



The Economic Impact of the Regional Renewable Energy Procurement (R-REP) Project

Report presented on September 9, 2013 to the

County of Alameda

By



Valley Economics Associates, Inc.

**P.O. Box 1507
Clovis, CA 93613**

info@valleyeconomicsassociates.com

1. Background

The Regional Renewable Energy Procurement Project (R-REP) is a regional initiative that utilizes a collaborative procurement scheme to purchase renewable energy systems. Currently, a total of 19 public agencies throughout Alameda, Contra Costa, San Mateo and Santa Clara Counties in the State of California are involved. The R-REP Project, which effectively drives down the cost of solar power for public agencies, is comprised of 188 sites developed with renewable energy systems with a total capacity to generate 30 Megawatts (MW).¹ The total construction costs amount to \$121.5 million² while operating and maintenance costs are \$7.4 million.³ The benefits of this innovative approach include: reduced transaction costs and administrative time; competitive contract terms; standardized procurement documents, financing, and process; accelerated financing and deployment; reduction in greenhouse gas emissions; and enhanced local economic activity and job growth.

Alameda County, the lead agency behind the initiative, retained Valley Economics Associates, Inc. (VEA) to conduct an economic impact analysis of the R-REP Project. This report contains such analysis.

2. Purpose, Scope and Methodology

The main goal of this analysis is to assess the economic impact of the R-REP Project on the local economies of Alameda, Contra Costa, San Mateo and Santa Clara Counties. The results of the investigation are also presented by participating agency.

The economic impact attributable to the R-REP Project is linked to at least two key factors:

- 1)** Construction expenditures⁴, which is the amount of money that will be spent to design and build each of the renewable energy systems, as well as the ways and places in which these resources will be spent.
- 2)** Operating and maintenance (O&M) expenditures that running the renewable energy systems will require over time, as well as the ways and places in which these resources will be spent.

It is worth highlighting that the economic impact of construction expenditures will occur only once during the construction phase (temporary short-term impact). In contrast, the economic impact of the operating and maintenance (O&M) expenditures will occur every year during the lifetime of

¹ For additional information on the R-REP Project see:

http://www.jointventure.org/index.php?option=com_content&view=article&id=646&Itemid=565

² This figure includes \$9.1 million in Project Management & Contingency Costs.

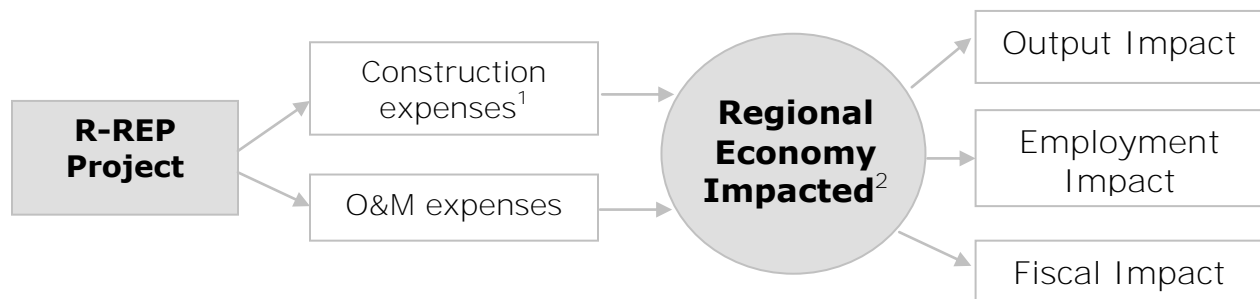
³ This figure represents the upfront cost of operating and maintaining the systems for 25 years.

⁴ Construction expenditures include project management & contingency costs.

the renewable energy systems (medium-long run impact).⁵ The economic impact is measured in three different areas shown below, while Figure 1 illustrates the conceptual framework of the analysis:

- 1) Additional output (business sales).
- 2) Additional employment (jobs created directly and indirectly).
- 3) Additional local and state tax revenue.

Figure 1: Conceptual Framework



NOTES: 1) Construction expenses include project management & contingency costs; 2) The region of impact changes depending on which agency or county is under examination.

The study relies on the use of input-output (IO) models and associated databases, which are techniques for quantifying interactions among firms, industries, and social institutions within a regional economy. IO models are standard techniques that regional economists utilize to conduct economic impact analysis. In particular, the study makes extensive use of IMPLAN, which is a software package produced by the Minnesota IMPLAN Group (MIG), Inc. and used widely around the country.⁶

The total economic impact (also known as the multiplier effect) of building and maintaining renewable energy systems is equal to the sum of three components: the *direct* effect, the *indirect* effect and the *induced* effect. The direct effect is the immediate upshot of construction expenditures as well as maintenance & operation costs. Due to the interactions among firms, industries, and social institutions that naturally occur within the regional economy, the direct effect initiates a series of iterative rounds of income creation, spending and re-spending that result in indirect and induced effects. The indirect effects are changes in production, employment and income that result from the inter-industry purchases triggered by the direct effect. Finally, induced effects arise due to changes in household income and spending patterns caused by direct and indirect effects. Since the total

⁵ The expected lifetime of the systems is 25 years.

