



# TUOLUMNE UTILITIES DISTRICT

18885 NUGGET BLVD • SONORA, CA 95370  
(209) 532-5536 • Fax (209) 536-6485

Committee Chair: J. Kerns

Member: D. Boatright

## Finance Committee Agenda Wednesday, September 28, 2022 - 8:00 a.m. 18885 Nugget Blvd., Sonora, California

### **Public Participation Procedures:**

During the Committee meeting, members of the public who wish to provide public comment will be invited to do so by the Committee Chair. Members of the public who are physically present will be called first. Members of the public who are not present and wish to provide remote public comment via Zoom may use the 'Raise Hand' feature on their computer or press \*9 if participating by phone.

**Notice:** Pursuant to AB 361 members of the Committee can participate by teleconference.

### Information to join meeting via Zoom:

- Via video conferencing at:
- <https://us02web.zoom.us/j/82131803642?pwd=dU1pWHk5ZlFyTmdrUFBRaIRPeWpjdz09>
- Via teleconference by calling (253) 215-8782 or (301) 715-8592
- US Meeting ID: 821 3180 3642
- Password: 131430
- Public may observe and listen to this meeting on TUD's YouTube Channel at [Tuolumne Utilities District - YouTube](#)

1. Discussion Regarding the SitelogIQ Letter of Agreement

*Note: Committee Agenda Material can be inspected at the District Office located at 18885 Nugget Blvd., Sonora, CA and on our website at [www.tudwater.com](http://www.tudwater.com).*

*In accordance with the Americans with Disabilities Act, if you need special assistance (i.e. auxiliary aids or services) in order to participate in this public meeting, please contact the Clerk of the Board, Melissa McMullen, and (209) 532-5536 ext. 510. Notifications 48 hours prior to the start of the meeting will enable the Clerk to make reasonable accommodations to ensure accessibility to this public meeting.*



**DRAFT TECHNICAL MEMORANDUM**

**Date:** September 28, 2022

**To:** TUD Finance Committee

**From:** Elizabeth Merchant-Wells (Assistant Engineer)  
Erik Johnson (District Engineer)

**Re:** Triple Bottom Line Analysis for Installation of Photovoltaic Systems for the Tuolumne Utilities District

**Executive Summary**

For more than 20 years, California has aggressively supported the rooftop solar market through its Net Energy Metering (NEM) program. Consequently, the photovoltaic (PV) industry has seen rapid growth over the last decade as California has instituted generous tax credits, grants, and other incentives to install photovoltaics. It is no coincidence that the push to photovoltaics has also coincided with steep increases in electric rates and improvements in solar panel technology. As of 2022, NEM systems have the capacity to reduce demand on California's electric grid by as much as 25% during the midday when the sun is shining.

Municipalities up and down the State have installed solar for various social, environmental, and financial reasons. Water utilities like TUD are typically both large landowners and large electricity consumers, so it is logical to consider the potential benefits of photovoltaics.

TUD Staff have conducted a high-level triple bottom line analysis of installing and operating photovoltaic systems on some of its lands and facilities. There are several social benefits of utilizing this technology; however, there are also competing opinions about the impacts photovoltaics may have on the stability of the electric grid. Environmental benefits are well documented and are consistent with State policies to reduce greenhouse gas emissions; unfortunately, subject matter experts also cite as fact that, at least for the near future, the electric grid will still need carbon dependent technologies to generate electricity for peak loads and on cloudy days.

The economics of installing solar are complex, especially for an agency like TUD which receives electricity at below market rates through the Tuolumne Public Power Authority (TPPA), which does not allow any excess power generated to be sold back at a lower subsidized rate or for stored credits to offset energy costs during times of low solar production (night or winter). Unless TPPA is able to change its rules and regulations, TUD would have to switch from TPPA to PG&E to meet a facility's full energy needs using stored credits or sell-back revenue. Further complicating the analysis is that the California Public Utilities Commission (CPUC) is considering reducing the NEM tariff, in part because as people transition to solar there is less stable revenue streams available to support the on-going operations and maintenance of the grid. However, the RES/BCT program allows public agencies to aggregate meters as an alternative to net metering.

Some of the social, environmental, and financial benefits of solar are summarized below:

<b>Social</b>	<b>Environmental</b>	<b>Financial</b>
Sends social signals to public that TUD values the environment and “green” energy.	Reduces reliance on carbon-based fuels contributing to climate change. The effects of climate change on the environment are numerous and well documented.	Reduces or offsets monthly energy bills.
Demonstrates that TUD adopts appropriate technology at the proper scale and is a “forward thinking” utility.	Generates clean energy and reduces air pollution emissions.	Provides a hedge against future increases in electricity rates.
Promotes resource sustainability.		
Reduces reliance on carbon fuels which can be a source of worldwide political and social conflict.		
Creates “green jobs” and supports the “green economy”.		
Contributes to improved public health due to less air pollution.		
Curbing climate change has global implications to food supply security and water resource management.		

TUD’s analysis has concluded that while solar does reduce, or in some cases, completely offsets the electricity bill for certain facilities, when the upfront capital costs are factored in, the corresponding payback time ranges from 14 to 23 years. Consequently, self funding solar installation would not make economic “sense” for the District. Fortunately, there are multiple expected grant opportunities for solar generation project funding due to the new federal infrastructure bill. If the TUD Board desires to further explore implementing a solar project, then the District should consider entering into an agreement with SiteLogIQ to develop a design and cost estimate that could be used to apply for grant funding (see Appendix A for agreement).

