

**CITY OF SONOMA
CITY HALL, NO. 1 THE PLAZA,
SONOMA, CA 95476**

**PHOTOVOLTAIC FEASIBILITY STUDY
FOR THE
CORPORATION YARD, FIRE STATION,
POLICE STATION AND
NORRBOM ROAD WATER TANK FACILITIES**



FINAL REPORT

MARCH 17, 2009

Prepared By:

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MEMORANDUM

To: Rob Gjestland, Senior Planner - City of Sonoma
Client: City of Sonoma, CA
Prepared By: Shishir Doctor, P.E., LEED AP - Winzler & Kelly
Date: February 17, 2009
Subject: Photovoltaic Feasibility Study for the City of Sonoma Corporation Yard, Fire Station, Police Station and Norrbom Road Water Tank facilities.
Project No. 02418-08-011

1.0 Purpose

The purpose of this technical memorandum is to evaluate the feasibility of installing photovoltaic systems at the City of Sonoma Corporation Yard, Fire Station, Police Station and Norrbom Road Water Tank facilities.

This report is being prepared in response to the Clean Renewable Energy Bonds (CREB) issued, totaling \$1,156,000 for use in funding the installation of photovoltaic systems at the following locations:

- A. City of Sonoma Corporation Yard, 19728 Eighth Street East, Sonoma, CA
- B. City of Sonoma Fire Station, 630 Second Street West, Sonoma, CA
- C. City of Sonoma Police Station, 175 First Street West, Sonoma, CA
- D. City of Sonoma Norrbom Road Water Tank Facilities, Pump House #6, 100 First Street West, Sonoma, CA

The CREBs provide funds for the installation of photovoltaic systems at the specified locations up to the maximum amounts allocated under the issued bonds.

Site	CREB Budget	CREB Budget Less Cost for Issuance of Bonds
Corporation Yard	\$180,000	\$164,711
Fire Station	\$242,000	\$221,445
Police Station	\$430,000	\$393,477
Water Tank Facilities	\$304,000	\$278,179
Total	\$1,156,000	\$1,057,812

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2.0 Description

Winzler & Kelly staff visited the various sites on September 12, 2008 to identify potential locations for installing the proposed photovoltaic (PV) arrays and ancillary components. Each site was evaluated using the following criteria.

- Building orientation
- Potential array mounting locations
- Potential inverter locations
- Structural limitations
- Building electrical service size
- Building electrical load type (i.e. constant, intermittent, etc)
- Photovoltaic array electrical interconnection points
- Site accessibility for maintenance of systems

Prior to the issuance of the bonds, the City of Sonoma worked with Dennis King of Solar Craft Services, Inc. to evaluate each site and determine suitability for installing PV systems at each site. The results of this site visit were summarized by City of Sonoma Senior Planner, Mr. Rob Gjestland, in a memo dated July 10, 2008. *See Appendix A - Memo Dated July 10, 2008 Summarizing Solar Craft Site Findings.*

3.0 Methodology

- A. The CREB funds will be used to provide the following services:
1. Task 1 - Conduct a feasibility study for the photovoltaic system
 2. Task 2 - Prepare a request for proposal (RFP) to solicit design-build price quotations from qualified contractors/vendors. Evaluate price quotations and select a qualified design-build contractor.
 3. Task 3 - Provide project management and construction support services to ensure that the PV system provided meet the design criteria and contract requirements.
 4. Task 4 - Retain a Design-Build contractor/vendor to provide a complete operational PV system based on the results of this feasibility report.

See Appendix E - Supplemental Report on CREBs for budget details, eligible project costs and CREBs project benefits.

Table 1 - Budgetary Cost Estimate shows the estimated engineering costs for Tasks 1, 2 and 3. Task 4 indicates funds available to award the design-build contract for providing and installing the photovoltaic system.

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TABLE 1 - BUDGETARY COST ESTIMATE						
Site	CREB Amount	Usable Funds after Bond Issuance Cost	Estimated Costs			
			Task 1	Task 2	Task 3	Task 4
			Feasibility Study	RFP DB Contract	PM & CS Services	Funds Available for Design-Build Contract
Corporation Yard	\$180,000	\$164,711	\$3,467	\$3,893	\$11,678	\$145,673
Fire Station	\$242,000	\$221,445	\$4,661	\$5,234	\$15,701	\$195,850
Police Station	\$430,000	\$393,477	\$8,282	\$9,299	\$27,898	\$347,997
Water Tank Facilities	\$304,000	\$278,179	\$5,855	\$6,574	\$19,723	\$246,026
TOTAL	\$1,156,000	\$1,057,812	\$22,266	\$25,000	\$75,000	\$935,546

- B. The design-build cost of the PV system is estimated at \$10.00 per installed watt (\$10,000 per installed kW) and is used to estimate the size (kW) of the PV array that can be installed at each site. *See Appendix B – Statewide Self-Generation Incentive Program Statistics from PG&E for PV system installation costs.*
- C. Using manufacturer’s data, the space allocation requirements for each 1-kW of PV panels is approximately 16.5 ft by 6 ft (99 square feet) of clear mounting area. This rating is based on using Sharp poly-crystalline, 170-watt PV modules rated at 13 percent efficiency. Each module has a nominal dimension of 62-inches by 36-inches.

The photovoltaic (PV) efficiency of a cell is used to describe the PV performance and is defined as the maximum electrical power output of the PV cell divided by the total available solar energy (irradiance) under industry standard conditions.

The industry standard irradiance value used to calculate the output capacity for a given cell is 1,000 watts / square meter. Factors such as cell soiling, age, shading (trees, nearby structures, etc) and available irradiance based on the time of year will vary the output.

- D. Based on industry standards, the PV system will receive approx. 1,800 hours of sunlight per year. This is an average of 6 hours per day of usable sunlight (1,800 hours/year for 300 days/year = 6 hours/day). The net kWh generated by the PV array may vary based on the weather pattern, final orientation of the installed array and the overall efficiency of the PV system provided.

The value of 6 hours of usable light per day used within the report is an average number of daylight hours and accounts for monthly irradiance variations.

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- E. The City would enter into an agreement with the service utility (PG&E) to permit connecting the photovoltaic system to the PG&E grid and also to provide a “Net Zero” metering contract. The Net Zero metering contract would allow the city to bank any excess kWh (net kWh harvested by the PV system less the kWh used by the connected loads), i.e. feed the excess kWh into the PG&E grid during the day and then use the banked kWh when the PV system is inactive. The PG&E agreement would cover applicable conditions and tariff for the banked or purchased kWh from PG&E at the end of each month.
- F. The service utility (PG&E) requires that the PV system utilize PG&E approved inverters to connect, transform and synchronize with the PG&E system. This requirement will be specified in the design criteria.
- G. PG&E also requires that an approved electrical disconnect switch be installed at the point of service connection. This is to facilitate disconnecting and locking-out the PV array from the PG&E system for maintenance purposes. This requirement will be specified in the design criteria.
- H. Each site was evaluated to identify a suitable area for locating the PV panels, inverters, disconnect switch and ancillary equipment.

4.0 Site Information

- A. City of Sonoma Corporation Yard
PG&E Meter # 97972R
Address: 19728 Eighth Street East, Sonoma, CA

Electrical Service: The Corporation yard electrical service size is 200 ampere, 208 volt, 3-phase and supplies power to the warehouse and office building (See Image 1).

Site: The warehouse consists of a non-reinforced corrugated aluminum structure approximately 25 feet in height. The roof is supported by steel trusses and is slightly pitched. The roof is considered to be of light weight construction and may not be adequate to support a PV array. Further structural analysis of the pre-fabricated building structural support system will be needed to determine upgrades required to support the proposed PV array.

The office building is located approximately 40 feet from the warehouse structure. It is wood frame construction and has a sloped roof (See Image 2). This building is approximately 10 feet in height with a roof area of 2,100 square feet (60 feet by 35 feet). A PV array could be installed on this roof. *See Appendix C – Building Plans for Roof area suitable for mounting Photovoltaic panels.*

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The inverter equipment could be located inside the existing warehouse building, directly behind the existing electrical service (See Image 3). The inverters should be installed in a dust and dirt free environment to maintain maximum efficiency. The utility disconnect switch can be located adjacent to the existing utility service meter and disconnect switch.

Roof access ladder and walkways would have to be installed to allow for periodic maintenance of the PV panels. These costs are included as special construction cost.

Operating Hours: Normal operating hours for the Corporation Yard are from 7:00 AM to 6:00 PM. The load is essentially constant through out the day.



Image 1 - Corporation Yard PG&E Service Meter



Image 2 - Corporation Yard Office Bldg.

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Image 3 - Corporation Yard Warehouse Bldg. Inverter Location

- B. City of Sonoma Fire Station
PG&E Meter # X08540
Address: 630 Second Street West, Sonoma, CA

Electrical Service: The Fire Station electrical service size is 1,200 ampere, 208 volt, 3-phase and supplies power to the facilities. There is an onsite engine generator to provide emergency power to the entire building in the event of a PG&E power outage.

Site: The building is a newer block and wood frame construction with a multiple panel, pitched roof system with different orientations. Due to the pitched roof structure and limited size of each roof panel, the PV panels would have to be split and installed on the south facing roof (See Image 4) and west facing roof (See Image 5). *See Appendix C – Building Plans for Roof area suitable for mounting Photovoltaic panels.*

The PV array conduit and cabling would have to be routed through the existing building space. Roof access ladders and walkways would have to be installed to allow for periodic maintenance of the PV panels. These costs are included as special construction costs.

The electrical room currently does not have any space for locating the inverters. The inverters location would have to be determined during the design. Possible locations are a closet or space within the building. The utility disconnect switch would be located outside, adjacent to the existing utility service disconnect switch (See Image 6).

Operating Hours: The Fire Station is occupied and operational 24 hours a day, 7 days a week. The load is essentially constant through out the day.

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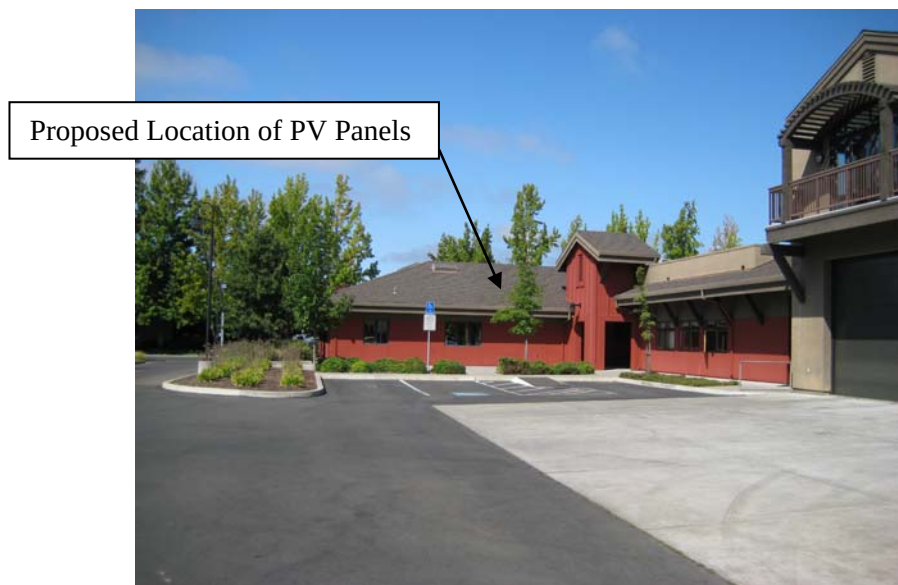


Image 4 - Fire Station Roofing System



Image 5 - Fire Station Roofing System

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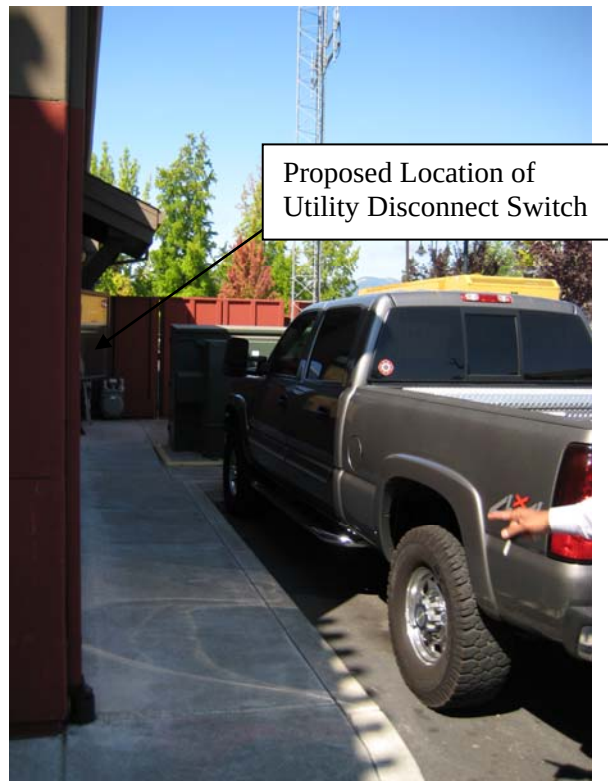


Image 6 - Fire Station Utility Disconnect Switch Location

- C. City of Sonoma Police Station
PG&E Meter # 38474710
Address: 175 First Street West, Sonoma, CA

Electrical Service: The Police Station electrical service size is 800 ampere, 208 volt, 3-phase and supplies power to the entire building. There is an onsite engine generator which provides power for emergency lighting and critical systems. This facility also functions as an Emergency Operations Center.

Site: The building is a newer block and wood frame construction with a multiple panel, pitched roof system with different orientations. The PV panels can be installed on the south facing roof panels (See Image 7 and 8). *See Appendix C – Building Plans for Roof area suitable for mounting Photovoltaic panels.*

Roof access ladder and walkways would have to be installed to allow for periodic maintenance of the PV panels. These costs are included as special construction costs.

Electrical rooms 34a and 34b do not have any space for locating the inverter equipment. A possible location would be inside electrical room 010 near the Community meeting

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room. Another option would be to locate the inverter equipment on the concrete pad adjacent to the fan coil units, outside the Community meeting room (See Image 9). The final location would depend on the size of the equipment provide by the PV system vendor. The utility disconnect switch would be located near the utility service panel (See Image 10).

Operating Hours: The Police Station is occupied and operational 24 hours a day, 7 days a week. The load is essentially constant through out the day.



Image 7 - Police Station PV Panel Location



Image 8 - Police Station PV Panel Location

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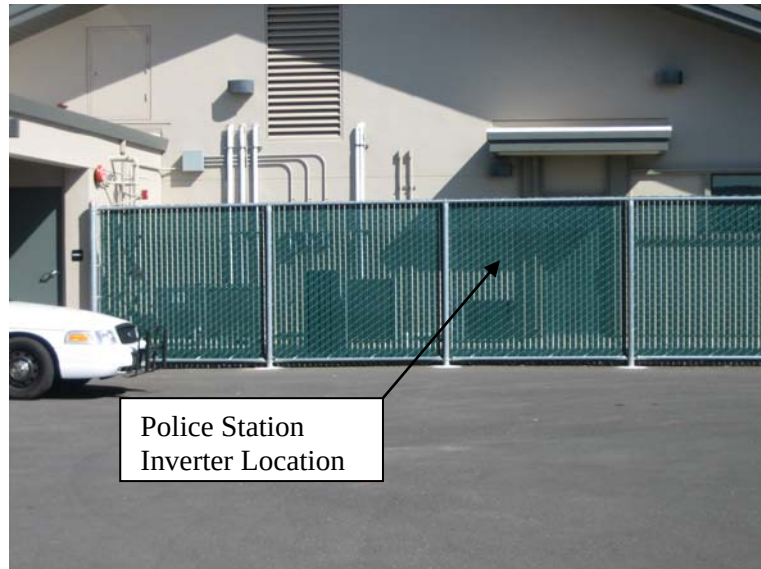


Image 9 – Police Station Inverter Location

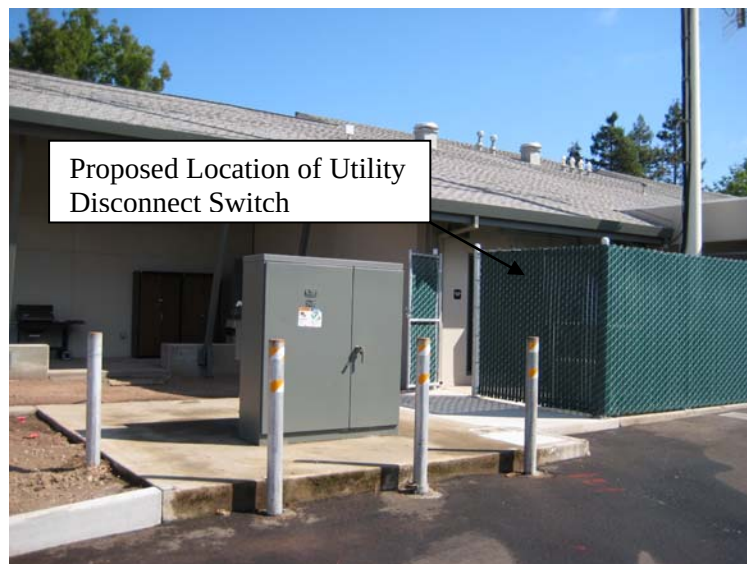


Image 10 - Police Station Utility Disconnect Switch Location

- D. City of Sonoma Norrbom Road Water Tank Facilities
PG&E Meter # 65734
Address: Pump House #6, 100 First Street West, Sonoma, CA

Electrical Service: The pump station electrical service size is 200 ampere, 480 volts, 3-phase and supplies power to the pump building and the adjacent well house. The pump

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station pumps water to the storage tank and is an integral part of the water storage facility.

Site: The water storage tank is located approx 2,000 feet from the pump station and the PG&E service meter and therefore not suitable for installing PV arrays.

The pump building is wood frame construction. The PV panels can be installed on the south facing roof panel (See Image 11). *See Appendix C – Building Plans for Roof area suitable for mounting Photovoltaic panels.*

The pump station room currently has space for installing the inverters (See Image 12). The utility disconnect switch would be located adjacent to the existing utility service disconnect switch (See Image 13).

Roof access ladder and walkways would have to be installed to allow for periodic maintenance of the PV panels. These costs are included as special construction costs.

Operating Hours: The pump station has (2) 10 HP pump motors that alternate to fill the offsite Norrbom water tank. Site loads include a ClorTec chlorine generation, injection system, Supervisory Controls and Data Acquisition (SCADA) system and ancillary loads. The pump motors are manually operated usually in the evening hours for to 2 to 4 hours, to fill the storage tank. The total electrical load, when the pumps are not operating, is estimated to be very small. The load is very minimal during the day except when the pumps are operated.