⁶ For additional information see: www.implan.com

impact of resources spent within the regional economy is a multiple of the initial expenditures, the total effect of construction expenditures as well as the operation and maintenance costs associated with renewable energy systems is expressed as a multiplier effect representing the sum of direct, indirect and induced effects. Therefore, the total impact of resources spent within the regional economy as estimated by IMPLAN is larger than the initial expenditures.

Increases in economic activity resulting from the multiplier process become smaller with each round due to leakages from the spending stream of the impacted region, as spending on external goods and services do not generate additional local spending. The multiplier process traces the flows of spending and re-spending until expenditures have completely leaked out to other regions. To properly estimate the effects at the regional level, an adjustment known as the *regional purchase coefficient* is implemented within the IMPLAN system.

3. Key Data and Assumptions

Assessing the economic impact of the R-REP Project directly depends on two basic sets of data. First, the IMPLAN data which contain the input-output (IO) table of the economy of each of the 4 counties involved (Alameda, Contra Costa, San Mateo and Santa Clara). Second, data related to construction expenditures, operation & maintenance costs, as well as other related expenditures of each of the 188 sites developed with renewable energy systems. This information was provided by Optony Inc., and Newcomb Anderson McCormick. Table 1 shows the data by county and Table 2 shows the data by agency participating in the R-REP Project.⁷

**Table 1
Total Costs of Renewable Energy Systems Sites by County**

County	Construction Costs ¹	O&M Costs ²	PM, Contingency Costs ³	TOTAL COSTS
Alameda	\$ 87,398,175	\$ 5,885,975	\$ 7,142,535	\$ 100,426,685
Contra Costa	\$ 12,439,028	\$ 769,188	\$ 1,014,813	\$ 14,223,028
San Mateo	\$ 9,428,738	\$ 581,750	\$ 769,192	\$ 10,779,680
Santa Clara	\$ 3,130,150	\$ 183,100	\$ 255,099	\$ 3,568,349
TOTAL ALL COUNTIES	\$ 112,396,091	\$ 7,420,013	\$ 9,181,640	\$ 128,997,743

NOTES: 1) Construction Costs are projections based on \$/watt estimates of \$3.35 - \$4.80, depending on the size and type of system; 2) O&M Costs = Operating and Maintenance Costs; 2) PM, Contingency Costs = Project Management & Contingency Costs for Project Development.

SOURCE: Optony Inc., and Newcomb Anderson McCormick.

⁷ Appendix A contains detailed data by individual site.

**Table 2
Total Costs of Renewable Energy Systems Sites by Agency**

Agency	Construction Costs ¹	O&M Costs ²	PM, Contingency Costs ³	TOTAL COSTS
Alameda County Fire Dept.	\$ 763,175	\$ 42,875	\$ 62,152	\$ 868,202
Castro Valley Sanitary Dist.	\$ 88,800	\$ 4,625	\$ 7,222	\$ 100,647
Central Contra Costa Sanitary Dist.	\$ 975,600	\$ 54,250	\$ 79,437	\$ 1,109,287
City of Berkeley	\$ 2,148,590	\$ 122,725	\$ 175,029	\$ 2,446,344
City of Cupertino	\$ 1,489,150	\$ 88,750	\$ 121,404	\$ 1,699,304
City of Emeryville	\$ 411,625	\$ 23,125	\$ 33,522	\$ 468,272
City of Foster City	\$ 913,500	\$ 55,500	\$ 74,501	\$ 1,043,501
City of Fremont	\$ 6,773,710	\$ 429,000	\$ 552,879	\$ 7,755,589
City of Menlo Park	\$ 2,108,798	\$ 124,250	\$ 171,885	\$ 2,404,933
City of Mountain View	\$ 1,641,000	\$ 94,350	\$ 133,695	\$ 1,869,045
City of Oakland	\$ 22,377,060	\$ 1,414,300	\$ 1,826,371	\$ 25,617,731
City of Redwood City	\$ 752,515	\$ 45,875	\$ 61,376	\$ 859,766
City of Richmond	\$ 3,242,383	\$ 202,213	\$ 264,567	\$ 3,709,162
City of Walnut Creek	\$ 2,491,845	\$ 148,725	\$ 203,155	\$ 2,843,725
County of Alameda	\$ 47,115,040	\$ 3,376,500	\$ 3,855,642	\$ 54,347,182
County of Contra Costa	\$ 5,729,200	\$ 364,000	\$ 467,654	\$ 6,560,854
County of San Mateo	\$ 5,653,925	\$ 356,125	\$ 461,431	\$ 6,471,481
Hayward Area Recreation & Park District (HARD)	\$ 1,894,800	\$ 108,250	\$ 154,355	\$ 2,157,405
UC Berkeley	\$ 5,825,375	\$ 364,575	\$ 475,363	\$ 6,665,313
TOTAL ALL AGENCIES	\$ 112,396,091	\$ 7,420,013	\$ 9,181,640	\$ 128,997,743

NOTES: 1) Construction Costs are projections based on \$/watt estimates of \$3.35 - \$4.80, depending on the size and type of system; 2) O&M Costs = Operating and Maintenance Costs; 2) PM, Contingency Costs = Project Management & Contingency Costs for Project Development.