If a transition to photovoltaics is a TUD Board priority some next steps could be:

1. Enter into an agreement with SiteLogIQ
2. Develop preliminary design for several project alternatives, along with cost estimates
3. Rank alternatives
4. Apply for grants to implement the selected alternative

### **Current Electricity Costs**

TUD spends approximately \$500,000-\$600,000 per year on electricity. This represents the 2<sup>nd</sup> largest individual operating expense and represents about 2.5% of the District’s overall O&M budget. TUD receives power from PG&E and from the TPPA (Tuolumne Public Power Authority) which was formed when New Melones was constructed. TPPA gets power for free from WAPA (Western Area Power Authority). TPPA charges a “wheeling fee” to its public agency customers like TUD. Current TPPA rates are \$0.1535/kWh and are about 60% of the prevailing PG&E rates. To qualify for a TPPA account the facility must have at least 5kW of connected loads and an average annual use of at least 20,000 kWhrs, which works out to an average PG&E bill of \$500/month. TUD staff consistently evaluates

usage at each site and will apply to have an account switched from PG&E to TPPA as soon as it qualifies. Approximately \$300,000 or 60% of TUD's annual electricity expenses are associated with TPPA accounts.

The top ten largest energy consuming facilities account for roughly 40% of the District's energy bills.

Rank	Facility	Annual Demand-2021 (kWh)	Annual Cost-2021 (\$)
1	TUD Central Office	602,400	\$51,945
2	Regional Wastewater Treatment Plant (Acct#-710, -739)	417,400	\$37,843
3	Sonora Water Treatment	268,560	\$25,441
4	Lakewood Water Treatment Plant	257,920	\$23,480
5	Monte Grande WTP	147,920	\$13,489
6	Tuolumne WTP	122,800	\$11,249
7	Big Hill WTP	116,560	\$10,232
8	Quartz Reservoir	107,040	\$10,768
9	Ponderosa WTP	92,612	\$8,410
10	East Sonora Pump Station	85,866	\$8,213

In 2021, all of the PG&E metered TUD facilities had a combined demand of 356,745 kWh costing a total of \$77,338.

### **General System Sizing**

Photovoltaic systems are generally sized to offset 100% of a facilities annual energy bill. It is important to note that the solar system isn't sized to simply produce the same amount of energy as is typically consumed at a site. It must be significantly oversized because 1) it can only produce energy during the sunlight hours and 2) during those times it necessarily must produce multiple times more energy than is consumed so that the sell back revenue can compensate for the difference in the sell back rate versus the retail purchase rate. Rates are much higher to purchase power from the grid than the rate to sell back power/ rate credited by exporting generated power to the grid.

Currently, TPPA does not allow for selling back energy or storing credits for excess energy usage. Storing credits would allow for excess energy created during the daytime to be put back into the grid for a credit that can then be applied to energy usage throughout the night.

The system size is naturally influenced by the efficiency of the panels, site exposure, and how much space is available for solar panels. General rules of thumb are that every kilowatt of solar panel capacity requires about 70 square feet of roof or ground space.

### **Social Analysis**

The Tuolumne County Action Plan (CAP) supports the effort to transition to renewable energy in Infrastructure Measure 4.1: "Transition to 100 percent clean electricity." and Action 4.1.2: "Encourage development of alternative

energy-producing facilities that conserve the county's natural resources such as rooftop solar and wind turbines." While not without controversy, the CAP has received many positive public comments and support for Tuolumne County's effort to do its part in the global effort to slow climate change. By pursuing a solar installation project, TUD could showcase its role as responsible water stewards by transitioning towards sustainability and innovation.

Dissent towards a solar project may be in part because of grid instability issues California faces as more and more solar is installed, which can only generate energy during sunlight hours, and is unable to replace base generation that typically comes from traditional carbon-based energy sources.

### **Environmental Analysis**

The main environmental advantages to solar installation are to reduce Greenhouse Gas (GHG) emissions and help slow our contribution to climate change as well as improving air quality by eliminating air pollution from carbon-based energy production. TUD's GHG emissions from PG&E metered facilities alone is roughly 125,000 lbs Carbon Dioxide per year<sup>1</sup>.

Although solar panels do not produce any carbon emissions throughout energy generation, they require large amounts of energy during manufacturing and delivery. The average estimated lifecycle carbon emissions for solar panels is roughly 0.1 pounds Carbon Dioxide/ per kWh produced<sup>2</sup>. This is about 20% of the average utility rate of PG&E carbon emissions.

The construction of any sizable PV system, especially ground mount systems, could involve environmental impacts that may need to be analyzed under CEQA. Impacts could be associated with tree clearing, grading, trenching, etc.

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<sup>1</sup> This was calculated from the PG&E 2020 CA Utility Average GHG Emissions rate of 466 lbs CO<sub>2</sub>e/MWh. Source: [https://www.pge.com/pge\\_global/common/pdfs/your-account/your-bill/understand-your-bill/bill-inserts/2021/1021-PowerContent.pdf](https://www.pge.com/pge_global/common/pdfs/your-account/your-bill/understand-your-bill/bill-inserts/2021/1021-PowerContent.pdf)

<sup>2</sup> Source: <https://www.nrel.gov/docs/fy13osti/56487.pdf>

## **Economic Analysis**

Capital Costs: Upfront capital costs can be separated into three broad categories: equipment, site and prep work, and installation labor.

