107.16	100%	$117.91	100%

* Expendables/Small Tools, Show up Time, Working Foreman, General Liability Insurance

C. Productivity

- No allowances have been made to cover items such as loss in productivity because of inclement weather conditions.

D. Quantity Sources

- Quantities of pieces of equipment and/or bulk material commodities used in this cost estimate were developed from SDG&E-provided and publically available information.
- Scrap value for recoverable metals is included in the estimate as a credit. No resale of equipment or material is included.

E. Scrap

- Scrap metals are a globally traded commodity and are part of the larger metals industry. The value of scrap metal is subject to constantly changing economic conditions, as such the price of mixed steel, stainless steel, copper, and aluminum can vary greatly over time as a result of global supply and demand. The value of scrap for this study was determined by a three-month average from 'Scrap Metals MarketWatch'(July, August, and September of 2016) for the West Coast (Zone 1) of the United States. The 'Scrap Metals MarketWatch' can be found on the following website:
- www.americanrecycler.com
- The values obtained are delivered prices expressed as cost per gross ton or pound to account for separation, preparation and shipping costs to the mills. Metal recycling is a cyclical industry. The costs used in this study represent market prices in mid-2016, and cannot be used to estimate the value of scrap in the future. Estimated scrap prices are listed in Table 4-2.

Table 4-2 — Estimated Scrap Prices

	#1 & 2 Mixed Steel	#1 Copper	Aluminum	Stainless Steel
	$ / Gross Ton	$/lb.	$/lb.	$/lb.
Date				
July 1, 2016	185	1.95	0.45	0.55
August 1, 2016	185	1.94	0.46	0.57
September 1, 2016	184	1.97	0.47	0.55
3 Month Average	*184.67*	*1.95*	*0.46*	*0.56*
Converted to $/tons	$165 / ton	$3,907 / ton	$920 / ton	$1,113 / ton
Scrap dealer costs - deduct	$78 / ton	$440 / ton	$260 / ton	$200 / ton
Net Value to Utility	**$87 / ton**	**$3,467 / ton**	**$660 / ton**	**$913 / ton**

F. Contractor Costs

- Contractors' general and administrative (G&A) cost is included at 5% of labor and material.

- Contractors' profit is included at 8% of labor and material.

G. Indirect Expenses

- Project indirect expense are based on percent total direct construction labor only.
- Engineering costs are included to cover engineering services associated with planning decommissioning activities.
- Construction management and field engineering is estimated to be 2%. This covers oversight of demolition activities but not full-time construction management.
- Owner's costs not included.

H. Escalation Rates

- Not included.

I. Sales and Use Taxes

- Sales and use taxes not included.

J. Contingency

- A 20% contingency is applied for material, labor and indirect expenses.
- A -20% contingency is applied for scrap value, as a drop in scrap value will result in an increase in project cost.

K. Contract Basis for Estimate

- The estimate is based on a multiple lump sum.

L. Assumptions

- The cost estimate assumes that 25 EV charging stations will decommissioned at a time.
- Per an SDG&E email dated September 8, 2016, we were instructed to assume all stations are pedestal-mounted type.
- Most EV charging stations are in series of two to 10 pedestals in parking lots and garages. Some individual pedestals have two protective bollards, while others have none or are protected by curbs. Consequently, to account for the removal of bollards, one bollard for each pedestal is included with the estimate.
- SDG&E has indicated that conduits in right-of-ways to pedestals will be abandoned in place.
- Underground facilities, such as conduits, will be covered through other accounts and are not included in this decommissioning cost estimate.
- Entire pedestal foundations and bollards shall be removed to 3 feet below grade.
- Bollard weight and dimensions are for a typical unit and are based on a manufacturer drawing. 1,700 lbs.; 2 feet diameter x 3 feet height + 7.5 inch diameter x 4.33 feet; 10.75 cubic feet of concrete per bollard).[1]
- Based on observations during the site visit, review of charging station installation manuals, and street views of SDG&E stations on maps.google.com, the EV charging station were

[1] "Vaughn Concrete Products", www.vaughnconcreteproducts.com/bollards.

found to be installed on sidewalks, pavement, curbs, and other structures. Some stations were fixed to freestanding foundations surrounded by soil. Since the location of each station was not available from the SDG&E database, it was assumed half of the pedestals are fixed to 2 feet x 2 feet x 3 feet deep foundations, and the remaining half are assumed to be fixed to existing concrete or pavement.

- The estimate considers that freestanding pedestal foundations will be removed, demolished for scrap, and backfilled (volume = 12 cubic feet per foundation).
- The estimate assumes that the process of removing bolts from existing concrete will result in some damage to existing surfaces. A material allowance of 5 cubic yards of concrete repair per station is assumed for the project.
- The pedestal weight is based on the GE WattStation. The weight of salvageable stainless steel is estimated to be 80 lbs., based on GE specifications. This weight is typical for pedestal-type EV charging stations.
- The amount of mixed steel, aluminum, copper, and other valuable metals is considered too small to salvage.
- All electrical equipment and wiring will be de-energized by others.
- No extraordinary environmental costs for demolition will be needed.
- All demolished materials are considered debris, except for metal from the pedestals, which has scrap value.
- The basis for salvage estimating is for scrap value only. No resale of equipment or material is included.
- Handling on-site and off-site disposal of hazardous materials will be performed in compliance with methods approved by SDG&E's Environmental Services Department.
- The material and labor cost for fill soil is estimated to be $37 per cubic yard for the San Diego area.

5. AVERAGE SERVICE LIFE EVALUATION

5.1 BENCHMARKING ANALYSIS

Because EV technology has evolved and grown significantly over only the past several years, there is little information available concerning the service life of EV charging stations. To date, most EV charging stations have gone out of service due to technological obsolescence. Nonetheless, the expected service life of EV charging stations has appeared in academic economic models. The table below lists the expected service life of EV charging stations from a recent academic study.

Table 5-1 — Expected Service Life of EV Charging Stations

Citation	Expected Service Life of EV Charging Stations
University of California Los Angeles, UCLA Anderson School of Management Chang, D., Erstad, D., et. al., "Financial Viability of Non-Residential Electric Vehicle Charging Stations," (August 2012).	"Depreciation: The actual lifespan of the machines (EV charging station) is uncertain at this point, but the model assumes 10 years. For tax purposes, the machine is depreciated straight line over a useful life of 7 years."

5.2 AVERAGE SERVICE LIFE

5.2.1 Typical Average Service Life

SDG&E expects to replace EV charging stations every five years. Many of the EV charging station components may have a longer service life. The powder-coated stainless steel pedestals are likely to have a service life of more than 25 years, and the plug connections are rated for 25,000 connections. It is unlikely that the stainless steel pedestal or the plug connection will limit the service life of the unit.

However, internal electronic controls and computers require regular updates or replacement over the service life of a unit. In addition, the physical components that control the units are susceptible to wear in ambient conditions. For example, SDG&E has noted that control screens on some units have permanently fogged over and require replacement after approximately three years.

