REDWOOD COAST EnergyAuthority

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Solar Feasibility Study

City of Arcata

December 2022

Arcata Community Center--321 Community Park Way, Arcata, CA 95521

Striving to develop and implement sustainable energy initiatives that reduce energy demand, increase energy efficiency, and advance the use of clean, efficient and renewable resources available in the region.

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1 Executive Summary

The City of Arcata (COA) is working with Redwood Coast Energy Authority's (RCEA) Public Agency Solar Program. As part of that work, RCEA performed an analysis of the energy consumption, efficiency opportunities, and solar photovoltaic installation opportunities at the Arcata Community Center, located at 321 Community Park Way in Arcata. RCEA believes that the most technically and economically viable projects include interior and exterior lighting efficiency upgrades and a solar PV installation at the Arcata Community Center.

RCEA believes that the City of Arcata could apply for the CEC 1% interest loans available to qualified renewable energy projects through the Energy Conservation and Assistance Act (ECAA). RCEA believes these projects will qualify for the ECAA 1% interest loans. If the City of Arcata's City Council resolves to move forward with any of the projects described in this report, RCEA's Public Agency Solar Program will continue to provide support in the form of project management, loan application assistance and technical assistance. Table 1 below provides a summary of the results from RCEA's efficiency and solar PV feasibility analyses.

Table 1 Summary of solar photovoltaic (PV) and energy efficiency options for Arcata's Community Center.

Project Measure / Location	Measure Cost ($)	Peak Demand Savings (kW)	Annual Electric Savings (kWh)	Measure Annual Cost Savings ($)	EUL (years) (For 1% Loans will be lesser of actual EUL or 17 Years)	Measure Cost Savings over EUL ($)	Measure Payback (years)
Retrofit eighty-five (85) CFL interior fixtures and MH and fifty-two (52) MH sports lights fixtures to LED fixtures at Arcata Community Center	$129,479	19.1	22,258	$6,620	15.0	$99,297	19.6
Install 109 kW (DC), roof-mounted solar photovoltaic array on Arcata Community Center	$381,000	24.7	125,395	$24,418	17.0	$415,106	15.6
Totals	$510,479	43.8	147,653	$31,038		$514,403	16.4

2 Introduction

The City of Arcata began working with Redwood Coast Energy Authority as part of RCEA's Public Agency Solar Program in January of 2020. After an initial kick-off meeting with City staff, the city indicated three initial sites of interest: Arcata Library, Arcata Community Center, and the 4700 West End Road site. Due to limitations via Covid-19 safety recommendations, RCEA conducted virtual assessments of the City's sites of interest. This report is limited to RCEA's analysis of the energy consumption, efficiency options, and solar photovoltaic installation opportunities at the Arcata Community Center.

2.1 Site Description

The Arcata Community Center is an assembly facility located at 321 Community Park Way in Arcata, CA. The site is used for community events and city sponsored programs. The community center hosts a senior dining program, a teen center, and has a commercial kitchen, dining room, gymnastics court, gymnasium, and classrooms. The site also has two community soccer fields, a futsal court and two softball/baseball fields with sports lighting. The site was first assessed back in 2013 by the Redwood Coast Energy Authority's (RCEA) Energy Watch program for lighting opportunities and again in 2021 by RCEA's Local Government Partnership program for additional energy saving measures. As part of the Energy Watch program, the community center upgraded the parking lot lighting from high intensity discharge lighting to all LED fixtures. There is also a city maintenance facility located on the same property.

2.2 Facility Description

The Arcata Community Center is a single building with 19,639 square feet of conditioned space. The building was constructed in 1999. The interior space comprises a lobby, a gymnasium, a teen center, a senior center/senior dining room, senior center office, an arts and crafts room, a conference room, a commercial kitchen, restrooms, as well as hallways and storage areas. These areas are detailed in Table 2 below.

Table 2 Community Center conditioned space descriptions and square footages.

Area Name	Area (Sq-Ft)
Lobby	944
Corridor/Restrooms	802
Janitor's Room	78
Gym Storage	358
Teen Center	831
Teen Center Kitchen	71
Teen Center Storage	62
Conference Room	301
Arts and Crafts Room	911
Hallway	365
Gym Storage	250
Storage	54
Senior Center	1,938
Senior Center Office	86
Senior Center Storage	90
Kitchen	1,162
Gymnastics	1,708
Gymnasium	9,628
Total Square Footage	**19,639**

3 Electric Load Analysis

RCEA performed an electric load analysis of the City of Arcata's electric consumption using utility data from the previous 12 months of use covering the period from January of 2022 to December of 2022. COA receives electric transmission and distribution service from PG&E and is enrolled in RCEA's Community Choice Energy program, a Community Choice Aggregation program that provides the power content. Analysis of the Arcata Community Center site includes five (5) electric meters: both north and south ballfield lights, the maintenance building, the parking lot lights, and the main community center building. The electric meters are on B1 (3), B6, and B10 electric rate schedules respectively. RCEA's and PG&E's electric rates and time-of-use periods used throughout this analysis can be found in **Appendix A** of this document. Table 3 and Figures 1 and 2 below show a summary of the annual electric costs and consumption across the five (5) electric meters analyzed in this report.

