PRELIMINARY ENERGY ASSESSMENT

CAMBRIA COMMUNITY SERVICES DISTRICT

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1 EXECUTIVE SUMMARY

On behalf of Pacific Gas and Electric Company (PG&E), we appreciate the opportunity to assist the Cambria Community Services District (CCSD or District) in advancing its goals of delivering high quality services to CCSD residents while responsibly managing operational priorities within the Board-approved budgets. Consistent with these goals, the District has engaged PG&E's **Sustainable Solutions Turnkey (SST) Program** to identify opportunities to reduce energy use and the associated costs within its operations. Utility costs are a significant component of the District's operating budget. Utility use is distributed throughout the District's operations. However, the single largest utility consumer is the Waste Water Treatment Plant (WWTP). Combined with the associated Lift Stations, the total annual electricity cost to the District is estimated at **$194,949** – representing approximately **70% of total electric usage** and **58% of total electric cost**. As such, our initial assessment was focused on <u>opportunities for operational improvements at the WWTP and Lift Stations</u>.

1.1 PG&E Sustainable Solutions Turnkey (SST) Program

As further detailed in Section 7 of this report, PG&E offers the SST Program to assist customers in assessing, evaluating and implementing energy-saving projects that reduce utility consumption and operating costs – all through a streamlined turnkey design-build process. The SST Program is modelled after our highly successful Utility Energy Services Contract (UESC) for Federal customers. Through a Public-Private Partnership with the United States Department of Energy (DoE), UESC authorizes both civilian and military branches of the Federal government to engage their local serving utility for the turnkey delivery of energy-related projects. Through this program, PG&E provides all of the services required to identify and implement comprehensive energy projects, including assessment, development, financial analysis, design, construction, commissioning, acceptance, training and turn-over. Since the goal of UESC projects is to reduce energy and water consumption (and the related operating cost), the capital cost of UESC projects is funded from the savings generated – either through financing, incentives, grants or a combination thereof. Since its inception over ten (10) years ago, the UESC program has delivered an impressive scorecard of results for Federal facilities across the PG&E service territory including NASA, FAA, US Army, GSA, IRS and VA.

Building on that success, PG&E's SST Program offers non-Federal customers the same ability to engage PG&E for the turnkey implementation of comprehensive efficiency and renewable energy projects across their facilities. Following the rigorous development and accounting requirements of UESC, the SST Program provides customers the same transparency, open-book cost development and warranties offered to our largest most discriminating customer.

The first step in the SST process is the **Preliminary Energy Assessment (PEA)**. The PEA analyzes energy-related activities across a customer's asset base. Leveraging that data, the PEA identifies and characterizes the cost-saving and/or revenue-generating opportunities that exist in the current operating environment. The PEA also investigates potential incentives, grants, and low-cost energy financing that may be available to reduce the capital cost of implementing these solutions. The results of the PEA, including the underlying methodology, data and conclusions, are detailed in the following report.

The development of this report required a significant amount of time and input from District staff over the course of several months. We would like to specifically acknowledge **John Allchin**, **Bob Gresens**, **Toni Artho**, **Delon Blackburn**, and **Melissa Bland** for their time and comprehensive understanding of WWTP and Lift Station operations. We have thoroughly enjoyed working with each of them and this report would not have been possible without their insightful contributions.

1.2 Report Highlights

As detailed in Section 4, the report identifies a series of opportunities for the District to reduce total operating costs by an **estimated $276,542 per year**. Additionally, the implementation of the related work would provide a foundation for achieving the following operational, regulatory and financial goals:

Increased Operational Efficiency

A streamlined and more predictable treatment process with improved SCADA controls reduces staff workload and overall operating cost.

Regulatory Resilience

Stable treatment and improved electric quality allow the plant to respond to potential future regulatory requirements (nutrient removal) while minimizing the current risk of permit violations.

Financial Flexibility

Reduced operating costs provide a basis for implementing significant capital improvements within the newly approved rate structure.

2 APPROACH TO THE PEA

2.1 Methodology

The primary purpose of the PEA is to identify financially viable energy efficiency, operations and maintenance, and infrastructure upgrade opportunities that meet the CCSD's specific goals for this project. To identify these opportunities, the SST team conducted several visits to the WWTP and Lift Stations, interviewed key personnel, reviewed utility data and available building information and reviewed prior audit reports. We leveraged this information to develop the Energy Conservation Measures (ECMs), preliminary scopes of work and budgetary financial estimates included in this report. The following sections provide an overview or our approach to developing this PEA.