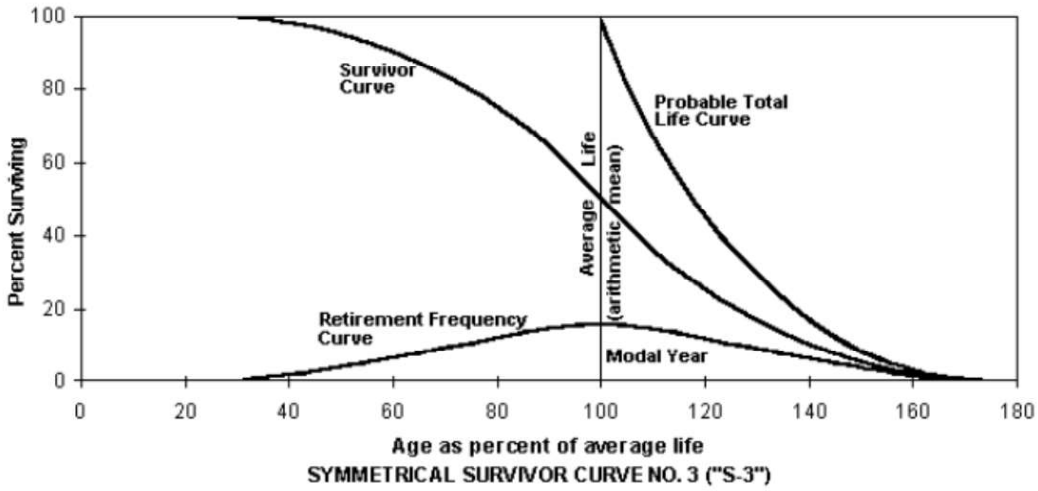
As of October 2016, the longest service life of an EV charging station in SDG&E's portfolio was seven years. With regular maintenance and investment in electronic upgrades, it is possible that the service life may be extended longer.

5.2.2 EV Charging Station Survivor Curve

In the early 20th century, a team of researchers at Iowa State University began researching the retirement characteristics of physical assets to consider depreciation in rate cases. The study and subsequent revisions resulted in a set of survivor curves and probable-life curves that continue to be used in utility-rate and valuation studies. Depreciation adjustments may be applied to the value of assets because existing assets are worth less than new assets due to reduction in functionality or remaining useful life from wear and tear, weather, obsolescence, and inadequacy due to physical deterioration, functional obsolescence, and economic obsolescence.

The relationship between a typical survival curve and probable life is illustrated in Figure 5-1. The probable life is the average life expectancy of the survivors of the original group. For 100% of the original group, the probable total life is equal to the Average Service Life (ASL) of the group. As the number of survivors declines over time, the ASL of the remaining group increases. The probable total life curve thus falls to the right of the survivor curve. Mathematically, the probable life curve at a given point is equal to the area under the survivor curve to the right of the current age.

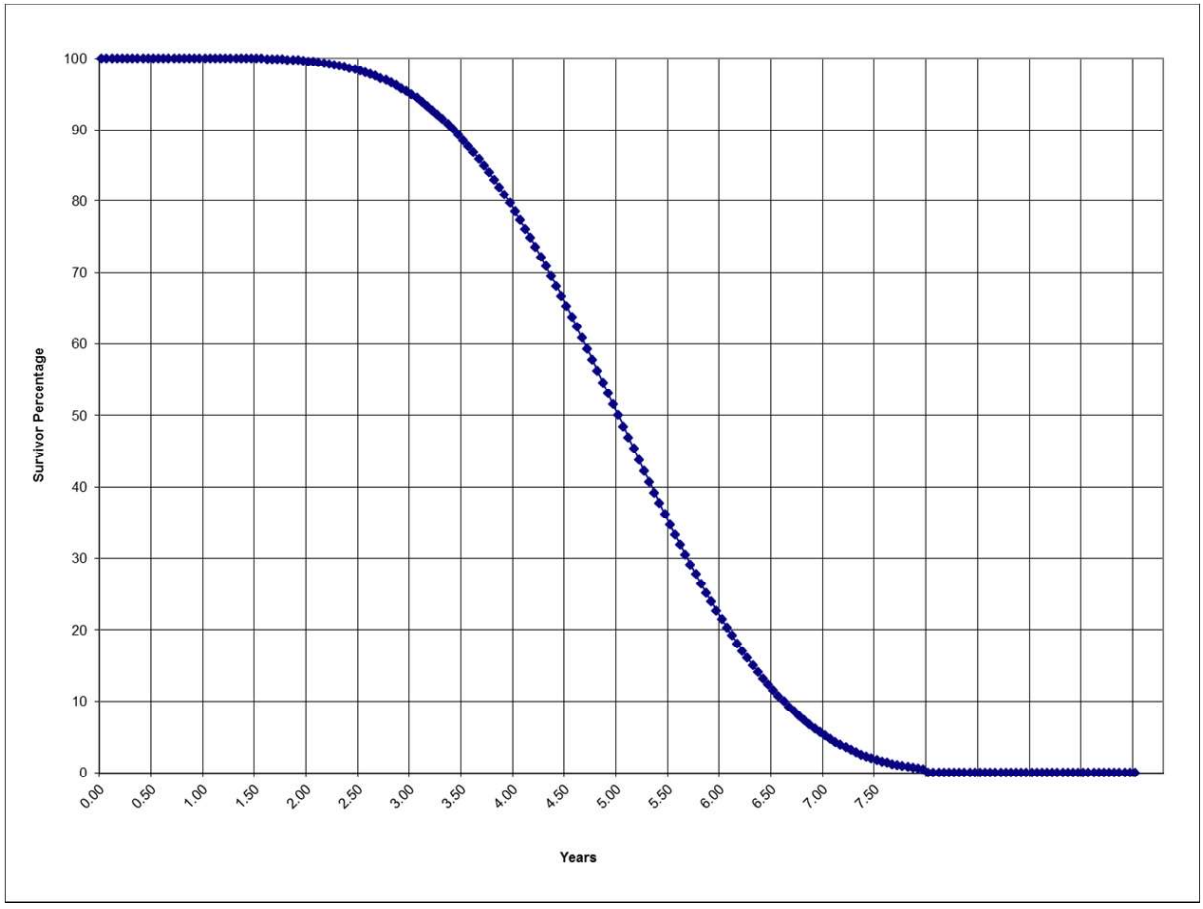
Figure 5-1 — Typical Survivor Curve and Relationship to Probable Total Life



Source: *Replacements, Units, Service Lives, Factors* (December 2005), U.S. Department of Energy, Western Area Power Administration, U.S. Department of the Interior, and U.S. Bureau of Reclamation.

The survivor curves developed by the Iowa State University study, also called "Iowa curves," are divided into four main classes: right-modal (R-curve), left-modal (L-curve), symmetrical (S-curve), and original-modal (O-curve). A symmetrical-modal survivor curve with mid-range order, or slope, and average service life of seven years is shown below as a typical survivor curve for EV charging stations.

Figure 5-2 — EV Charging Station Example Survivor Curve (Iowa Curve Type S3)



The curve shows that a half of the assets are expected to survive past the average service life. A type S3 Iowa curve, as shown above, was selected for the depreciation of EV charging station assets.

5.3 CONCLUSION

The expected average service life of SDG&E EV charging stations is five years. Historically, some EV charging stations' electronic control systems have been shown to fail or become obsolete before that time. However, EV charging stations may last longer than five years with investment to maintain the units and regular upgrades to electronic systems.

LAST PAGE OF SECTION 5.