SOURCE: Optony Inc., and Newcomb Anderson McCormick.

In order to accurately assess the economic impact of the R-REP Project, the following considerations are necessary. First, a significant amount of construction materials required for the solar energy projects are manufactured overseas. This means that a substantial amount of construction expenses will take place outside the county, which represents a leakage of income. Thus, those expenses produce no economic impact on the county's local economy. Similarly, it is reasonable to assume that some labor expenses will also take place outside the county and thus have no local economic impact. Therefore, it is conservatively assumed that only 60% of the total construction costs will be spent within the county's economy producing a measurable economic impact. It is also assumed that all construction sites will take less than a year to be completed and that all constructions sites will be completed the same year. Second, the upfront

costs of operating and maintaining the systems for 25 years needs to be converted into annual costs since the economic impact is calculated on a yearly basis. In other words, rather than a lump sum amount, it is necessary to calculate an annual payment option. Assuming a 3% annual increase, which is the typical annual escalation clause that vendors offer buyers that **don't pick the upfront lump sum option, the average annual payment is \$621,000.**⁸ It is assumed that all expenses of operating and maintaining the systems for 25 years will take place within the local economy.

4. The Annual Economic Impact

The annual economic impact of spending \$128.9 million in renewable energy systems is shown in Table 3 which presents the estimates by agency. It is worth highlighting some important aspects of these figures in order to facilitate their interpretation. First, as explained earlier, the impact of construction costs is only temporary. This means that since the construction of renewable energy systems will take a year or less, the employment, output and fiscal impacts shown will last exactly the same amount of time: a year or less. In other words, although the renewable energy systems will have a lifetime of 25 years, the economic impact of construction only takes place during the building phase and fades away as soon as the systems are completed. In contrast, although the impact of O&M costs is significantly smaller than the construction costs, it is not temporary. Instead, this annual impact will last 25 years which is the expected lifetime of the systems. Second, the **employment** impact measures the total number of newly created or supported jobs in the county in which the agency is located and includes full-time, part time, and temporary positions. The employment impact of construction shown in the table will last a year or less (the amount of time that building the systems will take), while the employment impact of O&M costs will last the lifetime of the systems (25 years). **Output** measures the total sales of businesses in the county in which the agency is located. **Fiscal** is the additional tax revenue collected by local and state governments. IMPLAN does not separate local from state tax revenue, but the following distribution can be used to identify the source. Personal income tax: 30%; Sales tax: 23%; Property tax: 24%; other taxes (corporate profit tax, motor vehicle licenses, social insurance tax, etc.): 23%.

Finally, Table 4 presents the annual economic impact by county, which results from aggregating the individual economic impact of each agency in their respective counties. Evidently, the bulk of the economic impact will take place in Alameda County, which is also the county that will bear most of the constructions and O&M costs.

⁸ This amount is the result of dividing the sum of the escalated annual payments by 25 years. The first annual payment is calculated to be \$426,115. Assuming a 3% interest rate, the sum of the present value of this annual payment amount for 25 years equals the lump sum figure of \$7,420,013.

**Table 3
Annual Economic Impact by Agency**

Agency	Employment		Output		Fiscal	
	Impact ¹		Impact ²		Impact ³	
	Construction	O&M	Construction	O&M	Construction	O&M
Alameda County Fire Dept.	5.8	0.0	\$ 788,043	\$ 3,957	\$ 37,787	\$ 193
Castro Valley Sanitary Dist.	0.7	0.0	\$ 91,693	\$ 427	\$ 4,397	\$ 21
Central Contra Costa Sanitary Dist.	7.2	0.0	\$ 995,837	\$ 5,000	\$ 45,955	\$ 233
City of Berkeley	16.4	0.1	\$ 2,218,600	\$ 11,328	\$ 106,382	\$ 552
City of Cupertino	9.7	0.0	\$ 1,368,805	\$ 7,253	\$ 56,612	\$ 303
City of Emeryville	3.1	0.0	\$ 425,038	\$ 2,134	\$ 20,381	\$ 104
City of Foster City	5.8	0.0	\$ 830,349	\$ 4,516	\$ 37,416	\$ 206
City of Fremont	51.8	0.3	\$ 6,994,427	\$ 39,597	\$ 335,382	\$ 1,928
City of Menlo Park	13.4	0.1	\$ 1,916,845	\$ 10,110	\$ 86,374	\$ 462
City of Mountain View	10.6	0.1	\$ 1,508,383	\$ 7,711	\$ 62,384	\$ 323
City of Oakland	171.0	1.0	\$ 23,106,201	\$ 130,541	\$ 1,107,941	\$ 6,356
City of Redwood City	4.8	0.0	\$ 684,017	\$ 3,733	\$ 30,822	\$ 170
City of Richmond	23.9	0.1	\$ 3,309,640	\$ 18,639	\$ 152,732	\$ 867
City of Walnut Creek	18.3	0.1	\$ 2,543,534	\$ 13,709	\$ 117,378	\$ 638
County of Alameda	360.1	2.4	\$ 48,650,251	\$ 311,653	\$ 2,332,776	\$ 15,174
County of Contra Costa	42.1	0.2	\$ 5,848,043	\$ 33,551	\$ 269,872	\$ 1,561
County of San Mateo	35.8	0.2	\$ 5,139,278	\$ 28,978	\$ 231,579	\$ 1,323
Hayward Area Recreation & Park District (HARD)	14.5	0.1	\$ 1,956,541	\$ 9,992	\$ 93,816	\$ 486
UC Berkeley	44.5	0.3	\$ 6,015,191	\$ 33,650	\$ 288,428	\$ 1,638
TOTAL	839.5	5.1	\$114,390,715	\$ 676,479	\$ 5,418,413	\$ 32,537