Table 3 Summary of electric use at City of Arcata's eight (5) meters analyzed in this report.

Site Name	Rate	Total Annual Load (kWh)	Percentage of Load (%)	Total Annual Charges ($)	Percentage of Charges (%)	Average Cost/kWh ($)
Community Center	B-10-S	89,016	77.8%	$29,969	77%	$0.34
City Maintenance Shop	B-1	5,880	5.1%	$1,920	5%	$0.33
Parking Lot Lights	B-6	11,063	9.7%	$3,504	9%	$0.32
North Ball Field Lights	B-1	6,042	5.3%	$2,354	6%	$0.39
South Ball Field Lights	B-1	2,356	2.1%	$1,200	3%	$0.51
Totals		114,357	100%	$38,947	100%	$0.34

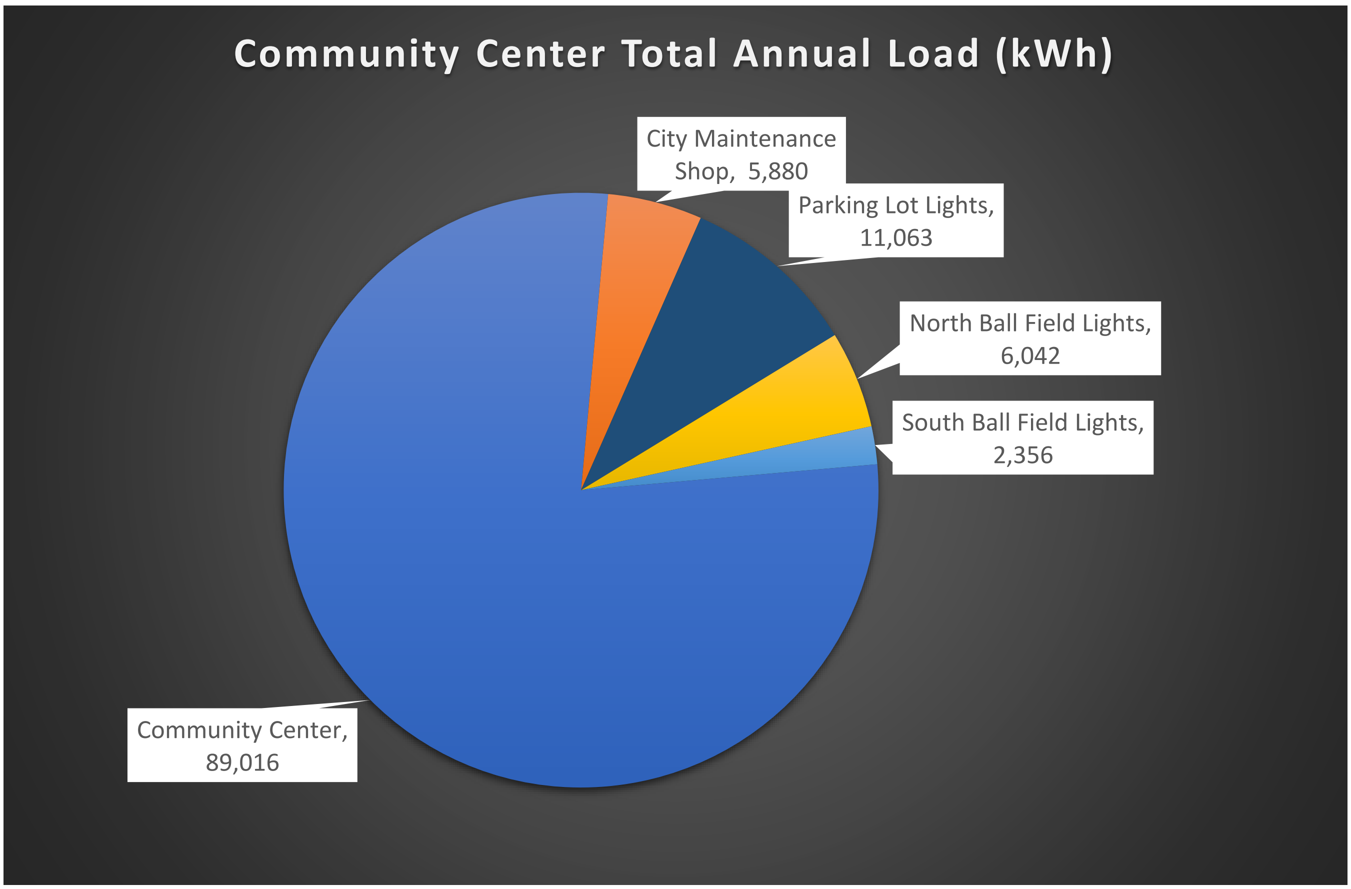

Figure 1 Annual electric use from the Arcata Community Center's five electric meters analyzed in this report.

