PERALTA COMMUNITY COLLEGE DISTRICT ITEM #

Board of Trustees Agenda Report

For the Trustee Meeting Date of July 21, 2009

ITEM TITLE:
Consider Approval to Enter into a Design-Build Contract with Chevron Energy Solutions Company for Photovoltaic (PV) System at Merritt College

SPECIFIC BOARD ACTION REQUESTED:
Approval is requested to enter into an energy services contract with Chevron Energy Solutions to provide design-build services for a new Photovoltaic (PV) System at Merritt College, in the amount of $8,888,322.

ITEM SUMMARY:
Chevron recommends installing a ground mounted PV array located on the hillside by the athletic field at the Merritt campus and a parking shade structure at a subsection of Merritt College Parking Lot C. This subsection of Parking Lot C where the PV system is located will not obstruct the "million dollar" view of the Bay Area, as extensive drawings have been made to this effect. The total size of the PV systems will be approximately 1.2 MW in size and will provide approximately 45% of the total energy usage by the college from clean, renewable onsite generation. Peralta Community College District requires approximately 8 MW to provide all of its energy needs District-wide.

PV systems produce the most electricity during peak hours of the day when electric rates are the highest. By installing a PV system at the Merritt campus, the District will reduce its energy bills by displacing power purchased at peak rates. The solar power systems will also enable the District to hedge against increasing electricity rates. The estimated total project cost is $8,888,322. The simple payback for the project cost is about 18 years, and the total net savings over 25 years is estimated at $14,201,267. The District will also be able to take advantage of utility incentives, estimated at $1,947,015 paid over a five-year period. A complete report on the Merritt PV System is included with Board member's materials.

BACKGROUND/ANALYSIS:
A Notice of Public hearing was posted giving notice of the intention to enter into a solar services contract in accordance with the terms of the Government Code Sections 4217.10 to 4217.18. Public comment will be heard at tonight's meeting. Consultation with the immediate stakeholders is ongoing. The faculty and students will be involved in the implementation phase. Local vendors that meet SLBE (Small Local Business Enterprise) and SELBE (Small Emerging Local Business Enterprise) qualifications will be utilized as subcontractors.

Although under Government Code an exception for competitive bidding is granted, Chevron Energy Solutions was selected as part of a competitive Request for Qualifications process. At the meeting of December 11, 2007, the Board approved

negotiation and development of a partnership contract for energy master planning and energy infrastructure retrofit services with Chevron Energy Solutions. Chevron was one of six companies responding to a Request for Qualifications (RFQ 07-08/19). Based on review and interviews by a selection committee, Chevron received the highest scores and was the recommended company. Their scope of services included designing and engineering services and procuring and financing of capital goods and services. Chevron has completed the initial phase of services assessing the energy infrastructure of all of the District's buildings and campuses. Authorization is requested to proceed pursuant to Government Code 4217.12 with Chevron Energy Solutions to utilize the design-build method for construction delivery of a New Photovoltaic (PV) System at Merritt College. A comprehensive five-year energy program of energy conservation measures and infrastructure upgrades is under development by Chevron Energy Solutions and will be brought to the Board for approval before implementation.

ALTERNATIVES/OPTIONS:
Not applicable.

EVALUATION AND RECOMMENDED ACTION:
Approval is recommended to enter into an energy services contract with Chevron Energy Solutions to provide design-build services for a new Photovoltaic (PV) System at Merritt College, in the amount of $8,888,322.

SOURCE OF FUNDS (AND FISCAL/BUDGETARY IMPACT):
Measure A, as approved by the voters in Peralta's constituency and authorized under Resolution 05/06-45, Exhibit A-1, District-Wide Projects, "Solar energy system installation and the retrofitting of existing energy systems."

OTHER DEPARTMENTS IMPACTED BY THIS ACTION (E.G. INFORMATION TECHNOLOGY):
YES _____ **NO** X

COMMENTS:
No additional comments.

WHO WILL BE PRESENTING THIS ITEM AT THE BOARD MEETING?
Vice Chancellor Ikharo

DID A BOARD STANDING COMMITTEE RECOMMEND THE ITEM? YES_____ **NO** _____
IF "YES", PLEASE INCLUDE THAT INFORMATION IN YOUR SUMMARY.
This item will be reviewed at a meeting of the Board Facilities and Land Use Planning Committee.

PLEASE ACQUIRE SIGNATURES IN THIS ORDER:

DOCUMENT PREPARED BY:

Prepared by: Sadiq B. Ikharo **Date:** July 15, 09

Dr. Sadiq B. Ikharo
Vice Chancellor of General Services

DOCUMENT PRESENTED BY:

Sadiq B. Ikharo **Date:** July 15, 09

Dr. Sadiq B. Ikharo
Vice Chancellor of General Services

FINANCE DEPARTMENT REVIEW

__X__ Finance review required _____ Finance review *not* required

If Finance review is required, determination is: _____ Approved ____ Not Approved

If not approved, please give reason: _____

_____

Signature: _____ **Date:** _____

Thomas Smith
Vice Chancellor for Finance and Administration

GENERAL COUNSEL (Legality and Format/adherence to Education Codes):

__X__ Legal review required _____ Legal review *not* required

If Legal review is required, determination is: ____ Approved ____ Not Approved

Signature: _____ **Date:** _____

Thuy T. Nguyen, General Counsel

CHANCELLOR'S OFFICE APPROVAL

__X__ Approved, and Place on Agenda ____ Not Approved, but Place on Agenda

Signature: [signature] **Date:** 7/15/09

Elihu Harris, Chancellor

Peralta Community College District

Sustainability and Energy Conservation Program

Merritt College Campus Solar PV System

Submitted to: Peralta Community College District

Attention: Dr. Sadiq Ikharo

Date: Friday, July 10, 2009

Submitted by:

Chevron Energy Solutions Company
A Division of Chevron U.S.A. Inc.
345 California Avenue
San Francisco, CA 94104

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Section 1

Executive Summary

Chevron Energy Solutions (ES) is pleased to provide this preliminary solar PV analysis to the Peralta Community College District (PCCD) staff in support of the District's goals to demonstrate fiscal responsibility by providing general fund relief through controlling future operating costs, demonstrate environmental stewardship (Board Policy 2.40), and help prepare students for the green economy of the 21st century.

Overview

Chevron Energy Solutions Company (Chevron ES), a Division of Chevron U.S.A. Inc., is pleased to present the preliminary analysis to Peralta Community College District (PCCD) for implementing a renewable energy program.

This analysis focuses on the following goals which were identified by PCCD:

- **Economic Leadership**
  - Provide General Fund relief by controlling operating costs
- **Student Involvement and development**
  - Prepare students for the green economy of the 21st century
- **Environmental Stewardship** (Board Policy 2.40)
  - Provide clean energy and reduce the district's carbon footprint

Chevron Energy Solutions (ES) expertise is rooted in our strong professional and technical in-house staff, which is responsive and experienced in performing in-depth solar PV analysis, implementation and comprehensive energy evaluations. In addition, we provide engineering design, including mechanical, electrical, lighting and water management. Our team has extensive experience working with community colleges throughout the state of California in all areas of energy, water conservation, renewable energy, and sustainability.

When PCCD selected Chevron Energy Solutions (ES) as its energy partner through the RFQ process it received the following benefits:

- All CES and its subcontractors work are guaranteed
- PCCD will not have any change orders – Fixed Price
- CES will work with the PLA program
- CES will partner with PCCD for state and federal grants
- CES will assist faculty to further develop curriculum at Laney and Merritt Colleges

CES is committed to being a comprehensive partner with PCCD in an effort to support the local economy and to create career ladders for its students.

The Proposed Scope of this preliminary analysis has been designed to provide long term budget relief and has been developed through extensive information gathering including need assessments, site walks, and interviews with many District personnel. The meetings with District staff, including members of District management have allowed Chevron ES to have a thorough and intimate understanding of the goals and priorities of the District. As a result, the physical opportunities that exist on the Merritt College campus for renewable energy generation are being addressed.

The Proposed Program Scope is a comprehensive approach that includes the use of photovoltaic panels to generate 45% of the Merritt College electrical annual use. CES is looking forward to continuing to define the program scope with PCCD leadership in a manner that best meets the District's needs. The specific components of the Proposed Program Scope are:

Solar Photovoltaics Installations: The installation of 1.2 MW of solar PV capacity on parking lot "C" and ground mount structures at a hillside.