Image 11 - Pump Station Panel Locations

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Image 12 - Pump Station Inverter Location



Image 13 - Pump Station Utility Disconnect Switch Location

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5.0 Analysis

The criteria used for determining the optimal size of the photovoltaic system at each site is as follows:

- A. The CREBs budget allocation (\$) for each site was adjusted to allow for project management, feasibility study, preparation of the Request for Proposal (RFP), selection of a qualified contractor/vendor and construction support services as outlined in the *Supplemental Report on CREBs in Appendix E*.
- B. The Design-Build budget allocation (Task 4) was then used to determine the maximum size (kW) of the PV panel that could be installed at each site.
- C. The average kWh/month and kWh/year harvested by the PV system was calculated based on the PV system size (kW) and 1,800 hours/year of useful sunlight available for harvesting energy.
- D. The average kWh/month (kWh/year) harvested were compared to the historic kWh used at the site, based on historic PG&E bills for past 12 months. *See Appendix D - PG&E Electrical Billing Summary*.
- E. The physical dimensions of the PV panels were then compared with the usable south or west facing roof panel area. Optimal sunlight can be harvested when the PV panels are installed facing South. If this is not possible, the PV panels can be installed facing West with reduced harvested kWh.
- F. Since the roof area is limited at the Fire Station and Norrbom Road Pump House # 6, the size (kW) of the PV system was reduced to fit the available roof area.
- G. Assuming that the CREB funds could be re-allocated to the other sites to optimize the harvesting of solar energy and thus increase the benefit to the City, the size of the PV system was re-calculated. The PV system sizes for the Corporation yard and the Police Station were increased to utilize the maximum available roof area.
- H. The PV system cost and size were adjusted such that the total kWh harvested from the PV systems would approximately equal the monthly (annual kWh) usage (energy purchased from PG&E) for the individual sites.
- I. The results of the PV System Sizing Calculations are summarized in Tables 2 and 3 below.
- J. The Cost and Payback Analysis for the PV array is tabulated in Table 4 below. *See Appendix G - California Solar Initiative Statewide Trigger Point Tracker for PV*

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Incentive. The most recent rate for a Governmental/Non Profit Agency is \$1.85 per watt of installed PV array.

K. Estimated net funds required for installing the PV System at:	
Corporation Yard office building	\$230,000
Police Station	\$545,000

Total estimated cost for PV Systems	\$775,000
Total net funds available from CREBs for PV System projects	\$1,057, 812
Total estimated cost for PV Systems	\$775,000

Excess CREBs funds available	\$282,812

These excess funds could be used as follows:

1. Pay-off the CREBs loan
2. Installing additional Photovoltaic panels on the Corporate Yard building roof. The solar energy harvested by these additional PV panels could then be sold to PG&E per there Net Metering Agreement and Interconnection Application.

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TABLE 2 - PV ARRAY SIZE CALCULATED BASED ON AVAILABLE CREB FUNDS

Site	Corporation Yard Office Bldg.	Fire Station	Police Station	Water Tank PS	Remarks
Net Funds from CREBs	\$164,711	\$221,445	\$393,477	\$278,179	\$1,057,812 Total
Est. Pro-Rated Engineering Costs	\$19,036	\$25,595	\$45,480	\$32,153	\$122,264 Total
Funds Available for PV System	\$145,675	\$195,850	\$347,997	\$246,026	\$935,548 Total
Special Construction Costs	\$5,000	\$12,500	\$10,000	\$2,500	See Note 1
Total Funds for D-B Contract	\$140,675	\$183,350	\$337,997	\$243,526	
Ave. Size of PV Array	14.1 kW	18.3 kW	33.8 kW	24.4 kW	\$10,000 Per kW
Average Gross kWh/Day from PV Array	84 kWh/day	110 kWh/day	203 kWh/day	146 kWh/day	6 Hours/Day
Average Efficiency of PV Array	82.0%	82.0%	82.0%	82.0%	
Average Net kWh/Day from PV Array	69 kWh/day	90 kWh/day	166 kWh/day	120 kWh/day	6 Hours/Day
Average Net kWh/Month from PV Array	1,730 kWh/Month	2,255 kWh/Month	4,157 kWh/Month	2,995 kWh/Month	150 Hours/Month
Historic PG&E kWh Usage per Month	2,602 kWh/Month	11,227 kWh/Month	11,671 kWh/Month	3,549 kWh/Month	From PG&E
Percent of Monthly kWh from PV Array	66.5%	20.1%	35.6%	84.4%	
Average Net kWh/Year from PV Array	20,764 kWh/Year	27,062 kWh/Year	49,888 kWh/Year	35,944 kWh/Year	1,800 Hours/Year
Historic PG&E kWh Usage per Year	31,228 kWh/Year	134,720 kWh/Year	140,053 kWh/Year	42,582 kWh/Year	From PG&E
Percent of Annual kWh from PV Array	66.5%	20.1%	35.6%	84.4%	
Total Effective Roof Area Required	1,393 Sq. Ft.	1,815 Sq. Ft.	3,346 Sq. Ft.	2,411 Sq. Ft.	99 Sq. Ft /kW
Usable Roof Area	2,100 Sq. Ft.	1,100 Sq. Ft.	4,900 Sq. Ft.	170 Sq. Ft.	
	Increase PV Size	Decrease PV Size	Increase PV Size	Decrease PV Size	
Observations:					
1. Special Construction Costs Includes Roof Access Ladders and Walkways for Maintenance of the PV Panels.					
2. Corporation Yard Office Bldg. - The size of the PV Panels can be Increased to achieve "Net Zero" Billing.					
3. Police Station - The size of the PV Panels can be Increased to Cover the Available Roof Area.					
4. Fire Station and Water Tank - The Size of the PV Panels is limited by the Max. Available and Usable Roof Area.					
5. The PV Panel Size is based on the Net CREB Available Funds.					
6. "Net Zero" Billing is when the monthly or annual PG&E energy Bill is Zero. This excludes fixed charges and taxes imposed by PG&E.					
Total Energy (kWh) harvested by the PV System is Equal to or Greater than the kWh purchased from PG&E.					

TABLE 3 - PV ARRAY SIZE BASED ON AVAILABLE ROOF AREA

Site	Corporation Yard Office Bldg.	Fire Station	Police Station	Water Tank PS	Remarks
Net Funds Required from CREBs	\$230,000	\$145,000	\$545,000	\$50,000	\$970,000 Total
Est. Pro-Rated Engineering Costs	\$19,036	\$25,595	\$45,480	\$32,153	\$122,264 Total
Funds Available for PV System	\$210,964	\$119,405	\$499,520	\$17,847	\$847,736 Total
Special Construction Costs	\$5,000	\$12,500	\$10,000	\$2,500	See Note 1
Total Funds for D-B Contract	\$205,964	\$106,905	\$489,520	\$15,347	
Ave. Size of PV Array	20.6 kW	10.7 kW	49.0 kW	1.5 kW	\$10,000 Per kW
Average Gross kWh/Day from PV Array	124 kWh/day	64 kWh/day	294 kWh/day	9 kWh/day	6 Hours/Day
Average Efficiency of PV Array	82.0%	82.0%	82.0%	82.0%	
Average Net kWh/Day from PV Array	101 kWh/day	53 kWh/day	241 kWh/day	8 kWh/day	6 Hours/Day
Average Net kWh/Month from PV Array	2,533 kWh/Month	1,315 kWh/Month	6,021 kWh/Month	189 kWh/Month	150 Hours/Month
Historic PG&E kWh Usage per Month	2,602 kWh/Month	11,227 kWh/Month	11,671 kWh/Month	3,549 kWh/Month	From PG&E
Percent of Monthly kWh from PV Array	97.3%	11.7%	51.6%	5.3%	
Average Net kWh/Year from PV Array	30,400 kWh/Year	15,779 kWh/Year	72,253 kWh/Year	2,265 kWh/Year	1,800 Hours/Year
Historic PG&E kWh Usage per Year	31,228 kWh/Year	134,720 kWh/Year	140,053 kWh/Year	42,582 kWh/Year	From PG&E
Percent of Annual kWh from PV Array	97.3%	11.7%	51.6%	5.3%	
Total Effective Roof Area Required	2,039 Sq. Ft.	1,058 Sq. Ft.	4,846 Sq. Ft.	152 Sq. Ft.	99 Sq. Ft /kW
Usable Roof Area	2,100 Sq. Ft.	1,100 Sq. Ft.	4,900 Sq. Ft.	170 Sq. Ft.	

Observations:

1. Special Construction Costs Includes Roof Access Ladders and Walkways for Maintenance of the PV Panels.
 2. Corporation Yard Office Bldg. - Approx. 20.6 kW of PV Panels can be Installed to Achieve "Net Zero" Billing from PG&E.
 3. Police Station - Approx. 49.0 kW of PV Panels can be Installed to reduce the PG&E Bill based on Max. Available Roof Area.
 4. Fire Station and Water Tank - The Size of the PV Panels is limited by the Max. Available and Usable Roof Area.
 5. The Net CREB Available Funds were reallocated between Sites to Optimize the kWh harvested based on Max. Available Roof Area. However not all of the Available CREB funds would be expended under this Scenario.
 6. "Net Zero" Billing is when the monthly or annual PG&E energy Bill is Zero. This excludes fixed charges and taxes imposed by PG&E.
- Total Energy (kWh) harvested by the PV System is Equal to or Greater than the kWh purchased from PG&E.

TABLE 4 - COST AND PAYBACK ANALYSIS FOR PV ARRAYS BASED ON AVAILABE ROOF AREA

Site	Corporation Yard Office Bldg.	Fire Station	Police Station	Water Tank PS	Remarks
Net Funds Required from CREBs	\$230,000	\$145,000	\$545,000	\$50,000	\$970,000 Total
Est. Pro-Rated Engineering Costs	\$19,036	\$25,595	\$45,480	\$32,153	\$122,264 Total
Funds Available for PV System	\$210,964	\$119,405	\$499,520	\$17,847	\$847,736 Total
Special Construction Costs	\$5,000	\$12,500	\$10,000	\$2,500	
Total Funds for D-B Contract	\$205,964	\$106,905	\$489,520	\$15,347	
Ave. Size of PV Array	20.6 kW	10.7 kW	49.0 kW	1.5 kW	\$10,000 Per kW
Average Gross kWh/Day from PV Array	124 kWh/day	64 kWh/day	294 kWh/day	9 kWh/day	6 Hours/Day
Average Efficiency of PV Array	82.0%	82.0%	82.0%	82.0%	
Average Net kWh/Day from PV Array	101 kWh/day	53 kWh/day	241 kWh/day	8 kWh/day	6 Hours/Day
Average Net kWh/Year from PV Array	30,400 kWh/Year	15,779 kWh/Year	72,253 kWh/Year	2,265 kWh/Year	1,800 Hours/Year
Historic PG&E kWh Usage per Year	31,228 kWh/Year	134,720 kWh/Year	140,053 kWh/Year	42,582 kWh/Year	From PG&E
Percent of Annual kWh from PV Array	97.3%	11.7%	51.6%	5.3%	
Average PG&E Cost / kWh	\$0.158	\$0.145	\$0.140	\$0.150 Assumed	From PG&E Bills
Annual Cost Savings from PV System	\$4,809	\$2,293	\$10,148	\$340	Annual kWh - PV
Installation Cost of PV System	\$205,964	\$106,905	\$489,520	\$15,347	Adj. CREB Budget
CA Solar Incentive @\$1.85/Watt of PV	(\$38,103)	(\$19,777)	(\$90,561)	(\$2,839)	See Note 1
Est. Final Installation Cost after PG&E Rebate	\$167,861	\$87,128	\$398,959	\$12,508	
Simple Payback in Years	34.9	38.0	39.3	36.8	
Total Effective Roof Area Required	2,039 Sq. Ft.	1,058 Sq. Ft.	4,846 Sq. Ft.	152 Sq. Ft.	99 Sq. Ft /kW
Usable Roof Area	2,100 Sq. Ft.	1,100 Sq. Ft.	4,900 Sq. Ft.	170 Sq. Ft.	

Note 1: See Appendix G - California Solar Initiative Statewide Trigger Point Tracker for latest PV Incentive for Government/Non-Profit. Currently City of Sonoma would qualify for Step 6 which is \$1.85/watt.

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6.0 **Conclusions**

Photovoltaic arrays could be installed at all four sites. However the maximum size (kW) of the PV array is not limited due to budgetary constraints but by the limited usable roof area that is suitable and available for mounting the photovoltaic panels, at each location.

In order to optimize harvesting of the solar energy, the roof needs to be oriented due south. A west facing roof is also suitable for mounting the PV array with a reduction of harvested solar energy.

1. The office building located adjacent to the Corporation yard is suitable for mounting the Photovoltaic panels. Approximately 20.6 kW of PV panels can be mounted on this 2,100 square feet roof structure. The estimated annual harvested energy (30,400 kWh) that can be harvested from the PV system will be 97.3 percent of the annual energy purchased from PG&E (31,228 kWh) for this facility (based on PG&E historic billing data for 2007-2008).

The payback period for the Corporation yard PV system was calculated to be approximately 34.9 years after PG&E rebate.

Installing PV array on the warehouse building roof would require a structural analysis of the roof structure to support the increased weight of the PV panels. This analysis would be performed under a separate study. If additional PV panels are installed the excess energy could be sold back to PG&E under a separate agreement.

2. The Fire Station is not an ideal site for installing a PV system. The roof design and orientation limits the available roof mounting space. Approximately 10.7 kW of PV panels can be mounted on two separate 700 and 400 square feet roof structures. The estimated annual harvested energy (15,779 kWh) that can be harvested from the PV systems is only 11.7 percent of the annual energy purchased from PG&E (134,720 kWh) for this facility (based on PG&E historic billing data for 2007-2008).

The payback period for the Fire Station was calculated to be approximately 38.0 years after PG&E rebate.

3. The Police Station is suitable for mounting the Photovoltaic panels. Approximately 49.0 kW of PV panels can be mounted on two separate 3,000 and 1,900 square feet roof structures. The estimated annual energy (72,253 kWh) that can be harvested from the PV system is only 51.6 percent of the annual energy purchased from PG&E (140,053 kWh) for this facility (based on PG&E historic billing data for 2007-2008).

The payback period for the Police Station was calculated to be approximately 39.3 years after PG&E rebate.

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March 17, 2009

4. The Water Tank is not an ideal site for installing a PV system since it presents significant design issues. The main power source (PG&E service meter) associated with the water tank is located at the pump house 6, at the bottom of the hill. The cables would need to be installed in a trench through rocky terrain. Usually the PV array needs to be installed in close proximity of the service meter.

Installing the PV system at the Pump House 6 is not recommended. The roof of the pump house is limited in size. Approximately 1.5 kW of PV panels can be mounted on this roof structures. The estimated annual energy (2,265 kWh) that can be harvested from the PV systems is only 5.3 percent of the annual energy purchased from PG&E (42,582 kWh) for this facility (based on PG&E historic billing data for 2007-2008).

The payback period for the Water Tank Pump Station was calculated to be approximately 36.8 years after PG&E rebate.

5. The Corporation Yard pre-fabricated building and roof structure was not originally designed to support photovoltaic panels. A structural analysis and evaluated of the building structure would be required to determine the economics and feasible of strengthening the steel members to support the weight of the photovoltaic panels. The roof is currently leaking and needs to be repaired.

7.0 Recommendations

1. The Corporate Yard office building 2,100 square feet roof structure is suitable for mounting approximately 20.6 kW of Photovoltaic panels. The estimated solar energy harvested would replace approx. 97.3 percent of the annual energy purchased from PG&E for this facility. Estimated total cost is \$230,000.
2. The Fire Station is not an ideal site for installing a Photovoltaic system. The roof area is segmented and available mounting space is very limited. The north facing roof orientation is not suitable for harvesting solar energy efficiently.
3. The Police Station is suitable for mounting approximately 49.0 kW of Photovoltaic panels on two separate 3,000 and 1,900 square feet roof structures. The 1,900 square feet roof over the Community meeting room may experience shading from the adjacent pine trees during the winter months. These trees may need to be periodically trimmed to maximize harvesting of the solar energy. Estimated total cost is \$545,000.
4. The Water Tank is not an ideal site for installing a Photovoltaic system due to its limited square footage.

Memorandum
March 17, 2009

5. If the City desires to utilize the excess CREBs fund to install additional Photovoltaic panels on the Corporation Yard building roof and then sell this excess energy to PG&E, then they should authorize the structural analysis and evaluation of the Corporation Yard pre-fabricated building and roof structure building structure. The results of this structural analysis will quantify the economics and feasible of strengthening the steel members to support the weight of the photovoltaic panels. The cost of this analysis is estimated to be approx. \$24,000.00

APPENDICES

Appendix A - Summary of Solar Craft Site Findings Memo Dated July 10, 2008
Appendix B - Statewide Self-Generation Incentive Program Statistics from PG&E
Appendix C - Building Plans showing Roof area suitable for mounting Photovoltaic panels
Appendix D - PG&E Electrical Billing Summary
Appendix E - Supplemental Report on CREBs
Appendix F - Solar Panel Orientation and Performance Data
Appendix G - California Solar Initiative Statewide Trigger Point Tracker for PV Incentive
Appendix H - PG&E Net Metering Agreement and Interconnection Application

End of Memo

APPENDIX A

Memo Dated July 10, 2008 Summarizing Solar Craft Site Findings

July 10, 2008

MEMO

To: Lind Kelly, City Manager
David Goodison, City Planner

From: Senior Planner Gjestland

Subject: Update on CREB Facility Evaluations

Prior to leaving on vacation, I met with Dennis King of Solar Craft and accompanied him on an inspection of the four CREB facility sites. As summarized below, these initial inspections were valuable in identifying the feasibility and potential issues associated installing PV (solar) arrays at the four sites.

Norrbom Tank Site

It appears that the initial concept for this site was to install a PV array directly on the top of the water tank itself. This approach presents a number of significant issues and is likely infeasible. Foremost, the main power source and electrical meter associated with the water tank are located at Pump House 6, at the bottom of the hill distant from the tank. Per Dennis King, one critical objective in installing an array is to site the solar panels in close proximity to the electrical meter. This rules out installing an array on top of the tank (or ground-mounted near the tank), which would require trenching through rocky terrain to install conduit between the water tank and pump house, and also result in the significant loss of current due to resistance. It is also questionable whether the top of the water tank is structurally capable of accommodating the additional load, and there are concerns related to tank access and maintenance, and the protection of treated drinking water.

The most viable alternative is to expand the roof of the pump house to the east and install a PV array on it (the structural addition would be necessary to provide sufficient roof area for an array that is appropriately sized to balance out usage costs associated with the facility). However, there are two questions that need to be answered regarding this alternative: 1) can the project location/description associated with this specific CREB allocation be changed from the Norrbom tank to the pump house as they are on two different parcels; and 2) can the pump house facility be expanded, as it appears to be located within an easement on a County-owned parcel. I will be following up on these two questions.

Community Meeting Room/Police Department

Based on the initial evaluation, installing a PV array on the roof of the Community Meeting Room/Police Station building appears very feasible. No significant issues were identified.

Fire Station

Based on the initial evaluation, installing a PV array on the roof of the Fire Station appears feasible. However, PV panels would likely need to be grouped on various roof elements given the design of the building.

Corporation Yard

It appears that the initial concept for this site was to install a PV array on the roof of the large warehouse building. This approach presents two significant issues. Foremost, the exterior building material, including the roof, is lightweight corrugated metal sheeting that cannot accommodate attachment of a PV array. Second, it is questionable whether the building is structurally capable of handling the additional load resulting from a PV array. As a result, a structural engineering analysis would be required and upgrades to the building would be necessary. However, in evaluating the property it was determined that a PV array could be installed on the roof of the new corporation yard *office* building to offset the electrical usage for the entire site. This alternative would avoid the significant costs associated with analyzing and upgrading the warehouse.

Next Steps

Dennis King has requested the kilowatt hour usage over the past year for each of the four facilities (I should be able to forward this information to him by the beginning of next week). Once he has this information, he will conduct a more detailed solar engineering analysis of each site and then provide a rough plan and estimates for the PV arrays.