NOTES: 1) Employment represents newly created or supported which include full-time, part time, and temporary positions; 2) Output constitutes additional business sales; 3) Fiscal constitutes the additional tax revenue at the state and local levels.

**Table 4
Annual Economic Impact by County**

County	Employment		Output		Fiscal	
	Impact ¹		Impact ²		Impact ³	
	Construction	O&M	Construction	O&M	Construction	O&M
Alameda	668.0	4.2	\$ 90,245,984	\$ 543,279	\$ 4,327,289	\$ 26,451
Contra Costa	91.5	0.5	\$ 12,697,054	\$ 70,899	\$ 585,937	\$ 3,298
San Mateo	59.7	0.3	\$ 8,570,489	\$ 47,337	\$ 386,191	\$ 2,162
Santa Clara	20.3	0.1	\$ 2,877,188	\$ 14,964	\$ 118,996	\$ 626
TOTAL	839.5	5.1	\$114,390,715	\$ 676,479	\$ 5,418,413	\$ 32,537

NOTES: 1) Employment represents newly created or supported which include full-time, part time, and temporary positions; 2) Output constitutes additional business sales; 3) Fiscal constitutes the additional tax revenue at the state and local levels.

APPENDIX A: Sites of Renewable Energy Systems: Location and Total Costs

Site #	County	Construction Costs	O&M Costs	PM, Contingency Costs	TOTAL COSTS
1	Alameda	\$ 730,050	\$ 42,750	\$ 59,498	\$ 832,298
2	Alameda	\$ 510,300	\$ 31,500	\$ 41,630	\$ 583,430
3	Alameda	\$ 352,350	\$ 21,750	\$ 28,745	\$ 402,845
4	Alameda	\$ 293,625	\$ 16,875	\$ 23,922	\$ 334,422
6	Alameda	\$ 720,900	\$ 44,500	\$ 58,811	\$ 824,211
8	Alameda	\$ 192,000	\$ 10,000	\$ 15,616	\$ 217,616
9	Alameda	\$ 102,350	\$ 5,750	\$ 8,335	\$ 116,435
9	Alameda	\$ 13,316,250	\$ 993,750	\$ 1,090,740	\$ 15,400,740
10	Alameda	\$ 730,050	\$ 42,750	\$ 59,498	\$ 832,298
11	Alameda	\$ 786,385	\$ 46,675	\$ 64,106	\$ 897,166
12	Alameda	\$ 544,180	\$ 32,200	\$ 44,359	\$ 620,739
13	Alameda	\$ 1,324,600	\$ 89,500	\$ 108,259	\$ 1,522,359
14	Alameda	\$ 530,550	\$ 32,750	\$ 43,282	\$ 606,582
15	Alameda	\$ 7,090,350	\$ 497,750	\$ 579,970	\$ 8,168,070
16	Alameda	\$ 2,154,050	\$ 160,750	\$ 176,439	\$ 2,491,239
17	Contra Costa	\$ 444,050	\$ 26,750	\$ 36,209	\$ 507,009
18	Contra Costa	\$ 937,900	\$ 56,500	\$ 76,478	\$ 1,070,878
19	Contra Costa	\$ 169,920	\$ 8,850	\$ 13,820	\$ 192,590
20	Contra Costa	\$ 605,900	\$ 36,500	\$ 49,406	\$ 691,806
21	Contra Costa	\$ 334,075	\$ 20,125	\$ 27,241	\$ 381,441
23	Alameda	\$ 153,525	\$ 8,625	\$ 12,503	\$ 174,653