2.2 PEA Process Overview

The PEA process included six primary steps:

1. **Kickoff Meeting:** Met with CCSD's key stakeholders and the SST team to review the SST program process and establish the primary goals for a SST project.
2. **Utility Analysis:** This effort provided a thorough understanding of the plant's utility consumption and costs as well as some insights into methods of operation, key trends and anomalies.
3. **Field Survey:** A brief field investigation/audit of important facilities and significant energy consuming systems.
4. **Baseline Energy & Cost Analysis:** A more detailed analysis of existing energy use and costs within facilities used for identifying potential ECM solutions and their savings.
5. **ECM Solution Development and Analysis:** Identification and development of the preliminary ECM solutions including the scope outlines, benefits and estimated turnkey implementation costs.
6. **PEA Presentation and Report:** Presentation of PEA findings and feasible SST project options to CCSD.

2.3 Facilities Included in the PEA

This PEA is primarily focused on the WWTP and the associated Lift Stations. However, we also reviewed a prior energy audit completed in 2015 in conjunction with additional information provided by CCSD to identify opportunities outside the WWTP. Should the District elect to proceed with the next phase of the SST Program, viable ECMs located across District facilities would be addressed in the Investment Grade Audit (IGA) phase.

2.3.1 Documentation Review

Our site investigation process began with obtaining readily available facility documentation such as design plans, utility data, equipment lists, and prior facility audits. Our engineering team reviewed this information in detail and utilized it in the development of this report.

2.3.2 Site Interviews

Our project team conducted multiple interviews with CCSD staff. During these interviews, our engineers and CCSD staff discussed overall plant operations, maintenance and repair, infrastructure needs, existing and/or anticipated issues and an overview of the permit/regulatory environment.

2.3.3 Energy Analysis

We derived the energy baselines from the available historic site utility data- specifically electric usage for the preceding three (3) years for all District meters and the previous twelve (12) months of 15-minute interval data for the single meter serving the WWTP. The energy use during this period formed the basis of the energy allocation analysis. An energy allocation analysis determines the estimated energy consumption for each end-use. The resulting end-use profile allows our engineers to assess where the energy is being used in the systems and to identify where the greatest opportunities for energy savings exist.

2.3.4 Energy Savings Calculations

Based on the data acquired during our investigation, the energy savings identified in this report were calculated using customized spreadsheets that use standard engineering practices and assumptions.

After we calculated the savings for each ECM, the total savings were then calibrated to ensure that no savings were "double-counted" in the analysis. All final savings by end-use were compared to total allocated end-use energy to ensure total savings fractions fall within expected ranges for the ECMs considered.

Cost savings are generally calculated using the average unit cost per utility whereby the cost of energy is calculated by dividing the total monthly cost (electricity, natural gas, etc.) by the monthly units consumed.

2.3.5 Project Costs

Preliminary engineering estimates were developed using manufacturer's data, contractor estimates, and/or standard estimating tools. By design, these estimates are intended to be **budgetary** with an estimated accuracy of +/- 25% of the expected final turn-key implementation costs.

Should the District elect to move forward with any or all of the ECMs identified in this report, final firm fixed costs and savings numbers will be developed and presented in the Investment Grade Audit (IGA).

2.3.6 ECM Selection

The ECMs identified in this report are based on District data, interviews and our professional experience with similar work. This report is NOT intended to be an “all or nothing” project proposal. Please note that the final selection of ECMs for inclusion in any subsequent phases of the SST Program is entirely at the discretion of the District. We have presented all potential ECMs identified by PG&E during the PEA and will not proceed with any work until we consult with the District and receive specific notice to proceed.

3 UTILITY DATA ANALYSIS

This utility analysis is a fundamental element of the PEA and was utilized to gain a deeper understanding of CCSD's utility consumption and costs. The results of the analysis provide the foundation for all subsequent steps in the PEA including comparison and benchmarking of facilities, allocation of energy use and cost to systems within individual facilities, and savings calculations.

The data utilized in this analysis includes annual, monthly and 15-minute electric meter data. The District receives electric utility service for its facilities from PG&E. Gas use at the WWTP and Lift Stations (NG/Propane) is nominal and has been specifically excluded from this report.

Electrical Service

CCSD receives electric service through 44 individual PG&E accounts. Thirty-six (36) months of electrical data from June 2015 through May 2018 and the most recent twelve (12) months of 15-minute interval data was analyzed as part of this PEA.