APPENDIX B

Statewide Self-Generation Incentive Program Statistics from PG&E

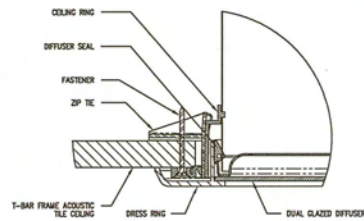
Statewide Self-Generation Incentive Program Statistics (updated November 2005)



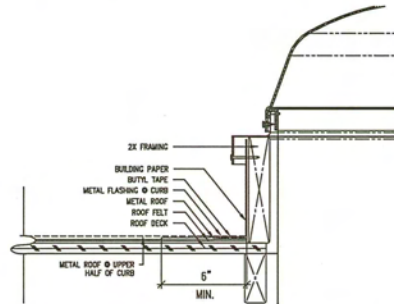
LEVEL 1 (Photovoltaics)		Statewide SELFGEN Projects to Date										
		Total # Projects	Total kW	System Size				\$/Watt Installed				
System Size	Status			Low	Avg	High	St. Dev.	Low	Avg	Median	High	St. Dev.
< 50	Complete	201	7,279	28	36	50	6	\$ 4.71	\$ 8.92	\$ 8.98	\$ 15.47	\$ 1.49
	Active	100	3,646	30	36	50	7	\$ 4.79	\$ 8.90	\$ 8.85	\$ 17.60	\$ 1.77
51 - 100	Complete	86	6,328	50	74	100	15	\$ 4.93	\$ 8.86	\$ 8.78	\$ 16.21	\$ 1.52
	Active	129	8,564	51	66	100	12	\$ 5.13	\$ 9.59	\$ 10.10	\$ 22.99	\$ 1.81
101 - 200	Complete	80	10,924	100	137	200	34	\$ 4.28	\$ 8.32	\$ 8.40	\$ 15.90	\$ 1.56
	Active	62	8,880	101	143	200	31	\$ 6.70	\$ 8.93	\$ 8.82	\$ 19.36	\$ 1.95
201 - 500	Complete	45	13,746	201	305	480	87	\$ 4.64	\$ 7.78	\$ 7.89	\$ 11.82	\$ 1.33
	Active	64	20,289	205	317	497	96	\$ 5.13	\$ 8.44	\$ 8.22	\$ 12.93	\$ 1.18
501 +	Complete	16	11,721	521	733	1,050	185	\$ 4.51	\$ 7.39	\$ 7.11	\$ 10.36	\$ 1.60
	Active	25	20,863	500	835	1,025	195	\$ 6.33	\$ 8.09	\$ 8.00	\$ 10.10	\$ 0.93
Total Completed		428	49,998	28	117	1,050	154	\$ 4.28	\$ 8.62	\$ 8.72	\$ 16.21	\$ 1.56
Total Active		380	62,242	30	164	1,025	213	\$ 4.79	\$ 9.01	\$ 8.92	\$ 22.99	\$ 1.75
Total Projects (Completed + Active)		808	112,241	28	139	1,050	186	\$ 4.28	\$ 8.80	\$ 8.83	\$ 22.99	\$ 1.66
Total Wait List		285	68,885	30	242	1,869	281	\$ 3.50	\$ 8.19	\$ 8.00	\$ 20.99	\$ 2.01
Total Projects		1,093	181,126	28	166	1,869	219	\$ 3.50	\$ 8.64	\$ 8.59	\$ 22.99	\$ 1.78

APPENDIX C

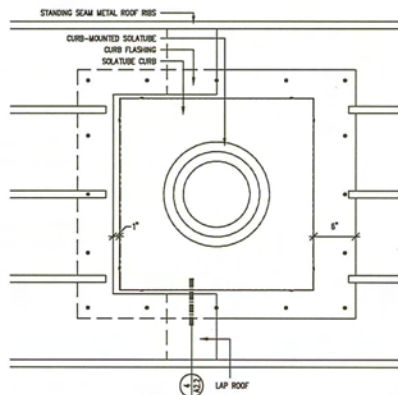
Building Plans showing Roof area suitable for mounting Photovoltaic panels



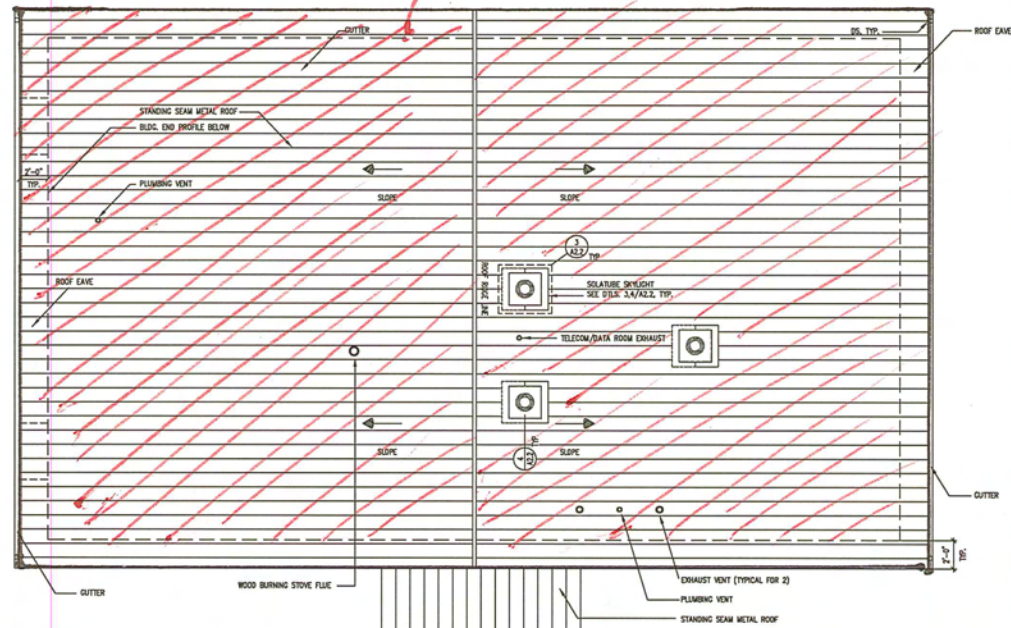
SOLATUBE DIFFUSER TRANSITION
SCALE: 3" = 1'-0"



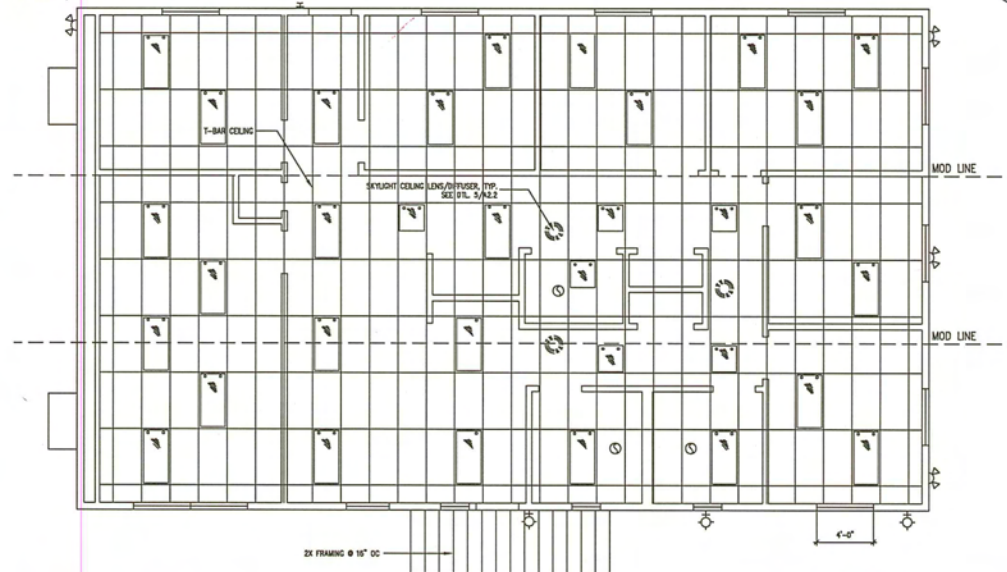
SOLATUBE CURB
SCALE: 3" = 1'-0"



SOLATUBE PLAN
SCALE: 1 1/2" = 1'-0"



ROOF PLAN
SCALE: 1/4" = 1'-0"



REFLECTED CEILING PLAN
SCALE: 1/4" = 1'-0"



ARCHITECTURE | PROGRAMMING | PLANNING

18837 ROBINSON ROAD
SONOMA, CALIFORNIA 95476

PHONE: 707.935.7944
FAX: 707.935.6618



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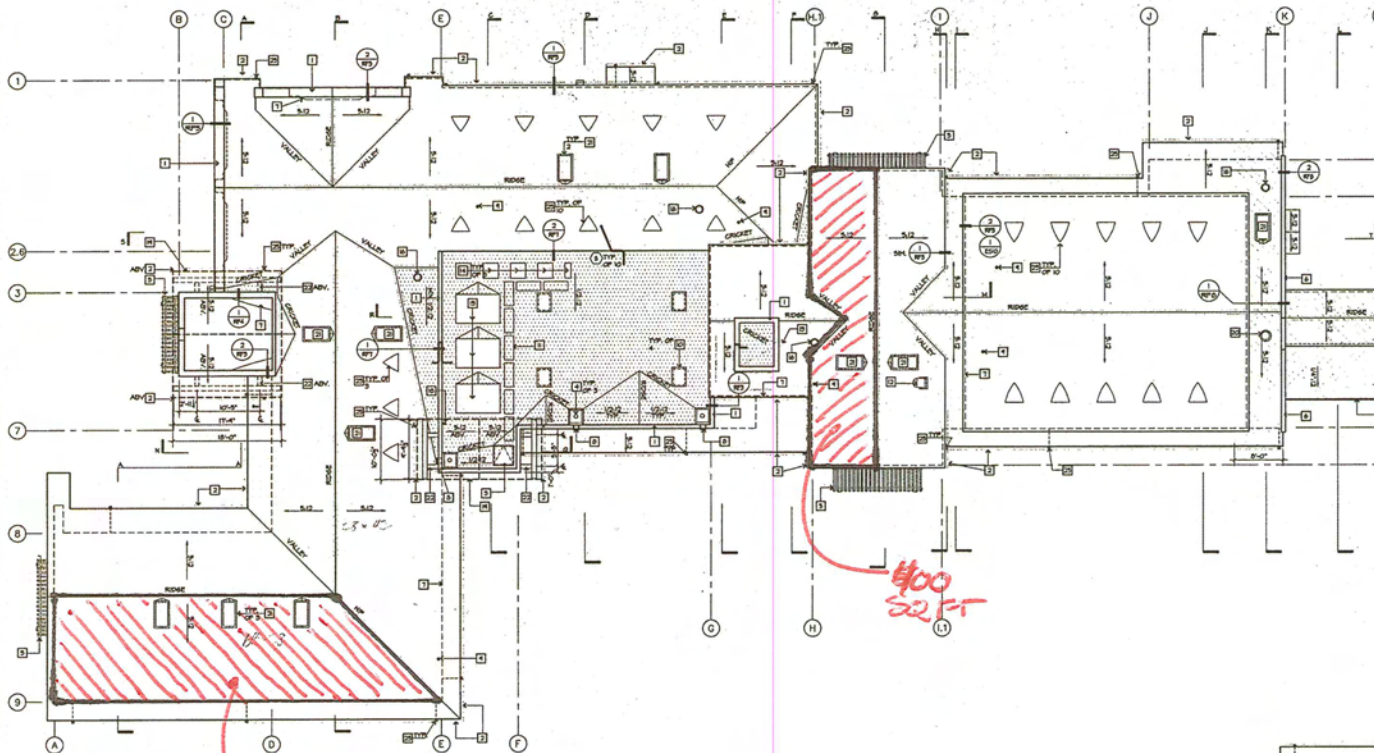
NEW OFFICE
BUILDING
19728 EIGHTH ST. EAST
SONOMA, CA 95476

CITY of SONOMA
CORP. YARD
19728 EIGHTH ST. EAST
SONOMA, CA 95476

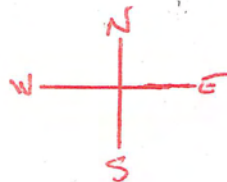
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JUN 16, 2007

REFLECTED CEILING
& ROOF PLANS

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ROOF PLAN

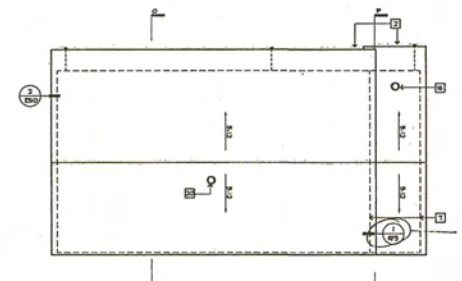


ROOF PLAN KEYNOTES

1. PROVIDE 24 GA. 65H GUTTING OF ROOF FRAMED PARAPET - PAINT
2. PROVIDE 6.5H. BUTTER - PAINT
3. PROVIDE 5H. X 5H. ROOF ACCESS HATCH - SEE DET. 1
4. PROVIDE ROOF DRAINS - SEE DET. 2
5. PROVIDE 30 GA. 65H GUTTING OF CH. PULL - PAINT
6. LINE OF PULL BELOW
7. PROVIDE 5H. X 5H. ELEV. PULL SUPPORT & ROOF DRAIN - PAINT
8. PROVIDE 5H. X 5H. ELEV. PULL SUPPORT & ROOF DRAIN - PAINT
9. PROVIDE 22" DIA. IN 30" TYPICAL PERMANENT VENT ON 8" DIA. ROOF FRAMED CURB WITH 24 GA. FLASHING, GUTTER/FLASH 1" GORE. SHIP, ETC. - PAINT
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ROOF PLAN PATTERNED LEGEND:

- 1. 4 PLY BUR ROOFING WITH CAP SHEET
- 2. COMPOSITION SHINGLE ROOFING SYSTEM
- 3. SEALED CONCRETE DECK
- 4. SELF-ADHERING WATERPROOFING MEMBRANE UNDER COMP. BUR. ROOF SYSTEM. TURN EDGE 4" UP ADJOINING FIELDS



ROOF PLAN

ROOF PLAN NOTES

1. PROVIDE BUR. WITH CAPSHEET ROOF SYSTEM. INTEGRATE FLASHING INTO PLYS & ALL GUTTERS MORE LESS THAN 5/16 BORE.
2. PROVIDE 24 GA. 65H & CRICKET & VALLEY FLASHING - TYPICAL & ALL LOCATIONS.
3. ALL ROOFING FLASHING, CRACKETS, SADDLES, SKYLIGHTS, CURED ETC. TO BE INSTALLED ACCORDING TO IRMA ROOFING & WATERPROOFING MANUAL, 4TH EDITION & SHANG.
4. PROVIDE (3) LAYERS OF UNDERLAYMENT TYPICAL & AT ROOF SLOPES LESS THAN 4:12 PITCH PER IRC, TABLE D-5.

MICHAEL ROSS - CHARLES DRULIS
ARCHITECTS AND PLANNERS
100 WEST NAPA STREET
SONOMA, CALIFORNIA 94978
TELEPHONE 707.898.8400
FACSIMILE 707.898.8542



REVIEWED
FOR
CODE COMPLIANCE
CITY OF SONOMA
BUILDING DIVISION
By: _____
Date: _____



PERMIT SET

REVISION	BY	DATE
1		
2		
3		
4		
5		

CITY OF SONOMA
FIRE STATION
SECOND STREET WEST
SONOMA, CA
ROOF PLAN

PROJECT: 990100.00
SCALE: 1/8" = 1'-0"
DATE: 15 DECEMBER 2000
SHEET NO.: A2.02

**CITY OF SONOMA
POLICE DEPARTMENT &
COMMUNITY MEETING
ROOM IMPROVEMENT
PROJECT**

175 FIRST STREET WEST
SONOMA, CA 95476

Revision	Description	Date
1	100% CONSTRUCTION DOCUMENTS	

ROOF PLAN

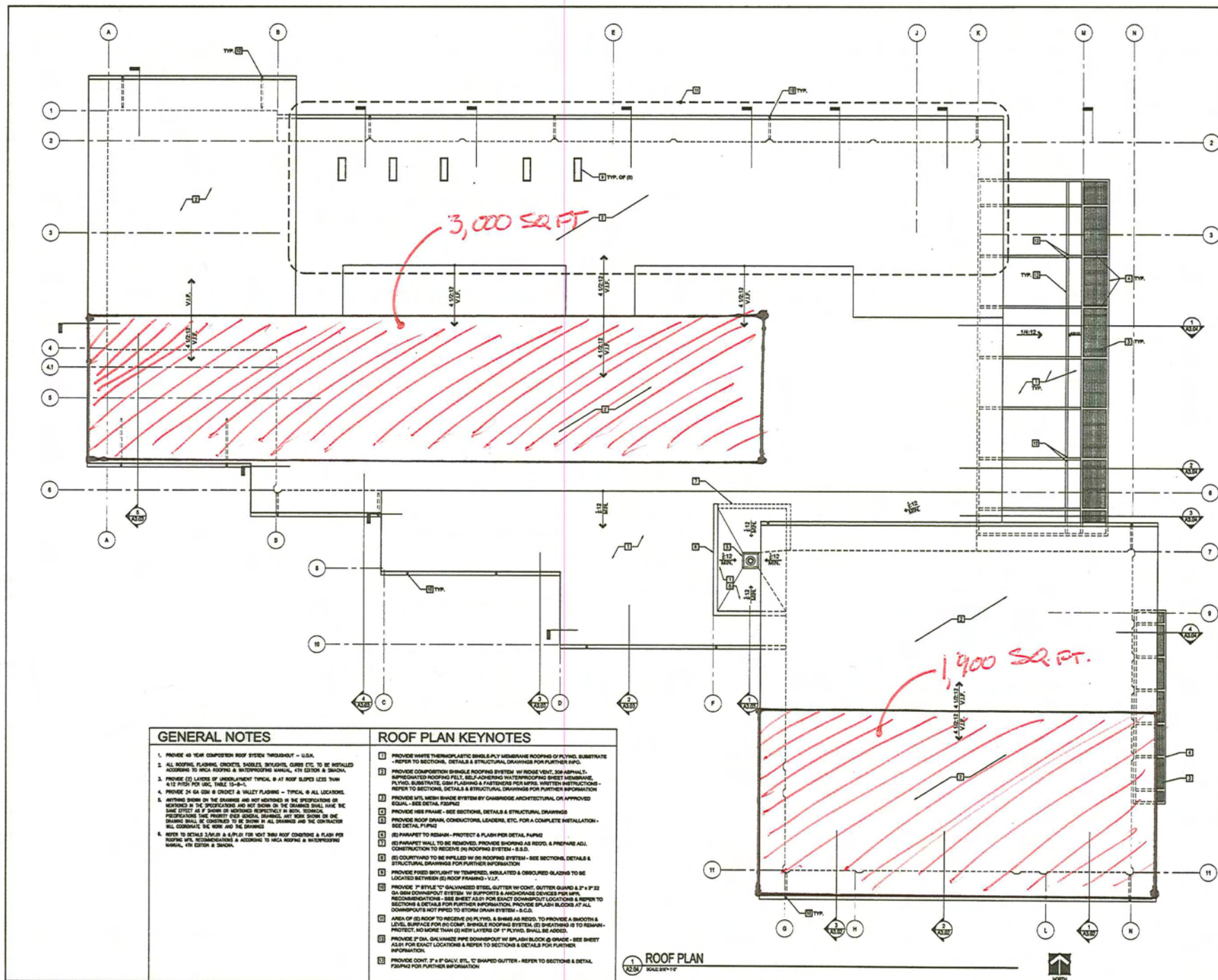
Sheet Title



Drawn By	Checked By
AS SHOWN	AS SHOWN
Date	11 DECEMBER 2006
Project No.	22030

A2.05
Drawing No.