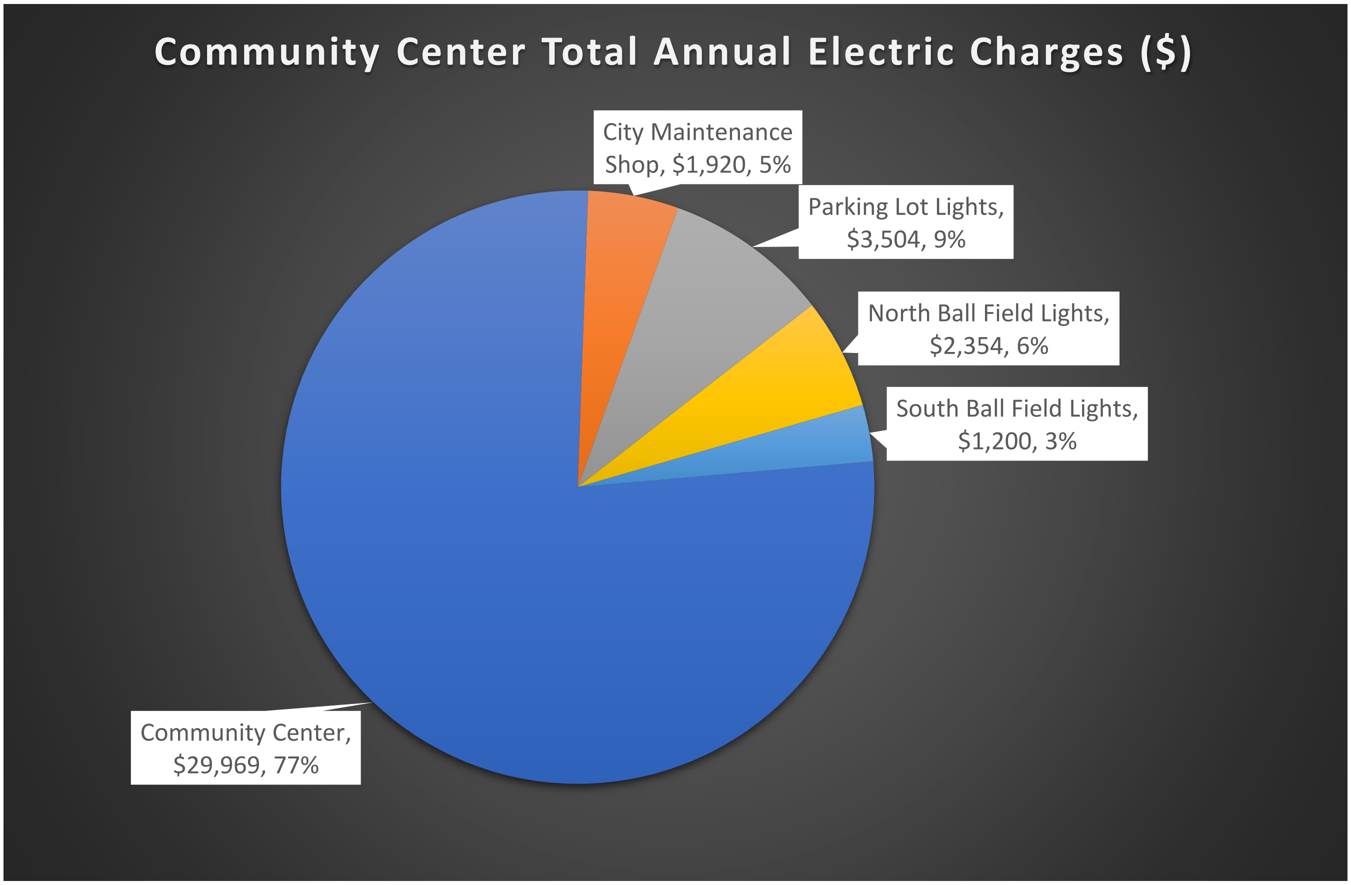

Figure 2 Annual electric cost from the Arcata Community Center's five electric meters analyzed in this report.

4 Arcata Community Center

The total annual electric load for the community center site, which includes all five (5) onsite electric meters, was 114,357 kilowatt hours (kWh) per year. The total annual cost of electricity at the community center site during the 12 months analyzed in this report was $38,947. The largest electric account is on a B10 electric rate, with smaller accounts on B1 and B6 electric rates. The site includes five (5) electric meters: both north and south field lights, the maintenance building, the parking lot lights, and the main community center building. The electric meters are on B1 (3), B6, and B10 electric rate schedules respectively. Table 4 below shows a summary of the electric use and costs for the five meters.

Table 4 Summary of annual electric use from the Community Center's five (5) electric accounts.