Outdoor Lighting: Redesign the lighting on Parking Lot "C" to accommodate the new canopies.

Educational Component: Curriculum consultation to develop and implement an Environmental Science-based curriculum that makes use of the renewable energy equipment and technologies installed at the Merritt College campus.

Green Jobs: Working with the District developing a "shadowing" program to allow students at Laney and Merritt Colleges to observe the installation of solar panels.

Work Performed:

- Reviewed and evaluated existing documentation, including drawings, and utility bills.
- Determined the feasibility and design parameters of the solar installations.
- Conducted onsite data gathering to identify optimum locations for the solar program.
- Managed a competitive procurement in selecting material vendors and subcontractors to perform the installation.
- Computed energy and demand savings of solar.
- Conducted financial analyses under different ownership models for potential energy system repairs.
- Prepared this technical report, and submitted it to PCCD staff.

This report presents an analysis of solar PV installations and energy conservation measures that are technically and economically feasible based on Chevron ES' experience. For the selected solar PV installations, detailed analyses with assumptions and costing are provided.

Benefits

Implementation of the recommended measures will provide the following key benefits:

- Environmental stewardship
- Economic leadership
- Utility and state grants and incentives
- State-of-the-art energy infrastructure additions
- Integration with PCCD Facility Operations Processes

Environmental Stewardship

PCCD will advance its environmental stewardship because:

- Alternative energy supplies reduce annual electric grid consumption by about one and half million kilowatt-hours, which is the equivalent of approximately ninety five hundred metric tons of carbon dioxide over the life of the system.

- Reduces greenhouse gas emissions by offsetting an estimated 9500 metric tons of carbon dioxide throughout the life of the system.
- Is a step forward toward the Board Policy 2.40 goals of achieving 50% reduction in GHG emissions in five years.

Economic Leadership

PCCD will maintain economic leadership by:

- Generating approximately $220,000 in year 2010 operating cost reductions and more than $12.5 million in cost reductions over the project's life.
- Forming a hedge against future electricity price volatility.
- Reduces and stabilizes the District's future energy costs by offsetting more than 45% of the Merritt's electric utility purchases.

Utility and State Grants and Incentives

The total cost for the Program can be reduced through grants and incentives totaling close to $1.9 million.

Integration with PCCD Facility Operations Processes

Throughout the Merritt College solar PV program, Chevron Energy Solutions will coordinate project schedules with PCCD staff and will implement key facility activities with site-specific work and class schedules. Our construction management personnel will be onsite to manage the contractors and construction activity and handle inquiries, deliveries, and project construction meetings.

Technical Proposal Organization

This report is presented in four sections.

Section 1: Executive Summary
Section 2: Environmental and Economic Benefits Analysis
Section 3: Renewable Generation – PV
Section 4: Monitoring and Maintenance

On behalf of the Chevron Energy Solutions Engineering Team, who completed this solar analysis for the district's Energy Program, we would like to thank the District staff who assisted us in our work. We look forward to great success on this program.

Section 2

Environmental and Economic Benefits Analysis

2.1 Environmental Benefits

Chevron Energy Solutions (Chevron ES) honors and commends Peralta CCD for committing to an aggressive goal to eliminate greenhouse gas (GHG) emissions, incorporate sustainability, energy efficiency and conservation measures and to become carbon neutral.

Shortly after being selected as the District's Energy Partner, Chevron ES worked with the District to identify critical facility needs. To ensure the District's high priority facility needs were met in a timely manner, Chevron ES developed the following programmatic elements. This program lays the foundation for the implementation of Board Policy 2.40.

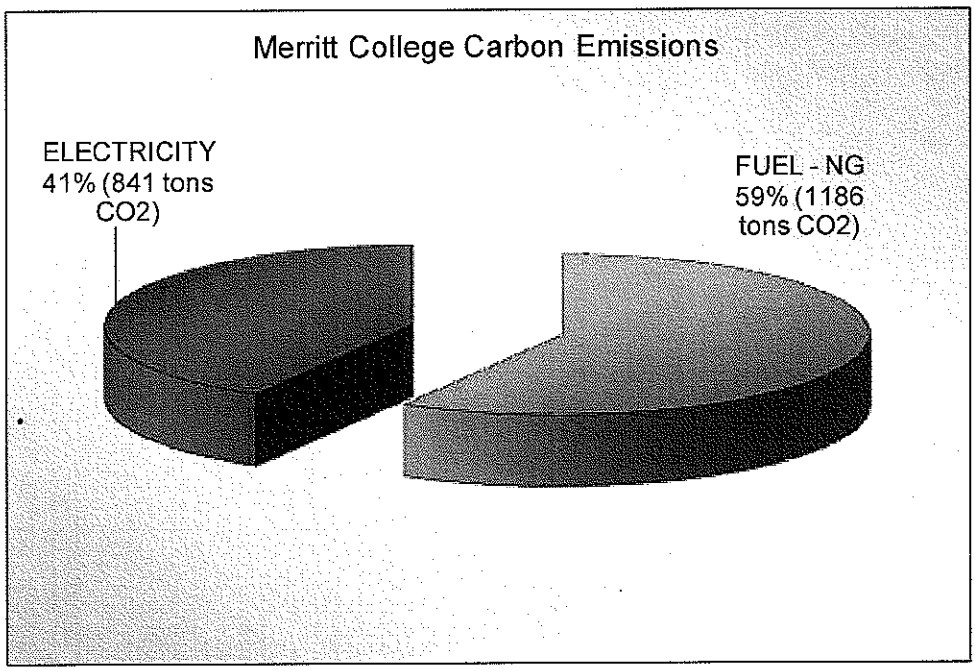
- Chevron ES identified and implemented Energy Efficiency measures including: lighting upgrades, building envelope improvements, boiler replacements, water conservation measures, building controls improvements and campus wide computer power management.
- Conducted a Greenhouse Gas Emissions inventory scope which included emissions associated with electricity and natural gas consumption.
- Established a Carbon Neutrality Assessment and program that includes program planning, execution and ongoing management services.
- Reviewed potential external and on-campus options that lead to a comprehensive approach to sustainable practices throughout the operation of the district to include active programs such as recycling, sustainable purchasing, and sustainable landscaping practices.
- Conducted a LEED design assessment that does not end with new buildings: they extend to existing buildings and operations as well and they can be fully integrated into facilities operations and management.
- Established and participated in planning meetings with the District's architect WLC to foster communication and coordination.
- Utilized Board Policy 2.40 as the guiding principle for all elements of our report.

The following sections describe Chevron ES's approach toward the goal for Merritt College to become 50% carbon neutral in five years as established by BP 2.40.

Merritt College Energy Usage Baseline

The carbon emissions from the energy used by the Merritt College were calculated using the information provided, the year 2007 was use as the baseline for this calculations. Figure 2-1 illustrates the results.

Figure 2-1: Carbon Emission – Baseline Year 2007



A summary of the information collected is shown on table 2-1. A 15-year projection of the energy usage is also presented on table 2-1.