6. REFERENCES

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4. Engineering Drawings, Equipment Lists, O&M Records and other information provided by the San Diego Gas & Electric.
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6. Bollard Dimensions - Vaugh Concrete Products - (www.vaughnconcreteproducts.com/bollards).
7. Battery Disposal/Recycling Costs - Kinsbursky Brothers, Inc. Pricing (Oct. 1st 2016).
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Appendix A

Conceptual Estimate of Cost to Decommission EV Charging Stations

San Diego Gas & Electric
Decommissioning Cost Estimates
Electric Vehicle Charging Sites

	Includes Contingency							
	Subcontract Cost	*Scrap Value*	*Material Cost*	*Labor Cost*	*G&A & Profit*	*Engineering, Procurement, & Project Services; Construction Management Support*	*Contingency on Indirect*	*Total Cost*
Number of EV Charging Stations Decommissioned at a Time								
25	***$ 1,013***	***$ (730)***	***$ 4,333***	***$ 106,448***	***$ 11,992***	***$ 8,339***	***$ 1,668***	***$ 133,063***
Current Number of EV Charging Stations in the SDG&E Portfolio								
206	**$ 8,345**	**$ (6,018)**	**$ 35,706**	**$ 877,129**	**$ 98,816**	**$ 68,715**	**$ 13,743**	**$ 1,096,436**

San Diego Gas & Electric
Decommissioning Cost Estimates
Electric Vehicle Charging Stations

Total Number of EV Charging Stations	206
Number of EV Charging Stations Decommissioned at one time	25

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.22.00	*Concrete*									
			Concrete	Foundations 2'x2'x3'	6.0 CY				309 /MH	$ 117.91	$ 36,384	$ 36,384
			Concrete	Protective Bollards, 103 @ 0.39 cu yd each	5.0 CY				257 /MH	$ 117.91	$ 30,320	$ 30,320
		11.41.00	*Electrical Equipment*									
			Remove pedestal from base		25 EA				50 /MH	$ 107.16	$ 5,358	$ 5,358
			Remove control units, conduit, wiring, other electronics, etc.		25 EA				125 /MH	$ 107.16	$ 13,395	$ 13,395
			Demolition			***$ -***	***$ -***	***$ -***			***$ 85,456***	***$ 85,456***
	18.00.00		**Scrap Value**									
		18.20.00	*Stainless Steel*									
			Stainless Steel	Pedestals @ 80 lbs. each	1 TN		$ (913)		/MH			$ (913)
			Scrap Value			***$ -***	***$ (913)***	***$ -***			***$ -***	***$ (913)***
	21.00.00		**Civil Work**									
		21.19.00	*Disposal*		7.0 CY							
			Dumpster, 40 CY Capacity	For concrete, electronics, rubbish	1 EA	$ 844			/MH			$ 844
		21.20.00	Backfill									
			Foundation backfill, imported material fill		3.0 CY			$ 111				$ 111
			Civil Work			***$ 844***	***$ -***	***$ 111***			***$ -***	***$ 955***
	24.00.00		**Architectural**									
			Concrete									
			Repair of concrete from removed pedestal base.		5.0 CY			$ 2,500	5.0 CY	$ 250.00	$ 1,250	$ 3,750
			Foundation backfill, pedestals on concrete/asphalt surfaces		3.0 CY			$ 375	3.0 CY	$ 250.00	$ 750	$ 1,125
			Foundation backfill, bollards	Installation	5.0 CY			$ 625	5.0 CY	$ 250.00	$ 1,250	$ 1,875
			Architectual			***$ -***	***$ -***	***$ 3,500***			***$ 3,250***	***$ 6,750***
Subtotal						*$ 844*	*$ (913)*	*$ 3,611*			*$ 88,706*	*$ 92,248*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 4,612
		91.10	Contractor's Profit									$ 7,380
												$ 11,992
Direct Costs + Construction Indirect Costs						*$ 844*	*$ (913)*	*$ 3,611*			*$ 88,706*	*$ 104,241*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ 6,254
		93.2	Construction Management Support									$ 2,085
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ 169						$ 169
		95.2	Contingency on Scrap Value				$ 183					$ 183
		95.3	Contingency on Material					$ 722				$ 722
		95.4	Contingency on Labor								$ 17,741	$ 17,741
		95.5	Contingency on Indirect									$ 1,668
Subtotal for		***25***	***EV Charging Stations***			***$ 1,013***	***$ (730)***	***$ 4,333***			***$ 106,448***	***$ 133,063***
Total for		**206**	**EV Charging Stations**			**$ 8,345**	**$ (6,018)**	**$ 35,706**			**$ 877,129**	**$ 1,096,436**

Prepared by

Sargent & Lundy LLC
Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

CONFIDENTIAL

Unmanned Aerial Vehicles (UAVs)
Decommissioning Study

Prepared for
San Diego Gas & Electric Company

Report SL-013559.H

Project 12699-004
February 2017

Photo Credit: http://www.dji.com/products/drones

SDGE
A Sempra Energy utility®

F I N A L

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February 2017

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Consulting

55 East Monroe Street
Chicago, IL 60603-5780 USA

Project 12699-004

LEGAL NOTICE

This report ('Deliverable') was prepared by Sargent & Lundy, L.L.C. ('S&L'), expressly for the sole use of San Diego Gas & Electric Company ('Client') in accordance with the agreement between S&L and Client. This Deliverable was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances. Client acknowledges (1) S&L prepared this Deliverable subject to the particular scope limitations, budgetary and time constraints, and business objectives of the Client; (2) information and data provided by others may not have been independently verified by S&L; and (3) the information and data contained in this Deliverable are time sensitive and changes in the data, applicable codes, standards, and acceptable engineering practices may invalidate the findings of this Deliverable. Any use or reliance upon this Deliverable by third parties shall be at their sole risk.

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Unmanned Aerial Vehicle (UAV) (Drones) Decommissioning Study

CONTENTS

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TABLES

ACRONYMS AND ABBREVIATIONS

Term	Definition or Clarification
ASL	Average Service Life
FERC	Federal Energy Regulatory Commission
HD	High definition
LiDAR	Light imaging detection ranging
O&M	Operations and maintenance
Owner	San Diego Gas & Electric Company
S&L	Sargent & Lundy LLC
SDG&E	San Diego Gas & Electric Company
UAV(s)	Unmanned aerial vehicle(s)

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EXECUTIVE SUMMARY

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual cost estimate for the decommissioning of their portfolio of unmanned aerial vehicle ("UAV," or drone) assets and to estimate their Average Service Life (ASL). The UAVs and their related components are kept in warehouses in the SDG&E service area.

METHODOLOGY

The S&L methodology for developing the cost estimate consisted of two elements: 1) our experience in developing site demolition costs and our existing database for numerous other projects, and 2) quotes from previous projects for similar activities. The cost estimate was developed based on the list of equipment provided by the Owner. This document was used to estimate the volume and weight of components for disposal.

An interview with the SDG&E UAV program manager was conducted during our site visit to the company headquarters. Information on the inventory of equipment and operations and maintenance (O&M) history was provided. SDG&E indicated that the UAV batteries could be disposed through a recycling program with an equipment vendor at no cost, while the remaining related equipment could be sent to a landfill.

CONCEPTUAL COST ESTIMATE

Unmanned Aerial Vehicles (UAVs)

The summary of the cost estimate for decommissioning the SDG&E UAVs and related equipment is shown in Table ES-1. The cost estimate broken into Federal Energy Regulatory Commission (FERC) accounts is shown in Table ES-2. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

Table ES-1 — Cost Estimate for UAV Inventory Stations

	Includes Contingency							
	Subcontract Cost	*Scrap Value*	*Material Cost*	*Labor Cost*	G&A & Profit	Engineering, Procurement, & Project Services; Construction Management Support	Contingency on Indirect	Total Cost
Drone Inventory Decommisioning	$ -	$ -	$ -	$ 3,224	$ 349	$ 61	$ 12	$ 3,647

Table ES-2 — UAV Inventory Cost Estimate Summary by FERC Account

	345 - ACCESSORY ELECTRIC EQUIPMENT		I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT		TOTAL PROJECT COST
TOTAL	$ 3,574		$ -	$ 73		$ 3,647

The total cost to decommission 21 existing UAVs and associated equipment is $3,702; therefore, the average or blended cost is approximately $175 per unit. The actual decommission cost will vary with respect to the amount of associated equipment included with the UAV and other factors listed in the cost estimate.