City of Arcata Annual Electricity Summary-All Sites	
Annual Electric Consumption (kWh)	114,357
Annual Electricity Costs ($)	$38,947
Average Electricity Rate ($/kWh)	$0.34

4.1 Community Center Efficiency Opportunities

RCEA performed an in-person audit and assessment of the interior and exterior lighting fixtures in September of 2021. The existing can fixtures in the gymnasium and gymnastics room use compact fluorescent (CFL) lamps. Can lights can be either completely replaced or retrofitted using a retrofit kit. The recommended fixtures retrofits are also available with an option to add a dimming control. The dimming features may be used to reduce energy usage of the lights for demand response. RCEA's audit found a total of 42 CFL can fixtures.

The existing fixtures in the Gymnasium are square recessed high bay fixtures with a metal halide bulb. Maintenance savings from the long life of the LEDs are especially important for difficult to access fixtures, such as these. Due to the unusual style of these fixtures and to retain the recessed look, a retrofit kits for the high bay inside is recommended. The recommended retrofit is also available with a dimming option for demand response. RCEA's audit found a total of 31 high bay fixtures.

The wallpacks on the exterior of the building are metal halide full cutoff fixtures. LED fixtures have instant-on capabilities with no warm-up time needed. This allows the lights to be fitted with motion sensors if desired. Exterior lighting can also be dimmed for demand response. The full cutoff fixtures do not add to light pollution in the sky. The latest recommendations for exterior lighting include changing to a warmer color temperature, at least 4000K or even lower. RCEA's audit found 5 of these fixtures.

The exterior doorways are also lit with LED Can lights. Replacing the can lights with an LED fixture will reduce the energy usage. Instead of a can fixture, a canopy fixture can be installed in the existing space of the can. The color temperature of the canopy fixture should be chosen to match the wallpacks. RCEA's audit found 7 of these fixtures.

Currently most of the switching in the Community Center appears to be manual. Adding occupancy sensors to areas with intermittent occupancy, such as bathrooms and closets will ensure that lights get turned off without ever having to touch a switch. For rooms where lights might need to remain off at times, or where more control is needed, a vacancy switch can be installed. Vacancy switches are manually turned on but turn off automatically when there is no occupancy. In areas where new fixtures could be installed, such as the gymnasium, gymnastics court, and exterior, dimming capability could also be installed. Fixtures with dimming drivers much be selected, and additional control wiring may be necessary. If the gymnasium has natural light, dimming could happen automatically to adjust to the available daylight. Dimming controls can also be used for demand response. A small reduction in light levels could lead to significant energy savings during a grid event.

The Arcata Community Center also supports two community baseball/softball fields that are currently lit with high wattage (1500-wat) metal halide fixtures. These fixtures could be replaced with lower wattage LED sports lighting that would save energy usage and costs. In addition, these fixtures would provide labor and maintenance savings because they have a much longer life than traditional metal halide bulbs which need more regular replacement. RCEA's audit found 52 of these fixtures.

RCEA estimates that the site could offset about 22% of its annual electric usage and costs by implementing LED lighting upgrades. The project would have a simple payback of 19.6 years, LED technologies have an effective useful life (EUL) of 15 years. Table 5 below shows a summary of the available savings from an LED lighting upgrade at the Arcata Community Center.

Table 5 Annual bill savings and energy offset for a lighting efficiency upgrade at Arcata's Community Center

Energy Conservation Measure	Estimated Project Cost ($)	Annual Energy Savings (kWh)	Annual Avoided Costs ($)	Simple Payback (Years)
Retrofit eighty-five (85) CFL and MH interior fixtures and fifty-two (52) MH sports lights fixtures to LED fixtures and add vacancy/occupancy/ dimming controls	$129,479	22,258	$6,620	19.6

4.2 Solar Photovoltaic (PV) Site Analysis

The Arcata Community Center site has available area for solar PV arrays on the southwest and southeast facing roofs of the community center building. The Community Center building is a multistory building; the roof has a 3-in-12 pitch (14.0°). The southwest facing roof is oriented 35 degrees west of due south (215°) and will experience approximately 2% shading on average. The southeast facing roof is oriented 45 degrees east of due south (125°) and will experience approximately 2% shading on average. The northwest facing roof is oriented 125 degrees west of due south (305°) and will experience approximately 2% shading on average. California Fire Marshal guidance for solar PV installations require 3' setbacks from gable ends and ridges of the roof. Accounting for area constraints due to small obstructions on the roof surface and Fire Marshall setbacks, the available area for installation on the roofs of the community center is approximately 6,500 square feet. Figure 3 below shows the potential layout and installation area for rooftop solar PV at the Arcata Community Center site.