Table 2-1: Utility Data – Merritt College

Total Electricity Usage				CO_2 Emissions from Electricity		Total Natural Gas Usage				CO_2 Emissions from Natural Gas		
Project Year	Yr	Energy Usage kWh/yr	Actual Year	CO_2 emission factor gr/kWh	Indirect CO2 emissions in metric tons	Project Year	Yr	Energy Usage therms/yr	Actual Year	CO_2 emission factor Kg/therm	Indirect CO2 emissions in metric tons	**TOTAL CO2 emissions in metric tons**
	1	3,966,527	2005	246.10	976		1	0	2005	6.10	0	976
	2	3,302,569	2006	246.10	813		2	0	2006	6.10	0	813
Baseline →	3	3,418,643	2007	246.10	841	Baseline →	3	194,456	2007	6.10	1,186	2,028
1	4	3,538,797	2008	246.10	871	1	4	198,345	2008	6.10	1,210	2,081
2	5	3,663,173	2009	246.10	902	2	5	202,312	2009	6.10	1,234	2,136
3	6	3,791,921	2010	246.10	933	3	6	206,358	2010	6.10	1,259	2,192
4	7	3,925,194	2011	246.10	966	4	7	210,485	2011	6.10	1,284	2,250
5	8	4,063,151	2012	246.10	1,000	5	8	214,695	2012	6.10	1,310	2,310
6	9	4,205,957	2013	246.10	1,035	6	9	218,989	2013	6.10	1,336	2,371
7	10	4,353,782	2014	246.10	1,071	7	10	223,369	2014	6.10	1,363	2,434
8	11	4,506,803	2015	246.10	1,109	8	11	227,836	2015	6.10	1,390	2,499
9	12	4,665,202	2016	246.10	1,148	9	12	232,393	2016	6.10	1,418	2,566
10	13	4,829,167	2017	246.10	1,188	10	13	237,041	2017	6.10	1,446	2,634
11	14	4,998,896	2018	246.10	1,230	11	14	241,782	2018	6.10	1,475	2,705
12	15	5,174,590	2019	246.10	1,273	12	15	246,617	2019	6.10	1,504	2,778
13	16	5,356,459	2020	246.10	1,318	13	16	251,550	2020	6.10	1,534	2,853
14	17	5,544,721	2021	246.10	1,365	14	17	256,581	2021	6.10	1,565	2,930
15	18	5,739,599	2022	246.10	1,413	15	18	261,712	2022	6.10	1,596	3,009

Electric: 0.524 lbs CO_2 per kWh

Natural Gas: 13.446 lbs CO_2 per therm

Carbon Emissions Reduction – Merritt College PV System

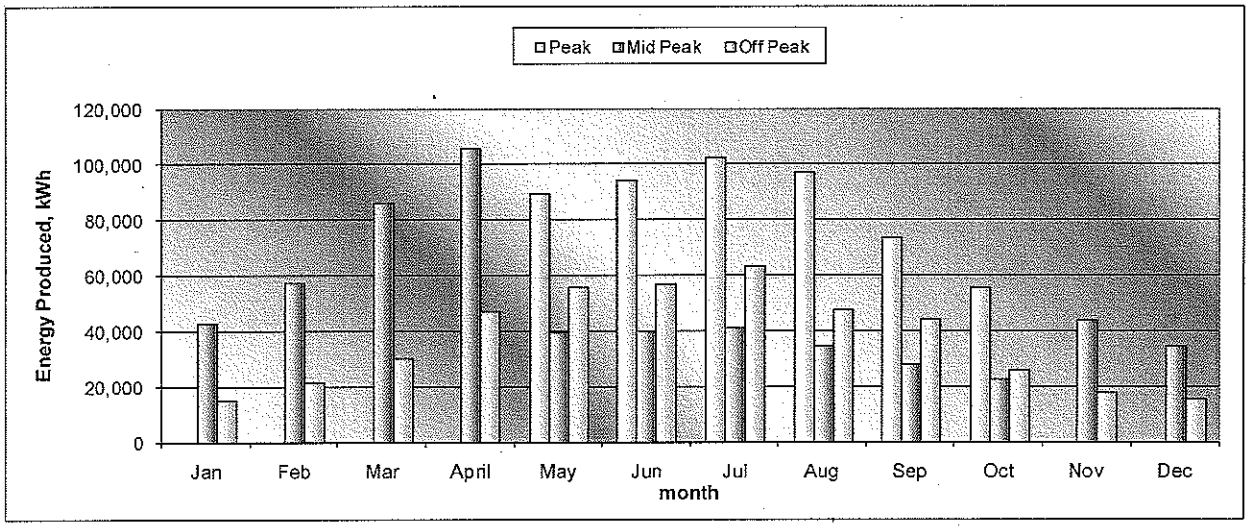
Chevron ES's solar program for Merritt College will generate approximately 1,535,000 kWh/year of clean and renewable energy, which represents about 45% of the current energy usage at Merritt. Table 2-2 illustrates the energy produced by the 1.2 MW system recommended.

Total reduction on carbon emissions = 378 tons of CO2.

Table 2-2: Merritt College Solar PV - Energy Produced

MERRITT SOLAR PV SYSTEM									
Month	No. Days	Demand (kW)				Energy Production (kWh)			
		Peak	Mid Peak	OFF Peak	Max. Demand	Peak	Mid Peak	OFF Peak	Total Energy Produced
Jan	31	0	524	473	524	0	43,082	15,394	58,475
Feb	28	0	665	680	680	0	57,361	21,512	78,873
Mar	31	0	783	758	783	0	86,278	30,545	116,823
April	30	0	886	864	886	0	105,907	47,000	152,907
May	31	926	803	934	934	89,677	39,390	56,064	185,131
Jun	30	907	794	897	907	94,460	40,010	57,228	191,697
Jul	31	904	780	893	904	102,626	41,423	63,529	207,578
Aug	31	876	741	856	876	97,074	34,497	47,703	179,275
Sep	30	814	683	812	814	74,087	28,005	44,290	146,382
Oct	31	682	579	645	682	56,046	22,755	26,069	104,870
Nov	30	0	560	496	560	0	44,154	18,187	62,340
Dec	31	0	487	466	487	0	34,936	15,914	50,850
TOTALS	**365**	**926**	**886**	**934**	**934**	**513,970**	**577,799**	**443,434**	**1,535,202**

Figure 2-2: Energy Produced Based on PG&E Electrical Rate E19



2.2 Economic Benefits Analysis

Chevron ES has developed an estimated budget to build a 1.2MW solar system at the Merritt College location. This section presents the economic and financial analysis. Assumptions for this analysis and costing are provided on table 2-3. Chevron ES's process includes,

- Reviewed and evaluated existing documentation, including drawings, and utility bills.
- Determined the feasibility and design parameters of the solar installations.
- Conducted onsite data gathering to the component of this solar program.
- Managed a competitive procurement in selecting material vendors and subcontractors to perform the installation.
- Computed energy and demand savings of solar.
- Conducted financial analyses under different ownership models for potential energy system repairs.
- Prepared this technical report, and submitted it to PCCD staff.

Table 2-2: Estimated Solar PV System Cost

MERRITT COLLEGE SOLAR PV SYSTEM - 1.2 MW						
PROJECT TASK	SUB COST (M&L COST)	ENGINEERING TRADES	GENERAL CONDITIIONS (4%)	OVERHEAD (6%)	PROFIT (5%)	SUBTOTALS
PV PANELS and INVERTERS, MATERIALS ONLY	$4,126,742	$321,172	$247,605	$247,605	$206,337	$5,149,461
ELECTRICAL EQUIPMENT, MATERIAL AND LABOR. PANEL INSTALLATION	$1,919,714	$213,237	$115,183	$115,183	$95,986	$2,459,302
METAL STRCUTURES, MATERIAL AND LABOR	$609,944	$75,711	$36,597	$36,597	$30,497	$789,346
METERING EQUIPMENT, MATERIAL AND LABOR	$86,166	$20,714	$5,170	$5,170	$4,308	$121,528
DSA PERMITS, FENCING, OTHER MISC	$98,175	$19,030	$5,891	$5,891	$4,909	$133,895
LIGHTING & SECURITY PKG LOT "C"	$175,000	$30,042	$10,500	$10,500	$8,750	$234,792
TOTAL PROJECT	$7,015,741	$679,905	$420,944	$420,944	$350,787	**$8,888,322**

ENGINEERING TRADES:

1. COMMISSIONING AGENT
2. STRUCTURAL ENGINEERING
3. ELECTRICAL ENGINEERING
4. SOILS ENGINEERING
5. CIVIL ENGINEERING
6. ENGINEERING CONTINGENCY
7. PERFORMANCE BONDS
8. MANAGEMENT OF DIFFERENT TRADES
9. SUBMITTAL REVIEW
10. ETC.