24	Alameda	\$ 191,350	\$ 10,750	\$ 15,583	\$ 217,683
25	Alameda	\$ 88,800	\$ 4,625	\$ 7,222	\$ 100,647
26	San Mateo	\$ 752,515	\$ 45,875	\$ 61,376	\$ 859,766
27	San Mateo	\$ 235,200	\$ 12,250	\$ 19,130	\$ 266,580
28	San Mateo	\$ 680,360	\$ 41,500	\$ 55,491	\$ 777,351
29	San Mateo	\$ 93,450	\$ 5,250	\$ 7,610	\$ 106,310
30	San Mateo	\$ 427,450	\$ 25,750	\$ 34,855	\$ 488,055
31	San Mateo	\$ 672,338	\$ 39,500	\$ 54,798	\$ 766,636
32a	Alameda	\$ 2,221,200	\$ 154,250	\$ 181,645	\$ 2,557,095
32b	Alameda	\$ 71,200	\$ 4,000	\$ 5,798	\$ 80,998
32c	Alameda	\$ 904,700	\$ 54,500	\$ 73,771	\$ 1,032,971
32d	Alameda	\$ 452,350	\$ 27,250	\$ 36,886	\$ 516,486
33	Alameda	\$ 1,725,960	\$ 105,000	\$ 140,765	\$ 1,971,725
34	Alameda	\$ 369,100	\$ 22,000	\$ 30,091	\$ 421,191
35	Alameda	\$ 1,029,200	\$ 62,000	\$ 83,923	\$ 1,175,123
36	Contra Costa	\$ 153,600	\$ 8,000	\$ 12,493	\$ 174,093
37	Contra Costa	\$ 682,800	\$ 39,000	\$ 55,622	\$ 777,422
38	Contra Costa	\$ 139,200	\$ 7,250	\$ 11,322	\$ 157,772
39	Alameda	\$ 169,100	\$ 9,500	\$ 13,771	\$ 192,371
40	Alameda	\$ 302,400	\$ 15,750	\$ 24,595	\$ 342,745
41	Alameda	\$ 129,600	\$ 6,750	\$ 10,541	\$ 146,891
42	Alameda	\$ 1,087,300	\$ 65,500	\$ 88,661	\$ 1,241,461
43	Alameda	\$ 206,400	\$ 10,750	\$ 16,787	\$ 233,937
44	Santa Clara	\$ 182,400	\$ 9,500	\$ 14,835	\$ 206,735
45	Santa Clara	\$ 574,850	\$ 34,250	\$ 46,865	\$ 655,965
46	Santa Clara	\$ 201,540	\$ 11,500	\$ 16,418	\$ 229,458
47	San Mateo	\$ 983,550	\$ 59,250	\$ 80,201	\$ 1,123,001
48	San Mateo	\$ 453,600	\$ 28,000	\$ 37,005	\$ 518,605
49	San Mateo	\$ 682,425	\$ 42,125	\$ 55,672	\$ 780,222
50	San Mateo	\$ 3,534,350	\$ 226,750	\$ 288,553	\$ 4,049,653
53	Alameda	\$ 187,020	\$ 10,600	\$ 15,233	\$ 212,853
54	Alameda	\$ 455,720	\$ 26,900	\$ 37,146	\$ 519,766
55	Alameda	\$ 151,300	\$ 8,500	\$ 12,322	\$ 172,122
57	Alameda	\$ 284,590	\$ 15,650	\$ 23,168	\$ 323,408
58	Alameda	\$ 375,575	\$ 22,625	\$ 30,625	\$ 428,825
59	Alameda	\$ 57,850	\$ 3,250	\$ 4,711	\$ 65,811
60	Alameda	\$ 136,800	\$ 7,125	\$ 11,126	\$ 155,051
61	Alameda	\$ 222,500	\$ 12,500	\$ 18,120	\$ 253,120
62	Alameda	\$ 84,995	\$ 4,775	\$ 6,922	\$ 96,692
63	Alameda	\$ 31,150	\$ 1,750	\$ 2,537	\$ 35,437

Appendix A: Sites of Renewable Energy Systems: Location and Total Costs (cont.)