Equipment	Site and Prep Work	Installation Labor
<ol style="list-style-type: none"><li>1) Panels</li><li>2) Racks</li><li>3) Inverter</li><li>4) Conduit and Wire</li><li>5) Misc</li></ol>	<ol style="list-style-type: none"><li>1) Tree Clearing</li><li>2) New Roof (as needed)</li></ol> <p>For Ground Mount Systems</p> <ol style="list-style-type: none"><li>3) Grading</li><li>4) Access Roads</li><li>5) Trenching</li><li>6) Fencing</li><li>7) Weed Control</li><li>8) Security Fencing</li></ol>	<ol style="list-style-type: none"><li>1) Panels</li><li>2) Racks</li><li>3) Inverter</li><li>4) Conduit and Wire</li><li>5) Misc</li></ol>

1. The system is also only active during daylight hours, derated through the seasons, and the panels have inherent inefficiencies. The system size is listed as its peak rated output; although, that output may only occur for a few hours a day during maximum solar intensity. Capital costs for installed solar is on the order of \$2-3,000/kW<sup>3</sup>.

### Meter Aggregation

The RES/BCT program is an alternative to net metering or net billing offered to public agencies for meter aggregation of a solar generation system. This would allow energy that is produced at one location to be exported to the grid for a credited rate that can be used at a different location. RES/BCT does not apply to TPPA metered sites. RES/BCT credit rates are dependent on a time-of-use and generator account rate schedule. Since off-site energy use is credited at a lower rate, it is beneficial to locate the solar generation site at a high power-using facility.

### Preliminary Project Analyses

Lift stations and Water Treatment Plants do not have enough available roof space to offset the energy consumed on site. Small pump stations are typically a 14'x16' building or a 16'x16' building and if they have a peaked roof with 2 foot eaves would only have about 200 sf of roof area on the exposed side. There are setback requirements from the ridge and edges that would effectively reduce the usable area to something less than 200 sf. It is not possible to eliminate the need for a generator in a power outage because there is not enough space on the site of our lift stations to store the batteries needed for 48 hours of energy consumption. Damin Road Lift Station uses about 35 kWh in 48 hours. The batteries required to cover this energy cost would take up an area of about 25'x10'x20'. In addition, there are much

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<sup>3</sup> Source: <https://www.consumeraffairs.com/solar-energy/how-much-do-solar-panels-cost.html>

higher operational costs associated with having numerous small solar generation sites. With the RES/BCT program available, it will be much more cost effective for TUD to install one large solar array and export that energy to be credited at other TUD facilities served by PG&E.

SiteLogIQ performed a preliminary analysis of a few project alternatives TUD could pursue (see Appendix B). These numbers are for preliminary analysis purposes only and are not accurate for project cost and size. For purposes of this analysis, the energy demand at the following facilities were chosen:

Project Location	Assumptions	Proposed System Size (kW)	Roof or Ground Mount	Panel Area Required (sf)	Capital Cost (\$)	Operational Cost (\$)	Annual Energy Savings (\$)	Payback Period (Years), Payed entirely upfront (Grant)	Payback Period (Years), TEML Financed <sup>4</sup>
<b>TUD Central Office</b>	Office meter switched from TPPA to PG&E; All other PG&E meters offset with RES/BCT	485	Ground	40,000	1,825,000	10,668	73,401	15	20
<b>TUD Central Office</b>	Sized to cover energy consumption at office site only	123	Roof	5,600	557,000	3,078	20,875	18	23
<b>Quartz Reservoir</b>	Switch Quartz TPPA meter to PG&E; All other PG&E meters offset with RES/BCT	230	Ground	20,000	970,000	5,069	43,471	14	17

This analysis is preliminary and does not include other options for a solar installation project at TUD. For example, other large energy-consuming sites, such as the Sonora Regional Wastewater Treatment Facility (SRWWTF) and the Sonora, Lakewood, and Monte Grande Water Treatment Plants, could be switched from TPPA to PG&E and aggregated in the RES/BCT program. An additional potential project location not analyzed in this preliminary estimate is the SRWWTF. SRWWTF has available space for a ground mounted system and would be a prime candidate for solar due to sunlight exposure and the high on-site energy demand. The highest annual cost saving projects have the largest proposed system size and capital cost.

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<sup>4</sup> TEML interest rate and term: 1% for 20 years

### Funding Options:

Preliminary cost estimating yielded payback periods ranging from 14 to 23 years. A worthwhile, sizeable solar installation project for the district would cost at least \$500,000. Due to the high cost and long payback period, a self-funded project would not be feasible for the District. However, there are multiple grant opportunities for solar generation funding. In addition to the annual Water SMART Water and Energy Efficiency Grant that rolls out in June/July, numerous funding opportunities for solar generation are expected due to the recent Inflation Reduction Act.

Other financing options include a Tax Exempt Municipal Lease (TEML) and an Energy Conservation Assistance (ECCA) loan. TEML interest rates are 3.5-4%. ECCA loans are offered at 1% for 17 years and require a project with a maximum payback period of 17 years.

Another funding mechanism involves a Power Purchase Agreement (PPA). In this arrangement a solar company would install, own, and operate panels on TUD land and supply energy to TUD at a lower rate. The solar company would be responsible for the capital cost of the project. However, a PPA is not feasible to TUD because typical subsidized rates are similar to the rate currently offered by TPPA. A project of this model would have no cost savings for TUD.