AVERAGE SERVICE LIFE

In conclusion, UAVs have an average service life of approximately three years. After that time, the units are expected to fail or become obsolete.

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SARGENT & LUNDY LLC

Prepared by

Bradley E. Toon
Senior Management Consultant

Emile Jabre
Management Consultant

Reviewed by

Matt N. Ozan
Manager
Cost Information Division

Robert. P. Charles
Senior Principal Consultant &
Project Manager

Approved by

Robert. P. Charles
Senior Principal Consultant &
Project Manager

February 1, 2017
Date

LAST PAGE OF EXECUTIVE SUMMARY.

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1. SCOPE OF WORK

Sargent & Lundy LLC (S&L) was contracted by San Diego Gas & Electric Company ("SDG&E" or "Owner") to perform a conceptual cost estimate for the decommissioning of their portfolio of unmanned aerial vehicle ("UAV," or drone) assets and to estimate their Average Service Life (ASL). The UAVs and their related components are kept in warehouses in the SDG&E service area.

Sargent & Lundy has been dedicated to providing complete engineering and environmental services exclusively to the power industry since 1891. Through our work with various utilities, lending institutions, and developers, over the years Sargent & Lundy Consulting has become one of the premier power project consultants in the power industry. This commitment to quality is proven by the successful completion of our International Organization for Standardization (ISO) 9000 certification audit. Our experience encompasses independent engineer services, including decommissioning cost estimation and average service life evaluation for both global and domestic electric power assets. S&L has recently completed decommissioning studies for a number of clients.

Sargent & Lundy has engineered over 958 power plant units. We have both the benefit of extensive design experience with feedback from operating plants as well as individuals with extensive plant operations experience to support our consulting services.

LAST PAGE OF SECTION 1.

2. GENERAL DESCRIPTION

2.1 UNMANNED AERIAL VEHICLES (UAVS)

SDG&E's inventory of UAVs consists of remote-controlled small aircraft, batteries, sensors, UAV-mounted cameras, controllers, computers, and replacement parts. SDG&E uses UAVs for the inspection and monitoring of transmission lines, interconnection stations, power plants, and other facilities.

The inventory of items in the UAV portfolio is described further in Section 5.1.

LAST PAGE OF SECTION 2.

3. COST ESTIMATE

3.1 METHODOLOGY

The S&L methodology for developing the cost estimate consisted of two elements: 1) our experience in developing demolition costs and our existing database for numerous other projects, and 2) quotes for previous projects for similar activities. The cost estimate was developed based on the list of equipment provided by the Owner. This document was used to estimate the volume and weight of components for disposal.

An interview with the SDG&E's UAV program manager was conducted during our site visit to the company headquarters. Information on the inventory of equipment and operations and maintenance (O&M) history was provided. SDG&E indicated that the UAV batteries could be disposed through a recycling program with an equipment vendor at no cost, while the remaining related equipment could be sent to a landfill.

Cost estimates were developed using the S&L cost model format and the S&L cost database. The estimates developed include details for each type of work performed, indirect costs, and contingencies.

3.2 COST ESTIMATE SUMMARY

3.2.1 UAVs

The summary of the cost estimate for decommissioning the inventory of UAVs and their related components is shown in Table 3-1. The commercial and technical basis for the estimate is included in Section 4. The detailed estimate is included in Appendix A. The breakdown into Federal Energy Regulatory Commission (FERC) accounts is shown in Table 3-2. The allocation of FERC accounts is shown in Appendix B. All costs are in 2016 US dollars. Decommissioning costs are expected to increase by the end of service life due to escalation.

Table 3-1 — Decommissioning Cost Estimate Summary for UAVs

	Includes Contingency							
	Subcontract Cost	*Scrap Value*	*Material Cost*	*Labor Cost*	G&A & Profit	Engineering, Procurement, & Project Services; Construction Management Support	Contingency on Indirect	Total Cost
Drone Inventory Decommisioning	$ -	$ -	$ -	$ 3,224	$ 349	$ 61	$ 12	$ 3,647

Table 3-2 — Decommissioning Cost Estimate Summary by FERC Account for UAVs

	345 - ACCESSORY ELECTRIC EQUIPMENT		I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT		TOTAL PROJECT COST
TOTAL	$ 3,574		$ -	$ 73		$ 3,647

The total cost to decommission 21 existing UAVs and their associated equipment is $3,702; therefore, the average or blended cost is approximately $175 per unit. The actual decommission cost will vary with respect to the amount of associated equipment included with the UAV.

4. BASIS OF ESTIMATE

The basis for the cost estimate is as follows:

The decommissioning cost estimates in Appendix A are for the decommissioning of the SDG&E inventory of UAVs and their related equipment. In general, the UAV equipment can be categorized as UAVs, batteries, control equipment, and other related items.

Detailed engineering has not been performed to firm up the project details. We have assigned allowances where necessary to cover issues that are likely to arise but are not clearly quantified at this time.

4.1 PROCEDURE

In general, the procedure to decommissioning the UAV equipment is as follows:

- The inventory of UAV assets includes drones, drone replacement parts, controllers, Apple iPads, replacement batteries, and other components.
- Batteries will be removed from UAVs.
- Batteries will be collected and sent to "Drones Made Easy" for recycling. There is no charge for disposal.
- All components will be disposed by sending to a landfill or electronics recyclers.
- The process estimates that two workers will decommission the UAV program in one eight-hour work day.

4.1.1 Pricing and Quantities

Quantities were provided by SDG&E in the form of a UAV portfolio database. The database includes the number of UAVs, batteries, controls, iPads, and other related equipment.

S&L visited the SDG&E headquarters and interviewed the UAV program manager, and we reviewed publically available data about the equipment.

A. Labor Wage Rates

- Craft labor wage rates selected for the estimates are based on those published in *RSMeans Prevailing Labor Rates for the Construction Industry*, 2016 edition, for San Diego, CA.
- The labor estimate is based on a 40-hour workweek; no per diem or other labor incentives.

B. Labor Crews

- The craft rates are incorporated into work crews appropriate for the activities by adding allowances for insurance, payment bonds, and site overheads to arrive at the crew rates used in the cost estimate.
- An example of crew rates for demolition of equipment is shown in Table 4-1 below:

Table 4-1 — Example Crew Rates

San Diego, CA		Demo Equipment	
		$/hr	Percentage
Crew Base		$ 32.74	39%
Crew Fringes		$ 19.34	23%
Crew FICA		$ 2.50	3%
Crew SUI		$ 0.42	0%
Crew FUI		$ 0.04	0%
Crew Workers Comp. Ins		$ 7.50	9%
Site OH		$ 21.43	26%
Total		$ 83.97	100%

C. Productivity

- No allowances have been made to cover items such as loss in productivity because of inclement weather conditions.

D. Scrap

- The inventory of UAVs and related components does not contain a large enough quantity of valuable metals to provide a credit for scrap.
- The UAV batteries are not considered scrap and will be disposed by a recycler at no cost.

E. Contractor Costs

- Contractors' general and administrative (G&A) cost is included at 5% of labor and material.
- Contractors' profit is included at 8% of labor and material.

F. Indirect Expenses

- Project indirect expenses are based on percent total direct construction labor only.
- There are no engineering costs included with the estimate, as no engineering work is needed for the decommissioning activities.
- Management is estimated to be 2%. This covers oversight of demolition activities.
- Owner's costs not included.

G Escalation Rates

- Not included.

H. Sales and Use Taxes

- Sales and use taxes not included.

I. Contingency

- A 20% contingency is applied for material, labor, and indirect expenses.

J. Contract Basis for Estimate

- The estimate is based on a multiple lump sum.