GENERAL CONDITION:

1. SITE SECURITY
2. SITE TEMPORARY ELECTRICAL POWER
3. ON SITE CONSTRCUTION MANAGEMENT
4. FOEREMAN: QUALITY CONTROL/QUALITY ASSURANCE
5. FOREMAN: PROJECT SAFETY
6. PROJECT DEVELOPMENT
7. COORDINATION WITH OTHER TRADES/CLIENT
8. TEMPORARY IT (PHONE LINES, FAXES, ETC.)
9. SAFETY TRAINING (STUDENTS APRENTICE)
10. DSA INPECTIONS MANAGEMENT

OVERHEAD:

1. FRINGE RATE:

a) State Unemployment Insurance
b) State Disability Insurance
c) 401k Match
d) Medical Dental Insurance
e) Holiday/Vacation time
f) Sick/Bereavement/Family emergency time
g) Social Security taxes
h) Life Insurance

2.0 MISCELLANEOUS RATE:

a) Rent
b) Utilities
c) Taxes
d) Cafeteria services

3.0 GENERAL & ADMINISTRATIVE RATES:

a) Management
b) Accounting
c) IT
d) Human Resources
e) Marketing
f) Corporate Allocations

A financial proforma was created to illustrate the economic benefits over the useful life of the PV system. The analysis illustrated on table 2-3 is based on the following assumption:

- Total Estimated Cost = $8,888,322
- Total Annual Cost Avoidance = $220,163 (1st year)
- Current cost of electricity = $0.14/kWH
- Annual Usage Escalation = 1.5%
- Utility Cost Increase Rate = 4%
- Solar Panel Degradation Factor = 0.7%/year
- CSI Incentive Rate = $0.26/kWH/yr
- REC Value = $0.025/kWH
- Maintenance Cost = $0.010/kWh/yr
- Maintenance Cost Escalation = 1.5%
- Cost of Electricity after PV = $0.12/kWH
- Solar PV System size = 1200 kWdc (1.2 MWdc)
- Adjusted Annual PV Production = 1,528,910 kWh/yr
- Net Present Value % = 5%
- Baseline Year = 2009
- 1st Year of Full Production = 2010
- Source of Funding = Measure A Bonds
- Useful life of PV Panels = 25 years (Manufacturer's warranty)
- Useful Life of Inverter = 20 years (Manufacturer's warranty)
- Cost of PV System = Valid for 30 days

Table 2-3: Solar PV System – Proforma

SUMMARY	
SCENARIO	TOTAL COST OVER 25 YRS
Business_As_Usual	$26,732,917
Solar Program	$12,531,649
Total Net Savings over 25 years	$14,201,267
Net Present Value Savings at 5.0%	$7,720,678
Simple Payback, yrs	18 yrs
Electricity Cost Reduction (%)	53.12%

MERRITT COLLEGE SOLAR PV SYSTEM
FINANCIAL PROFORMA

BUSINESS AS USUAL (BAU)			SOLAR PROGRAM								
			Cost Components			Solar PV System Benefits					
Yr#	Year	Cost to PCCD	Residual Electrical Cost	Annual Operation & Maintenance Costs	Total Solar Component Costs	CSI Incentive Payment	Renewable Energy Credits	Total Solar Component Benefits	Total Solar Program Cost	Solar Program Cost Savings	Accumulative Cost Savings
1	2008	$482,105			$0	-		-	$0	0	0
2	2009	$508,910	$240,622	$15,289	$255,912	394,893	38,223	$433,116	($177,204)	$686,114	$686,114
3	2010	$537,205	$258,123	$15,518	$273,641	392,287	37,970	430,257	($156,616)	$693,822	$1,379,936
4	2011	$567,074	$276,732	$15,751	$292,483	389,698	37,720	427,417	($134,934)	$702,008	$2,081,944
5	2012	$598,603	$296,518	$15,987	$312,505	387,126	37,471	424,597	($112,091)	$710,695	$2,792,639
6	2013	$631,886	$317,549	$16,227	$333,776	384,571	37,224	421,794	($88,018)	$719,904	$3,512,542
7	2014	$667,019	$339,900	$16,471	$356,371	-	36,978	36,978	$319,393	$347,626	$3,860,168
8	2015	$704,105	$363,650	$16,718	$380,367	-	36,734	36,734	$343,633	$360,471	$4,220,639
9	2016	$743,253	$388,880	$16,969	$405,849	-	36,491	36,491	$369,357	$373,896	$4,594,535
10	2017	$784,578	$415,680	$17,223	$432,903	-	36,251	36,251	$396,652	$387,925	$4,982,460
11	2018	$828,200	$444,141	$17,481	$461,623	-	36,011	36,011	$425,611	$402,589	$5,385,049
12	2019	$874,248	$474,362	$17,744	$492,106	-	35,774	35,774	$456,332	$417,916	$5,802,966
13	2020	$922,856	$506,447	$18,010	$524,456	-	35,538	35,538	$488,919	$433,938	$6,236,903
14	2021	$974,167	$540,504	$18,280	$558,784	-	35,303	35,303	$523,481	$450,686	$6,687,590
15	2022	$1,028,331	$576,651	$18,554	$595,205	-	35,070	35,070	$560,135	$468,196	$7,155,786
16	2023	$1,085,506	$615,009	$18,832	$633,841	-	34,839	34,839	$599,003	$486,504	$7,642,290
17	2024	$1,145,860	$655,708	$19,115	$674,823	-	34,609	34,609	$640,215	$505,646	$8,147,935
18	2025	$1,209,570	$698,887	$19,402	$718,288	-	34,380	34,380	$683,908	$525,662	$8,673,597
19	2026	$1,276,822	$744,688	$19,693	$764,381	-	34,153	34,153	$730,227	$546,595	$9,220,192
20	2027	$1,347,814	$793,266	$19,988	$813,254	-	33,928	33,928	$779,326	$568,487	$9,788,680
21	2028	$1,422,752	$844,783	$20,288	$865,071	-	33,704	33,704	$831,367	$591,385	$10,380,065
22	2029	$1,501,857	$899,409	$20,592	$920,002	-	33,482	33,482	$886,520	$615,337	$10,995,402
23	2030	$1,585,360	$957,327	$20,901	$978,228	-	33,261	33,261	$944,968	$640,393	$11,635,795
24	2031	$1,673,506	$1,018,727	$21,215	$1,039,942	-	33,041	33,041	$1,006,901	$666,606	$12,302,401
25	2032	$1,766,553	$1,083,812	$21,533	$1,105,344	-	32,823	32,823	$1,072,521	$694,032	$12,996,433
26	2033	$1,864,774	$1,152,795	$21,856	$1,174,650	-	32,606	32,606	$1,142,044	$722,730	$13,719,162
TOTALS		$26,732,917	$14,904,168	$459,637	$15,363,805	$1,948,573	$883,582	$2,832,155	$12,531,649	$13,719,162	
NPV		$12,925,046	$7,149,373	$249,663	$7,399,036	$1,688,350	$506,317	$2,194,667	$5,204,369	$7,720,678	

Section 3

Renewable Generation:

Merritt College Solar PV System

This section includes of following:

Solar Resource: This division explains how solar resources can be quantified and analyzed to evaluate the benefit of a solar system at the Merritt College location.

Savings Calculation: This division explains how savings are calculated for the solar Photovoltaic system proposed for Merritt College.

Proposed PV system: A detailed description of the solar photovoltaic system is included in this section.

Scope of Work: This division describes the proposed scope developed by Chevron ES for this project, aerial pictures and layouts of the system are included.

3.1 Solar Resources

Peralta Community College District is situated in an excellent geographic location to take advantage of the energy provided by the sun. At the same time, California is currently the State that best combines good solar insolation and economic incentives.

Insolation data

Using data collected between 1960 and 1990, the National Renewable Energy Laboratory (NREL) has put together a model (PV Watts) able to predict the amount of solar energy received in a year in any location in the 50 states. PVWatts uses historical irradiance data to determine the power density of the sunlight incident on a PV array at a certain location. Irradiance is measured in watts per square meter. The earth receives 1367 W/m2 from the sun, but the atmosphere limits the amount of irradiance available at the earth's surface to 1000 W/m2. Chevron ES uses this model to estimate energy generation by the solar PV system.

Figure 3-1 illustrates how much solar energy is produced throughout the year per unit of capacity installed. **Figure 3-2** shows, on average, how the solar energy produced varies during the day for January and July.