### Conclusion:

Electricity is TUD's 2<sup>nd</sup> largest operating expense at an annual cost of \$500,000-\$600,000. PV installation projects at TUD have long payback periods and reduced annual cost savings because of the low, subsidized electricity rate offered by TPPA. However, preliminary analyses show that TUD could accrue large annual cost-savings, depending on project size and scope, through self-generation with a solar installation project. The greatest cost-savings would be achieved by offsetting energy at multiple PG&E metered locations with the RES/BCT program. As TPPA rates continue to climb, there may be a time when it is economically feasible to serve TPPA accounts with solar power, but that time has not yet arrived.

TPPA does not allow for stored credits, meaning that energy generated during peak-sunlight hours cannot be used at night or exported to the grid at a sell-back or credited rate. Large energy-using facilities could be switched to PG&E to fully take advantage of self-generation opportunities and cost savings of increased project size.

Lift station and water treatment plant facilities at TUD do not have enough space for roof or ground mount solar installations to cover on-site energy demands. Operational costs can be reduced with one, larger solar installation instead of many small solar installations.

It is not feasible for TUD to self-fund a sizeable solar installation project. Fortunately, in addition to the existing Water SMART Water and Energy Efficiency Grant, grants for self-generation and renewable energy projects are expected to be released due to the new Inflation Reduction Act.

If the TUD Board wishes to continue to pursue solar, the next step would be to hire a consultant such as SiteLogIQ to evaluate various project alternatives and developing a design for a PV installation project that could be used as the basis for grant applications as opportunities become available.

# APPENDIX A



September 22, 2022

Don Perkins  
General Manager  
Tuolumne Utilities District  
18885 Nugget Blvd,  
Sonora, CA 95370

RE: Facility Solution Project Feasibility and Letter of Agreement (LOA)

Dear Mr. Perkins:

This Letter of Agreement (LOA) is intended to briefly describe the manner in which SiteLogIQ and the Tuolumne Utilities District will work together during the engineering process, as well as the obligations of each party with respect to the engineering process.

Client Identification: Tuolumne Utilities District

Facility Location(s): All District-Owned Facilities

District Office  
Quartz Reservoir

Area of Focus:

SiteLogIQ will provide a proposal and Facility Solution agreement for the implementation of facility improvements, energy conservation, energy generation, and/or energy management services.

Scope of Services:

- A. SiteLogIQ will conduct a site visit to the Facilities to perform a physical audit and collect data. The Client will cooperate and collaborate with SiteLogIQ during this phase by providing copies of requested data, including (if available): Site and/or system drawings, historical operating data produced or recorded by existing controls or meters, manual logs, and any other data that may be pertinent to this evaluation.
- B. Client will also make operational personnel available at reasonable times for

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*Phone: (916) 978-1315 • Fax: (916) 978-5813*

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in-person and telephone interviews with SitelogIQ to answer questions about existing facilities conditions, operating profile and existing equipment operation.

- C. Where operational data is not available to support the analysis, SitelogIQ will utilize standard engineering practices and assumptions to provide a conservative analysis on the potential energy savings from installing the energy conservation measures.
- D. SitelogIQ will also analyze the potential for energy generation measures.
- E. SitelogIQ will recommend energy management and/or on-going monitoring services.
- F. For each of the targeted Energy Conservation Measures (ECMs), estimated (projected) operating costs will be calculated and then compared to existing operating costs. Existing conditions will be evaluated using data-logged or stipulated and mutually agreed operational schedules.
- G. SitelogIQ will prepare a return on investment analysis (consistent with the client's preferred evaluation methods based on agreed upon Economic Criteria noted below).
- H. SitelogIQ will provide budgetary construction costs estimates and a summary Scope of Work for all recommended ECMs. Cost estimates will represent a "turnkey" solution. Refer to Attachment A for the list of discussed potential ECM's to be evaluated.
- I. The results will be presented to client as a recommended Scope of Work and a financial proforma (such as a Cash Flow) which will include costs and energy savings for the next 25 years with escalation of no more than 6% and including future maintenance & repair costs. As a result, *True Cost of Ownership* is presented to the client for their review and consideration.

#### Client Responsibilities:

In order for SitelogIQ to provide the services described in this LOA, the Client agrees to provide (or cause its energy suppliers to provide) SitelogIQ with utility usage data. Client agrees to provide As-built plans as needed to facilitate the completion of the scope.

#### Development Efforts:



Client acknowledges that SitelogIQ will incur considerable expense in developing the Project. This expense includes the cost to provide professional services by SitelogIQ's development team, the cost to visit the Site, and the cost to prepare the deliverables.

Interconnection Application Fee:

Depending on the utility and available capacity, the utility may charge additional interconnection fees of between \$300 - \$2500 (not included in Development Fee) per application IF a system impact study is required. SitelogIQ will pass through these costs to the Client.

Ownership of Work:

All work products, including all proforma's, schedules, and scope of work documentation provided by SitelogIQ, will only become the property of the Client upon execution of a binding, irrevocable contract between the Client and SitelogIQ for the implementation of the ECMs proposed by SitelogIQ. Notwithstanding the foregoing, to the extent that any tangible work documentation produced by SitelogIQ contains SitelogIQ's pre-existing materials (including but not limited to templates, forms, and other SitelogIQ -created materials), SitelogIQ will remain the sole and exclusive owner of all such pre-existing materials.