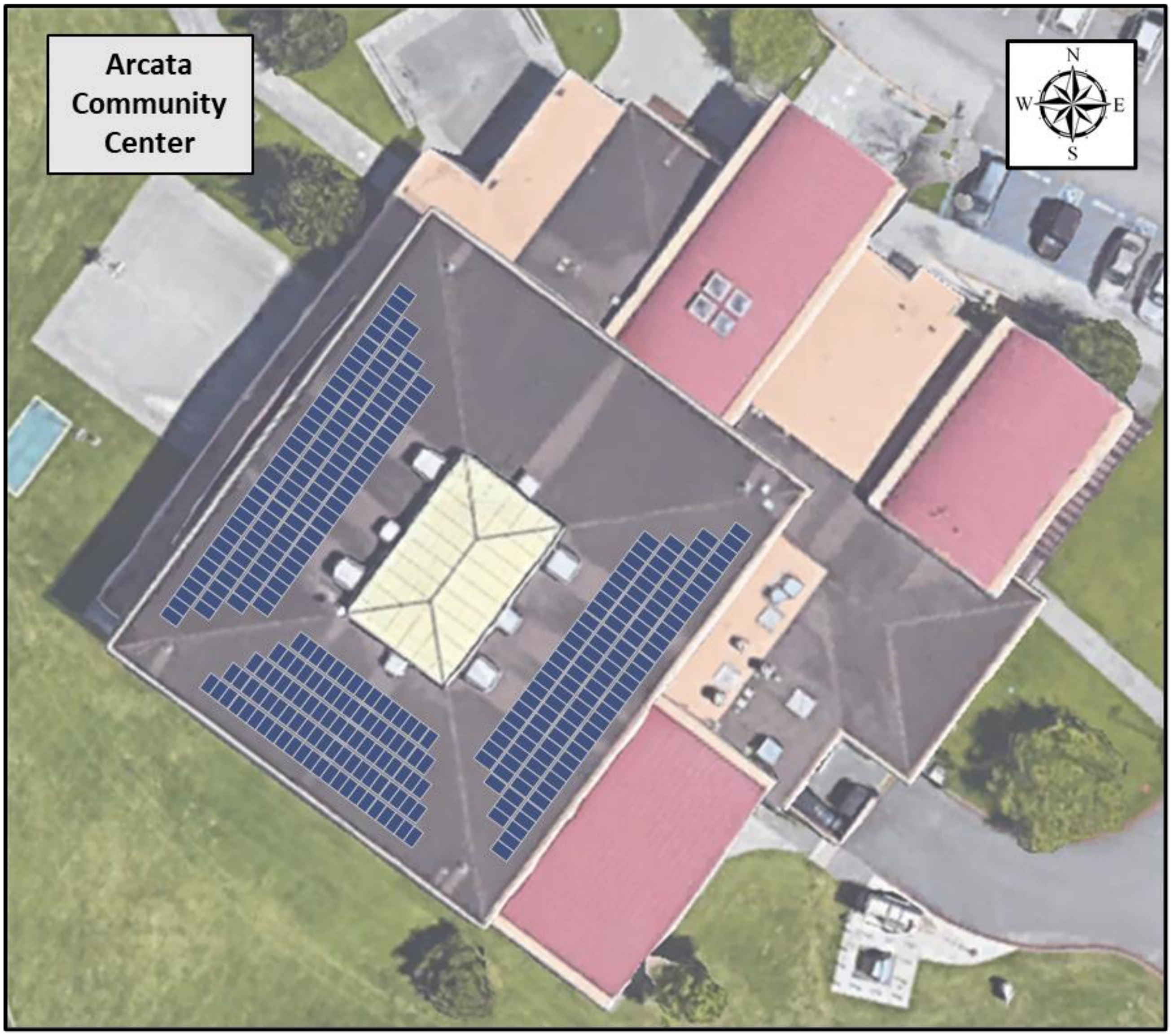

Figure 3 Potential solar PV installation area at COA's Community Center Building.

4.3 Solar Photovoltaic (PV) System Size

RCEA estimates that the Community Center southeast, southwest, and northwest facing roofs shown in Figure 3 could host a combined109 kW DC solar photovoltaic array.

A 109 kW DC solar PV array installed on the Community Center roof could offset approximately 100% of the electric consumption and 63% of the electric bills associated with the five electric accounts at the Community Center.

4.4 NEM2A Option

RCEA's analysis of the site indicates the project would meet the requirements of PG&E's Aggregated Net Energy Metering (NEM-2A) program which allows for the installation of one solar array that would offset the electricity from multiple qualified benefitting electric accounts. This program requires that all meters in an arrangement be owned or controlled by one entity and all meters must be on the same parcel or contiguous parcels. Figure 4 below shows the five (5) meters located on the Arcata Community Center in red and parcel boundary in yellow.

Figure 4 Community Center parcel and five associated electric meters.

4.5 Analysis Results and Costs

RCEA has a recent history with solar PV installations for public works projects in California's Proposition 39 program. The average installed price of a roof-mounted solar PV system, including all labor, materials, engineering, permitting and design has typically been about $3.50/DC watt. Assumptions and inputs for RCEA's financial analysis are listed in **Appendix B**. An average installed price of $3.50/DC watt yields a combined PV cost of approximately $381,000; the system would have a simple payback period of 15.6 years. Table 6 below shows a summary of the analysis results for a combined 109 kW DC of solar PV at the Arcata Community Center site.