K. Assumptions

- SDG&E indicated that UAV batteries can be recycled by the vendor "Drones Made Easy" at no cost.
- All remaining electronic components, including motors, controllers, iPads, and other items will be disposed in a landfill.
- The volume and weight of equipment for disposal does not necessitate special collection or a dumpster. Instead, it will be disposed through regular collection.
- All UAVs, spare parts, and associated components are assumed to have no sale or salvage value.
- All electrical equipment and wiring is de-energized.
- No extraordinary environmental costs for demolition will be needed.
- No resale of equipment or material is included.

LAST PAGE OF SECTION 4.

5. AVERAGE SERVICE LIFE EVALUATION

5.1 DESCRIPTION OF EQUIPMENT

An unmanned aircraft system is typically comprised of a UAV (or drone), a remote control system, and auxiliary equipment, such as cameras. These systems are utilized in a wide range of applications. SDG&E uses UAVs for the inspection and monitoring of transmission lines, interconnection stations, power plants, and other facilities. Generally, the different components of a UAV include:

- Vehicle's body
- Power source (batteries)
- Sensors and actuators
- Software for control
- Camera (high definition [HD] or infrared), light imaging detection ranging (LiDAR) camera, or any addition based on the application
- Replacement parts (if any)

SDG&E employs several UAV models listed in Table 5-1 below. These include:

- DJI Inspire quad-copter UAV with an HD camera for inspection and a battery with minimum capacity of 4,500 mAh integrated.
- IE Mk II UAV with integrated camera.
- Aeryon Sky Ranger vertical take-off and landing quad-copter UAV with a high-resolution integrated camera.
- Pulse Aerospace Vapor55 helicopter UAV with an embedded high-resolution camera.

One important item in SDG&E portfolio is the LiDAR camera. Similar to radar, a LiDAR camera measures the distance to a target by emitting a laser light to a specified target.

Table 5-1 — SDG&E Portfolio of UAV Equipment

Make/Model	Vendor	Purchase Date	Type of Equipment
IE Mk II Gen 2	Physical Science Incorporated	7/1/2013	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE Mk II Gen 2	Physical Science Incorporated	7/1/2013	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries

Make/Model	Vendor	Purchase Date	Type of Equipment
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3	Physical Science Incorporated	10/31/2014	UAV
GSC, batteries and battery charger	Physical Science Incorporated		GCS, batteries
IE MK II Gen 3 Geotagger IR camera	Physical Science Incorporated	6/23/2015	IR Camera payload
IE MK II Gen 3 Multispectural Camera (TETRACAM)	Physical Science Incorporated	6/23/2015	Multispectural Camera payload
IE MK II Gen 3 Line Spooler	Physical Science Incorporated	6/23/2015	Payload to for "pull string"
IE HD CAMERA	Physical Science Incorporated		HD camera
SONY HD CAMERA WITH LIVE VIEW REMOTE KIT	Best Buy		HD Camera
GARMEN	Best Buy		HD Camera
Go-Pro	Best Buy		HD Camera detachable payload
Go Pro Back Bone camera	Backbone		HD Camera
Fat Shark VR1100 goggles	Hobby Lobby		HD Goggles
Aeryon Sky Ranger w/batteries & charger stations	Aeryon Labs Inc.	6/15/2015	UAV and batteries

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Make/Model	Vendor	Purchase Date	Type of Equipment
Aeryon GCS (Microsoft Touchpad)	Aeryon Labs Inc.	6/15/2015	GCS
Aeryon EO Camera	Aeryon Labs Inc.	6/15/2015	HD Camera
Aeryon 30x zoom Camera	Aeryon Labs Inc.	6/15/2015	HD Camera
DJI Spreading Wings S1000 w/batteries, etc.(everything except controllers)	Drones Made Easy	6/4/2015	UAV
FUTABA Controller	Drones Made Easy		GCS
FUTABA Controller	Drones Made Easy		GCS
Sony Camera A7R w/lens	Best Buy	6/4/2015	HD Camera
DJI Inspire w/batteries & charger stations (12 Mpixel camera only, interchangeable with DJI Inspire)	Drones Made Easy	6/4/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
Stock Camera			Camera
DJI Inspire w/batteries & charger stations(12 Mpixel camera only, interchangeable with DJI Inspire)	Drones Made Easy	6/4/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
Stock Camera			Camera
DJI Inspire1 Pro w/batteries & charger stations(interchangeable camera from 12 to 16 Mpixels)	Drones Made Easy	10/29/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
Zenmuse X5			Camera
DJI Inspire1 Pro w/batteries & charger stations(interchangeable camera from 12 to 16 Mpixels)	Drones Made Easy	10/29/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
Zenmuse X5			Camera

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Make/Model	Vendor	Purchase Date	Type of Equipment
DJI Inspire1 Pro w/batteries & charger stations(interchangeable camera from 12 to 16 Mpixels)	Drones Made Easy	10/29/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
Zenmuse X5			Camera
DJI Inspire1 Pro w/batteries & charger stations(interchangeable camera from 12 to 16 Mpixels)	Drones Made Easy	12/21/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
Zenmuse X5			Camera
DJI Inspire1 Pro w/batteries & charger stations(interchangeable camera from 12 to 16 Mpixels)	Drones Made Easy	12/21/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
Zenmuse X5			Camera
DJI Inspire1 Pro-IR camera w/batteries & charger stations(interchangeable camera from 12 to 16 Mpixels)	Drones Made Easy	12/7/2015	UAV
CAMERA CONTROLLER	Drones Made Easy		GCS
PILOT CONTROLLER	Drones Made Easy		GCS
IR Camera			Camera
Pulse Aerospace Inc Vapor 55 w/batteries & charger stations	Pulse AeroSpace Inc.	9/17/2015	UAV
RIEGL VUX-1UAV (LiDAR CAMERA and IMU mounted on the LiDAR camera	Pulse AeroSpace Inc.	9/24/2015	LiDAR Camera
SONY Camera a6000	Pulse Aero		Camera
SONY Camera a6000	Pulse Aero		Camera
SONY Camera a6000 lenses	Pulse Aero		Camera
SONY Camera a6000 lenses	Pulse Aero		Camera
Apple iPad WiFi/Data	Apple Store		Display for DJI UAS

Make/Model	Vendor	Purchase Date	Type of Equipment
Apple iPad WiFi/Data	Apple Store		Display for DJI UAS
Apple iPad with WiFi	Apple Store		Display for DJI UAS
Apple iPad with WiFi	Apple Store		Display for DJI UAS
Apple iPad with WiFi	Apple Store	12/11/2015	Display for DJI UAS
Apple iPad with WiFi	Apple Store	12/11/2015	Display for DJI UAS
Apple iPad with WiFi	Apple Store	12/11/2015	Display for DJI UAS
Apple iPad with WiFi	Apple Store	12/11/2015	Display for DJI UAS
Apple iPad with WiFi	Apple Store	12/11/2015	Display for DJI UAS
Apple iPad with WiFi	Apple Store	12/11/2015	Display for DJI UAS
MacBook Pro	Apple Store		Processing PC
Rotor Craft		2014	UAV
HP Zbook 15 LiDAR PC	CompuCom		Processing PC for LiDAR software
OSMO Handheld unit	Drones Made Easy	6/15/2016	
OSMO Handheld unit camera 12mpix	Drones Made Easy		
OSMO Battery	Drones Made Easy		
OSMO Battery	Drones Made Easy		
OSMO Battery	Drones Made Easy		

5.2 AVERAGE SERVICE LIFE

The UAVs in the SDG&E portfolio have an expected service life of three years. The flight hours and battery life data are tracked and logged by SDG&E. Their maintenance service is completed by the applicable UAV vendor every 200 hours. The batteries are recycled by Drones Made Easy at no cost. The average service life of the UAV battery will differ from the unit as a whole, as several replacement batteries may be needed during a unit's service life. In general, UAVs are expected to be obsolete or fail after three years of use. Human error while piloting drones has been reported to be a major cause of failure, as discussed in the next section.