Development Fee:

SitelogIQ will develop the Project for the firm, fixed fee/rate as listed below:

1. Fee/Rate of: Fee not to exceed \$20,000.00.

In the event that the Client enters into a contract with SitelogIQ for the implementation of the ECMs within 60 days after presenting the Proposal, then SitelogIQ's cost to develop the Proposal will not be billed. If the Client enters into a contract with SitelogIQ at a later date, the Development Fee paid by the Client will be credited toward the project's total implementation cost.

If SitelogIQ cannot meet the Economic Criteria Client will not compensate SitelogIQ for its LOA fee.

Economic Criteria:

The Client has represented to SitelogIQ that Client agrees to move forward with the project if the project is shown to reduce the operational expenses at the site over the useful life of the project. The main financial objectives of the project are as follows:



1. Provide a self-funded program, which pays for itself through expense reductions and minimizes the Client's contribution and meets the requirements of California Government Code 4217.10 et seq.

This LOA shall be construed and enforced in accordance with the laws of the State of California without regard to principles of conflicts of law.

If you agree with the provisions set forth in this LOA, kindly sign and date the LOA below and return one fully-executed copy to my attention. Thank you again for providing SitlogIQ with the opportunity to work with the Tuolumne Utilities District on this important initiative.

Acceptance of Letter of Agreement

This agreement is between the Arvin Community Services District and SitelogIQ, Inc.

Client:

SitelogIQ

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Name:

Title:

Title:

Date:

Date:

**Attachment A:  
Potential Facility Improvement, Energy Conservation and Energy  
Generation Measures to be considered**

1. Solar Generation

## **APPENDIX B**



FULL PROJECT PROFORMA CASH FLOW <sup>12</sup>



Scope: PV System TUD Headquarters – TPPA (no export compensation)

Year	Estimated Annual ECAA Loan Payment	Estimated Annual TEML Finance Payment	Solar O&M Service & Energy Dashboard	Maintenance Savings & Avoided Cost	Gross Annual Project Savings	Annual Net Savings	Cumulative Net Savings
0	\$ -	\$ 20,041	\$ -	\$ -	\$ 20,875	\$ 834	\$ 834
1	\$ -	\$ 40,083	\$ 3,078	\$ -	\$ 21,919	\$ (21,242)	\$ (20,408)
2	\$ -	\$ 40,083	\$ 3,170	\$ -	\$ 23,015	\$ (20,238)	\$ (40,646)
3	\$ -	\$ 40,083	\$ 3,265	\$ -	\$ 24,165	\$ (19,182)	\$ (59,828)
4	\$ -	\$ 40,083	\$ 3,363	\$ -	\$ 25,374	\$ (18,072)	\$ (77,901)
5	\$ -	\$ 40,083	\$ 3,464	\$ -	\$ 26,642	\$ (16,904)	\$ (94,805)
6	\$ -	\$ 40,083	\$ 3,568	\$ -	\$ 27,974	\$ (15,676)	\$ (110,481)
7	\$ -	\$ 40,083	\$ 3,675	\$ -	\$ 29,373	\$ (14,384)	\$ (124,865)
8	\$ -	\$ 40,083	\$ 3,785	\$ -	\$ 30,842	\$ (13,026)	\$ (137,891)
9	\$ -	\$ 40,083	\$ 3,898	\$ -	\$ 32,384	\$ (11,597)	\$ (149,489)
10	\$ -	\$ 40,083	\$ 4,015	\$ -	\$ 34,003	\$ (10,095)	\$ (159,584)
11	\$ -	\$ 40,083	\$ 4,136	\$ -	\$ 35,703	\$ (8,515)	\$ (168,099)
12	\$ -	\$ 40,083	\$ 4,260	\$ -	\$ 37,489	\$ (6,854)	\$ (174,954)
13	\$ -	\$ 40,083	\$ 4,388	\$ -	\$ 39,363	\$ (5,108)	\$ (180,061)
14	\$ -	\$ 40,083	\$ 4,519	\$ -	\$ 41,331	\$ (3,271)	\$ (183,333)
15	\$ -	\$ 40,083	\$ 4,655	\$ -	\$ 43,398	\$ (1,340)	\$ (184,673)
16	\$ -	\$ 40,083	\$ 4,795	\$ -	\$ 45,568	\$ 690	\$ (183,983)
17	\$ -	\$ 40,083	\$ 4,938	\$ -	\$ 47,846	\$ 2,825	\$ (181,158)
18	\$ -	\$ 40,083	\$ 5,087	\$ -	\$ 50,238	\$ 5,069	\$ (176,090)
19	\$ -	\$ 40,083	\$ 5,239	\$ -	\$ 52,750	\$ 7,428	\$ (168,662)
20	\$ -	\$ 20,041	\$ 5,396	\$ -	\$ 55,388	\$ 29,950	\$ (138,712)
21	\$ -	\$ -	\$ 5,558	\$ -	\$ 58,157	\$ 52,599	\$ (86,113)
22	\$ -	\$ -	\$ 5,725	\$ -	\$ 61,065	\$ 55,340	\$ (30,774)
23	\$ -	\$ -	\$ 5,897	\$ -	\$ 64,118	\$ 58,221	\$ 27,448
24	\$ -	\$ -	\$ 6,074	\$ -	\$ 67,324	\$ 61,250	\$ 88,698
25	\$ -	\$ -	\$ 6,256	\$ -	\$ 70,690	\$ 64,434	\$ 153,132
26	\$ -	\$ -	\$ 6,444	\$ -	\$ 74,225	\$ 67,781	\$ 220,913
27	\$ -	\$ -	\$ 6,637	\$ -	\$ 77,936	\$ 71,299	\$ 292,212
28	\$ -	\$ -	\$ 6,836	\$ -	\$ 81,833	\$ 74,997	\$ 367,209
29	\$ -	\$ -	\$ 7,041	\$ -	\$ 85,924	\$ 78,883	\$ 446,092
30	\$ -	\$ -	\$ 7,252	\$ -	\$ 90,221	\$ 82,968	\$ 529,060
<b>Totals</b>	<b>\$ -</b>	<b>\$ 801,658</b>	<b>\$ 146,413</b>	<b>\$ -</b>	<b>\$ 1,477,131</b>	<b>\$ 529,060</b>	<b>\$ 529,060</b>