Site #	County	Construction Costs	O&M Costs	PM, Contingency Costs	TOTAL COSTS
64	Alameda	\$ 35,600	\$ 2,000	\$ 2,899	\$ 40,499
65	Alameda	\$ 73,870	\$ 4,150	\$ 6,016	\$ 84,036
66	Alameda	\$ 84,550	\$ 4,750	\$ 6,886	\$ 96,186
67	Alameda	\$ 124,600	\$ 7,000	\$ 10,147	\$ 141,747
68	Alameda	\$ 160,200	\$ 9,000	\$ 13,046	\$ 182,246
69	Alameda	\$ 785,700	\$ 48,500	\$ 64,098	\$ 898,298
70	Alameda	\$ 106,800	\$ 6,000	\$ 8,698	\$ 121,498
71	Alameda	\$ 75,650	\$ 4,250	\$ 6,161	\$ 86,061
72	Alameda	\$ 111,250	\$ 6,250	\$ 9,060	\$ 126,560
73	Alameda	\$ 93,450	\$ 5,250	\$ 7,610	\$ 106,310
74	Alameda	\$ 50,285	\$ 2,825	\$ 4,095	\$ 57,205
75	Alameda	\$ 117,035	\$ 6,575	\$ 9,531	\$ 133,141
76	Alameda	\$ 1,016,750	\$ 61,250	\$ 82,908	\$ 1,160,908
77	Alameda	\$ 204,700	\$ 11,500	\$ 16,670	\$ 232,870
78	Alameda	\$ 222,500	\$ 12,500	\$ 18,120	\$ 253,120
79	San Mateo	\$ 913,500	\$ 55,500	\$ 74,501	\$ 1,043,501
80	Santa Clara	\$ 1,032,650	\$ 61,250	\$ 84,180	\$ 1,178,080
81	Santa Clara	\$ 456,500	\$ 27,500	\$ 37,224	\$ 521,224
82	Contra Costa	\$ 1,874,750	\$ 124,500	\$ 153,167	\$ 2,152,417
83	Contra Costa	\$ 531,200	\$ 32,000	\$ 43,315	\$ 606,515
84	Contra Costa	\$ 110,400	\$ 5,750	\$ 8,979	\$ 125,129
85	Contra Costa	\$ 153,748	\$ 8,638	\$ 12,521	\$ 174,906
86	Contra Costa	\$ 161,535	\$ 9,075	\$ 13,155	\$ 183,765
87	Contra Costa	\$ 146,850	\$ 8,250	\$ 11,959	\$ 167,059
88	Contra Costa	\$ 86,400	\$ 4,500	\$ 7,027	\$ 97,927
89	Contra Costa	\$ 177,500	\$ 9,500	\$ 14,443	\$ 201,443
90	Alameda	\$ 498,110	\$ 26,625	\$ 40,530	\$ 565,265
91	Alameda	\$ 2,057,200	\$ 139,000	\$ 168,134	\$ 2,364,334
92	Alameda	\$ 235,850	\$ 13,250	\$ 19,207	\$ 268,307
93	Alameda	\$ 931,500	\$ 57,500	\$ 75,992	\$ 1,064,992
94	Alameda	\$ 453,600	\$ 28,000	\$ 37,005	\$ 518,605
95	Alameda	\$ 797,850	\$ 49,250	\$ 65,089	\$ 912,189
96	Alameda	\$ 547,515	\$ 32,200	\$ 44,626	\$ 624,341
97	Alameda	\$ 302,600	\$ 17,000	\$ 24,643	\$ 344,243
98	Alameda	\$ 153,525	\$ 8,625	\$ 12,503	\$ 174,653
99	Alameda	\$ 53,400	\$ 3,000	\$ 4,349	\$ 60,749
100	Alameda	\$ 51,175	\$ 2,875	\$ 4,168	\$ 58,218
101	Alameda	\$ 75,650	\$ 4,250	\$ 6,161	\$ 86,061
102	Alameda	\$ 48,950	\$ 2,750	\$ 3,986	\$ 55,686
103	Alameda	\$ 77,875	\$ 4,375	\$ 6,342	\$ 88,592
104	Alameda	\$ 170,435	\$ 9,575	\$ 13,880	\$ 193,890
105	Alameda	\$ 102,350	\$ 5,750	\$ 8,335	\$ 116,435
106	Alameda	\$ 226,950	\$ 12,750	\$ 18,482	\$ 258,182
109	Alameda	\$ 66,750	\$ 3,750	\$ 5,436	\$ 75,936
110	Santa Clara	\$ 244,800	\$ 12,750	\$ 19,910	\$ 277,460
111	Santa Clara	\$ 437,410	\$ 26,350	\$ 35,667	\$ 499,427
112	Alameda	\$ 17,800	\$ 1,000	\$ 1,450	\$ 20,250
113	Alameda	\$ 33,820	\$ 1,900	\$ 2,754	\$ 38,474
114	Alameda	\$ 97,010	\$ 5,450	\$ 7,900	\$ 110,360
115	Alameda	\$ 36,490	\$ 2,050	\$ 2,972	\$ 41,512
116	Alameda	\$ 38,270	\$ 2,150	\$ 3,117	\$ 43,537
117	Alameda	\$ 46,280	\$ 2,600	\$ 3,769	\$ 52,649
118	Alameda	\$ 28,480	\$ 1,600	\$ 2,319	\$ 32,399
119	Alameda	\$ 64,525	\$ 3,625	\$ 5,255	\$ 73,405
120	Alameda	\$ 40,940	\$ 2,300	\$ 3,334	\$ 46,574
121	Alameda	\$ 57,850	\$ 3,250	\$ 4,711	\$ 65,811
122	Alameda	\$ 263,885	\$ 14,825	\$ 21,490	\$ 300,200
123	Alameda	\$ 344,655	\$ 21,275	\$ 28,117	\$ 394,047
124	Alameda	\$ 1,966,680	\$ 136,575	\$ 160,831	\$ 2,264,086
125	Alameda	\$ 84,550	\$ 4,750	\$ 6,886	\$ 96,186
126	Alameda	\$ 60,965	\$ 3,425	\$ 4,965	\$ 69,355

Appendix A: Sites of Renewable Energy Systems: Location and Total Costs (cont.)