CCSD consumes **1,715,657 kWh** of electricity annually at a cost of **$333,223** for a total blended rate of $0.194 per kWh. Table 3.1 provided a summary of the electric consumption and cost across CCSD's facilities.

Table 1: Electrical Summary by Usage Area

Facility Name	Annual Use kWh	Electric Cost $	% of Annual Electric Use	% of Annual Electric Cost
WWTP	1,106,060	$ 172,728	64.5%	51.8%
Wells	221,993	$ 61,786	12.9%	18.5%
Lift Stations	93,886	$ 22,221	5.5%	6.7%
Water Tanks	70,797	$ 16,518	4.1%	5.0%
Street Lights	38,154	$ 14,634	2.2%	4.4%
Police/Fire	35,464	$ 7,981	2.1%	2.4%
Water Yard/SWF Sprayfield	92,234	$ 24,155	5.4%	7.2%
Administration Facility	25,808	$ 5,982	1.5%	1.8%
Veteran's Building	22,857	$ 5,047	1.3%	1.5%
Other	8,404	$ 2,171	0.5%	0.7%
Total	**1,715,657**	**$ 333,223**		

This summary confirms that the **WWTP** is the single largest electric consumer in the District. Combined, the **WWTP** and **Lift Stations** account for 70% of CCSD's total annual utility costs. Water Wells, Water Tanks, and Street Lighting are the next largest users at a combined total of 28% of annual utility costs. Due to their direct relationship, the WWTP and associated Lift Stations are the subject of this report.

We also performed analysis using **Fifteen (15) Minute Interval Data** for the WWTP using a data visualization tool (DVIEW).

The following are representations of the annual and weekly demand data for the WWTP:

Figure 1: Annual Fifteen Minute Interval Demand Profile (Jul-18 through Sep-18)

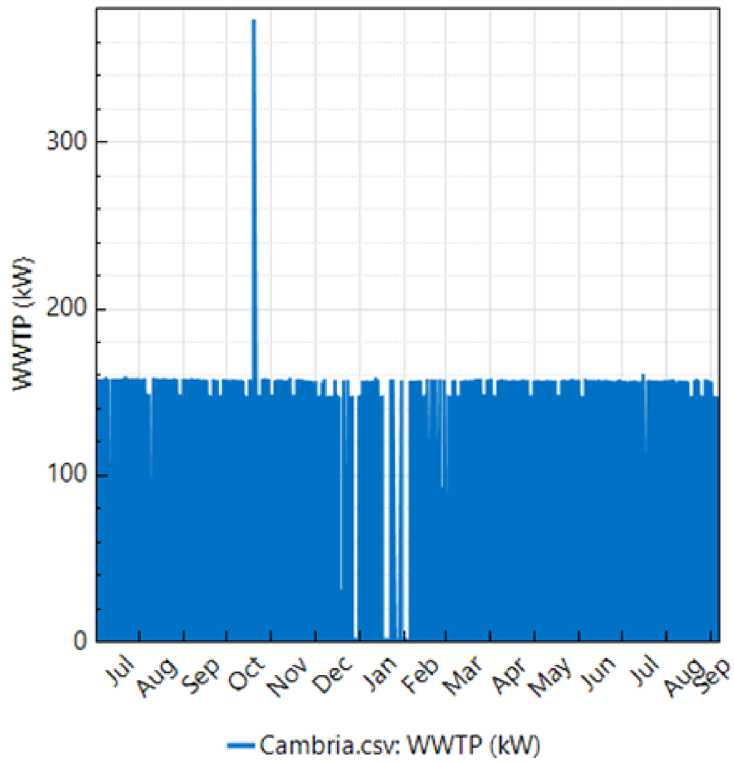


Figure 2: Fifteen Minute Interval Demand Profile (Typical Summer Month)