PV System TUD Headquarters – TPPA (no export compensation)  
 System size = 123.1 KW - Roof Mounted  
 ROM Installed cost = \$557,000  
 1<sup>st</sup> year Savings = \$20,875  
 1<sup>st</sup> year Savings = \$25,610 with \$0.075/kwh export compensation  
 Energy Offset = 42%  
 Exported to grid = 63,725 kwh or 32%

Notes:

- 1.) SiteLogIQ is not a Municipal Financial Advisor and this tool is used to confirm if the proposed project is Budget Neutral or better in compliance with CA Govt. Code 4217.
- 2.) Cash Flow is based on a Preliminary Analysis using rough order of magnitude budgetary estimates and other standard assumptions. Final analysis and results may vary.
- 3.) Scope of work includes .....

INPUTS		
BASE PROJECT COST	\$ 587,000	This is the total cost of the project
TOTAL PROJECT COST	\$ 587,000	
ECAA LOAN AMOUNT	\$ -	
ECAA FINANCE TERM (YEARS)	20	
ECAA INTEREST RATE	1.00%	
TEML LOAN AMOUNT	\$ 587,000	This is the portion of the total cost that is proposed to be financed via Tax Exempt Municipal Lease
TEML FINANCE TERM (YEARS)	20	
TEML INTEREST RATE	3.75%	← Interest Rate
UTILITY ESCALATION	5.0%	
CALCULATED ENERGY SAVINGS	\$ 20,875	This is the Annual Gross savings from the Solar PV
LIGHTING MAINT/AVOIDED COST SAVINGS	\$ -	5 Years
HVAC MAIN/AVOIDED COSY SAVINGS	\$ -	10 Years
SOLAR O&M COST	\$ 3,078	This is an estimated cost for Operation & Maintenance of the proposed solar array, as well as SiteLogIQ's energy management services dashboard
O&M/MAINT ESCALATION	3.0%	



FULL PROJECT PROFORMA CASH FLOW <sup>1,2</sup>



Scope: PV System TUD Headquarters – TPPA switch to PG&E and offset all PG&E meters via RES-BCT