It is the drawing to be used for construction. It is the responsibility of the contractor to verify the accuracy of the information shown on this drawing. The architect is not responsible for errors or omissions on this drawing.



GENERAL NOTES

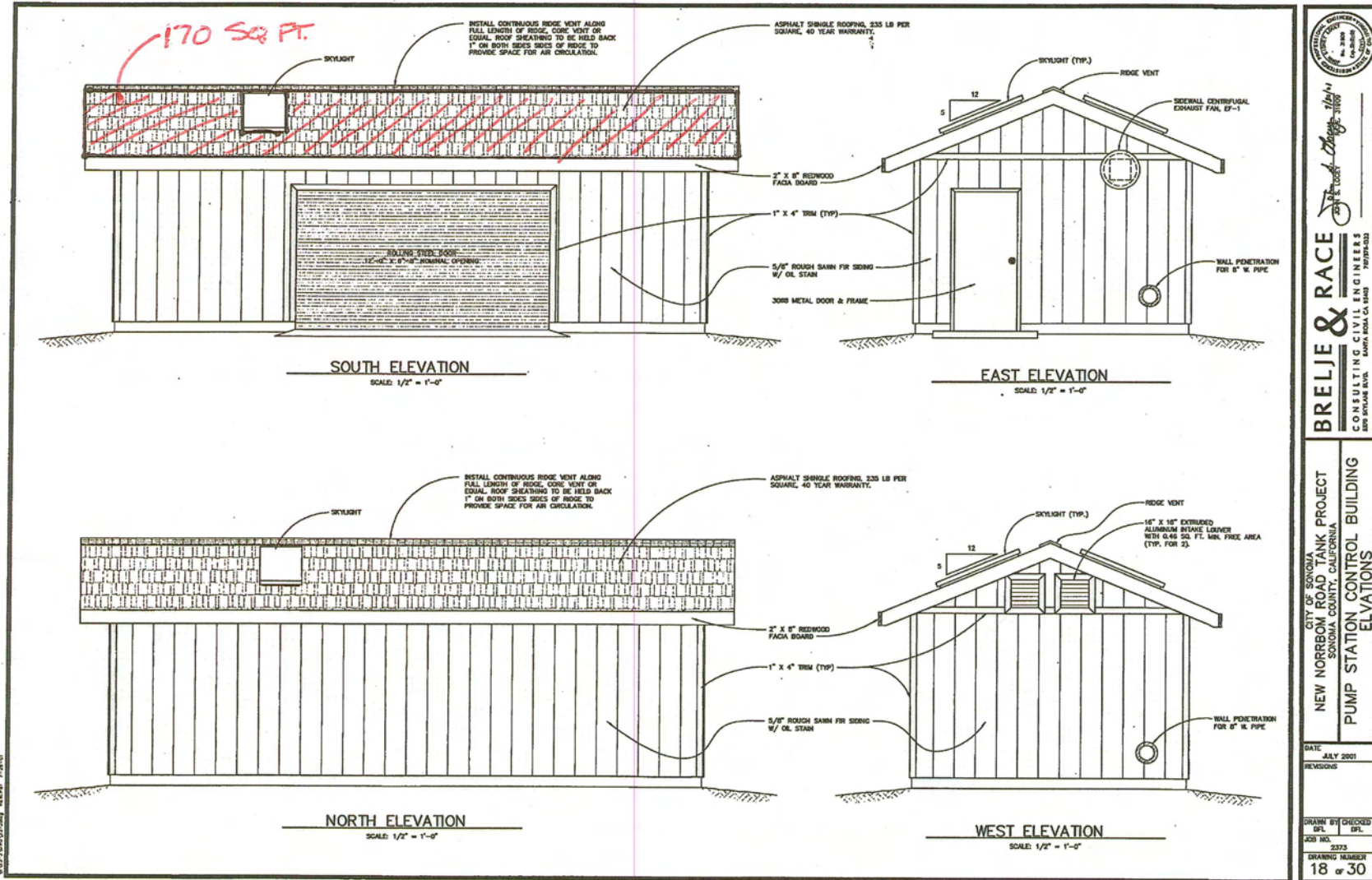
1. PROVIDE 40 YEAR COMPOSITION ROOF SYSTEM THROUGHOUT - U.G.A.
2. ALL ROOFING, FLASHING, CRACKS, SHIMMERS, SHIMMERS, ETC. TO BE INSTALLED ACCORDING TO IRCA ROOFING & WATERPROOFING MANUAL, 4TH EDITION & SONOMA.
3. PROVIDE (1) LAYER OF UNDRERSLANT TYPICAL @ AT ROOF SLOPES LESS THAN 4:12 PER IN. SEE TABLE 15-1-1.
4. PROVIDE 24 GA GSI @ CRACK & VALLEY FLASHING - TYPICAL @ ALL LOCATIONS.
5. ANYTHING SHOWN ON THE DRAWING AND NOT NOTED IN THE SPECIFICATIONS OR NOTED IN THE SPECIFICATIONS AND NOT SHOWN ON THE DRAWING SHALL HAVE THE SAME EFFECT AS IF SHOWN OR NOTED RESPECTIVELY IN BOTH. TECHNICAL PREPARATIONS SHALL BE SHOWN IN ALL DRAWINGS AND THE CONTRACTOR SHALL COMBINE THE WORK AND THE DRAWING.
6. REFER TO DETAILS 2401.1 & 2401.2 FOR ROOF FLASHING & FLASH FOR ROOFING. REFER TO DETAILS 2401.1 & 2401.2 FOR ROOF FLASHING & FLASH FOR ROOFING. REFER TO DETAILS 2401.1 & 2401.2 FOR ROOF FLASHING & FLASH FOR ROOFING.

ROOF PLAN KEYNOTES

1. PROVIDE WHITE THERMOPLASTIC SINGLEPLY MEMBRANE ROOFING OF PLYING, SUBSTRATE - REFER TO SECTIONS, DETAILS & STRUCTURAL DRAWINGS FOR FURTHER INFO.
2. PROVIDE COMPOSITION SHINGLE ROOFING SYSTEM W/ ROOF VENT, 304 ASPHALT, IMPREGNATED ROOFING FELT, SELF-ADHERING WATERPROOFING SHEET MEMBRANE, PLYING, SUBSTRATE, GSI FLASHING & FLASHING PER IRCA, WRITTEN INSTRUCTIONS - REFER TO SECTIONS, DETAILS & STRUCTURAL DRAWINGS FOR FURTHER INFORMATION.
3. PROVIDE 1/2\"/>

ROOF PLAN
SCALE 3/8\"/>





BRELJE & RACE
CONSULTING CIVIL ENGINEERS
1000 AVENUE B, SUITE 100
SONOMA, CALIFORNIA 94965
707/234-1100

CITY OF SONOMA
NEW NORBOM ROAD TANK PROJECT
SONOMA COUNTY, CALIFORNIA
PUMP STATION CONTROL BUILDING
ELEVATIONS

DATE: JULY 2001
REVISIONS:

DRAWN BY: CHECKED: DFL
JOB NO.: 2373
DRAWING NUMBER: 18 of 30

APPENDIX D

PG&E Electrical Billing Summary

PG&E ACCOUNT # 1283035687-4

			Kilowatt Hours (Kwh) Usage													
SERVICE ID#	DESC.	LOCATION	May '07	June '07	July '07	Aug. '07	Sept. '07	Oct. '07	Nov. '07	Dec. '07	Jan. '08	Feb. '08	March '08	April '08	May '08	June '08
128303-5050	Corporation Yard	19728 Eight Street East	1746	1714	1281	1353	1819	2475	2675	3544	3258	3175	2347	2716	2407	2527
128303-5060	Corp Yard Area Lights	19784 Eight Street East	31	28	29	28	31	28	32	28	28	31	28	29	29	29
128303-5090	Pump #6	100 First Street West	3308	5303	4996	3545	5031	5933	1710	1710	2630	2630	2210	4420	4421	3346
128303-5105	Police Station/Cnty Mtg Room	175 First Street West	2080	2160	1680	2000	1920	1600	1600	11680	11360	11280	11680	11440	11520	12560
258580-0005	Fire Station	620 Second Street West	10720	11040	11680	12480	10240	9120	9120	10240	8160	9760	10400	9600	11520	10880

The red highlighted cells represent the timeframe when the police station/community meeting room was being remodeled. These figures to not reflect typical electrical usage usage and should not be used in sizing the PV array.

For City of Sonoma (NBY / 8026397)

SA Id: 1283035050 Open: Y Bus Act Desc: CORP YARD SHOP&GARA Svc Descriptor: CORP YARD SHOP&GAR

From Sep 1, 2007 to Aug 31, 2008

Per Name: CITY OF SONOMA

Meter #: 97972R

Billing Addr: 1 THE PLZ, SONOMA, CA 95476

Acct Id: 1283035687

Service Addr: 19728 8TH ST E, SONOMA, CA 95476

Date	Days	Rate	Gas Charges (Dollars)	Therms	Electric Charges (Dollars)	On-Peak Usage (kwh)	Part-Peak Usage (kwh)	Off-Peak Usage (kwh)	Total Usage (kwh)	Hours	Billing Demand (kW)	Created Demand (kW)	On-Peak Demand (kW)	Part-Peak Demand (kW)	Off-Peak Demand (kW)	Taxes
08/28/2008	30	A1P			389.35	0	0	0	2,069	0	0	0	0	0	0	0.46
07/29/2008	29	A1P			415.62	0	0	0	2,216	0	0	0	0	0	0	0.49
06/30/2008	31	A1P			473.03	0	0	0	2,527	0	0	0	0	0	0	0.56
05/30/2008	30	A1P			450.78	0	0	0	2,407	0	0	0	0	0	0	0.53
04/30/2008	30	A1P			367.05	0	0	0	2,716	0	0	0	0	0	0	0.60
03/31/2008	31	A1P			319.42	0	0	0	2,347	0	0	0	0	0	0	0.52
02/29/2008	31	A1P			424.62	0	0	0	3,175	0	0	0	0	0	0	0.70
01/29/2008	27	A1P			433.60	0	0	0	3,258	0	0	0	0	0	0	0.72
01/02/2008	33	A1P			483.25	0	0	0	3,544	0	0	0	0	0	0	0.78
Total for 2008:			0.00	0	3,756.72	0	0	0	24,259	0						5.36
11/30/2007	31	A1P			372.00	0	0	0	2,675	0	0	0	0	0	0	0.59
10/30/2007	29	A1P			465.05	0	0	0	2,475	0	0	0	0	0	0	0.54
10/01/2007	32	A1P			346.01	0	0	0	1,819	0	0	0	0	0	0	0.40
Total for 2007:			0.00	0	1,183.06	0	0	0	6,969	0						1.53
Total for SA id: 1283035050:			0.00	0	4,939.78	0	0	0	31,228	0						6.89

$$\text{Average Cost per kWh} = \frac{\$4,940}{31,228 \text{ kWh/year}} = \$0.158/\text{kwh}$$

For City of Sonoma (NBY / 8026397)

SA Id:1283035060 Open: Y Bus Act Desc: AREA LIGHTING P-7021 Svc Descriptor: AREA LIGHTING P-7021

From Sep 1, 2007 to Aug 31, 2008

Per Name: CITY OF SONOMA

Meter #:

Billing Addr: 1 THE PLZ, SONOMA, CA 95476

Acct Id: 1283035687

Service Addr: 19784 8TH ST E, SONOMA, CA 95476

Date	Days	Rate	Gas Charges (Dollars)	Therms	Electric Charges (Dollars)	On-Peak Usage (kwh)	Part-Peak Usage (kwh)	Off-Peak Usage (kwh)	Total Usage (kwh)	Hours	Billing Demand (kW)	Created Demand (kW)	On-Peak Demand (kW)	Part-Peak Demand (kW)	Off-Peak Demand (kW)	Taxes
08/22/2008	29	OL1			9.89	0	0	0	28	0	0	0	0	0	0	0.01
07/24/2008	30	OL1			9.89	0	0	0	29	0	0	0	0	0	0	0.01
06/24/2008	32	OL1			9.89	0	0	0	31	0	0	0	0	0	0	0.01
05/23/2008	29	OL1			9.89	0	0	0	28	0	0	0	0	0	0	0.00
04/24/2008	30	OL1			9.93	0	0	0	29	0	0	0	0	0	0	0.01
03/25/2008	29	OL1			9.92	0	0	0	28	0	0	0	0	0	0	0.01
02/25/2008	32	OL1			9.88	0	0	0	31	0	0	0	0	0	0	0.01
01/24/2008	29	OL1			10.11	0	0	0	28	0	0	0	0	0	0	0.01
Total for 2008:			0.00	0	79.40	0	0	0	232	0						0.07
12/26/2007	29	OL1			11.24	0	0	0	28	0	0	0	0	0	0	0.01
11/27/2007	33	OL1			11.23	0	0	0	32	0	0	0	0	0	0	0.01
10/25/2007	29	OL1			11.24	0	0	0	28	0	0	0	0	0	0	0.01
09/26/2007	32	OL1			11.24	0	0	0	31	0	0	0	0	0	0	0.01
Total for 2007:			0.00	0	44.95	0	0	0	119	0						0.04
Total for SA id: 1283035060:			0.00	0	124.35	0	0	0	351	0						0.11

$$\text{Average Cost PER KwH} = \frac{\$125}{351 \text{ KwH/yr}} = \$0.356/\text{Kwh}$$

For City of Sonoma (NBY / 8026397)

SA Id:2585800005

Open: Y

Bus Act Desc: FIRE STATION

Svc Descriptor: FIRE STATION

From Sep 1, 2007 to Aug 31, 2008

Per Name: CITY OF SONOMA

Meter #: X08540

Billing Addr: 1 THE PLZ, SONOMA, CA 95476

Acct Id: 1283035687

Service Addr: 630 2ND ST W, SONOMA, CA 95476

Date	Days	Rate	Gas Charges (Dollars)	Therms	Electric Charges (Dollars)	On-Peak Usage (kwh)	Part-Peak Usage (kwh)	Off-Peak Usage (kwh)	Total Usage (kwh)	Hours	Billing Demand (kW)	Created Demand (kW)	On-Peak Demand (kW)	Part-Peak Demand (kW)	Off-Peak Demand (kW)	Taxes
08/28/2008	28	A10S			1,785.21	0	0	0	11,040	291	38	38	0	0	0	2.43
07/31/2008	31	A10S			1,906.55	0	0	0	12,160	347	35	35	0	0	0	2.68
06/30/2008	28	A10S			1,756.97	0	0	0	10,880	294	37	37	0	0	0	2.39
06/02/2008	33	A10S			1,880.80	0	0	0	11,520	288	40	40	0	0	0	2.53
04/30/2008	29	A10S			1,173.94	0	0	0	9,600	300	32	32	0	0	0	2.11
04/01/2008	32	A10S			1,245.75	0	0	0	10,400	359	29	29	0	0	0	2.29
02/29/2008	30	A10S			1,136.90	0	0	0	9,760	444	22	22	0	0	0	2.15
01/30/2008	27	A10S			984.72	0	0	0	8,160	340	24	24	0	0	0	1.80
01/03/2008	33	A10S			1,245.01	0	0	0	10,240	320	32	32	0	0	0	2.25
Total for 2008:			0.00	0	13,115.85	0	0	0	93,760	2,982						20.63
12/01/2007	30	A10S			1,118.77	0	0	0	9,120	304	30	30	0	0	0	2.01
11/01/2007	29	A10S			1,585.49	0	0	0	9,120	268	34	34	0	0	0	2.01
10/03/2007	29	A10S			1,753.47	0	0	0	10,240	293	35	35	0	0	0	2.25
09/04/2007	32	A10S			2,066.53	0	0	0	12,480	337	37	37	0	0	0	2.75
Total for 2007:			0.00	0	6,524.26	0	0	0	40,960	1,202						9.02
Total for SA id: 2585800005:			0.00	0	19,640.11	0	0	0	134,720	4,184						29.65
Report Total:			0.00	0	40,456.80	0	47,360	64,800	278,459	8,371						61.33

$$\text{Average Cost per Kwh} = \frac{\$40,457}{278,459 \text{ Kwh/yr}} = \$0.145/\text{Kwh}$$

For City of Sonoma (NBY / 8026397)

SA Id:1283035105

Open: Y

Bus Act Desc: POLICE STATION

Svc Descriptor: POLICE STATION

From Sep 1, 2007 to Aug 31, 2008

Per Name: CITY OF SONOMA

Meter #: 927N70

Billing Addr: 1 THE PLZ, SONOMA, CA 95476

Acct Id: 1283035687

Service Addr: 175 1ST ST W, SONOMA, CA 95476

Date	Days	Rate	Gas Charges (Dollars)	Therms	Electric Charges (Dollars)	On-Peak Usage (kwh)	Part-Peak Usage (kwh)	Off-Peak Usage (kwh)	Total Usage (kwh)	Hours	Billing Demand (kW)	Created Demand (kW)	On-Peak Demand (kW)	Part-Peak Demand (kW)	Off-Peak Demand (kW)	Taxes
08/28/2008	29	A10S			1,867.72	0	5,280	6,480	11,760	318	37	37	0	37	30	2.59
07/30/2008	30	A10S			1,871.67	0	5,120	6,640	11,760	318	37	37	0	37	30	2.59
06/30/2008	31	A10S			1,982.44	0	5,360	7,280	12,640	342	37	37	0	37	30	2.78
05/30/2008	30	A10S			1,806.41	0	4,720	6,720	11,440	336	34	34	0	34	26	2.52
04/30/2008	30	A10S			1,325.32	0	4,800	6,640	11,440	424	27	27	0	27	25	2.52
03/31/2008	31	A10S			1,351.76	0	4,560	7,120	11,680	433	27	27	0	27	25	2.57
02/29/2008	29	A10S			1,299.06	0	4,560	6,720	11,280	418	27	27	0	27	25	2.48
01/31/2008	28	A10S			1,340.61	0	5,200	6,160	11,360	325	35	35	0	35	30	2.50
01/03/2008	31	A10S			1,386.27	0	4,320	7,360	11,680	344	34	34	0	34	30	2.57
Total for 2008:			0.00	0	14,231.26	0	43,920	61,120	105,040	3,256						23.12
12/03/2007	33	A10S			285.50	0	640	960	1,600	267	6	6	0	6	5	0.35
10/31/2007	28	A10S			362.34	0	800	800	1,600	229	7	7	0	7	5	0.35
10/03/2007	28	A10S			424.01	0	1,040	880	1,920	213	9	9	0	9	9	0.42
09/05/2007	33	A10S			449.45	0	960	1,040	2,000	222	9	9	0	9	6	0.44
Total for 2007:			0.00	0	1,521.30	0	3,440	3,680	7,120	931						1.56
Total for SA id: 1283035105:			0.00	0	15,752.56	0	47,360	64,800	112,160	4,187						24.68

$$\text{Average Cost per kwh} = \frac{\$15,753}{112,160 \text{ kwh/yr}} = \$0.140/\text{kwh}$$

CITY OF SONOMA

Usage Comparison	Days Billed	Therms Billed	Therms per Day
This Year	30	77	2.6
Last Year	N/A	N/A	N/A

Customer Charge is based on the Highest Average Daily Usage within the last 12 months (2.6 therms per day during the billing period ending 04/30/2008).