5.3 BENCHMARKING ANALYSIS

There is no data reported to FERC for UAVs.

Many statistical studies have been performed on the reliability of military UAVs; however, commercial UAVs have not been studied to such an extent. In general, human error and component failure during flight have resulted in the premature end of service life for many UAVs. One article by DfR Solutions indicates that the general aviation failure rate is "about 1 per 100,000 flight hours, while military UAV systems have experienced failure rates of 2 orders of magnitude higher, nearly 1 per 1,000 flight hours."[4] Another study showed that "about 60% of the UAV mishaps involved human factors."[5] While the technical service life of UAVs may be three years or more, it is possible the service life will be cut short due to human factor mishaps and component failures.

5.4 CONCLUSION

In conclusion, UAVs are expected to have an average service life of approximately three years. After that time, the units are expected to fail or become obsolete.

LAST PAGE OF SECTION 5.

6. REFERENCES

1. Sargent & Lundy Proprietary Cost Data Base.
2. RSMeans Cost Data, 2016.
3. Engineering Drawings, Equipment Lists, O&M Records and other information provided by the San Diego Gas & Electric.
4. Caswell, G. and Dodd, E. “Improving Unmanned Aerial Vehicle (UAV) Reliability,” DfR Solutions, www.dfrsolutions.com.
5. Tvaryanas, Major A; Thompson, William; Constable, Stephen, “The U.S. Military Unmanned Aerial Vehicle (UAV) Experience: Evidence-Based Human Systems Integration Lessons Learned,” InStrategies to Maintain Combat Readiness during Extended Deployments – A Human Systems Approach (pp. 5-1 – 5-24). Meeting Proceedings RTO-MP-HFM-124, Paper 5. Neuilly-sur-Seine, France: RTO.

LAST PAGE OF TEXT.

Appendix A

Conceptual Estimate of Cost to Decommission UAVs and Related Equipment

San Diego Gas & Electric
Decommissioning Cost Estimates
UAVs

	Includes Contingency							
	Subcontract Cost	*Scrap Value*	*Material Cost*	*Labor Cost*	G&A & Profit	Engineering, Procurement, & Project Services; Construction Management Support	Contingency on Indirect	Total Cost
Drone Inventory Decommisioning	$ -	$ -	$ -	$ 3,224	$ 349	$ 61	$ 12	$ 3,647

San Diego Gas & Electric
Decommissioning Cost Estimates
UAVs

Number of Drones 22

Area	Group	Phase	Description	Notes	Quantity	Subcontract Cost	Scrap Value	Material Cost	Man Hours	Crew Rate	Labor Cost	Total Cost
	11.00.00		**Demolition**									
		11.41.00	*Electrical Equipment*									
			Remove battery from drones		22 EA				16 /MH	$ 83.97	$ 1,344	$ 1,344
			Sort items to be recycled and sent to landfill		93 EA				16 /MH	$ 83.97	$ 1,344	$ 1,344
			Demolition			***$ -***	***$ -***	***$ -***			***$ 2,687***	***$ 2,687***
	21.00.00		**Civil Work**									
			Civil Work			***$ -***	***$ -***	***$ -***			***$ -***	***$ -***
Direct Costs Subtotal						*$ -*	*$ -*	*$ -*			*$ 2,687*	*$ 2,687*
	91.00.00		**Other Direct & Construction Indirect Costs**									
		91.09	Contractor's General and Administration Expense									$ 134
		91.10	Contractor's Profit									$ 215
												$ 349
Direct Costs + Construction Indirect Costs						*$ -*	*$ -*	*$ -*			*$ 2,687*	*$ 3,036*
	93.00.00		**Indirect Costs**									
		93.1	Engineering, Procurement, & Project Services									$ -
		93.2	Construction Management Support									$ 61
	95.00.00		**Contingency**									
		95.1	Contingency on Subcontractor			$ -						$ -
		95.2	Contingency on Scrap Value				$ -					$ -
		95.3	Contingency on Material					$ -				$ -
		95.4	Contingency on Labor								$ 537	$ 537
		95.5	Contingency on Indirect									$ 12
Total						**$ -**	**$ -**	**$ -**			**$ 3,224**	**$ 3,647**

Appendix B

Conceptual Estimate of Cost — FERC Accounts

San Diego Gas & Electric
Decommissioning Cost Estimates
UAVs

	345 - ACCESSORY ELECTRIC EQUIPMENT		I1 - ENGINEERING, PROCUREMENT, & PROJECT SERVICES	I2 - CONSTRUCTION MANAGEMENT SUPPORT		TOTAL PROJECT COST
TOTAL	$ 3,574		$ -	$ 73		$ 3,647

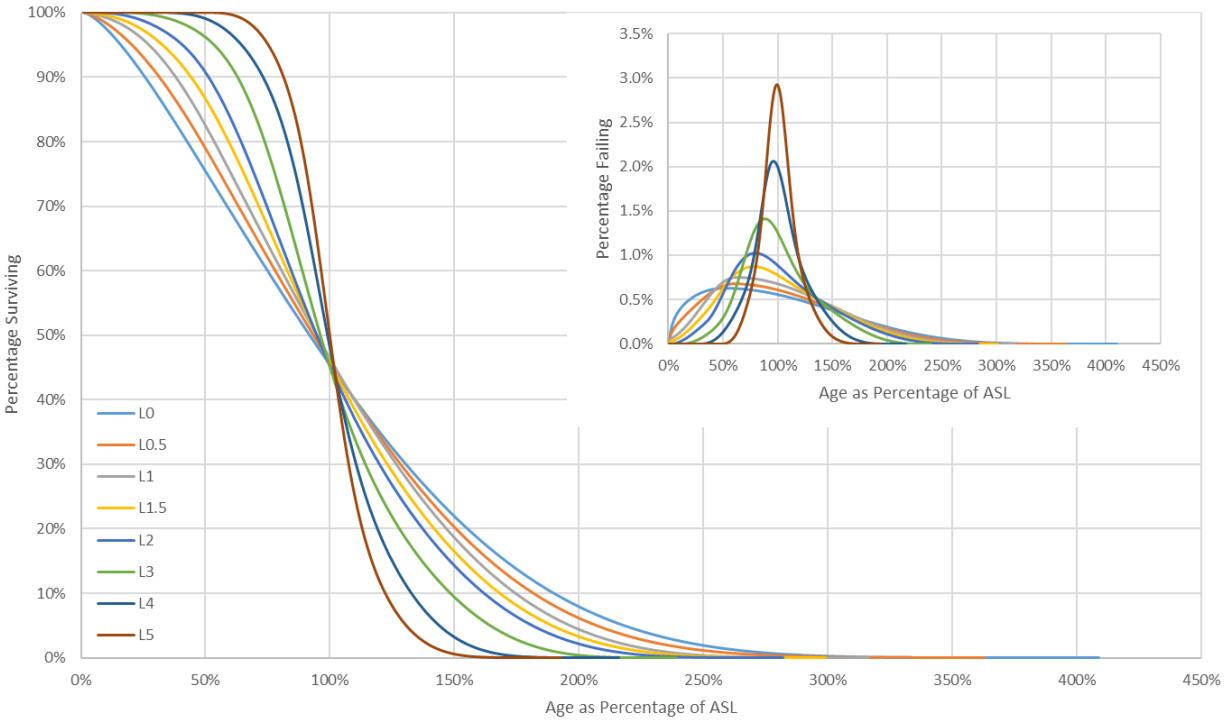
San Diego Gas & Electric
Decommissioning Cost Estimates
UAVs