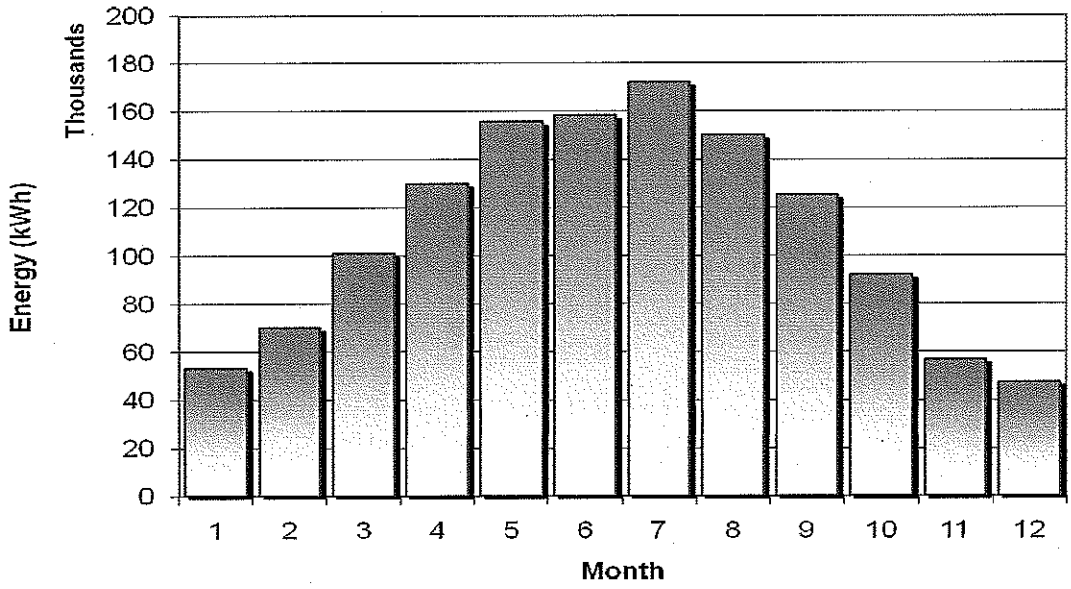


Figure 3-1: Energy produced by 1 kW of south facing photovoltaic panels tilted at 5 degrees over a year with Typical Meteorological Conditions[1].

[1] Typical Meteorological Year (TMY) : Composite year of hourly data created using whole months of data from selected years, while minimizing standard deviation from the composite of any given year. This allows for the creation of average, but realistic, hour-by-hour data.

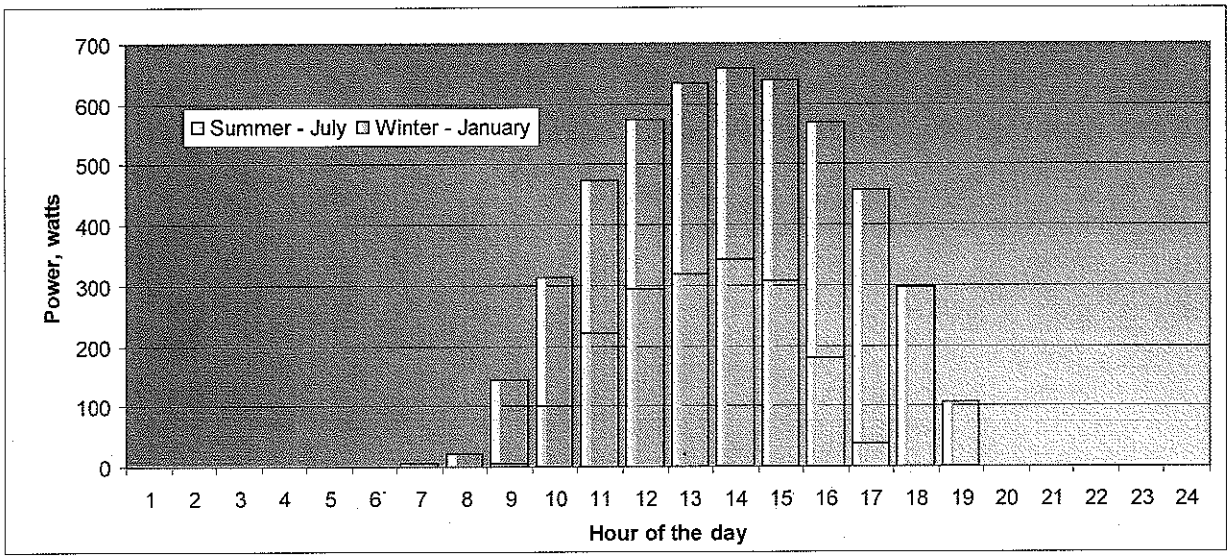


Figure 3-2: Power output of 1kW of south facing photovoltaic panels tilted at 5 degrees, average over the month of July in yellow, over the month of January in blue

A photovoltaic array generates the most electrical energy in the summer when electrical costs are the highest, maximizing the value of the array.

Photovoltaic System Description

A photovoltaic (PV) array is best mounted in an area of good solar exposure where its appearance will not be considered obtrusive. It is critical that the arrays not to be shaded. Typically, the modules, which are commonly about 3½ feet by 5 feet each, are mounted at a slight tilt on an elevated steel structure, facing South or Southwest as site conditions allow. Modules are connected in a series "string" to produce 300 to 500 volts at their maximum power point. Several strings are tied together in parallel to form a PV array. Each array is connected through one or more disconnect switches to the inverter.

The inverter converts the direct current (DC) produced by the PV array to common alternative current (AC), which is a more useful form of electric power. It contains sophisticated control logic to maximize the solar output, and to synchronize the AC output with the utility grid to which it is connected. Thus the PV system injects power into the electric system "inside" the utility billing meter, offsetting the District's electric load, and reducing the utility electric bill. In the event that utility power fails, the PV inverter will immediately disconnect the PV system – this is a utility safety requirement. Upon return of utility power, the inverter will wait a preset period, and then automatically re-connect.

Some design considerations for the location of the array include the size and openness of the available area, presence of shading, service access, proximity to an electrical connection point, impact on building usage and maintenance, security, and wind concerns. Concerns for the array itself include cooling of the modules, tilt and spacing of the modules, accessibility and serviceability, among other things.

A minimum module tilt is desirable. It gives higher levels of energy production (kWh) from an installation of a given size (kW), due primarily to better "presentation" of the panel area to the

sunlight, better cooling, and better self-cleaning aspects. Tilt is usually a compromise between energy production and limitations of the support structure: a steeper tilt will give somewhat more output per module, but require that structural support members be larger due to wind loading.

3.2 Savings Calculations

Calculation Methodology

Chevron ES calculated the cost savings generated by Merritt College PV system using an hourly simulation computer engine. A sample output from this simulation is included in Table 3-1. To illustrate the performance of this model, consider a PV system that generates 100 kW between 3:00 PM and 4:00 PM on July 27th. For a business purchasing power under the A-6 tariff rate, one kilowatt hour on a July afternoon costs $0.41, the summer-peak rate. At $0.41/kWh, the customer has saved $41.00 for the one hour under consideration. The savings calculation engine performs this calculation for all 8760 hours of the year, at the prescribed PG&E tariff rate, summing the energy generated and dollars saved. A similar calculation calculates the business as usual (BAU) electrical cost and the residual electrical cost. The business as usual cost is the utility bill before the PV system is installed. The residual cost is the cost of the power that the facility uses that is not supplied by the PV system.

When using current utility rates for Merritt College, this method provides conservative first year savings. To include changes in electrical rates, an escalation factor is applied to the current rates to estimate future savings.