19728 8TH ST E
SONOMA CA 95476

ELECTRIC ACCOUNT DETAIL

Service ID #: 1283035050 CORP YARD SHOP&GARAGE
Rate Schedule: A1 Small General Service
Billing Days: 30 days



Serial	Rotating Outage Blk	Meter #	Prior Meter Read	Current Meter Read	Difference	Meter Constant	Usage
D	9N	97972R	96,784	99,500	2,716	1	2,716 Kwh

Charges

04/01/2008 - 04/30/2008

Electric Charges	\$367.05	
Net Charges		\$367.05

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Generation	\$169.94
Transmission	22.17
Distribution	107.58
Public Purpose Programs	33.16
Nuclear Decommissioning	0.73
DWR Bond Charge	12.96
Ongoing CTC	11.87
Energy Cost Recovery Amount	8.64

Taxes and Other

Energy Commission Tax	\$0.60
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TOTAL CHARGES

\$367.65

Usage Comparison	Days Billed	Kwh Billed	Kwh per Day
This Year	30	2,716	90.5
Last Year	29	1,915	66.0

Rotating outage blocks are subject to change without advance notice due to operational conditions.

Generation includes charges for the portion of your energy usage provided by the Department of Water Resources (DWR) and is being collected by PG&E as an agent for DWR. DWR is collecting 7.123 cents per kWh from Bundled customers for each kWh it provides plus the Power Charge Indifference Adjustment component of the Cost Responsibility Surcharge from Direct Access and Transitional Bundled Service customers.

The rates shown above are applicable to bundled service customers. Direct Access and Community Choice Aggregation customers pay only a portion of these rates. Please see the appropriate rate schedule for the applicable charges.

19784 8TH ST E
SONOMA CA 95476

Rotating Outage Block 9N

CITY OF SONOMA

ELECTRIC ACCOUNT DETAIL

Service ID #: 1283035060 AREA LIGHTING P-7021
Rate Schedule: OL1 Outdoor Area Lighting Service
Billing Days: 29 days

Charges

04/25/2008 - 04/30/2008

Electric Charges

\$2.05

Net Charges

\$2.05

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Generation	\$0.39
Transmission	0.04
Distribution	1.50
Public Purpose Programs	0.07
DWR Bond Charge	0.03
Energy Cost Recovery Amount	0.02

Charges

05/01/2008 - 05/23/2008

Electric Charges

\$7.84

Net Charges

\$7.84

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Generation	\$1.51
Transmission	0.13
Distribution	5.75
Public Purpose Programs	0.26
Nuclear Decommissioning	0.01
DWR Bond Charge	0.11
Energy Cost Recovery Amount	0.07

TOTAL CHARGES

\$9.89

Usage Comparison	Days Billed	Kwh Billed	Kwh per Day
This Year	29	28	1.0
Last Year	32	31	1.0

rotating outage blocks are subject to change without advance notice due to operational conditions.

eneration includes charges for the portion of your energy usage provided by the Department of Water
esources (DWR) and is being collected by PG&E as an agent for DWR. DWR is collecting 7.123 cents
er kWh from Bundled customers for each kWh it provides plus the Power Charge Indifference Adjustment
omponent of the Cost Responsibility Surcharge from Direct Access and Transitional Bundled Service
istomers.

re rates shown above are applicable to bundled service customers. Direct Access and Community Choice
gregation customers pay only a portion of these rates. Please see the appropriate rate schedule for the
pplicable charges.

310 SONOMA HWY
SONOMA CA 95476

ELECTRIC ACCOUNT DETAIL

Service ID #: 1283035145 MUNI WTER SYST PMP
Rate Schedule: A1 Small General Service
Billing Days: 29 days

CITY OF SONOMA

Charges

04/01/2008 - 04/30/2008

Electric Charges

\$8.87

Net Charges

\$8.87

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Distribution

\$8.87

TOTAL CHARGES

\$8.87

Usage Comparison	Days Billed	Kwh Billed	Kwh per Day
This Year	30	0	0.0
Last Year	30	0	0.0

Rotating outage blocks are subject to change without advance notice due to operational conditions.

Generation includes charges for the portion of your energy usage provided by the Department of Water Resources (DWR) and is being collected by PG&E as an agent for DWR. DWR is collecting 7.123 cents per kWh from Bundled customers for each kWh it provides plus the Power Charge Indifference Adjustment component of the Cost Responsibility Surcharge from Direct Access and Transitional Bundled Service customers.

The rates shown above are applicable to bundled service customers. Direct Access and Community Choice Aggregation customers pay only a portion of these rates. Please see the appropriate rate schedule for the applicable charges.

100 1ST ST W
SONOMA CA 95476

ELECTRIC ACCOUNT DETAIL

Service ID #: 1283035090 PUMP #6
Rate Schedule: A6 Small General Time-of-Use Service
Billing Days: 60 days

Serial	Rotating Outage Blk	Meter #	Prior Meter Read	Current Meter Read	Difference	Meter Constant	Usage
F	50	61P734	42,535	46,956	4,421	1	4,420 Kwh

Charges

04/01/2008 - 04/30/2008

Electric Charges

\$248.80

Net Charges

\$248.80

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Generation	\$109.88
Transmission	16.57
Distribution	75.16
Public Purpose Programs	21.62
Nuclear Decommissioning	0.55
DWR Bond Charge	9.69
Ongoing CTC	8.87
Energy Cost Recovery Amount	6.46

Taxes and Other

Energy Commission Tax

\$0.45

CITY OF SONOMA

Time of Use Detail

Season: Winter	Energy
Peak	
Partial-Peak	434 @ \$0.13349
Off-Peak	1,596 @ \$0.11015

Charges

05/01/2008 - 05/30/2008

Electric Charges	\$396.16	
Net Charges		\$396.16

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Generation	\$202.04
Transmission	19.51
Distribution	121.56
Public Purpose Programs	25.45
Nuclear Decommissioning	0.65
DWR Bond Charge	11.41
Ongoing CTC	7.94
Energy Cost Recovery Amount	7.60

Taxes and Other

Energy Commission Tax	\$0.53
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Time of Use Detail

Season: Summer	Energy
Peak	360 @ \$0.36568
Partial-Peak	434 @ \$0.17131
Off-Peak	1,596 @ \$0.10972

TOTAL CHARGES\$645.94

Usage Comparison	Days Billed	Kwh Billed	Kwh per Day
This Year	60	4,420	73.7
Last Year	59	3,529	59.8

Rotating outage blocks are subject to change without advance notice due to operational conditions.

Generation includes charges for the portion of your energy usage provided by the Department of Water Resources (DWR) and is being collected by PG&E as an agent for DWR. DWR is collecting 7.123 cents per kWh from Bundled customers for each kWh it provides plus the Power Charge Indifference Adjustment component of the Cost Responsibility Surcharge from Direct Access and Transitional Bundled Service customers.

The rates shown above are applicable to bundled service customers. Direct Access and Community Choice Aggregation customers pay only a portion of these rates. Please see the appropriate rate schedule for the applicable charges.

75 1ST ST W
SONOMA CA 95476

ELECTRIC ACCOUNT DETAIL

Service ID #: 1283035105 POLICE STATION 
Rate Schedule: A10S Medium General Demand-Metered Service
Billing Days: 30 days

Rotating	Prior	Current	Meter		
Outage Blk	Meter #	Meter Read	Meter Read	Difference	Constant
50	927N70	27,888	28,030	142	80
					Usage
					11,440 Kwh

CITY OF SONOMA

Charges

04/01/2008 - 04/30/2008

Electric Charges \$1,325.32
Net Charges \$1,325.32

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Generation	\$682.62	
Transmission	70.82	
Distribution	305.90	
Public Purpose Programs	124.01	
Nuclear Decommissioning	3.09	
DWR Bond Charge	54.57	
Ongoing CTC	47.93	
Energy Cost Recovery Amount	36.38	0

Taxes and Other

Energy Commission Tax \$2.52

Demand Detail

Billing Demand Winter 27

TOTAL CHARGES

\$1,327.84

Usage Comparison	Days Billed	Kwh Billed	Kwh per Day
This Year	30	11,440	381.3
Last Year	28	2,080	74.3

ating outage blocks are subject to change without advance notice due to operational conditions.

Generation includes charges for the portion of your energy usage provided by the Department of Water Resources (DWR) and is being collected by PG&E as an agent for DWR. DWR is collecting 7.123 cents per kWh from Bundled customers for each kWh it provides plus the Power Charge Indifference Adjustment component of the Cost Responsibility Surcharge from Direct Access and Transitional Bundled Service customers.

The rates shown above are applicable to bundled service customers. Direct Access and Community Choice Aggregation customers pay only a portion of these rates. Please see the appropriate rate schedule for the applicable charges.

375 1ST ST E
SONOMA CA 95476

ELECTRIC ACCOUNT DETAIL

Service ID #: 1283035140 PRKG LT LTS-CASA GRNDE
Rate Schedule: A1 Small General Service
Billing Days: 30 days

Serial	Rotating Outage Blk	Meter #	Prior Meter Read	Current Meter Read	Difference	Meter Constant	Usage
F	50	G38902	98,338	98,659	321	1	321 Kwh

Charges

04/01/2008 - 04/30/2008

Electric Charges \$50.68
Net Charges \$50.68

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

CITY OF SONOMA

ELECTRIC ACCOUNT DETAIL

Service ID #: 2585800005 FIRE STATION
 Rate Schedule: A10S Medium General Demand-Metered Service
 Billing Days: 29 days

Serial	Rotating Outage Blk	Meter #	Prior Meter Read	Current Meter Read	Difference	Meter Constant	Usage
F	50	X08540	4,395	4,455	60	160	9,600 Kwh

Charges

04/02/2008 - 04/30/2008

Electric Charges

\$1,173.94

Net Charges

\$1,173.94

The net charges shown above include the following component(s).
Please see definitions on Page 2 of the bill.

Generation	\$572.84
Transmission	85.12
Distribution	292.79
Public Purpose Programs	104.06
Nuclear Decommissioning	2.59
DWR Bond Charge	45.79
Ongoing CTC	40.22
Energy Cost Recovery Amount	30.53

Taxes and Other

Energy Commission Tax

\$2.11

Demand Detail

Billing Demand Winter

32

TOTAL CHARGES

\$1,176.05

Usage Comparison	Days Billed	Kwh Billed	Kwh per Day
This Year	29	9,600	331.0
Last Year	N/A	N/A	N/A

Rotating outage blocks are subject to change without advance notice due to operational conditions.

Generation includes charges for the portion of your energy usage provided by the Department of Water Resources (DWR) and is being collected by PG&E as an agent for DWR. DWR is collecting 7.123 cents per kWh from Bundled customers for each kWh it provides plus the Power Charge Indifference Adjustment component of the Cost Responsibility Surcharge from Direct Access and Transitional Bundled Service customers.

The rates shown above are applicable to bundled service customers. Direct Access and Community Choice Aggregation customers pay only a portion of these rates. Please see the appropriate rate schedule for the applicable charges.

115 BROADWAY
SONOMA CA 95476

ELECTRIC ACCOUNT DETAIL

Service ID #: 1824607036
 Rate Schedule: A1 Small General Service
 Billing Days: 30 days

Serial	Rotating Outage Blk	Meter #	Prior Meter Read	Current Meter Read	Difference	Meter Constant	Usage
D	50	96M598	150	155	5	1	5 Kwh

APPENDIX E

Supplemental Report on CREBs

SUPPLEMENTAL REPORT

Authorization to proceed with issuance of Clean Renewable Energy Bonds [CREBs] to construct photo voltaic solar power systems on City facilities

For the Council Meeting of June 18, 2008

Background

Since 2007 staff has been working towards the issuance of Clean Renewable Energy Bonds [better known as "CREBs"] to install solar infrastructure on certain publicly-owned buildings. CREBs is a federal program that finances energy projects of public agencies for a value exceeding \$100,000. The main difference between a CREB and any other governmental borrowing [such as a redevelopment bond] is that CREBS are issued at a 0% interest rate. The City only repays the principal on the bond during the 15 year term. CREBs authority is awarded on a competitive basis by the U.S. Treasury to fund renewable energy projects. The bond buyer, in lieu of interest, receives a federal tax credit for the life of the principal outstanding. The interest-free CREBs proceeds can be incorporated into a proprietary financing structure whereby the City has no operating risk or obligation [at rate competitive kWh rates] only for power actually produced and the City retains all of the residual interest in the system [i.e. continues to receive the solar advantages after the CREBs has been paid in full].

In July 2007, staff prepared and submitted an application for CREBs financing for four separate projects. On December 17, 2007 the City of Sonoma was awarded a CREBs allocation of \$1,156,000 to fund all projects applied for. The award was granted as follows:

\$180,000	Corporation Yard PV Solar Project [General Fund]
\$242,000	Fire Station PV Solar Project [General Fund]
\$430,000	Police Station PV Solar Project [General Fund]
\$304,000	Water Tank PV Solar Project [Water Fund]
\$1,156,000	TOTAL AWARD

Eligible project costs include any necessary structural upgrades to designated PV sites, feasibility study costs and costs for the City to provide a Project Manager as capitalized project costs. Additionally, use of existing staff for project management can be charged against the financing. The limitation on the CREB program is that it can only be used for energy projects that are applied for and approved by the federal government. CREBs cannot be used for privately-owned projects.

Nexus with Adopted City Goals and Policies

On February 20, 2008, the City Council adopted the City of Sonoma Greenhouse Gas Emissions Reduction Action Plan Analysis, Plan D, which sets a goal of 37.2% reduction in greenhouse gas emissions (GHG) from City operations (below 2000 baseline emissions). Seventeen percent (17%) of the City's GHG emissions are from the category of City buildings. The adopted Plan D relies on City photovoltaic projects as a vehicle for reducing GHG emissions caused by City buildings.

Further, the City's General Plan Environmental Resources Element contains as a Goal ER-3.3, "Set an example of sustainability by conserving resources and following green practices in City facilities, services, and projects."

The Clean and Renewable Energy Bonds project allows the City to take advantage of an IRS qualified program formulated for the needs of public agencies, in order to facilitate the installation of photovoltaic systems on public properties.

CREBs Projects Status

Concurrent with pursuing the financing, City staff has been moving forward on the photovoltaic projects in order to be in a position to start the projects in 2008. The Senior Planner has been working with Hetty Howerton of Green Living Sonoma and Dennis King of SolarCraft who have volunteered to assist the City with initial evaluations and estimates. As such, site inspections were conducted of the four facilities and the proposed water tank array at the Norrbom Tank is being studied for the feasibility of an array on the tank or elsewhere on the site (ground-mounted). In addition, a feasibility study will be required for the Corporation Yard warehouse to determine if it can support an array and identify what upgrades will be necessary and associated costs.

In addition, the City Manager has been in contact with the Sebastopol City Manager in order to gain an understanding of their experience with the CREBs financing process, in order to better inform the City of Sonoma's project efforts.

Private Placement Financing Agreement

Based on the relatively small amount of the debt [in the current financing world], it was determined that Private Placement Financing was an option which avoids a number of expensive processes including extensive bond counsel reviews, public hearings and issuance of required bond documents. The private placement firm chosen to purchase the refinancing lease will be Municipal Finance Corporation [MFC]. Since the City is presently associated with this financing company it reduces the need to file additional financial reports and audits. In addition, MFC recently completed the only other CREBs issuance in Sonoma County [City of Sebastopol]. The lease will be recorded against the title of Police Station property which is offered as collateral for the debt. Private

placement transactions tend to move quickly and closing can be expected within a few weeks after an investor has been identified. Costs involved in this transaction are minimal compared to a public offering since a fiscal agent is not needed, legal counsel only submits a tax opinion and disclosure and registration documentation are not required.

Property Lease Agreement

The financing structure places an existing asset [the Police Station] as collateral to Municipal Finance Corporation [MFC] under a Lease Agreement and “leases back” the asset concurrently. The purpose of the lease-leaseback arrangement is to obligate Municipal Finance Corporation to raise the funds needed [i.e. find investors] for the project and to obligate the City to repay the financing. Under the Lease Agreement, the City agrees to pay annual installments of rent [lease payments] for the Police Station in accordance with the CREBs regulations. The Lease Payments are payable from the City's General Fund, although the portion of the project that will be generated from the Water Tank Project will be paid out of the City's Water Fund. Midterm Budget Amendments will be necessary to include the Lease payments in the FY 08-09 Operating Budget. Payments were not anticipated during the original adoption of the two-year budget.

Financing Structure

The Lease Payments under CREBs financing do not include an interest payment. The lender /investors receives quarterly tax credits calculated at rates which are published as of the date there is a written commitment by the lender [MFC] to fund the CREBs projects. Such written commitment is established through a Purchase Agreement. MFC will obtain the funds needed for the projects [\$1,156,000] by assigning its rights under the Lease Agreement, including the right to receive Lease Payments, to a lender under an Assignment Agreement. Proceeds of the financing will be deposited with Deutsche Bank, as custodian through a Project Fund Agreement. The City will then requisition payments from the custodian as required to pay projects costs. A separate account is set up for each of the four [4] approved CREBs projects in order to ensure that the IRS allocations for each project are not exceeded. The CREBs projects have an ambitious/specified project completion schedule. The project fund must be spent entirely in 18 months, with 15% being spent in the six months following the issuance of CREBs and 60% being spent within 12 months. Ninety-five percent of remaining proceeds must be expended within the full 18 month period unless unforeseeable delays beyond reasonable control of the City occur. The final 5% may occur as late as June 2013 [5 years]. Failure to complete the CREBs projects within these timeframes does not negate the City's responsibility for lease payments. Should the City not expend the funds in a timely manner [by June 2013], the funds remaining in the CREBs project account will be used to prepay the debt and any remaining construction or project costs would be the direct responsibility of the City for payment.

Financing Costs/Fiscal Impact

The CREBs regulations require the City to pay the principal portion only of the Lease Payments in equal annual installments with one installment due each fiscal year and one at the final maturity of the lease. The estimated annual principal payment will be \$68,750 in the first year funded 74% from the General Fund and 26% from the Water Fund. The first annual payment for this CREBs issuance will be due in December 2008. The Treasury Department has set the CREBs rates for 15 years, equating to 16 annual payments to repay the CREBs. CREBs interest rates are set by published Treasury rates at time of issuance. Presently the 15-year credit rate is set by term of maturity beginning in year one at 3.46% escalating to a 5.91 rate at year 15.

For comparison purposes only, staff has prepared a reference table for traditional bond financing versus CREBs financing for the award amount of \$1,156,000 as follows:

15-YR FINANCING SOURCE	AMOUNT	PRINCIPAL PAID	INTEREST PAID
CREBs Financing	\$1,156,000	\$1,156,000	0
Traditional Financing	\$1,156,000	\$1,156,000	\$618,890

CREBs Project Benefits

Based on historical data provided by the Finance Department, annual electricity costs for the CREBs facilities are projected as follows:

Corporation Yard (19728 Eight Street East)	\$4,417
Fire Station (630 Second Street West)	\$18,302
Norrbom Water Tank	\$5,027
Police Station/Community Meeting Room (175-177 First Street West) Estimate based on two months post-remodel.	\$15,996

The expectation of the CREBs project is to significantly reduce the electricity costs through the generation of solar energy. The City also anticipates that rebates will be received on the costs of the infrastructure materials that can be used to further offset project costs, apply to principal repayment, and/or be retained for long-term maintenance of the solar facilities.