FERC ACCT.		TOTAL	
345	**ACCESSORY ELECTRIC EQUIPMENT**	$	3,574
I1	**ENGINEERING, PROCUREMENT, & PROJECT SERVICES**	$	-
I2	**CONSTRUCTION MANAGEMENT SUPPORT**	$	73
	TOTAL PROJECT COST FOR 206 EV CHARGING STATIONS	**$**	**3,647**

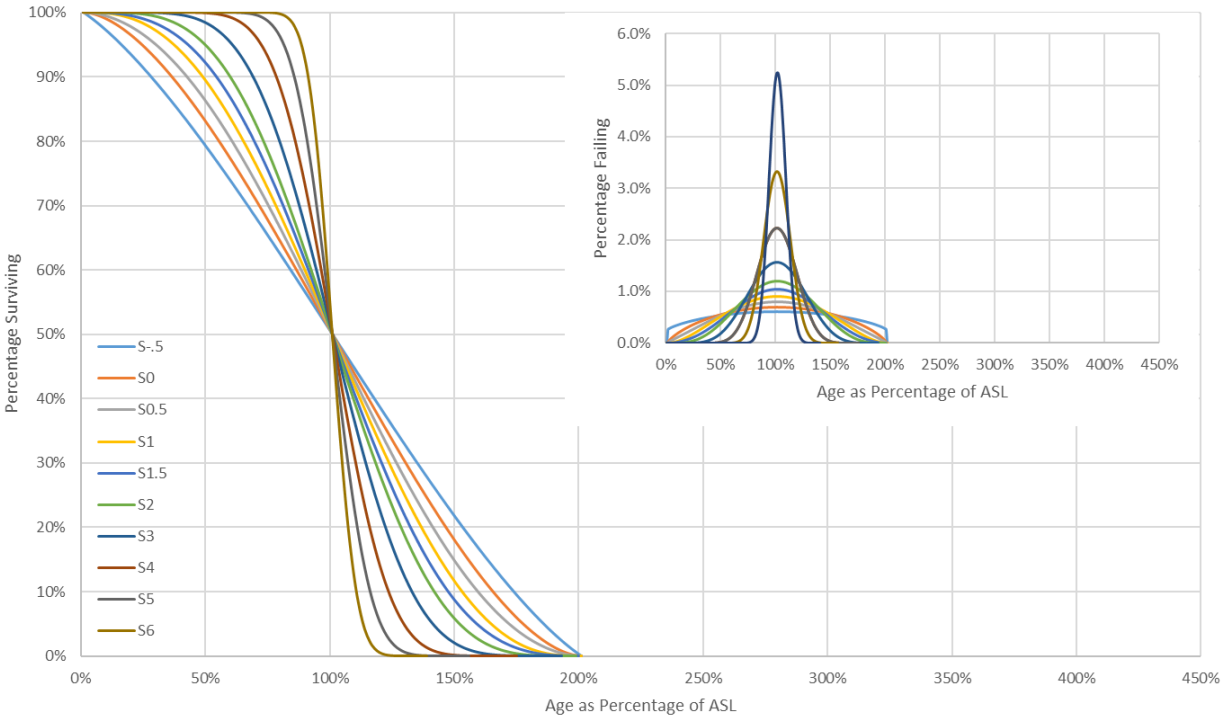
VII. STANDARDIZED SURVIVOR CURVES

This workpaper section summarizes provides a visual summary of the standardized survivor curves.

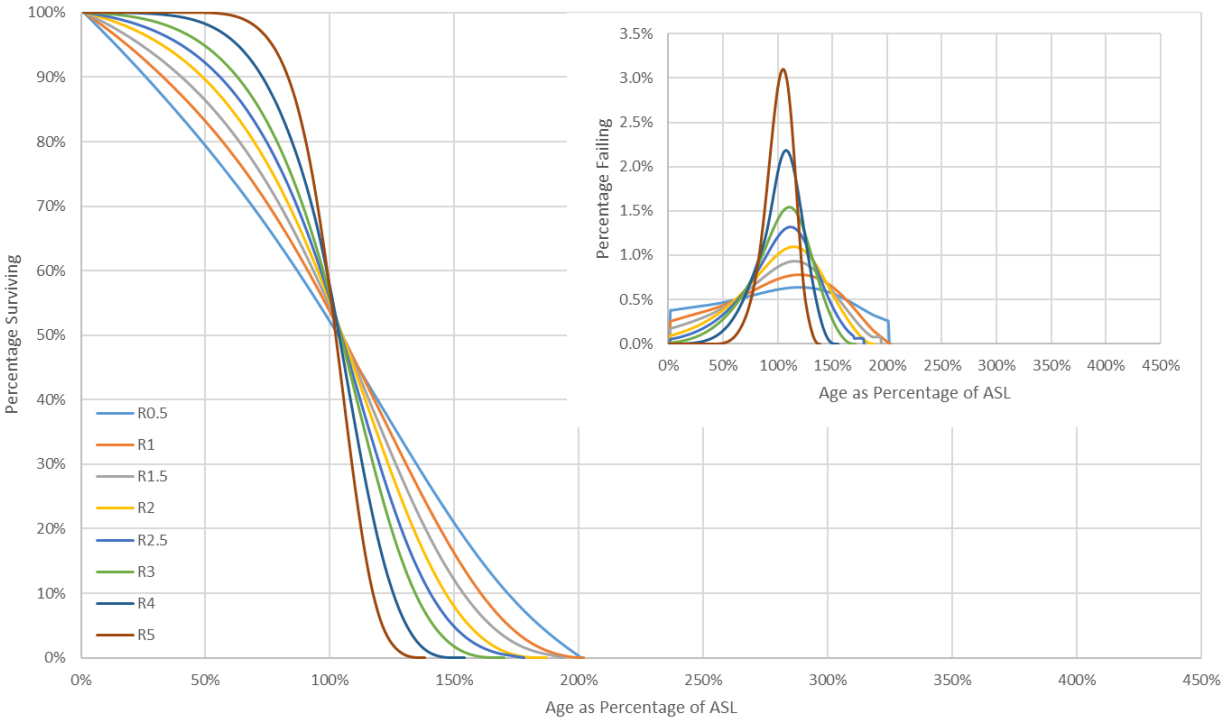
Left-Modal (Iowa L-Type) Survivor Curves