Table 6 Potential solar photovoltaic array options for Arcata Community Center.

Energy Measure	Array Size	Annual Energy Production (kWh AC)	Annual kWh Offset from PV (%)	Annual Bill Offset from PV (%)	First Year Avoided Cost ($)	Project Installation Cost ($)	Project Payback (Years)
Community Center Solar Photovoltaic Array	109	125,395	110%	63%	$24,418	$381,000	15.6

5 CEC Loan Financing

The California Energy Commission's (CEC's) Energy Conservation Assistance Act (ECAA) makes 1% interest loans available to cities, counties, and special districts for energy efficiency and renewable energy projects. The potential roof mounted solar array and the LED lighting upgrades at Arcata's Community Center would qualify for this funding source. The CEC's ECAA loan is a 1% interest loan, the loan amortization is based on the estimated savings from the energy projects. The payback period begins one year after project completion allowing the city to bank the energy savings dollars which would be used for the loan repayment. Because the loan is paid for by the annual energy savings to the city, the loan is revenue neutral and functions similar to an "on-bill" finance program. The ECAA loan funding is made available on a reimbursement basis for qualified energy expenditures. RCEA has researched the loan requirements and believes the described projects would qualify for loan funding. RCEA can help put together a loan application package for the City of Arcata to apply for the CEC's ECAA loan program if the City Council votes to approve applying for these funds. The table below shows a summary of the energy efficiency and solar PV options at Arcata's Community Center.

Table 7 Summary of energy efficiency and solar PV options at Arcata's Community Center.

Project Measure / Location	Measure Cost ($)	Peak Demand Savings (kW)	Annual Electric Savings (kWh)	Measure Annual Cost Savings ($)	EUL (years) (For 1% Loans will be lesser of actual EUL or 17 Years)	Measure Cost Savings over EUL ($)	Measure Payback (years)
Retrofit eighty-five (85) CFL interior fixtures and MH and fifty-two (52) MH sports lights fixtures to LED fixtures at Arcata Community Center	$129,479	19.1	22,258	$6,620	15.0	$99,297	19.6
Install 109 kW (DC), roof-mounted solar photovoltaic array on Arcata Community Center	$381,000	24.7	125,395	$24,418	17.0	$415,106	15.6
Totals	$510,479	43.8	147,653	$31,038		$514,403	16.4

6 Audit Methodologies

6.1 Lighting

RCEA staff performed an area-by-area, walk through audit of the interior lighting at the Arcata Community Center. In addition, RCEA audited the exterior, pole-mounted sports lighting used at the two ballfields. City staff was able to provide specifications and wattages for the existing fixtures to supplement RCEA's data collection. The data from the lighting audits was then entered into the Modified Lighting Calculator (MLC) (version 13.1.1) that is accepted by the California Public Utilities Commission for custom, calculated lighting projects that are incentivized through RCEA's Elect-to-Administer, direct-install energy efficiency programs. The MLC was used to generate estimates of energy and cost savings for the project. RCEA worked with their partner contractor to get a quote in order to estimate the cost of the project for the loan application

6.2 Solar Photovoltaics

RCEA analyzed the required PV system size to offset almost 110% of the kWh consumed from the five (5) electric meters associated with this site including the Community Center, north ballfield lights, south ballfield lights, parking lot lights and city maintenance shop. RCEA downloaded insolation data from PV Watts for global horizontal irradiance on a flat plane. Table 8 below shows the insolation data on a horizontal plane; Table 9 shows insolation at an azimuth of 215° (near due south) on a surface tilted to 14°.

Table 8 Average global horizontal irradiance on a flat plane for the Arcata Community Center.

Average Daily Insolation for Arcata, CA (latitude 40.85°N, longitude 124.1°W, from PV Watts)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Average Insolation (kW/m^2/day)	1.77	2.48	3.56	5.03	5.84	6.52	5.94	5.26	4.51	3.35	1.98	1.45	3.98

Table 9 Average global horizontal irradiance at azimuth 215 degrees and a tilt of 14 degrees.

Average Daily Insolation for Arcata, CA at 215° azimuth and tilt of 14°													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Average Insolation (kW/m^2/day)	2.14	2.83	3.83	5.21	5.88	6.48	5.94	5.38	4.81	3.80	2.37	1.77	4.21

Table 10 below shows the inputs and assumptions used in RCEA's PV system sizing for the array on the south facing roof.