Attached is a cash-flow projection of the CREBs costs/savings based on a 27-year schedule.

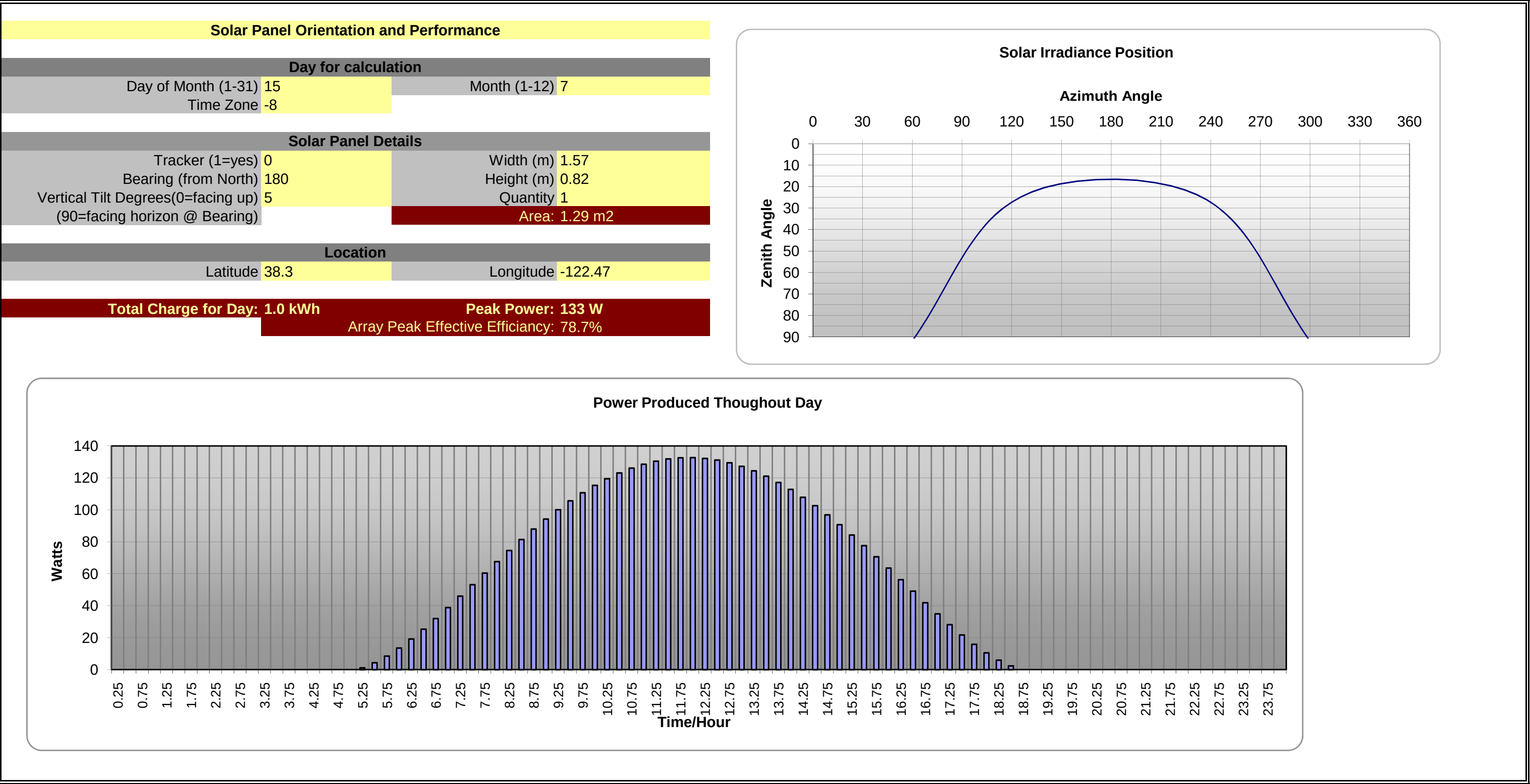
RECOMMENDATION

Staff recommends Council approve a resolution authorizing lease financing of for Clean Renewal Energy Bonds [CREBs] and further authorize and direct the City Manager or her designee to complete all documents and actions necessary to proceed.

APPENDIX F

Solar Panel Orientation and Performance Data

Solar Panel Orientation and Performance Data



APPENDIX G

California Solar Initiative Statewide Trigger Point Tracker for PV Incentive

Statewide Trigger Point Tracker



Last updated 3/04/2009

Administrator	Customer Class *	Current Step	Initial MW in Step	Unused MW from Previous Steps	Revised Total MW in Step	Issued Conditional Reservation Letters (MW)	MW Remaining	MW Under Review
PGE	Residential	5	23.10	0.16	23.26	5.17	18.09	0.43
	Non-Residential	6	55.60	0.15	55.75	5.34	50.41	20.92
SCE	Residential	3	15.20	0.40	15.60	10.70	4.90	1.10
	Non-Residential	5	49.30	20.40	69.70	12.52	57.18	3.73
CCSE	Residential	4	4.40	0.04	4.44	1.73	2.70	0.09
	Non-Residential	5	11.10	1.75	12.85	1.26	11.59	0.12

		EPBB Payments (per Watt)			PBI Payments (per kWh)		
Step	Statewide MW in Step	Residential	Non-Residential		Residential	Non-Residential	
			Commercial	Government / Non-Profit		Commercial	Government / Non-Profit
1	50	n/a	n/a	n/a	n/a	n/a	n/a
2	70	\$2.50	\$2.50	\$3.25	\$0.39	\$0.39	\$0.50
3	100	\$2.20	\$2.20	\$2.95	\$0.34	\$0.34	\$0.46
4	130	\$1.90	\$1.90	\$2.65	\$0.26	\$0.26	\$0.37
5	160	\$1.55	\$1.55	\$2.30	\$0.22	\$0.22	\$0.32
6	190	\$1.10	\$1.10	\$1.85	\$0.15	\$0.15	\$0.26
7	215	\$0.65	\$0.65	\$1.40	\$0.09	\$0.09	\$0.19
8	250	\$0.35	\$0.35	\$1.10	\$0.05	\$0.05	\$0.15
9	285	\$0.25	\$0.25	\$0.90	\$0.03	\$0.03	\$0.12
10	350	\$0.20	\$0.20	\$0.70	\$0.03	\$0.03	\$0.10

* The non-residential customer class includes commercial, private, government, and non-profit participants.

Please be aware that the final CSI incentive rate that is reserved for you will be determined by your CSI Program Administrator at the time your reservation request (RR) application is approved, and may be lower than the current incentive rate shown in the CSI Statewide Trigger Point Tracker. Please note that final incentive amounts are subject to change based upon the configuration of the as-built system. (Per the CSI Handbook, no projects or applications are reserved CSI funding until all required information has been submitted and approved in writing by the Program Administrator.)

For more information about the California Solar Initiative, visit GoSolarCalifornia.ca.gov.

For more details on the California Solar Initiative's project history, visit CSI.PowerClerk.com.

APPENDIX H

PG&E Net Metering Agreement and Interconnection Application



Pacific Gas and
Electric Company®

Net Energy Metering

Application and Interconnection Agreement for Customers with Solar and/or Wind Electric Generating Facilities of 30 Kilowatts or Less

Please note that this agreement does not constitute an application to any **rebate** and/or **incentive programs**. For more information on these programs and their specific applications, please contact PG&E by phone, or by email using the subject "solar energy" at smarter-energy@pge.com, 1-800-933-9555 (residential) or BusinessCustomerHelp@pge.com, 1-800-468-4743 (commercial/industrial).

For more information on the California Solar Initiative (CSI), please go to www.pge.com/csi where you will find information about the program, including the program handbook, reservation request forms with the program contract as well as a list of requirements, FAQ's and resources. For additional questions about the CSI, contact PG&E at solar@pge.com.

If you are applying for a CSI rebate, please check below and continue with this application

☐ Yes, I am also applying for a CSI rebate.

Part I – Identifying the Generating Facility's Location and Responsible Parties

A. Applicability and Purpose:

This *NET ENERGY METERING APPLICATION AND INTERCONNECTION AGREEMENT FOR CUSTOMERS WITH SOLAR AND/OR WIND ELECTRIC GENERATING FACILITIES OF 30 KW OR LESS* ("Agreement") applies to electric rate schedule NEM, Net Energy Metering Service (NEM) for Customer-Generators ("Customer") who interconnect a solar and/or wind turbine electrical Generating Facility, or a hybrid system of both, with an aggregate capacity of 30 kilowatts (kW) or less that is located on Customer's premises, and that operates in parallel with Pacific Gas and Electric Company's ("PG&E") Distribution System.

The purpose of this Agreement is to allow Customer to interconnect with PG&E's Distribution System, subject to the provisions of this Agreement and PG&E's rate schedule NEM. Customer has elected to interconnect and operate its solar and/or wind electric Generating Facility in parallel with PG&E's Distribution System, primarily to offset part or all of the Customer's own electrical requirements at this service point. Customer shall at all times comply with this Agreement as well as with all applicable laws, tariffs and applicable requirements of the Public Utilities Commission of the State of California.

B. Description of Service (This Agreement is being filed for, check all that apply):

- ☐ A New NEM Generating Facility interconnection (at an existing service)
- ☐ For Physical Changes to an interconnected Generating Facility with previous approval by PG&E (adding PV panels, changing inverters/turbines or changing load and/or operations).
- ☐ A New interconnection in conjunction with a new service
 - An **Application for Service** must be completed. Additional fees may be required if a service or line extension is required (in accordance with PG&E Electric Rules 15 and 16). Please contact PG&E at 1-800-PGE-5000.
- ☐ An Interconnection under Direct Access (DA)
 - Customers applying for NEM who are served under **Direct Access** by an Energy Service Provider (ESP) must contact their ESP directly for information regarding the ESP's net energy metering program.
- ☐ An interconnected non-exporting Generating Facility (load always exceeds generation)
 - For Customers with a non-exporting Generating Facility, Form 79-974 may be more appropriate. Form 79-974 may be found at <http://www.pge.com/tariffs/pdf/E79-974.pdf>

Please complete this agreement in its entirety

C. Customer Generating Facility Information - Where will the Generating Facility be installed?

Name shown on PG&E service account (Must Match Customer Name on PG&E Blue Bill)		Account Number	Meter Number (Meter Badge ID)
Street Address			
City	State	Zip	
Mailing Address			
City	State	Zip	
Business Phone	Home Phone	Fax	Email

D. Contractor Information (Must be completed even if Contractor will not serve as a PG&E contact).

Contractor		Company Name
Mailing Address		
City	State	Zip
Business Phone	Fax	Email
☐ This contractor is to be used as PG&E contact and is authorized by Customer to receive confidential Customer information and act on behalf of Customer with respect to this agreement.		

E. Other Contact Information (This information is optional.)

Contact Person		Company Name
Mailing Address		
City	State	Zip
Business Phone	Fax	Email
☐ This contact person is to be used as PG&E contact and is authorized by Customer to receive confidential Customer information and act on behalf of Customer with respect to this agreement.		

By checking the boxes above and signing this agreement, Customer authorizes PG&E to release information to the contact(s) named above regarding Customer's usage and billing information, Generating Facility location, size and operational characteristics as requested in the course of this interconnection process. PG&E is granted permission to share information with authorized recipients for a period of **three years** from the date this agreement is received by PG&E. Contacts(s) are also authorized to make changes to rates and metering arrangements which may result in charges to Customer.

Please complete this agreement in its entirety

In addition, Customer authorizes PG&E to release to the California Energy Commission (CEC) information regarding Customer's facility, including customer name and Generating Facility location, size, and operational characteristics, as requested from time to time pursuant to the CEC's rules and regulations.

Part II – Requirements for Interconnection

In submitting this document, I the Customer, understand and agree to the following terms and conditions:

Permission to Interconnect

Customers must not operate their Generating Facility in parallel with PG&E's Distribution System until they receive written authorization for Parallel Operation from PG&E. Unauthorized Parallel Operation could result in injury to persons and/or damage to equipment and/or property for which the Customer may be liable.

Safe Operation of your Generating Facility

Notwithstanding any other provision of this Agreement, if at any time PG&E determines that either (a) the Customer's Facility, or its operation, may endanger PG&E personnel, or (b) the continued operation of the Customer's Facility may endanger the safe and reliable operation of PG&E's electrical system, PG&E shall have the right to disconnect the Facility from PG&E's system. Customer's Facility shall remain disconnected until such time as PG&E is satisfied that the unsafe condition(s) have been corrected.

Interconnections on PG&E's Secondary Network

Applications to interconnect systems located in San Francisco or Oakland may require additional analysis to determine whether or not their proposed installation is on PG&E's networked secondary system. Networked secondary systems are in place to provide heightened levels of reliability in densely populated areas and may affect the ability of PG&E to interconnect NEM customers. **Please contact Generation Interconnection Services at 415-972-5676 or email gen@pge.com if your proposed installation is in San Francisco or Oakland.**

Meter Access

Following your bi-directional meter installation, your meter must be installed in a safe PG&E-accessible location and remain unobstructed by locked gates or pets. Additionally, meter access must be maintained at all times for meter reading and system maintenance. Any animals owned by the customer, including pet dogs, should not have access to these areas to avoid hindering PG&E service personnel from completing their work.

Document and Fee Requirements

Other Documents and/or Fees *may* be required and there may be requirements for interconnection in addition to the above list, depending on the specifics of the planned Generating Facility. Other approvals and/or other agreements may be needed for special PG&E programs or regulatory agency requirements.

Stale Agreements

If this agreement is still pending two years from its date of submittal and customer has not met all of the requirements, PG&E will close this application and Customer will be required to submit a new application should Customer wish to take service on Schedule NEM.

A. Agreement Package:

These documents are needed to ensure safe and reliable operation of PG&E's Distribution System and to confirm that Customer's interconnection has been performed in accordance with PG&E's tariffs. (Additional forms are available upon request by telephoning 415-972-5676, emailing gen@pge.com, or visiting PG&E's website at <http://www.pge.com/standardnem>). **Customers should not delay sending any part of the agreement package to PG&E.** As PG&E receives documentation described in Sections (1) through (5) below, PG&E will begin to process the application.

Required Documents for New Applicants:

1. A completed copy of this **Agreement**. **Please note:** the Customer name (as identified in Part I, Section C) must be the same name as on the PG&E bill. In this Agreement, Customer will confirm their otherwise-applicable rate schedule (OAS), establishing how Customer's monthly usage or net generation will be charged/credited. Customer-initiated rate changes are governed in accordance with PG&E's Electric Rule 12.

Please complete this agreement in its entirety

2. A **single-line diagram** showing Customer's actual installation of his/her Generating Facility. The diagram must include the electrical rating and operating voltages of the significant electrical components such as the service panel, the disconnect switch (if required), inverters, all wind and/or photovoltaic generators, circuit breakers and other protective devices of the Generating Facility, the general location of the Customer's loads relative to the Generating Facility, and the interconnection with PG&E's Distribution System. The diagram must include the following information:

A. A description and location of the visible, lockable **AC disconnect switch** if present.

Effective November 21, 2006, customers installing inverter-based systems will no longer be required to include an AC disconnect switch when the facility has a self-contained electric revenue meter (i.e. 0-320 amp socket-based meters or 400 amp K-based meters). This type of meter is used by 98% of all PG&E customers.

To accommodate this change while maintaining utility operating needs, the revenue meter, when appropriate, may be temporarily removed by PG&E to isolate the customer's generator from the electric distribution system. Removal of the revenue meter (due to an emergency or maintenance on PG&E's system) will result in loss of electrical service to the customer's facility or residence.

PG&E recommends that customers installing an inverter-based generator consider also installing an AC disconnect switch to facilitate maintenance of the customer's equipment (i.e. inverter, PV arrays, etc). The AC disconnect switch provides the additional benefit of allowing PG&E to isolate the customer's generator from the utility's Distribution System without having to interrupt service to the customer's facility or residence.

PG&E's AC disconnect requirement for Distributed Energy Resources (Distributed Generation) will continue to apply to:

- Inverter-based interconnections having a transformer-rated meter (i.e. all meter panels or switchboards employing the use of potential and current transformers).
- Non-inverter based generators, including rotating or machine-based generators - irrespective of whether the service meter configuration is transformer-rated or self-contained.

B. A description of the specific **inverter(s)** used to control the interconnection between PG&E and the Generating Facility, including rating, brand name, and model number. CEC-certified inverters¹ will pass the requirements for Simplified Interconnection per PG&E's Electric Rule 21. Non-certified units will require further study and may involve additional costs.

C. A complete description of the **generating equipment Customer plans to install**. If the Generating Facility includes photovoltaic panels, the description must include the manufacturer name, model number, number of panels, and the nameplate rating. If the Generating Facility includes a wind turbine, the description must include the manufacturer name, model number, number of turbines, and the nameplate rating. Only CEC-certified inverters and certified wind-turbine generators without separate inverters will pass the requirements for Simplified Interconnection. (See the PG&E website <http://www.pge.com/gen> or the CEC website at: <http://www.consumerenergycenter.org/erprebate/equipment.html>)

D. A description of how the power output from the inverter is connected to the **main service panel via a branch breaker**. The ampere rating of this branch breaker and the main service panel breaker must be compatible with the output rating of the Generating Facility. The output rating is computed based on the total nameplate rating of the inverter.

E. If such metering is required, a complete description of the **performance (generation output) meter and related equipment**. The description must include the meter manufacturer, model number and type (socket or panel), as well as any other relevant information (e.g., socket, panels, breakers, etc.). If instrument transformers are required, the description should include this information.

3. Information Regarding any existing **insurance coverage** (liability and/or property) for the Schedule-NEM Generating Facility location.

¹ The CEC's eligible inverter list can be found at: (http://www.consumerenergycenter.org/erprebate/eligible_inverters.html)

Customer shall meet all applicable safety and performance standards established by the National Electrical Code, the Institute of Electrical and Electronics Engineers, accredited testing laboratories such as Underwriters Laboratories and, where applicable, rules of the California Public Utilities Commission regarding safety and reliability. A Customer with a solar or wind-turbine electrical generating system, or a hybrid system of both, that meets those standards and rules shall not be required to install additional controls, perform or pay for additional tests, or purchase additional liability insurance.

To the extent that Customer has currently in force property insurance and commercial general liability or personal liability insurance, Customer agrees that it will maintain such insurance in force for the duration of this Agreement in no less amounts than those currently in effect. Pacific Gas and Electric Company shall have the right to inspect or obtain a copy of the original policy or policies of insurance prior to commencing operation. As long as Customer meets the requirements of this section, Customer shall not be required to purchase any additional liability insurance.

☐ I have insurance. I hereby certify that there is presently insurance coverage in the amount of \$_____ for the Schedule-NEM Generating Facility location.

Insuring Company's Name: _____

Insurance Policy # _____

☐ I **do not** have insurance. I hereby certify that there is presently \$0 (zero) dollars of insurance for the Schedule-NEM Generating Facility location

4. A copy of the **final, signed, jurisdictional approval (building permit) for Customer's Generating Facility** from the local government entity with jurisdiction over the Customer's project. **Customer's agreement package will not be complete until PG&E receives this document.** Once PG&E receives the final building permit, PG&E will contact Customer to schedule an on-site inspection and, if required, bi-directional meter installation.