Table 3-1: Results of Hourly PV Simulation

Leigh High Meter 1					
Assumptions					
Location	San_Francisco, CA				
Total System Size	491.28	kW DC STC (CEC max: 564 kW)			
	size (kW)	tilt (deg)	azimuth (deg)	Normalization	
	491.28	5	180		
PV Derating	0.77	**Results**			
PV Degradation fac	0.70%		BAU	Residual	
Efficiency	0%	Energy	846,192 kWh	201,010 kWh	
Usage increase	0%	Payments	$122,830	$7,854	
BAU Rate	A-10STOU	Rate	$0.145/kWh	$0.039/kWh	
New Rate	A-6				
First year	2010	Solar prod.	645183 kWh	1313 kWh/kW	
Calc. year	2010	Avoided costs	$114,976	$0.178/kWh	

25-year proforma analysis

Year	Production	BAU	Residual Electricity Bill payments	Solar Power Generated Value	Avoided rate
2010	645183	$122,830	$7,854	$114,976	$0.178
2011	640666	$128,971	$8,140	$120,832	$0.189
2012	636182	$135,435	$9,466	$125,969	$0.198
2013	631728	$142,210	$10,886	$131,324	$0.208
2014	627306	$149,320	$12,403	$136,917	$0.218
2015	622915	$156,786	$14,025	$142,762	$0.229
2016	618555	$164,644	$15,757	$148,888	$0.241
2017	614225	$172,880	$17,607	$155,273	$0.253
2018	609925	$181,524	$19,580	$161,944	$0.266
2019	605656	$190,600	$21,685	$168,915	$0.279
2020	601416	$200,153	$23,931	$176,222	$0.293
2021	597206	$210,165	$26,326	$183,839	$0.308
2022	593026	$220,673	$28,877	$191,796	$0.323
2023	588875	$231,707	$31,594	$200,112	$0.340
2024	584753	$243,320	$34,491	$208,829	$0.357
2025	580659	$255,491	$37,574	$217,917	$0.375
2026	576595	$268,265	$40,854	$227,411	$0.394
2027	572559	$281,679	$44,346	$237,333	$0.415
2028	568551	$295,796	$48,063	$247,733	$0.436
2029	564571	$310,592	$52,017	$258,575	$0.458
2030	560619	$326,122	$56,219	$269,903	$0.481
2031	556694	$342,428	$60,686	$281,742	$0.506
2032	552798	$359,590	$65,441	$294,149	$0.532
2033	548928	$377,577	$70,492	$307,085	$0.559
2034	545086	$396,456	$75,856	$320,600	$0.588

Savings NPV at 5%	**$2,549,404**

3.3 Merritt College Solar PV System

Chevron ES recommends installing ground-mounted and parking canopy solar photovoltaic (PV) systems at the Merritt College campus. This will offset a percentage of the District's electric demand with clean, renewable onsite-generation. PV systems produce the most electricity during peak hours of the day when electric rates are the highest. By installing PV at the Merritt campus, the Peralta Community College District will reduce its energy bills by displacing power purchased at peak rates. The solar power systems will enable the District to hedge against increasing electricity rates. PG&E rates have historically increased at 6% a year on an average bases and are projected to escalate between 6%–8% in the future.

Solar Benefits:

- *Environmental stewardship*
- *Positive public recognition*
- *Diversify the District's energy portfolio*
- *Hedge against increasing electric rates*
- *Generate General Fund savings*
- *On-site learning laboratory for renewable energy*
- *Clean and renewable energy produced = 1,529,526 kWh/yr*
- *% Of total energy use generated by PV = 45%*
- *GHG Emissions eliminated = 374 tons CO2/yr*
- *General Fund savings, 1st year = $214,134*
- *Estimated Utility Incentives = $1,947,015 (Paid over five years)*

Proposed PV System

Chevron ES proposes installing a ground-mounted PV array located on the hillside by the football field at the Merritt College campus. The PV system will be approximately 850 kWdc in size. Chevron ES also recommends installing a parking shade structure at Merritt College parking lot "C" of approximately 350 kWdc. The total size of the PV systems will be approximately 1.2 MW in size and will provide approximately 45% of the total energy usage by the college. Figure 3-3 illustrates the location of both PV systems. Figure 3-4 includes the proposed layout to avoid blocking the site view of the bay, as requested by the district. Figures 3-5, and 3-6 are computer rendering images of both solar PV system proposed for Merritt College.

Figure 3-3: Ground Mount and Parking Canopy Photovoltaic System

Project Description:

Proposed System Size: 1.2 MW PV

Potential Offset: 45% reduction in Merritt's Annual Utility Bill

Figure 3-4: Solar PV System Proposed Layout

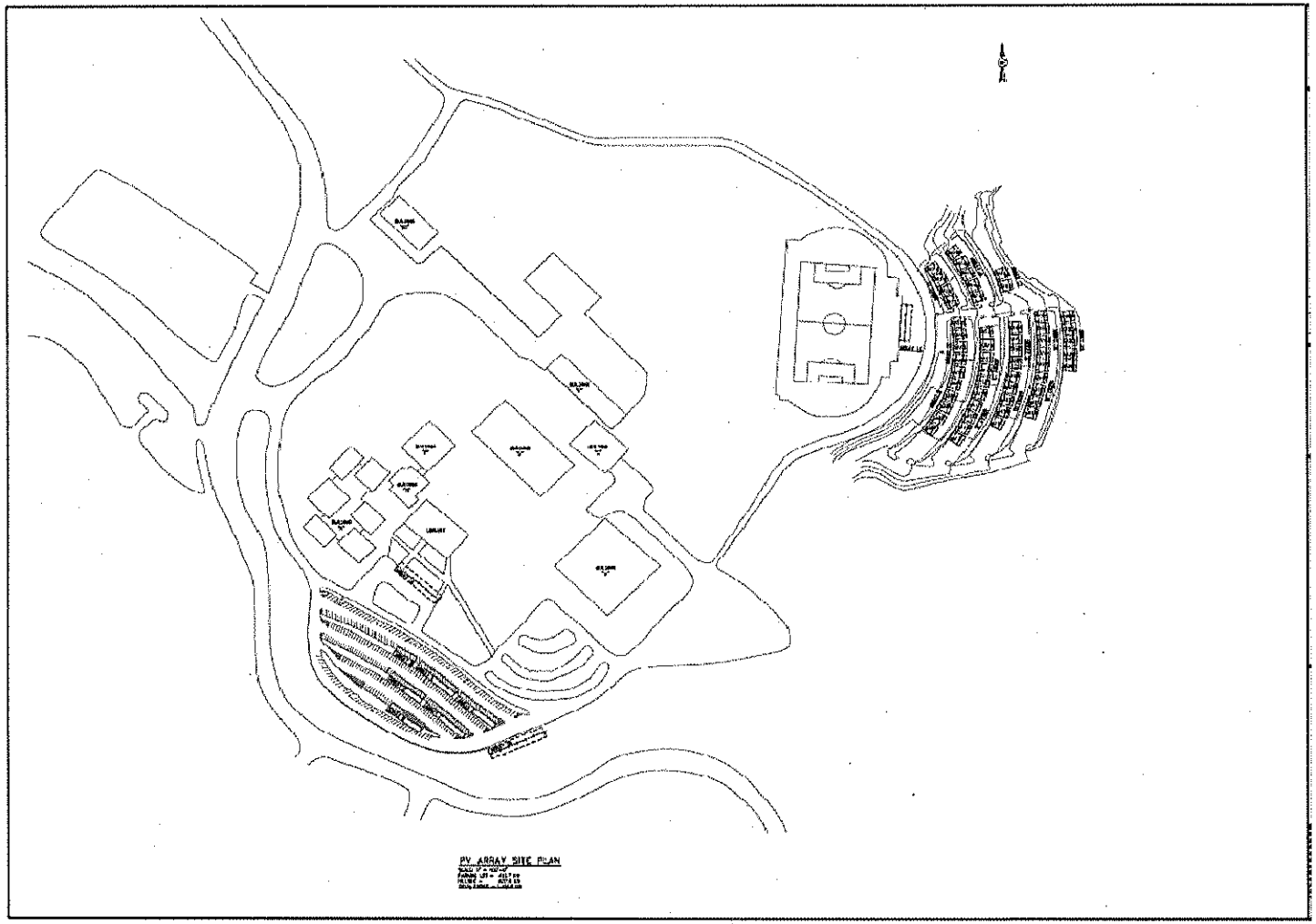


Figure 3-5: Parking Lot "C" Solar PV System

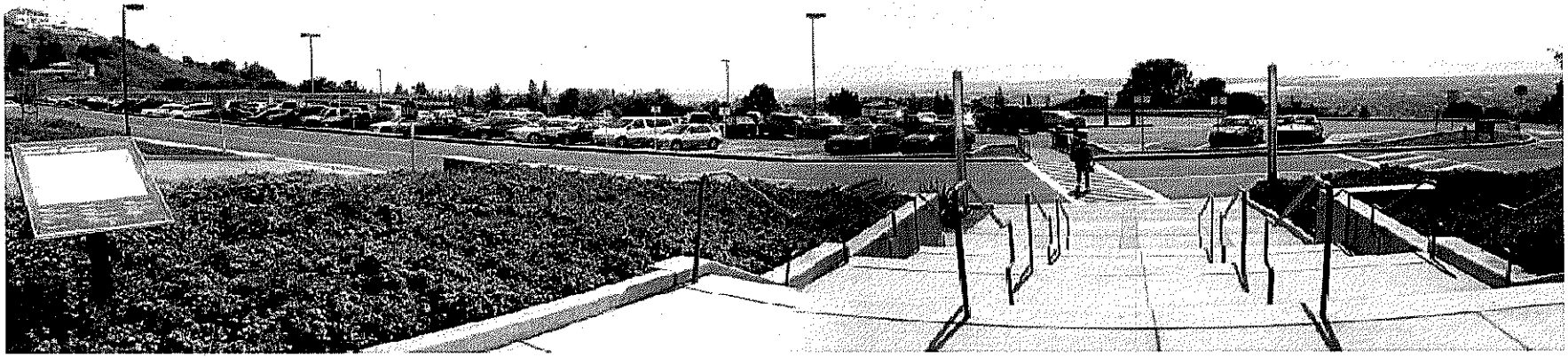
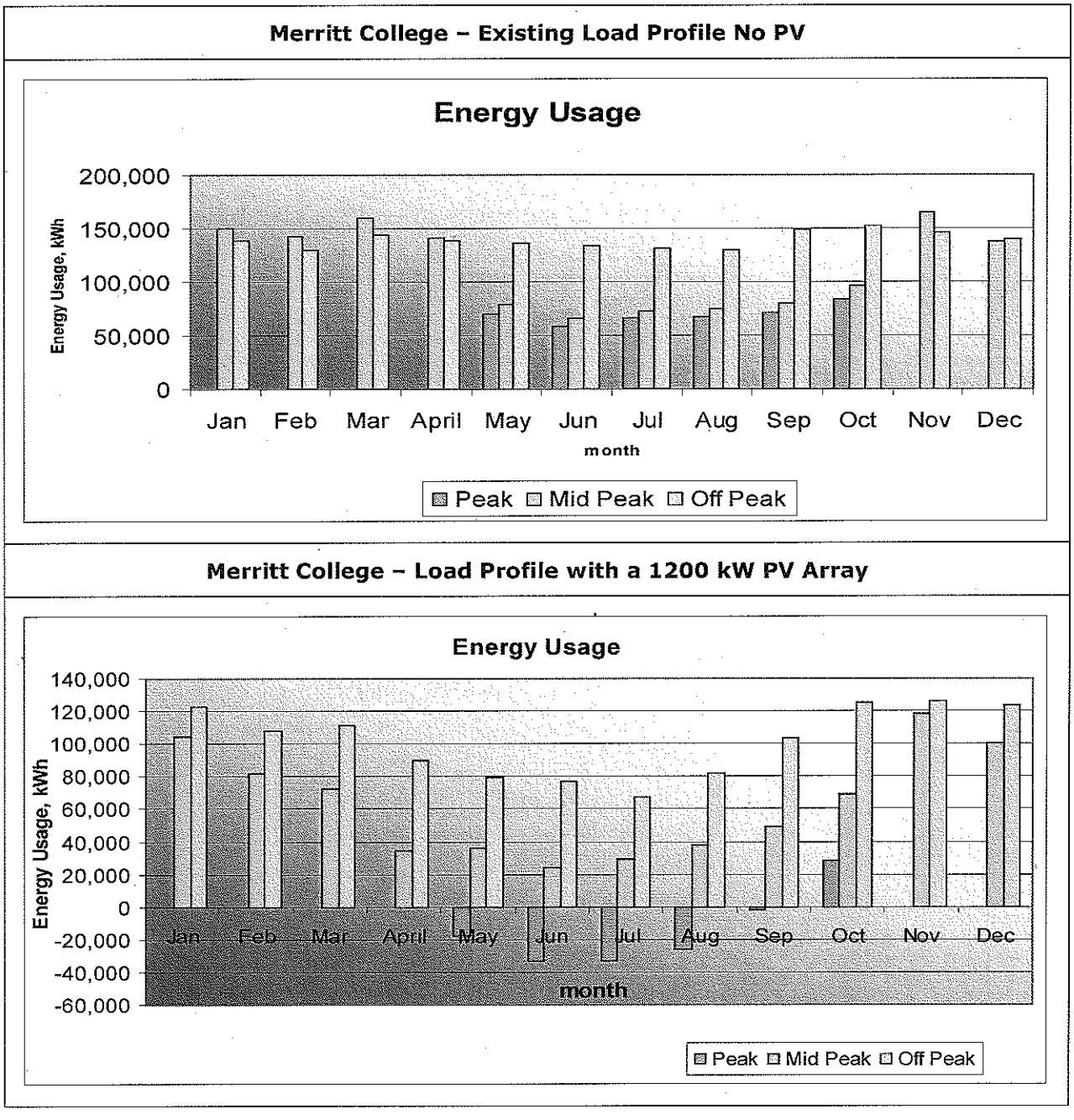


Figure 3-6: Hillside Ground-Mount PV System

Impact Analysis for the Merritt College Campus

An hour-by-hour output was generated for the solar systems at the Merritt College campus to calculate the new usage profile of the site. The complete model recreates a whole year of consumption, solar production and billing, the net results are illustrated on Figure 3-7.

Figure 3-7: Merritt College Load Profile with a 1200 kWdc PV System



As indicated by the previous figures, the new solar PV system will have a significant impact on the energy use during peak hours by the Merritt College facility. From May – September, the PV system will generate more electricity during peak hours than the actual energy used by the college; the mid-peak use will also be reduced due to the PV system. The net effect will be a reduction on the average cost that the college pays currently for electricity; we estimated that the cost will decrease from $0.14/kWH to $0.12/kWH.

3.4 Scope of Work

Chevron ES recommends installing a solar PV system with a total capacity of 1.2 MWdc (Direct Current) including 350 kWdc of parking canopies installed at Parking Lot "C", and 850 kWdc of ground mount structures installed on a hillside. Based on the requirements for parking lot "C" expressed by the district and the desire to maximize the economic incentives provided by the California Solar Initiative managed by PG&E, a system sized for 1.2MW will best meet Peralta's stated needs.

Our design-built process will include the following items:

Parking Lot "C" Canopies

- Provide and install 350 kWdc of solar PV panels to be mounted on a parking shading structure
- Provide and install parking canopies structures to accommodate 350 kW of solar panels
- New lighting fixtures mounted under new parking canopies
- Inverters and all the necessary electrical equipment and conduits to connect to the nearest electrical substation.
- Add electrical breakers as needed to existing panel and all necessary conduit and wiring
- Application for incentives through the CSI program.
- Metering equipment to verify electrical production required to obtain incentives from the California Solar Initiative program.
- All engineering specialties required to deliver a complete system are included
- Project management costs are include
- On-site construction management is included (one construction superintendent)
- AutoCAD drawings and operation and maintenance manuals will be provided at completion of project (hard and electronic copies)

Assumptions and exceptions:

- Indicative pricing based on straight time work between the hours of 7:00 – 3:30
- No hazardous materials removal is included
- No geotechnical reports were available at the time Chevron ES develop the design for Parking Lot "C", our pricing assumes digging and trenching is possible with normal construction equipment, no blasting or other similar methods are included.
- CEQA or other environmental studies will be responsibility of Peralta CCD
- Cost of conduct public hearing, if needed, is responsibility of the district. Chevron ES will facilitate field experts to attend any hearings as required by the district.

- Parking areas during construction will be blocked to access by students and college personal for safety reasons.

Hillside Ground-Mount PV System

- Provide and install 850 kWdc of solar panels mounted on a ground metal structure
- Provide and install ground metal structures to accommodate 850 kW of solar panels
- Inverters and all the necessary electrical equipment and conduits to connect to the nearest electrical substation.
- Add electrical breakers as needed to existing panel and all necessary conduit and wiring
- Application for incentives through the CSI program.
- Metering equipment to verify electrical production required to obtain incentives from the California Solar Initiative program.
- All engineering specialties required to deliver a complete system are included
- Project management costs are include
- On-site construction management is included (one construction superintendent)
- AutoCAD drawings and operation and maintenance manuals will be provided at completion of project (hard and electronic copies)

Assumptions and exceptions:

- Indicative pricing based on straight time work between the hours of 7:00 – 3:30
- No hazardous materials removal is included
- No geotechnical reports were available at the time Chevron ES develop the design for Parking Lot "C", our pricing assumes digging and trenching is possible with normal construction equipment, no blasting or other similar methods are included.
- CEQA or other environmental studies will be responsibility of Peralta CCD
- Cost of conduct public hearing, if needed, is responsibility of the district. Chevron ES will facilitate field experts to attend any hearings as required by the district.
- Parking areas during construction will be blocked to access by students and college personal for safety reasons.