Table 10 Arcata Community Center PV System Sizing Inputs

Arcata Community Center PV System Sizing Inputs	
Array Orientation (Degrees)	215
Array Tilt (Degrees)	14
Average Daily Insolation (kWh/m^2/day)	4.21
Inverter Efficiency (%)	97%
De-rate Factor (Soiling, Wire Loss, Mismatch) (%)	10%
Shading	2%
Average Operating Cell Temperature (°C)	40
Temperature Coefficient of Power (Wp/°C)	-0.0037
Module DC Rating (Watts)	335
Manufacturer Power Guarantee (%)	98%

RCEA's system sizing methodology is adopted from and detailed in *Photovoltaic Systems* by James Dunlop. Module specs are based on Q-Cell Peak-G5 335-watt modules. Inverter efficiency and MPPT efficiency are based on a SMA-TL-US inverter. The equations below outline the system sizing process; tables 10 and 11 show the actual values used in the calculations for the south facing array at the Community Center, the supporting workbook contains the same detailed calculations for all the arrays proposed for this project.

RCEA's system sizing methodology starts with the daily energy production goal, derived by dividing the total, annual kWh consumed on site by 365. RCEA uses a "peak sun hours" method of system sizing where 1000 watts/m^2/day is one "peak sun hour" corresponding to the Standard Test Conditions (STC) under which the solar modules are given their name-plate rating (Solar Energy International, 2013). This is divided by the average daily insolation to estimate a required inverter AC output (EQ 1).

$$\frac{\text{Daily Energy Production Goal (kWh)}}{\text{Avg. daily insolation } \frac{\text{kWh}}{\text{m}^2 \times \text{day}}}$$

$$= \textbf{Required Inverter AC Output (kW)} \qquad \text{EQ 1}$$

The output is then de-rated for inverter efficiency to estimate the required array DC output in kW (EQ 2)

$$\frac{\text{Inverter AC Output (kW)}}{\left(\frac{\text{Inverter Efficiency}}{\text{Max Power point tracking Efficiency}}\right)}$$

$$= \textbf{Required Array DC Power Output (kW)} \qquad \text{EQ 2}$$

A further de-rating (10%-14%) is applied to account for module mismatch, soiling, wire loss, shading and other system losses (EQ 3).

$$\frac{\text{Required Array Output (kW)}}{1 - (\text{Derate Factor} + \text{Shading})}$$

$$= \textbf{Required Temp. Corrected Array Power Output} \qquad \text{EQ 3}$$

This is further de-rated by accounting for temperature corrected output at nominal operating cell temperature of 40^{o} C for coastal regions and 47^{0}C for inland regions of Humboldt County and again de-rated based on the module manufacturer's power guarantee (EQ 4).

$$\frac{(\text{Temp. Corrected Array Power Output})}{\left(1 + 1 \times \text{Temp. CoeffiecientofPower} \times (\text{Avg. OperatingTemp. }(^\circ\text{C}) - 25)\right)}$$

$$= \textbf{Required Array Guaranteed Power Output (kW)} \qquad \text{EQ 4}$$

An estimate of the required number of modules for the PV array can be generated using the required array guaranteed power output, the manufacturer power guarantee and the individual module DC rating (EQ 5). This value is always rounded up to the nearest whole number of modules.

$$\frac{\frac{\text{Required Array Guaranteed Power Output}}{\text{Manufacturer Power Guarantee (\%)}}}{(\text{Module DC Rating (Watts)}/1000)}$$

$$= \textbf{Number of Modules in Array} \qquad \text{EQ 5}$$

Multiplying the module DC rating by the number of modules in the array yields the total DC system size (EQ 6).

$$\frac{(\text{Module DC Rating (Watts)} \times \text{ Number of Modules in Array})}{1000}$$

$$= \textbf{DC System Size (kW)} \qquad \text{EQ 6}$$

Table 11 shows the values used to estimate a DC system size of 34.5 kW for the solar PV array on the south facing roof.

Table 11 Example of RCEA's solar PV system sizing.

DC System Size Based on Annual Electric Load	
Average Daily Insolation (kWh/m2/day)	4.21
Daily Energy Production Goal (kWh)	113.73
Required Inverter AC Output (kW)	27.01
Inverter Efficiency	0.97
Maximum Power Point Tracking Efficiency	1.00
Required Array DC Output (kW)	27.85
De-rate Factor (Soiling, Wire Loss, Mismatch) (%)	0.12
Required Temp Corrected Array Power Output	31.65
Average Operating Temperature (°C)	40.00
Temperature Coefficient of Power (/°C)	-0.0037
Required Array Guaranteed Power Output	33.51
Module DC Rating (Watts)	335.00
Manufacturer Power Guarantee (%)	0.98
Number of Modules in Array	103.00
DC System Size (kW)	34.51

Multiplying the module DC rating, the manufacturer power guarantee, and the number of modules in the array yields the array guaranteed power output (EQ 7).

$$\frac{(\text{Module DC Rating (Watts)} \times \text{Manufacturer Power Guarantee (\%)} \times \text{ Number of Modules in Array})}{1000}$$

$$= \textbf{Array Guaranteed Power Output (kW)} \qquad \text{EQ 7}$$

To account for the effect of temperature on power output, the temperature coefficient of power is applied to the array guaranteed power output (EQ 8).