B. Internet Agreement Forms

If this Agreement has been completed on PG&E's website, it may be automatically submitted via that system. Copies or forms requiring a signature, attachments and any applicable fees described in Part II must be mailed to PG&E at the address noted in Section IV (E), Notices.

Part III – General Facility and Rate Information

A. What applicable **Rate Schedule** have you selected for your NEM account (known as your "otherwise applicable rate schedule" or "OAS")?

RESIDENTIAL:

- ☐ E-1 – Non-Time-of-Use Residential Service
☐ E-6 – Residential Time-of-Use Service
☐ E-7 – Residential Time-of-Use Service²
☐ E-9 – Experimental Residential Time-of-Use for Low Emission Vehicle Customers³
☐ Other (_____)

²Pursuant to 2003 GRC Phase 2 Decision 05-11-005, the E-7 rate schedule was closed to all new customers on May 1, 2006, but was subsequently temporarily reopened on January 1, 2007 only to new solar customers satisfying the conditions in Decision 06-12-025. This schedule was closed to new solar customers as of January 1, 2008, except that solar customers requesting service under this rate schedule prior to January 1, 2008, may begin taking this service between January 1, 2008 and June 30, 2008, up to the maximum number of new solar customers established by D.06 12 025. Availability of this option will be determined in the order the request was received in either the PG&E Interconnection Application or in the PG&E California Solar Initiative Application, and additionally, after June 1, 2008, based on the date the customer is ready to interconnect. Otherwise, E-7 NEM service is available only to qualifying customers who have continuously taken service on E-7 since December 31, 2007 or earlier.

³ If customer selects **Schedule E-9**, the **Experimental Rate for Low Emission Vehicles** as the otherwise-applicable rate, a **Schedule E-9 Application** will need to be completed and signed.

Please complete this agreement in its entirety

SMALL COMMERCIAL

- ☐ A-1 – Small General Non-Time-of-Use Service
- ☐ A-6 – Small General Time-of-Use Service
- ☐ A-10 - Medium General Demand-Metered Service
- ☐ Other (_____)

AGRICULTURAL

- ☐ AG-1 – Agricultural Power
- ☐ AG-R – Split-Week Time-of-Use Agricultural Power
- ☐ AG-V – Short-Peak Time-of-Use Agricultural Power
- ☐ AG-4 – Time-of-Use Agricultural Power
- ☐ AG-5 - Large Time-of-Use Agricultural Power

Historical electrical rate information may be found at: <http://www.pge.com/notes/rates/tariffs/rateinfo.shtml>, and current electric rate schedules may be found at: <http://www.pge.com/tariffs/ERS.SHTML#ERS>.

Depending on Customer's rate schedule and metering arrangement, an installation fee and/or reprogramming fee may be required to provide net energy metering.

Customers will be billed and will be expected to pay monthly for the non-energy charges (i.e., non-per-kilowatt-hour charges) that are due under Customer's OAS. In addition, Customer may (at his/her option) pay any amount for energy charges monthly, with the understanding that any and all payments will be reconciled at the completion of the true-up period. At the end of every twelve (12) billing cycles, or other reconciliation period as provided in Schedule NEM, Customer's charges will be totaled including: (1) any unpaid monthly non-energy charges, (2) the charge for any net-energy consumption as defined in rate Schedule NEM. Customer's total payments for the twelve (12) billing cycles or other reconciliation period as provided in Schedule NEM will then be subtracted from the total charges. Customer will then be billed for any balance due. In addition, PG&E Electric Rules and Rates, including but not limited to Electric Rules 2, 14, 15, 16, and 21, Schedule NEM, and Customer's OAS may apply.

For further information on understanding NEM billing, please go to the 'related docs' section of PG&E's Net Energy Metering website at: www.pge.com/standardnem.

B. Will this account be established in a new **subdivision?**

- ☐ Yes **If yes**, who is the developer? _____
- ☐ No

C. Will an electric **vehicle recharging facility be included as part of the load at this location?**

- ☐ Yes
If yes, will the vehicle recharging facility be separately metered from the residence?
 - ☐ Yes
 - ☐ No
- ☐ No

D. Expected **date of Project Completion and PG&E Receipt of Final, Signed-Off Building Permit for Generating Facility?**

Date: _____

E. Are there any other generators connected on this account?

- ☐ Yes
If yes, specify what kind of generator _____
- ☐ No

F. Are there any possible meter access issues?

- ☐ Yes
 - ☐ Dog at Residence
 - ☐ Locked Gate
 - ☐ Meter located inside of facility/residence
 - ☐ Other (Please explain) _____
- ☐ No

Please complete this agreement in its entirety

A. AC Disconnect Switch

List the disconnect switch that will be used at this Generating Facility (Enter "N/A" if not applicable).

Disconnect Switch Manufacturer	Disconnect Switch Model Number	Disconnect Switch Rating (amps)

B. Inverters interconnected with PG&E

List all the inverters that will be interconnected to PG&E.

Customers with non-standard inverters which do not meet the UL and IEEE requirements specified in Electric Rule 21, or Customers whose aggregate Generating Facility capacity exceeds 15% of the peak load on the distribution line section as described in Electric Rule 21 (Section I.6.) require a **Supplemental Review** which may entail a study, additional equipment, and/or other requirements.

No.	Inverter Manufacturer	Inverter Model Number	Inverter Rating (kW) ⁴	Quantity of Inverters	Inverter Output Voltage	Single or Three phase?
1						
2						

C. Photovoltaic Generator Equipment

List the photovoltaic (PV) panel information requested below. If the panels are not all identical modules, list the total capacity connected to each inverter you listed above. (Please attach additional sheets if more space is needed.)

No.	PV Panel Manufacturer	PV Panel Model	PV Panel Rating ³ (kW)	Quantity of PV Panels	Total Capacity (kW) ⁴	Inverter number from (B) above (1 or 2)
1						
2						

D. Wind Turbine Equipment

List the wind turbine information requested below. If there is more than one wind turbine of the same type, list the total capacity connected to each inverter you listed in B) above. Write NONE if the inverter is incorporated in the wind turbine and no inverter is required.

No.	Wind Turbine Manufacturer	Wind Turbine Model	Wind Turbine Rating ⁴ (kW)	Quantity of Wind Turbines	Total Capacity (kW) ⁴	Inverter number from (B) above (1 or 2)	Turbine Output Voltage	Single or Three Phase
1								

⁴ The inverter rating equals the nameplate rating, in kW, of each inverter. The CEC efficiency is obtained the CEC website at http://www.consumerenergycenter.org/erprebate/eligible_inverters.html as listed on the date the application is reviewed. Enter the total of all inverter ratings for multiple inverter installations in the Table above.

⁴ For all generation equipment ratings, please use the nameplate rating found on the equipment or in the equipment specifications.

E. Notices - Mailing Instructions and Assistance:

When this agreement has been completed it should be mailed, along with the required attachments and any applicable fees, to:

Pacific Gas and Electric Company
Attention: Generation Interconnection Services
Mail Code N7L
P.O. Box 770000
San Francisco, California 94177

Phone calls and questions may be directed to the Generation Interconnection Services hotline at: 415-972-5676 or email gen@pge.com

GOVERNING LAW

This Agreement shall be interpreted, governed, and construed under the laws of the State of California as if executed and to be performed wholly within the State of California.

TERM OF AGREEMENT

This Agreement shall become effective as of the date of PG&E's issuance of the permission to operate letter after receipt of all applicable fees, required documents, and this completed Agreement. This Agreement shall continue in full force and effect until terminated by either Party providing 30-days prior written notice to the other Party, or when a new Customer takes service with PG&E operating this approved generating facility. This new Customer will be interconnected subject to the terms and conditions as set forth in Schedule NEM.

GOVERNING AUTHORITY

This contract shall at all times be subject to such changes or modification by the Public Utilities Commission of the State of California as said Commission may, from time to time, direct in the exercise of its jurisdiction.

Customer Name (Please Print): _____

(Signature): _____ Date: _____

Title: _____

A copy of this signed agreement should be retained with the "Permission to Operate" letter to confirm project approval.

Please complete this agreement in its entirety

Part 1 – Introduction and Overview

- A. Applicability:** This Generating Facility Interconnection Application (Application) is used to request the interconnection of a Generating Facility to Pacific Gas and Electric Company's (PG&E) Distribution System (over which the California Public Utilities Commission (CPUC) has jurisdiction). Refer to PG&E's Rule 21 to determine the specific requirements for interconnecting a Generating Facility. Capitalized terms used in this Application, and not otherwise defined herein, shall have the same meanings as defined in PG&E's Rule 21 and Rule 1.

Except as noted in the next paragraph, this Application may be used for any Generating Facility to be operated by, or for, a Customer and/or Producer to supplement or serve part or all of its electric energy requirements that would otherwise be provided by PG&E, including "distributed generation", "cogeneration," emergency, backup, and standby generation, and Net Energy Metered Generating Facilities. A simpler, shorter form is also available from PG&E for Net Energy Metering Customers with Solar and/or Wind Electric Generating Facilities less than 30kW (Form 79-1101). This form is available upon request by telephoning 415-972-5676 or on PG&E's website at <http://www.pge.com/gen>. While Customers operating Generating Facilities isolated from PG&E's Distribution System are not obligated to enter into an Interconnection Agreement with PG&E, parts of this Application will still need to be completed to satisfy PG&E's notice requirements for operating an isolated Generating Facility as specified in the California Health and Safety Code Section 119085 (b).

This Application may not be used to apply for interconnecting Generating Facilities used to participate in transactions where all, or a portion of, the electrical output of the Generating Facility is scheduled with the California Independent System Operator. Such transactions are subject to the jurisdiction of the Federal Energy Regulatory Commission (FERC) and require a different application available from PG&E.

This Application is not applicable for incentives and/or rebates offered by the Energy Resources Conservation and Development Commission ("CEC") or the CPUC. Please contact those agencies directly or on their respective websites (www.energy.state.ca.us and www.cpuc.ca.gov).

Guidelines and Steps for Interconnection: This Application must be completed and sent to PG&E along with the additional information indicated in Part 1, Section C below to initiate PG&E's interconnection review of the proposed Generating Facility. An Initial Review fee of \$800 (payable by check or money order to PG&E must accompany the Applications except those Applications for isolated Generating Facilities and Net Energy Metering Generating Facilities. Supplemental Review and Interconnection Study fees may be required for large capacity and/or more complex Generating Facility Interconnections; see PG&E's Rule 21, Section C.1.b. & c. for more information regarding interconnection of a generator to PG&E's Distribution System. Please refer to the California Energy Commission's website: http://www.energy.ca.gov/distgen/interconnection/guide_book.html.

This document is only an Application. Upon acceptance of the Generating Facilities, PG&E will prepare an Interconnection Agreement for execution by the "Producer," the party that will be responsible for the Generating Facility. PG&E may also require an inspection and testing of the Generating Facility and installation of any related Interconnection Facilities prior to giving the Producer written authorization to operate in parallel. **Unauthorized Parallel Operation may be dangerous and may result in injury to persons and/or may cause damage to equipment and/or property for which a Producer/Customer may be liable!**

Please note, other approvals may need to be acquired, and/or other agreements may need to be formed with PG&E or regulatory agencies, such as the Air Quality Management Districts and local governmental building and planning commissions prior to operating a Generating Facility. PG&E's authorization to operate in parallel does not satisfy the need for an Applicant to acquire such other approvals.

- B. Required Documents:** Four (4) copies of this Application and each of the following documents **are required to be submitted** before this application will be processed. Drawings must conform to accepted engineering standards and must be legible. 11"x17" drawings are preferred.
1. A **Single-line drawing** showing the electrical relationship and descriptions of the significant electrical components such as the primary switchgear, secondary switchboard, protective relays, transformers, generators, circuit breakers, with operating voltages, capacities, and protective functions of the Generating Facility, the Customer's loads, and the interconnection with PG&E's Distribution System. Please show the location of all required net generation electric output meter(s) and the A.C. manual operated disconnect switch on the single line drawing.
 2. **Site plans and diagrams** showing the physical relationship of the significant electrical components of the Generating Facility such as generators, transformers, primary switchgear/secondary switchboard, and control panels, the Customer's loads and the interconnection with PG&E's Distribution System. Please show the location of all required net generation electric output meter(s) and the A.C. manual operated disconnect switch on the site plans.
 3. If **transformers** are used to interconnect the Generating Facility with PG&E's Distribution System, please provide transformer nameplate information (voltages, capacity, winding arrangements, connections, impedance, et cetera).
 4. If a **transfer switch** or scheme is used to interconnect the Generating Facility with PG&E Distribution System, please provide component descriptions, capacity ratings, and a technical description of how the transfer scheme is intended to operate.
 5. If **protective relays** are used to control the interconnection, provide protection diagrams or elementary drawings showing relay wiring and connections, proposed relay settings, and a description of how the protection scheme is intended to function.
 6. An Initial Review fee check or money order in the amount of \$800, if applicable, made out to PG&E referencing the electric account number and "Initial Interconnection Review Fee."

GENERATING FACILITY INTERCONNECTION APPLICATION

Part 1 Cont'd – Introduction and Overview

- C. Mailing Instructions, Assistance:** When this application has been completed it may be printed and mailed, along with the required attachments to:

**Pacific Gas and Electric Company
Attn: Manager, Generation Interconnection Services
P.O. Box 770000
Mail Code N7L
San Francisco, California, 94177**

Alternatively, you may contact PG&E at (415) 972-5676 or e-mail at gen@pge.com

Part 2 – Identifying the Generating Facility's Location and Responsible Parties

Project Name:	Date Received:	Generating Facility ID:	Application Expiration Date (Refer to Part 2, Section E)

(For PG&E Use Only)

A. Customer Electric Account Information (What electric service will the Generating Facility be interconnected for parallel operation with PG&E? For aggregated electric accounts (under NEMBIO, dairy operations only) provide the primary and all associated accounts/meter information)

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Name shown on PG&E service account Electric Account Number Electric Badge (Meter) Number

NOTE: Customer Electric account must match the customer's utility bill account information.

--	--	--	--

Meter Location Street Address City State Zip

Customer Electric Account Contact Information (Who is the customer contact for progress updates and/or additional information?)

--	--

Contact Person Company Name

--	--	--

Phone Fax E-mail

--	--	--	--

Mailing Address City State Zip

B. Project Contact Information (Who is the project manager for this Generating Facility?)

--	--

Project Contact Person (Optional) Company Name

--	--	--

Phone Fax E-mail

--	--	--	--

Mailing Address City State Zip

B.1. Will the Generating Facility be owned by a (third) party other than the name appearing on the PG&E service account in A. above (please check)? ☐ Yes ☐ No

Part 2 Cont'd – Identifying the Generating Facility's Location and Responsible Parties

C.1. Customer - Generating Facility Interconnection Agreement ("GFIA") or Customer Generation Agreement ("CGA") (for 3rd Party Generator on Premises) Information (Please identify the party that will execute the applicable agreement.) This Section is not applicable to Net Energy Metering (NEM) Applicants because PG&E and the Customer, not the 3rd Party if any, must enter into the Net Energy Metering Interconnection Agreement.

Company Name to be entered on GFIA/CGA	Legal Title of Company to be entered on GFIA/CGA
Person Executing the GFIA/CGA	Title of Person Executing the GFIA/CGA

Mailing Address	Phone	E-Mail

C.2. 3rd Party Owner – GFIA Information (Please identify the Party, if known, that will execute the GFIA). This Section is not applicable to Net Energy Metering (NEM) Applicants because PG&E and the Customer, not the 3rd Party if any, must enter into the Net Energy Metering Interconnection Agreement.

Company Name to be entered on GFIA/CGA	Legal Title of Company to be entered on GFIA/CGA
Person Executing the GFIA	Title of Person Executing GFIA
Mailing Address	Phone
	E-Mail

D. Operating Date (What date is this Generating Facility expected to begin operation?)

--

E. Expiration Date* (The date the status of this Application is changed to "withdrawn" by PG&E?)

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- The information submitted in this Application will remain active and valid for a period of 12 months from the date the Application was accepted by PG&E as a "completed" Application. If the project has not been interconnected, or that reasonable proof the project is going forward has not been submitted to PG&E by that time, the Application will be considered "withdrawn" and removed from the queue. To the extent that the Initial Review, Supplemental Review, or Detailed Interconnection Study fees have been paid to and the corresponding reviews/study completed by PG&E, Applicant will only be entitled to a return of one-half of the Initial Review fee of \$400. All other fees will be forfeited.

Part 2 Cont'd – Electing Interconnection Cost Responsibilities
F. Estimated Versus Actual Cost Responsibility

Under Rule 21 Applicants can elect estimated or actual costs for (1) detailed interconnection studies, and/or (2) Interconnection Facilities and distribution system modifications. This election must be made at the time of application submission. Under both cost options, an estimate is prepared. If the Applicant elects the actual cost option, there will be a true-up after the completion of the work. If actual costs exceed the original estimated amounts, Applicant will be responsible for costs above the estimated amounts. Conversely, if actual costs are less than the original estimated amounts, PG&E will refund the difference.

Applicants seeking interconnection under PG&E's Net Energy Metering tariffs are not responsible for Initial Review, Supplemental Review and Detailed Interconnection Study fees, nor for distribution system modifications' costs.

Selection of detailed interconnection study cost responsibility* (Non-NEM only):

_____ **Estimated Cost**

_____ **Actual Cost**

Selection of Interconnection Facilities and distribution system modifications' (if applicable) cost responsibility*:

_____ **Estimated Cost**

_____ **Actual Cost**

* **Note:** If no selections are made, estimated cost responsibility will apply.

Part 3 - Describing the Generating Facility and Host Customer's Electrical Facilities

A.
(MP&I)

Indicate the operating mode of the Generating Facility

operating mode
options:

____1 ____2 ____3
(Choose one)

Instructions and Notes

Choose from the following operating mode options:

1. **Parallel Operation:** The Generating Facility will interconnect and operate "in parallel" with PG&E's Distribution System for more than one (1) second.
2. **Momentary Parallel Operation (MP):** The Generating Facility will interconnect and operate on a "momentary parallel" basis with PG&E's Distribution System for a duration of one (1) second or less through transfer switches or operating schemes specifically designed and engineered for such operation.
3. **Isolated Operation (I):** The Generating Facility will be "isolated" and prevented from becoming interconnected with PG&E's Distribution System through a transfer switch or operating scheme specifically designed and engineered for such operation.

Part 3 – Cont'd - Describing the Generating Facility and Host Customer's Electrical Facilities

If the answer is operating mode option 1, "parallel operation," please supply all of the information requested for the Generating Facility. Be sure to supply adequate information including diagrams and written descriptions regarding the protective relays that will be used to detect faults or abnormal operating conditions on PG&E's Distribution System.

If the answer is operating mode option 2, "momentary parallel operation," only questions A, E and F of this Part 3 and questions A, B, E, F, I, L, M, N, and S of Part 4 need be answered. Be sure, however, to supply adequate information including diagrams and written descriptions regarding the switching device or scheme that will be used to limit the parallel operation period to one second or less. Please also describe the back up or protective device and controls that will trip the Generating Facility should the transfer switch or scheme not complete the transfer in one second or less.

If the answer is operating mode option 3, "Isolated Operation," only questions A, E, and F of this Part 3 and questions A, B, F, and S of Part 4 need be answered. Be sure, however, to supply adequate information including diagrams and written descriptions regarding the isolating switching device or scheme that will be used to prevent the Generating Facility from operating in parallel with PG&E's Distribution System.

B.