Year	Estimated Annual ECAA Loan Payment	Estimated Annual TEML Finance Payment	Solar O&M Service & Energy Dashboard	Maintenance Savings & Avoided Cost	Gross Annual Project Savings	Annual Net Savings	Cumulative Net Savings
0	\$ -	\$ 64,204	\$ -	\$ -	\$ 73,401	\$ 9,197	\$ 9,197
1	\$ -	\$ 128,409	\$ 10,668	\$ -	\$ 77,805	\$ (61,272)	\$ (52,075)
2	\$ -	\$ 128,409	\$ 10,988	\$ -	\$ 82,473	\$ (56,923)	\$ (108,999)
3	\$ -	\$ 128,409	\$ 11,317	\$ -	\$ 87,422	\$ (52,305)	\$ (161,303)
4	\$ -	\$ 128,409	\$ 11,657	\$ -	\$ 92,667	\$ (47,399)	\$ (208,702)
5	\$ -	\$ 128,409	\$ 12,007	\$ -	\$ 98,227	\$ (42,189)	\$ (250,891)
6	\$ -	\$ 128,409	\$ 12,367	\$ -	\$ 104,121	\$ (36,655)	\$ (287,546)
7	\$ -	\$ 128,409	\$ 12,738	\$ -	\$ 110,368	\$ (30,779)	\$ (318,325)
8	\$ -	\$ 128,409	\$ 13,120	\$ -	\$ 116,990	\$ (24,539)	\$ (342,864)
9	\$ -	\$ 128,409	\$ 13,514	\$ -	\$ 124,009	\$ (17,913)	\$ (360,777)
10	\$ -	\$ 128,409	\$ 13,919	\$ -	\$ 131,450	\$ (10,878)	\$ (371,655)
11	\$ -	\$ 128,409	\$ 14,337	\$ -	\$ 139,337	\$ (3,409)	\$ (375,064)
12	\$ -	\$ 128,409	\$ 14,767	\$ -	\$ 147,697	\$ 4,522	\$ (370,542)
13	\$ -	\$ 128,409	\$ 15,210	\$ -	\$ 156,559	\$ 12,940	\$ (357,602)
14	\$ -	\$ 128,409	\$ 15,666	\$ -	\$ 165,953	\$ 21,878	\$ (335,724)
15	\$ -	\$ 128,409	\$ 16,136	\$ -	\$ 175,910	\$ 31,365	\$ (304,359)
16	\$ -	\$ 128,409	\$ 16,620	\$ -	\$ 186,464	\$ 41,435	\$ (262,924)
17	\$ -	\$ 128,409	\$ 17,119	\$ -	\$ 197,652	\$ 52,125	\$ (210,799)
18	\$ -	\$ 128,409	\$ 17,632	\$ -	\$ 209,511	\$ 63,470	\$ (147,329)
19	\$ -	\$ 128,409	\$ 18,161	\$ -	\$ 222,082	\$ 75,512	\$ (71,817)
20	\$ -	\$ 64,204	\$ 18,706	\$ -	\$ 235,407	\$ 152,496	\$ 80,679
21	\$ -	\$ -	\$ 19,267	\$ -	\$ 249,531	\$ 230,264	\$ 310,943
22	\$ -	\$ -	\$ 19,845	\$ -	\$ 264,503	\$ 244,658	\$ 555,601
23	\$ -	\$ -	\$ 20,441	\$ -	\$ 280,373	\$ 259,933	\$ 815,534
24	\$ -	\$ -	\$ 21,054	\$ -	\$ 297,196	\$ 276,142	\$ 1,091,676
25	\$ -	\$ -	\$ 21,685	\$ -	\$ 315,028	\$ 293,342	\$ 1,385,018
26	\$ -	\$ -	\$ 22,336	\$ -	\$ 333,929	\$ 311,593	\$ 1,696,611
27	\$ -	\$ -	\$ 23,006	\$ -	\$ 353,965	\$ 330,959	\$ 2,027,570
28	\$ -	\$ -	\$ 23,696	\$ -	\$ 375,203	\$ 351,507	\$ 2,379,077
29	\$ -	\$ -	\$ 24,407	\$ -	\$ 397,715	\$ 373,308	\$ 2,752,385
30	\$ -	\$ -	\$ 25,139	\$ -	\$ 421,578	\$ 396,439	\$ 3,148,824
<b>Totals</b>	<b>\$ -</b>	<b>\$ 2,568,179</b>	<b>\$ 507,525</b>	<b>\$ -</b>	<b>\$ 6,224,528</b>	<b>\$ 3,148,824</b>	<b>\$ 3,148,824</b>



PV System TUD Headquarters – TPPA switch to PG&E & offset all PG&E meters via RES-BCT

System size = 484.9 KW – Ground Mounted

ROM installed cost = \$1,825,000

1<sup>st</sup> year savings = 573,401

Energy Offset = 110%

Exported to grid = 617,100wh or 77%

Notes:

- 1) SitelogIQ is not a Municipal Financial Advisor and this tool is used to confirm if the proposed project is Budget Neutral or better in compliance with CA Govt. Code 4217.
- 2) Cash Flow is based on a Preliminary Analysis using rough order of magnitude budgetary estimates and other standard assumptions. Final analysis and results may vary.
- 3) Scope of work includes .....

INPUTS		
BASE PROJECT COST	\$ 1,825,000	This is the total cost of the project
TOTAL PROJECT COST	\$ 1,825,000	
ECAA LOAN AMOUNT	\$ -	
ECAA FINANCE TERM (YEARS)	20	
ECAA INTEREST RATE	1.00%	
TEML LOAN AMOUNT	\$ 1,825,000	This is the portion of the total cost that is proposed to be financed via Tax Exempt Municipal Lease
TEML FINANCE TERM (YEARS)	20	
TEML INTEREST RATE	3.50%	
UTILITY ESCALATION	6.0%	
CALCULATED ENERGY SAVINGS	\$ 73,401	This is the Annual Gross savings from the Solar PV
LIGHTING MAINT/AVOIDED COST SAVINGS	\$ -	5 Years
HVAC MAINT/AVOIDED COSY SAVINGS	\$ -	10 Years
SOLAR O&M COST	\$ 10,668	This is an estimated cost for Operation & Maintenance of the proposed solar array, as well as SitelogIQ's energy management services dashboard
O&M/MAINT ESCALATION	3.0%	



FULL PROJECT PROFORMA CASH FLOW <sup>1,2</sup>



Scope: PV System TUD Quartz Reservoir – TPPA switch to PG&E & offset all PG&E meters via RES-BCT