$$\text{Array Guaranteed Power Output (kW)} + (\text{Array Guaranteed Power Output (kW)} \times Temperature\ Coefficient\ of\ Power\ (\%/°C) \times (Average\ Operating\ Temperature\ (°C) - 25)) \qquad \text{EQ 8}$$

$$= \textbf{Temp. Corrected Array Power Output (kW)}$$

Derating for soiling, wire loss, and mismatch yields the net array DC output (EQ 9).

$$\text{Temp Corrected Array Power Output (kW)} - (\text{Temp Corrected Array Power Output (kW)} \times \text{Derate Factor(Soiling, Wire loss, Mismatch)})$$

$$= \textbf{Net Array DC Output} \qquad \text{EQ 9}$$

Further derating for inverter efficiency and maximum power point tracking efficiency results in inverter AC output (EQ 10).

$$\text{Net Array DC Output} \times \text{Inverter Efficiency} \times \text{Maximum Power Point Tracking Efficiency}$$

$$= \textbf{Inverter AC Output} \qquad \text{EQ 10}$$

Daily energy production can then be found by multiplying the inverter AC output by the average daily insolation at the site EQ 11).

$$\text{Inverter AC Output} \times \text{Average Daily Insolation}$$

$$= \textbf{Daily Energy Production (kWh)} \qquad \text{EQ 11}$$

Annual energy production is then found by multiplying the daily energy production (kWh) by the number of days per year (EQ 12).

$$\text{Daily Energy Production (kWh)} \times 365 \text{ Days/Year}$$
$$= \textbf{Annual AC Energy Production (kWh)} \qquad \text{EQ 12}$$

Table 12 shows the values used to estimate the annual AC energy production of 41,894 kWh for south facing solar PV array at the Community Center.

Table 12 Summary of RCEAs annual energy production analysis.

Annual AC Energy Production Based on System Size	
Module DC Rating (Watts)	335.00
Manufacturer Power Guarantee (%)	0.98
Number of Modules in Array	103.00
Array Guaranteed Power Output (kW)	33.81
Average Operating Temperature (^oC)	40.00
Temperature Coefficient of Power (%/^oC)	-0.0037
Temp Corrected Array Power Output (kW)	31.9382
De-rate Factor (Soiling, Wire Loss, Mismatch) (%)	0.12
Net Array DC Output	28.11
Inverter Efficiency (%)	0.97
Maximum Power Point Tracking Efficiency	1.00
Inverter AC Output	27.26
Average Daily Insolation	4.21
Daily Energy Production (kWh)	114.78
Annual AC Energy Production (kWh)	41,894

Appendix A Electricity rate schedules used for solar PV feasibility analysis

B-1 Electric Rates				
Season	**Total B-1 Rates**	**Months**	**Days**	**Time**
Summer Peak	0.33479	Jun-Sept	Every Day	4PM-9PM
Summer Part-Peak	$0.28556	Jun-Sept	Every Day	Part Peak (2-4PM, 9-11PM)
Summer Off-Peak	$0.26475	Oct-May	Every Day	Off-Peak (All Other Hours)
Winter Peak	$0.25937	Oct-May	Every Day	Peak (4PM-9PM)
Winter Off-Peak	$0.24325	Mar-May	Every Day	Off-Peak (2PM-4PM, 9PM-9AM)
Winter Super Off-Peak	$0.22683	Oct-May	Every Day	(9AM-2PM)

B-6 Electric Rates				
Season	**Total B-6 Rates**	**Months**	**Days**	**Time**
Summer Peak	0.36517	Jun-Sept	Every Day	4PM-9PM
Summer Part-Peak	$0.24723	Jun-Sept	Every Day	Part Peak (2-4PM, 9-11PM)
Summer Off-Peak	$0.25756	Oct-May	Every Day	Off-Peak (All Other Hours)
Winter Peak	$0.23781	Oct-May	Every Day	Peak (4PM-9PM)
Winter Off-Peak	$0.22140	Mar-May	Every Day	Off-Peak (2PM-4PM, 9PM-9AM)
Winter Super Off-Peak	0.36517	Oct-May	Every Day	(9AM-2PM)

B-10 Electric Rates				
Season	**Total B-10 Rates**	**Months**	**Days**	**Time**
Summer Peak	0.27142	Jun-Sept	Every Day	4PM-9PM
Summer Part-Peak	$0.20973	Jun-Sept	Every Day	Part Peak (2-4PM, 9-11PM)
Summer Off-Peak	$0.17716	Oct-May	Every Day	Off-Peak (All Other Hours)
Winter Peak	$0.19515	Oct-May	Every Day	Peak (4PM-9PM)
Winter Off-Peak	$0.15967	Mar-May	Every Day	Off-Peak (2PM-4PM, 9PM-9AM)
Winter Super Off-Peak	$0.12333	Oct-May	Every Day	(9AM-2PM)