Site #	County	Construction Costs	O&M Costs	PM, Contingency Costs	TOTAL COSTS
127	Alameda	\$ 148,185	\$ 8,325	\$ 12,068	\$ 168,578
128	Alameda	\$ 8,170,560	\$ 567,400	\$ 668,170	\$ 9,406,130
129	Alameda	\$ 89,890	\$ 5,050	\$ 7,320	\$ 102,260
130	Alameda	\$ 260,325	\$ 14,625	\$ 21,200	\$ 296,150
131	Alameda	\$ 282,130	\$ 15,850	\$ 22,976	\$ 320,956
132	Alameda	\$ 42,275	\$ 2,375	\$ 3,443	\$ 48,093
133	Alameda	\$ 72,535	\$ 4,075	\$ 5,907	\$ 82,517
134	Alameda	\$ 105,465	\$ 5,925	\$ 8,589	\$ 119,979
135	Alameda	\$ 96,120	\$ 5,400	\$ 7,828	\$ 109,348
136	Alameda	\$ 102,795	\$ 5,775	\$ 8,371	\$ 116,941
137	Alameda	\$ 75,205	\$ 4,225	\$ 6,125	\$ 85,555
138	Alameda	\$ 130,385	\$ 7,325	\$ 10,618	\$ 148,328
139	Alameda	\$ 235,405	\$ 13,225	\$ 19,171	\$ 267,801
140	Alameda	\$ 109,025	\$ 6,125	\$ 8,879	\$ 124,029
141	Alameda	\$ 96,565	\$ 5,425	\$ 7,864	\$ 109,854
142	Alameda	\$ 130,385	\$ 7,325	\$ 10,618	\$ 148,328
143	Alameda	\$ 211,375	\$ 11,875	\$ 17,214	\$ 240,464
144	Alameda	\$ 51,175	\$ 2,875	\$ 4,168	\$ 58,218
145	Alameda	\$ 15,130	\$ 850	\$ 1,232	\$ 17,212
146	Alameda	\$ 243,860	\$ 13,700	\$ 19,860	\$ 277,420
147	Alameda	\$ 943,650	\$ 58,250	\$ 76,983	\$ 1,078,883
148	Alameda	\$ 65,415	\$ 3,675	\$ 5,327	\$ 74,417
149	Alameda	\$ 129,940	\$ 7,300	\$ 10,582	\$ 147,822
150	Alameda	\$ 66,750	\$ 3,750	\$ 5,436	\$ 75,936
151	Alameda	\$ 64,970	\$ 3,650	\$ 5,291	\$ 73,911
152	Alameda	\$ 137,060	\$ 7,700	\$ 11,162	\$ 155,922
153	Alameda	\$ 200,695	\$ 11,275	\$ 16,344	\$ 228,314
154	Alameda	\$ 95,675	\$ 5,375	\$ 7,792	\$ 108,842
155	Alameda	\$ 20,470	\$ 1,150	\$ 1,667	\$ 23,287
156	Alameda	\$ 55,625	\$ 3,125	\$ 4,530	\$ 63,280
157	Alameda	\$ 539,460	\$ 33,300	\$ 44,009	\$ 616,769
158	Alameda	\$ 240,745	\$ 13,525	\$ 19,606	\$ 273,876
159	Alameda	\$ 97,900	\$ 5,500	\$ 7,973	\$ 111,373
160	Alameda	\$ 75,205	\$ 4,225	\$ 6,125	\$ 85,555
161	Alameda	\$ 25,365	\$ 1,425	\$ 2,066	\$ 28,856
162	Alameda	\$ 77,430	\$ 4,350	\$ 6,306	\$ 88,086
163	Alameda	\$ 515,565	\$ 31,825	\$ 42,060	\$ 589,450
164	Alameda	\$ 105,910	\$ 5,950	\$ 8,625	\$ 120,485
165	Alameda	\$ 82,770	\$ 4,650	\$ 6,741	\$ 94,161
166	Alameda	\$ 74,760	\$ 4,200	\$ 6,088	\$ 85,048
167	Alameda	\$ 106,355	\$ 5,975	\$ 8,661	\$ 120,991
168	Alameda	\$ 408,645	\$ 25,225	\$ 33,337	\$ 467,207
169	Alameda	\$ 283,910	\$ 15,950	\$ 23,121	\$ 322,981
170	Alameda	\$ 250,535	\$ 14,075	\$ 20,403	\$ 285,013
171	Alameda	\$ 21,600	\$ 1,125	\$ 1,757	\$ 24,482
172	Alameda	\$ 12,480	\$ 650	\$ 1,015	\$ 14,145
173	Alameda	\$ 98,880	\$ 5,150	\$ 8,042	\$ 112,072
174	Alameda	\$ 7,200	\$ 375	\$ 586	\$ 8,161
175	Alameda	\$ 18,720	\$ 975	\$ 1,523	\$ 21,218
176	Alameda	\$ 81,120	\$ 4,225	\$ 6,598	\$ 91,943
177	Alameda	\$ 19,680	\$ 1,025	\$ 1,601	\$ 22,306
178	Contra Costa	\$ 632,950	\$ 37,750	\$ 51,602	\$ 722,302
179	Contra Costa	\$ 1,424,500	\$ 96,250	\$ 116,424	\$ 1,637,174
180	Contra Costa	\$ 348,600	\$ 21,000	\$ 28,426	\$ 398,026
181	Contra Costa	\$ 1,166,150	\$ 70,250	\$ 95,090	\$ 1,331,490
182	Contra Costa	\$ 954,500	\$ 57,500	\$ 77,832	\$ 1,089,832
183	Contra Costa	\$ 1,202,500	\$ 81,250	\$ 98,280	\$ 1,382,030
184	Alameda	\$ 597,600	\$ 36,000	\$ 48,730	\$ 682,330
185	Alameda	\$ 389,450	\$ 21,250	\$ 31,700	\$ 442,400
186	Alameda	\$ 303,750	\$ 18,750	\$ 24,780	\$ 347,280
188	Alameda	\$ 16,750,000	\$ 1,250,000	\$ 1,372,000	\$ 19,372,000
	ALL SITES	\$ 112,396,091	\$ 7,420,013	\$ 9,181,640	\$ 128,997,743