Section 4

Monitoring & System Maintenance

California Solar Initiative Monitoring Requirements

The California Solar Initiative (CSI) provides financial incentives to customers installing PV systems in territories service by investor owned utilities. All PV systems enrolled in the CSI program must abide by the minimum metering and monitoring requirements outlined in the CSI Program Handbook. Please refer the CSI Program Handbook for a complete description of the metering and monitoring requirements (http://www.gosolarcalifornia.ca.gov/csi/index.html).

Monitoring Services

To help ensure the long-term success of the District's energy program, Chevron ES offers a monitoring system to provide the District with the ability to monitor the Merritt College PV system output in near real time.

The proposed plan includes the following monitoring services:

- Electricity generation monitoring reports managed through UtilityVision
- IT and Firewall Port Requirements for UtilityVision
- Annual site visit

UtilityVision Monitoring System

The main component of our UtilityVision is the "Acquisuite" Data Acquisition Server. The data acquisition server collects data from the onsite monitoring equipment, translates the data to useful information and uploads it to our central server. After formatting the information, a kiosk located at the Merritt College facility (or any other location selected by the district) displays the energy generated by the PV system.

The tables below identify the network architecture for the kiosk display and data acquisition server.

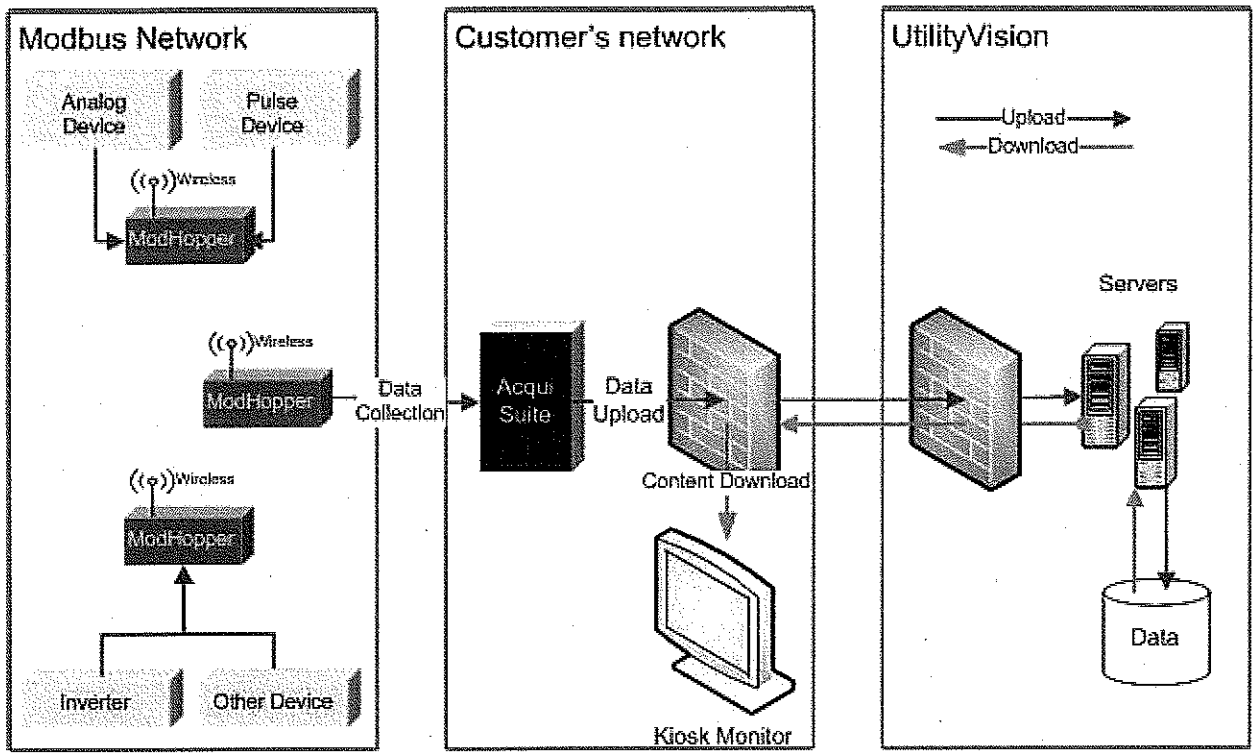
In order to be able to maintain the devices, CES will need a VPN connection. The connection should be open to the range 12.105.152.128/27 or at least 12.105.152.137.

AcquiSuite Data Acquisition Server – TCP Ports

Port Number	Direction	Transport Protocol	Communication Protocol	Description
80	Outbound	TCP	HTTP	Used to upload interval data and status information.
80	Inbound	TCP	HTTP	Allows remote connection for maintenance purposes

Kiosk Display – TCP Ports

Port Number	Direction	Transport Protocol	Communication Protocol	Description
80	Outbound	TCP	HTTP	Used to downloads web content to local drive
3389	Inbound	TCP	Terminal Client	Allows remote desktop connection for maintenance purposes



Additional Connectivity Requirements

UtilityVision requires the following connectivity provisions:

- Provide a 10BaseT Ethernet connection on the LAN for each UtilityVision panel
- Assign a static internal IP address (10 dot) for each UtilityVision panel.
- Assign a public IP address to each metering panel.
- Provide the default gateway IP address and the network mask size.

Maintenance Services

In conjunction with our commitment to quality and long term relationships with our customers, Chevron ES offers a maintenance program with five and ten year components to support the rebate and warranty.

Inspections (10 years)

Inspect PV modules, combiner boxes, inverters, isolation transformers, and support structure on an annual basis.

On an annual basis, measure voltage and current output at each PV string and compare the measurements to isolation and temperature readings.

On an annual basis, check electrical connections at array combiner boxes, main combiner boxes and inverters.

Monitoring (5 years)

Monitor system performance on a real-time basis. Provide a real-time data stream to the kiosk display.

Inverter Cleaning (5 years)

1. Remove dust, dirt, and debris from outside cabinets of combiner boxes, inverters, transformers, and disconnect switches on an annual basis.
2. If Chevron ES determines that additional cleaning and site maintenance services are necessary to maintain the integrity of the system, we shall provide at an additional cost.

Solar Panel Cleaning (3 years)

1. Wash PV modules to remove accumulated dust and debris on an annual basis.
2. If Chevron ES determines that additional cleaning and site maintenance services are necessary to maintain the integrity of the system, we shall provide at an additional cost.

Repair Services

Provide repairs for the PV system as required to restore the generating facilities to normal operating parameters or to replace deteriorated, damaged parts.

"Repairs" will include any of the following as necessary: procuring parts or materials, removing damaged or out-of-specification parts or materials, and installing repaired or replacement parts or materials and testing.

In the event that Chevron ES determines repair services are necessary, we shall provide for those repairs and receive payment on a time and materials basis. In such an event, we will, except in the event of an emergency or in the event that we otherwise believe that a failure of the generating facility is imminent, provide advance notice to and receive prior written approval from District, of the scope, schedule and reasons for the repair.

Responsibilities of the District

- Generating facilities shall be preserved in their entirety and maintained in good working order as of the Effective Date of the Solar Services Contract. The district shall not alter the system in any way that prevents Chevron ES from performing maintenance duties.
- Operate and maintain security systems associated with generating facilities.
- Allow Chevron ES and our subcontractors to access as necessary to the generating facilities, and any related areas that may be reasonably necessary for performance of the services.
- Allow Chevron ES and our subcontractors to access reasonable quantities of water, electrical power, and other utilities then existing at the site as necessary for contractor to satisfy its obligations, free of charge.
- Customer shall be responsible pursuant to applicable law for the remediation of any known Hazardous Substances encountered by Contractor during the performance of the Services.
- Chevron ES shall have no obligation to provide the Services to the extent such provision of services is materially adversely affected by District's failure to satisfy the conditions set forth in this section.
- The District shall maintain the height of trees (if not removed or relocated) that have already been specified to an acceptable level so as not impede maximum solar production of any solar panel.