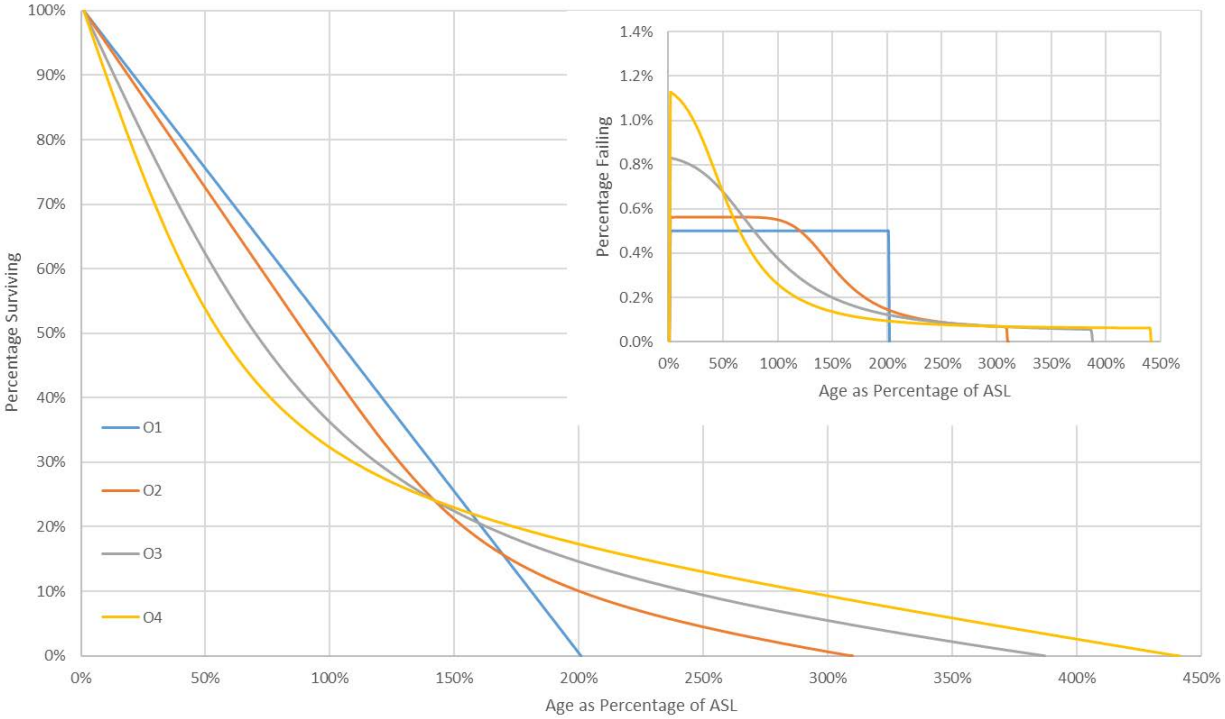
Symmetrical-Modal (Iowa S-Type) Survivor Curves



Right-Modal (Iowa R-Type) Survivor Curves

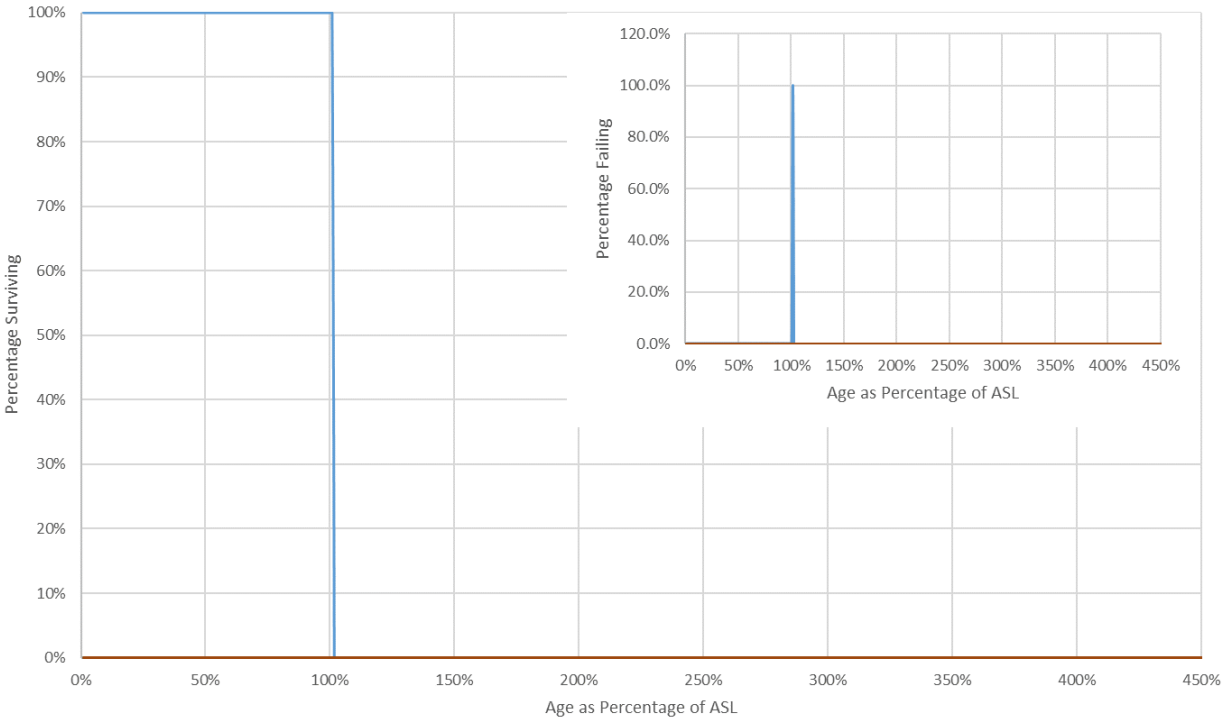


Origin-Modal (Iowa O-Type) Survivor Curves



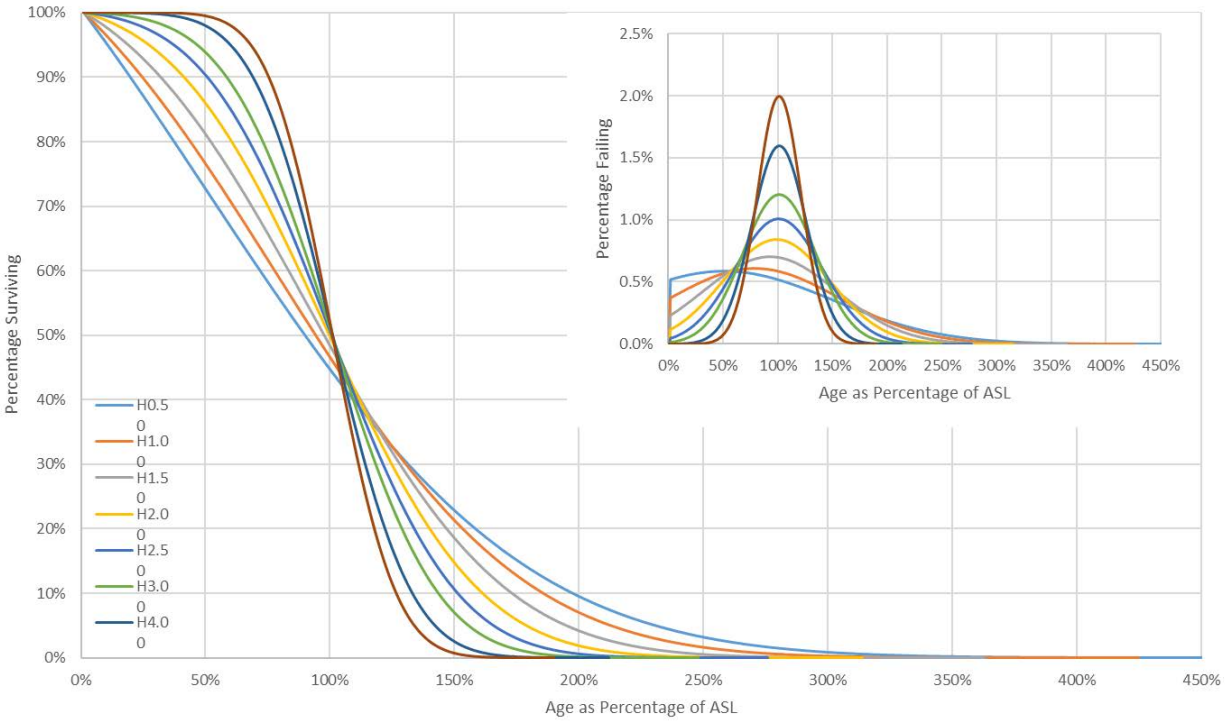
1

Square (Iowa SQ-Type) Survivor Curves



2

Kimball (h-Type) Survivor Curves



Gompertz-Makeham (GM-Type) Mortality Curves