Contact Information:

Valley Economics Associates, Inc.
P.O. Box 1507
Clovis, CA 93613
(559) 862-5951
info@valleyeconomicsassociates.com

www.valleyeconomicsassociates.com

VEA is a think tank and consulting company located in California, providing businesses, professional organizations, governments and individuals with the understanding of their economic environment and the application of economic tools needed to make confident and sound decisions about tactics, strategy and policy. VEA also offers independent litigation support services, including forensic economic and valuation analyses. We provide expert witness services to assist clients at the evaluation, settlement, and adjudication stages of a dispute.

VEA consists of two PhD economists that serve on the economics faculty at California State University, Fresno and Tennessee Tech University. This means that your project is handled exclusively by qualified experts. Our clients value our ability to apply and communicate state-of-the-art approaches clearly and convincingly, our commitment to deliver unbiased findings and our reputation for quality and integrity. We focus on client needs while conducting analyses based on rigorous, independent research. In addition, we offer all these services in English and Spanish.

VEA's economists have over fifteen years of relevant experience in economic and public finance analysis. Our work has appeared in leading economic, legal and public policy journals and we have provided research, analysis and testimony for a wide variety of clients, including large and small government entities, research foundations, private companies, law firms and law schools.

Dr. Antonio Avalos – Primary Contact

Dr. Antonio Avalos specializes in economic development, regional economics, international economics and economic and demographic forecasting. He holds a Ph.D. in Economics from Oklahoma State University. In the past, Dr. Avalos has worked as Herman Kahn Fellow at the Hudson Institute in Indianapolis, and later as an external consultant for the institute, conducting research on regional economics and workforce issues. He also was a visiting scholar at the Andean Corporation of Development in Caracas, Venezuela, where he conducted applied research in international trade, economic development and labor markets in Latin American economies.

Dr. Avalos has an extensive research and publication record in economic and fiscal impact analysis, as well as public policy analysis. In the recent past, Dr. Avalos has also investigated the dynamics of labor markets and migration in the Central Valley of California. Over the last few years, Dr. Avalos has participated and presented research at an assorted list of regional, national and international conferences, including countries such as Chile, Argentina, Nicaragua, China, and others. Currently, he is an associate professor of economics at California State University, Fresno.

Dr. Sean Alley

Dr. Sean Alley specializes in law, regional economics, environmental and natural resource economics and public finance. He holds a Ph.D. in Economics from Colorado State University and a J.D., *magna cum laude*, from the George Mason University School of Law. Dr. Alley has worked as a research fellow as Levy Fellow at George Mason Law School in Arlington, VA and for the Natural Resource Ecology Lab in Fort Collins, CO. In addition, he has worked as a public finance attorney for McGuireWoods, LLP in Charlotte, North Carolina. Currently, he is an assistant professor of economics at Tennessee Tech University. Dr. Alley is a member of the North Carolina State Bar.

In the recent past, Dr. Alley has researched and co-authored several economic impact analyses of solar projects in the San Joaquin Valley and of the federal Earned Income Tax Credit in California. In the recent past, he has extensively researched the landmark stimulus legislation from 2008 and 2009 and has participated in, published and presented research on corporate governance law, the economics of collective action, economics education, suburban economic development and neighborhood transition.