*Parallel
Operation
Applications
Only*

If the Answer to Section A above was operating mode option 1, please indicate the type of agreement that is being requested with this Application. If operating mode option 2 or 3 was selected, please skip to questions E and F.

If agreement options 2, 3, 5, 7, 8, 9, or 10 to this Section B are chosen, please provide an estimate of the maximum kW the Generating Facility is expected to export to PG&E's Distribution System. If PG&E determines that the amount of power to be exported is significant in relation to the capacity available on its Distribution System, it may request additional information, including time of delivery or seasonal kW/kWh estimates.

agreement options:

 1 2 3 4 5
 6 7 8 9 10
 (Choose all that apply)

 Maximum kW

Instructions and Notes

Sample agreements are available from PG&E for review. Choose from the following ten (10) agreement options:

Customer Owned Generating Facility (non-NEM)

1. **A Generating Facility Interconnection Agreement** that provides for parallel operation of the Generating Facility, but does not provide for exporting power to PG&E's Distribution System. This non-export agreement, however does allow the occasional and uncompensated export of energy to PG&E's Distribution System for less than 2 seconds in duration.
2. **A "Qualifying Facility" Power Purchase Agreement** that provides for parallel operation of the Generating Facility, and exporting energy to PG&E's Distribution System for sale to PG&E. This option is available only to "Qualifying Facilities" with a total Nameplate Capacity of 100 kW or less. See Question F for the definition of a Qualifying Facility. (This type of agreement has not yet been developed by PG&E or approved by the CPUC. Check with PG&E for availability).
3. **A Generating Facility Interconnection Export Addendum** that provides for parallel operation of the Generating Facility and the occasional, continuous, non-compensated, export of inverter-based technology solar and wind energy, 1 MW or less to PG&E's Distribution System. Continuous export is export greater than 60 seconds in duration. This addendum must be executed in concert with Agreement 1.

Third Party Owned Generating Facility (non-NEM)

4. **A Generating Facility Interconnection Agreement** that provides for parallel operation of the 3rd Party owned Generating Facility, but does not provide for exporting energy to PG&E's Distribution System.
5. **A "Qualifying Facility" Power Purchase Agreement** that provides for parallel operation of the 3rd Party owned Generating Facility, and exporting energy to PG&E's Distribution System for sale to PG&E. This option is available only to "Qualifying Facilities" with a total Nameplate Capacity of 100 kW or less. See Question F for the definition of a Qualifying Facility. (This type of agreement has not yet been developed by PG&E or approved by the CPUC. Check with PG&E for availability).
6. **A Customer Generation Agreement** that defines the relationship between the Customer whose name appears on PG&E's electric service account. This agreement must be executed in addition agreements 4 and 5.

Part 3 Cont'd - Describing the Generating Facility and Host Customer's Electrical Facilities
Net Energy Metering Generating Facility

If you wish to have your Generating Facility participate on one of PG&E's Net Energy Metering tariffs, following your bi-directional meter installation, your meter and disconnect switch must be installed in a safe PG&E accessible location and remain unobstructed by plants, structures, locked gates or pets. Meter and disconnect switch access must be maintained at all times for your safety and PG&E's electrical system safety. Additionally, unencumbered access is required for meter reading, system maintenance, and operations. Any animals owned by the customer, for example pet dogs, should be kept clear from these areas to avoid hindering PG&E service personnel from completing their work.

Are there any meter access issues? Please check all that apply to avoid interconnection delays.

- ☐ Dog, or other animals at Residence
- ☐ Locked Gate
- ☐ Shrubs or Bushes
- ☐ Other (please explain) _____

7. **A Net Energy Metering Agreement: Solar and Wind**, that provides for parallel operation of the Generating Facility, and exporting energy to PG&E's Distribution System for credit under the terms of PG&E's Net Energy Metering tariffs for solar or wind Generating Facilities of 1MW or less, other than Generating Facilities of 30 kW or less. This agreement also requires submittal of an expanded net energy metered supplemental application. This option is available only to eligible Generating Facilities as defined in PG&E's Net Energy Metering tariffs.
8. **A Net Energy Metering Agreement: Bio-Gas**, that provides for parallel operation of the Generating Facility, and exporting energy to PG&E's Distribution System for credit under the terms of PG&E's Net Energy Metering tariffs for qualifying bio-gas digester Generating Facilities. This option is available only to eligible Generating Facilities as defined in PG&E's Net Energy Metering tariffs
9. **A Net Energy Metering Agreement: Fuel Cell**, that provides for parallel operation of the Generating Facility, and exporting energy to PG&E's Distribution System for credit under the terms of PG&E's Net Energy Metering tariffs for fuel-cell Generating Facilities. This option is available only to eligible Generating Facilities as defined in PG&E's Net Energy Metering tariffs
10. **Multiple Tariff Generating Facility Agreement**, that provides for the parallel operation of a Generating Facility that utilizes generators eligible for service under NEM or other applicable Net Energy Metering tariffs that are electrically connected behind the same Point of Common Coupling with generators not eligible to receive service under the NEM tariff.
11. **Other, please describe:** _____

C. <i>Parallel Operation Applications Only</i>	If the answer to Section B above was agreement option 1 or 4, please indicate the protection option that will be used to prevent energy from being exported to PG&E's Distribution System. If protection option 3 to this Section C is selected, please provide the continuous current rating of the host Customer facility's service entrance equipment (service panel rating): If Protection Option 4 to this Section C is selected, please provide the minimum load of the host Customer facility:	Protection Option: <u> 1 </u> <u> 2 </u> <u> 3 </u> <u> 4 </u> (Choose one) _____ Amps _____ kW
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Part 3 Cont'd - Describing the Generating Facility and Host Customer's Electrical Facilities

Instructions and Notes

Refer to PG&E's Rule 21, Section I.2., for additional information as to how to answer this question. If the Generating Facility will never export power to PG&E's Distribution System, a simpler, lower cost, protection scheme may be used to control the interface between the Generating Facility and PG&E's Distribution System. Choose from the following four options:

1. A reverse-power protection device will be installed to measure any export of power and trip the Generating Facility or open an intertie breaker to isolate the Generating Facility if limits are exceeded.
2. An under-power protection device will be installed to measure the inflow of power and trip or reduce the output of the Generating Facility if limits are not maintained.
3. The Generating Facility Interconnection Facility equipment has been certified as Non-Islanding and the incidental export of power will be limited by the design of the interconnection. If this option is to be used, the continuous ampere rating of the service entrance equipment (service panel rating) that is used by the host Customer facility must be stated in the space provided above.
4. The Gross Nameplate Rating of the Generating Facility will not exceed 50% of the host Customer facility's minimum electrical load. If this option is to be used, the minimum load of the host Customer facility must be stated in the space provided above.

Note: With the approval of PG&E, a Producer that wishes to retain the option to export power from a Generating Facility to PG&E's Distribution System may use a different protection scheme that provides for the detection of faults and other abnormal operating conditions.

D.

*Parallel
Operation
Applications
Only*

What is the maximum 3-phase fault current that will be contributed by the Generating Facility to a 3-phase fault at the Point of Common Coupling (PCC)? (If the Generating Facility is single phase in design, please provide the contribution for a line-to-line fault.)

Please indicate the short circuit interrupting rating of the host Customer facility's service panel:

_____ Amps

_____ Amps

Instructions and Notes

Refer to PG&E's Rule 21 Sections D.4.a. and I.3.g. for significance and additional information. To determine this value, any transformers and/or significant lengths of interconnecting conductor used between each of the Generators (if there are more than one) that make up the Generating Facility and the PCC must be taken into account. The details, impedance, and arrangement of such transformers and interconnecting conductors should be shown on the single-line diagram that is provided. Consult an electrical engineer or the equipment supplier if assistance is needed in answering this question.

It is expected that most Applicants will want to reserve the flexibility to operate any or all of their Generators in parallel. If the design of the proposed Generating Facility limits the amount of generation that may be interconnected at any time to PG&E's Distribution System, please describe the assumptions used in calculating the maximum fault current contribution value.

E.
(MP&I)

Please indicate how this Generating Facility will be operated.

 1 2 3 4 5 6

(Please choose all options that may apply.)

Choose from the following six operation options:

1. **Combined Heat and Power or Cogeneration** – Where the operation of the Generating Facility will produce thermal energy for a process other than generating electricity.
2. **Peak Shaving/Demand Management** – Where the Generating Facility will be operated primarily to reduce electrical demands of the host Customer facility during PG&E's "peak pricing periods".
3. **Primary Power Source** – Where the Generating Facility will be used as the primary source of electric power and power supplied by PG&E to the host Customer's loads will be required for supplemental, standby, or backup power purposes only.
4. **Standby / Emergency / Backup** – Where the Generating Facility will normally be operated only when PG&E's electric service is not available.
5. **Net Energy Metering** – Where the Generating Facility qualifies and receives service under PG&E's Net Energy Metering tariffs. For applicants for the Net Energy Metering of a solar and/or wind generating facility 1,000kW or less, other than customers with facilities of 30kW or less, a supplemental application (Form Number 79-998) is also required.
6. **Multiple Tariff** - Generating Facilities that have a combination of non-Net Energy Metering (non-NEM) generator(s) and a Net Energy Metering (NEM) generator(s). Check one of the following four options on the next sheet.

GENERATING FACILITY INTERCONNECTION APPLICATION

Part 3 Cont'd - Describing the Generating Facility and Host Customer's Electrical Facilities

For **Multiple Tariff** Generating Facilities, check one of the following:

- ☐ New facility installing non-NEM generator(s) and NEM generator(s) at the same time.
- ☐ Existing facility with non-NEM generator(s) and planning to add NEM generator(s). Please provide data for the table below.
- ☐ Existing facility with NEM generator(s) and planning to add non-NEM generator(s). Please provide data for the table below.
- ☐ Existing facility with NEM generator(s) and planning to add NEM generator(s) under a different NEM tariff. Please provide data for the table below.

Instructions (From Part 4)	Generator Information	Existing Generator Type	Existing Generator Type	New Generator Type	New Generator Type	Generating Facility Totals
#	Please indicate the number of each "type" of Generator being installed: (see Instruction)					
A	Gen/Inverter Manufacturer					
B	Generator/Inverter Model					
C	Gen/Inverter software Version					
D	Is the Gen/Inverter certified	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
E	Generator design	☐ Synch ☐ Induct. ☐ Inverter	☐ Synch ☐ Induct. ☐ Inverter	☐ Synch ☐ Induct. ☐ Inverter	☐ Synch ☐ Induct. ☐ Inverter	
F	Gross Nameplate Rating					
I	Operating Voltage					
J	Power Factor rating					
K	PF Adjustment Range					
L	Wiring Configuration					

Part 3 Cont'd - Describing the Generating Facility and Host Customer's Electrical Facilities

Instructions From Part 4	Generator Information	Existing Generator Type	Existing Generator Type	New Generator Type	New Generator Type
M (MP)	3-Phase Winding Configuration (Choose One)	__ 3 Wire Delta __ 3 Wire Wye __ 4 Wire Wye	__ 3 Wire Delta __ 3 Wire Wye __ 4 Wire Wye	__ 3 Wire Delta __ 3 Wire Wye __ 4 Wire Wye	__ 3 Wire Delta __ 3 Wire Wye __ 4 Wire Wye
N (MP)	Neutral Grounding System Used (Choose One)	__ Ungrounded __ Solidly Grounded __ Ground Resistor Ohms	__ Ungrounded __ Solidly Grounded __ Ground Resistor Ohms	__ Ungrounded __ Solidly Grounded __ Ground Resistor Ohms	__ Ungrounded __ Solidly Grounded __ Ground Resistor Ohms
O	<i>For Synchronous Generators Only:</i> Synchronous Reactance: Transient Reactance: Subtransient Reactance:	____ (Xd %) ____ (X'd %) ____ (X''d %)	____ (Xd %) ____ (X'd %) ____ (X''d %)	____ (Xd %) ____ (X'd %) ____ (X''d %)	____ (Xd %) ____ (X'd %) ____ (X''d %)
P	<i>For Induction Generators Only:</i> Locked Rotor Current: OR Stator Resistance: Stator Leakage Reactance: Rotor Resistance: Rotor Leakage Reactance:	____ (Amps) ____ (%) ____ (%) ____ (%) ____ (%)	____ (Amps) ____ (%) ____ (%) ____ (%) ____ (%)	____ (Amps) ____ (%) ____ (%) ____ (%) ____ (%)	____ (Amps) ____ (%) ____ (%) ____ (%) ____ (%)
Q	Short Circuit Current Produced by Generator:	____ (Amps)	____ (Amps)	____ (Amps)	____ (Amps)
R	<i>For Generators that are Started as a "Motor" Only</i> 1. In-Rush Current: 2. Host Customer's Service Entrance Panel (Main Panel) Continuous Current Rating:	____ (Amps) ____ (Amps)	____ (Amps) ____ (Amps)	____ (Amps) ____ (Amps)	____ (Amps) ____ (Amps)
S (MP&I)	Prime Mover Type: (Circle One)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Part 3 Cont'd - Describing the Generating Facility and Host Customer's Electrical Facilities

F.
(MP&I)

Please indicate if Qualifying Facility Status will be obtained from the FERC for this Generating Facility.

☐ Yes

☐ No

Instructions and Notes

Parties operating Generating Facilities complying with all of the requirements for qualification as either a small power production facility or cogeneration facility pursuant to the regulations of the FERC (18 Code of Federal Regulations Part 292, Section 292.203 et seq.) implementing the Public Utility Regulatory Policies Act of 1978 (16 U.S.C.A. Section 796, et seq.), or any successor requirements for "Qualifying Facilities," may seek certification from FERC to have the Generating Facility designated as a Qualifying Facility or "QF." In summary, QF's are Generating Facilities using renewable or alternative fuels as a primary energy source or facilities that utilize the thermal energy given off by the generation process for some other useful purpose. QF's enjoy certain rights and privileges not available to non-QF Generating Facilities.

QF status is not required to interconnect and operate in parallel with PG&E's Distribution System.

G.

Please indicate if Generating Facility will meet the annual Efficiency and Operating Standards of PUC Code 218.5(Applicable to Cogeneration Only)

☐ Yes

☐ No

☐ N/A

Part 4 – Instructions for Describing the Generators

	Generator Information	Instructions and Comments
#	Please indicate the number of each "type" of Generator being installed:	Please provide the following information for each Generator "type". Be sure all Generators classified as one "type" are identical in all respects. If only one type of Generator is to be used, only one column needs to be completed. Please be sure the information in the "Totals" column is correct and reflects the total number of Generator units to be installed.
A	Generator/Inverter Manufacturer	Enter the brand name of the Generator.
B	Generator/Inverter Model	Enter the model name or number assigned by the manufacturer of the Generator.
C	Generator/Inverter Software Version	If this Generator's control and or protective functions are dependent on a "software" program supplied by the manufacturer of the equipment, please provide the version or release number for the software that will be used.
D	Is the Generator Certified by a Nationally Recognized Testing Laboratory (NRTL) according to Rule 21?	Answer "Yes" only if the Generator manufacturer can or has provided certification data. See PG&E's Rule 21, Section J for additional information regarding Generator certification.

Part 4 – Instructions for Describing the Generators

Generator Information	Instructions and Comments
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GENERATING FACILITY INTERCONNECTION APPLICATION

	Generator Information	Instructions and Comments
E	Generator Design	Please indicate the design of each Generator. Designate "Inverter" anytime an inverter is used as the interface between the Generator and the electric system regardless of the primary power production/storage device used.
F	Gross Nameplate Rating (kVA)	This is the capacity value normally supplied by the manufacturer and stamped on the Generator's "nameplate". This value is not required where the manufacturer provides only a "kW" rating. However, where both kVA and kW values are available, please indicate both.
G	Gross Nameplate Rating (kW)	This is the capacity value normally supplied by the manufacturer and stamped on the Generator's "nameplate". This value is not required where the manufacturer provides only a "kVA" rating. However, where both kVA and kW values are available, please indicate both.
H	Net Nameplate Rating (kW)	This capacity value is determined by subtracting the "auxiliary" or "station service" loads used to operate the Generator or Generating Facility. Applicants are not required to supply this value but, if it is not supplied, applicable standby charges may be based on the higher "gross" values.
I	Operating Voltage	This value should be the voltage rating designated by the manufacturer and used in this Generating Facility. Please indicate phase-to-phase voltages for 3-phase installations. See PG&E's Rule 21, Section D.2.b. for additional information.
J	Power Factor Rating	This value should be the nominal power factor rating designated by the manufacturer for the Generator. See PG&E's Rule 21, Section D.2.i. for additional information.
K	PF Adjustment Range	Where the power factor of the Generator is adjustable, please indicate the maximum and minimum operating values. See PG&E's Rule 21, Section D.2.i.
L	Wiring Configuration	Please indicate whether the Generator is a single-phase or three-phase device. See PG&E's Rule 21, Section D.3.
M	3-Phase Winding Configuration	For three-phase generating units, please indicate the configuration of the Generator's windings or inverter systems.
N	Neutral Grounding	Wye connected generating units are often grounded – either through a resistor or directly, depending upon the nature of the electrical system to which the Generator is connected. If the grounding method used at this facility is not listed, please attach additional descriptive information.

Part 4 – Instructions for Describing the Generators

Generator Information	Instructions and Comments
-----------------------	---------------------------

	Generator Information	Instructions and Comments
O	<i>For Synchronous Generators Only:</i>	If the Generator is of a "synchronous" design, please provide the synchronous reactance, transient reactance, and subtransient reactance values supplied by the manufacturer. This information is necessary to determine the short circuit contribution of the Generator and as data in load flow and short circuit computer models of PG&E's Distribution System. If the Generator's Gross Nameplate Capacity is 10 MW or greater, PG&E may request additional data to better model the nature and behavior of the Generator with relation to its Distribution System.
P	<i>For Induction Generators Only:</i>	If the Generator is of an "induction" design, please provide the "locked rotor current" value supplied by the manufacturer. If this value is not available, the stator resistance, stator leakage reactance, rotor resistance, rotor leakage reactance values supplied by the manufacturer may be used to determine the locked rotor current. If the Generator's Gross Nameplate Capacity is 10 MW or greater, PG&E may request additional data to better model the nature and behavior of the Generator with relation to its Distribution System.
Q	Short Circuit Current Produced by Generator	Please indicate the current each Generator can supply to a three-phase fault across its output terminals. For single phase Generators, please supply the phase-to-phase fault current.
R	<i>For Generators that are Started as a "Motor" Only:</i> 1. In-Rush Current 2. Host Customer's Service Entrance Panel (Main Panel) Continuous Current Rating	This information is needed only for Generators that are started by "motoring" the generator. See PG&E's Rule 21, Section I.3.e. for significance and additional information. If this question was answered in Part 3, question C of this Application, it need not be answered here.
S	Prime Mover Type	Please indicate the type and fuel used as the "prime mover" or source of energy for the Generator. 1 = Internal Combustion Engine – Natural Gas 2 = Internal Combustion Engine – Diesel Fueled 3 = Internal Combustion Engine - Other Fuel 4 = Microturbine– Natural Gas 5 = Microturbine – Other Fuel 6 = Combustion Turbine Natural Gas 7 = Combustion Turbine - Other Fuel 8 = Steam Turbine 9 = Photovoltaic Panels 10 = Solar-thermal engine 11 = Fuel Cell– Natural Gas 12 = Fuel Cell– Other Fuel 13 = Hydroelectric Turbine 14 = Wind Turbine 15 = Other (please describe)