Year	Estimated Annual ECAA Loan Payment	Estimated Annual TEML Finance Payment	Solar O&M Service & Energy Dashboard	Maintenance Savings & Avoided Cost	Gross Annual Project Savings	Annual Net Savings	Cumulative Net Savings
0	\$ -	\$ 34,125	\$ -	\$ -	\$ 43,471	\$ 9,346	\$ 9,346
1	\$ -	\$ 68,250	\$ 5,069	\$ -	\$ 46,079	\$ (27,240)	\$ (17,894)
2	\$ -	\$ 68,250	\$ 5,221	\$ -	\$ 48,844	\$ (24,627)	\$ (42,521)
3	\$ -	\$ 68,250	\$ 5,377	\$ -	\$ 51,775	\$ (21,853)	\$ (64,374)
4	\$ -	\$ 68,250	\$ 5,539	\$ -	\$ 54,881	\$ (18,908)	\$ (83,282)
5	\$ -	\$ 68,250	\$ 5,705	\$ -	\$ 58,174	\$ (15,781)	\$ (99,063)
6	\$ -	\$ 68,250	\$ 5,876	\$ -	\$ 61,664	\$ (12,462)	\$ (111,525)
7	\$ -	\$ 68,250	\$ 6,052	\$ -	\$ 65,364	\$ (8,938)	\$ (120,463)
8	\$ -	\$ 68,250	\$ 6,234	\$ -	\$ 69,286	\$ (5,198)	\$ (125,662)
9	\$ -	\$ 68,250	\$ 6,421	\$ -	\$ 73,443	\$ (1,228)	\$ (126,889)
10	\$ -	\$ 68,250	\$ 6,614	\$ -	\$ 77,850	\$ 2,986	\$ (123,903)
11	\$ -	\$ 68,250	\$ 6,812	\$ -	\$ 82,521	\$ 7,459	\$ (116,445)
12	\$ -	\$ 68,250	\$ 7,016	\$ -	\$ 87,472	\$ 12,206	\$ (104,239)
13	\$ -	\$ 68,250	\$ 7,227	\$ -	\$ 92,721	\$ 17,243	\$ (86,996)
14	\$ -	\$ 68,250	\$ 7,444	\$ -	\$ 98,284	\$ 22,590	\$ (64,406)
15	\$ -	\$ 68,250	\$ 7,667	\$ -	\$ 104,181	\$ 28,264	\$ (36,142)
16	\$ -	\$ 68,250	\$ 7,897	\$ -	\$ 110,432	\$ 34,284	\$ (1,858)
17	\$ -	\$ 68,250	\$ 8,134	\$ -	\$ 117,058	\$ 40,673	\$ 38,815
18	\$ -	\$ 68,250	\$ 8,378	\$ -	\$ 124,081	\$ 47,453	\$ 86,268
19	\$ -	\$ 68,250	\$ 8,629	\$ -	\$ 131,526	\$ 54,646	\$ 140,914
20	\$ -	\$ 34,125	\$ 8,888	\$ -	\$ 139,417	\$ 96,404	\$ 237,318
21	\$ -	\$ -	\$ 9,155	\$ -	\$ 147,782	\$ 138,628	\$ 375,946
22	\$ -	\$ -	\$ 9,429	\$ -	\$ 156,649	\$ 147,220	\$ 523,166
23	\$ -	\$ -	\$ 9,712	\$ -	\$ 166,048	\$ 156,336	\$ 679,502
24	\$ -	\$ -	\$ 10,004	\$ -	\$ 176,011	\$ 166,008	\$ 845,509
25	\$ -	\$ -	\$ 10,304	\$ -	\$ 186,572	\$ 176,268	\$ 1,021,778
26	\$ -	\$ -	\$ 10,613	\$ -	\$ 197,766	\$ 187,153	\$ 1,208,931
27	\$ -	\$ -	\$ 10,931	\$ -	\$ 209,632	\$ 198,701	\$ 1,407,632
28	\$ -	\$ -	\$ 11,259	\$ -	\$ 222,210	\$ 210,951	\$ 1,618,583
29	\$ -	\$ -	\$ 11,597	\$ -	\$ 235,543	\$ 223,946	\$ 1,842,528
30	\$ -	\$ -	\$ 11,945	\$ -	\$ 249,675	\$ 237,730	\$ 2,080,259
<b>Totals</b>	<b>\$ -</b>	<b>\$ 1,365,005</b>	<b>\$ 241,150</b>	<b>\$ -</b>	<b>\$ 3,686,414</b>	<b>\$ 2,080,259</b>	<b>\$ 2,080,259</b>



PV System TUD Quartz Reservoir – TPPA switch to PG&E & offset all PG&E meters via RES-BCT  
 System size = 230.4 kW – Ground Mounted  
 ROM Installed cost = \$970,000  
 1<sup>st</sup> year Savings = \$43,471  
 Energy Offset= 107%  
 Exported to grid = 350,483kwh or 89%

Notes:

- 1) SitelogiQ is not a Municipal Financial Advisor and this tool is used to confirm if the proposed project is Budget Neutral or better in compliance with CA Govt. Code 4217.
- 2) Cash Flow is based on a Preliminary Analysis using rough order of magnitude budgetary estimates and other standard assumptions. Final analysis and results may vary.
- 3) Scope of work includes .....

INPUTS		
BASE PROJECT COST	\$	970,000 This is the total cost of the project
TOTAL PROJECT COST	\$	970,000
ECAA LOAN AMOUNT	\$	-
ECAA FINANCE TERM (YEARS)		20
ECAA INTEREST RATE		1.00%
TEML LOAN AMOUNT	\$	970,000 This is the portion of the total cost that is proposed to be financed via Tax Exempt Municipal Lease
TEML FINANCE TERM (YEARS)		20
TEML INTEREST RATE		3.50%
UTILIFY ESCALATION		6.0%
CALCULATED ENERGY SAVINGS	\$	43,471 This is the Annual Gross savings from the Solar PV
LIGHTING MAINT/AVOIDED COST SAVINGS	\$	- 5 Years
HVAC MAINT/AVOIDED COSY SAVINGS	\$	- 10 Years
SOLAR O&M COST	\$	5,069 This is an estimated cost for Operation & Maintenance of the proposed solar array, as well as SitelogiQ's energy management services dashboard
O&M/MAINT ESCALATION		3.0%