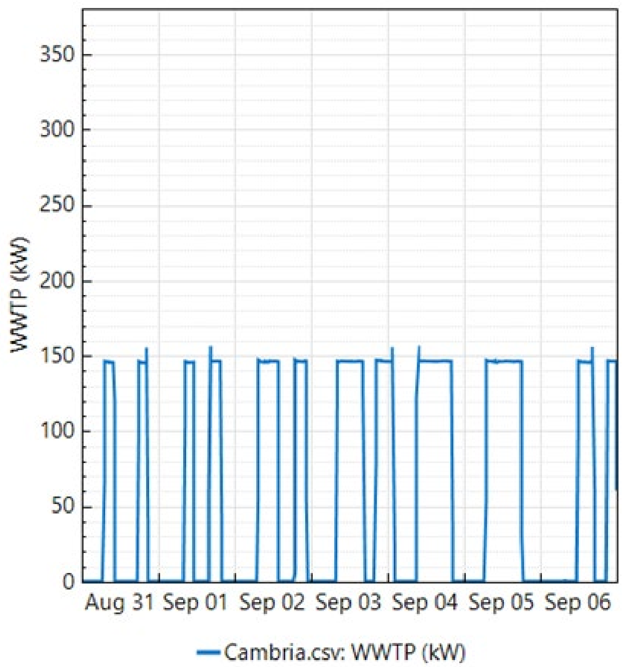
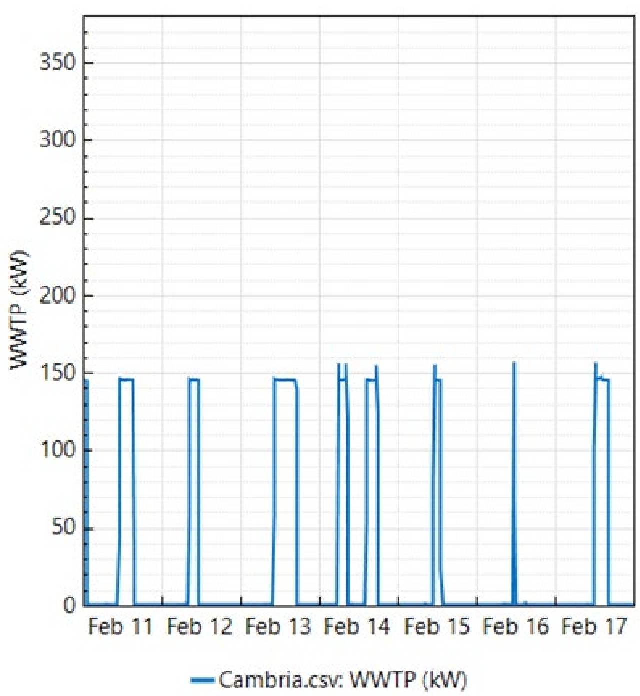


Figure 3: Fifteen Minute Interval Demand Profile (Typical Winter Month)



Our demand analysis revealed the following key observations:

- Annual & monthly profiles are extremely flat with an average peak load of approximately 160 kW
- The annual load factor for the plant is approximately 7,000 hours (summation of monthly peak demand divided by the total hours in a year)
- There are no seasonal impacts on the peak demand

Upcoming PG&E Rate Changes

All Investor Owned Utilities (IOU) in California, including PG&E, have pending rate cases filed with the California Public Utilities Commission (CPUC) that include rate modifications. The general intent of the modifications is to shift the On-Peak Time-of-Use (TOU) periods for the A-6, A-10, E-19, and E-20 tariffs to later in the day to address the large amount of solar photovoltaic (PV) power added to the grid over the last ten years.

A summary of what was filed includes:

1. **The Summer Period will be defined as June 1 through September 30 (4 months).** Currently, Summer is defined as May 1 through the end of October (6 months).
2. **During the Summer Period, both weekdays and weekends will have On-Peak Periods.** Currently, Summer On-Peak applies only on weekdays.
3. **The Summer On-Peak TOU period will change to 4:00 p.m. to 9:00 p.m. (5 hours).** Currently it is from Noon to 6:00 p.m. (6 hours).
4. **The Summer Partial-Peak TOU Period will change from 2:00 p.m. to 4:00 p.m. and 9:00 p.m. to 11:00 p.m. seven days a week.** Currently it is from 8:30 a.m. to Noon and 6:00 p.m. to 9:30 p.m. weekdays only.
5. **It appears the Winter TOU time periods will not be changing with the exception that weekends will now have Partial-Peak rates apply from 8:30 a.m. to 9:30 p.m.** Previously, weekends were all off-peak.

If approved by the CPUC as proposed, these changes will impact the CCSD's annual energy cost. Based on currently available information, the following are our **estimates** of the qualitative effects to individual accounts. A thorough assessment of the new tariff(s) and the effects to District energy costs will be conducted in the Investment Grade Audit (IGA).

1. Any non-TOU accounts with a flat rate fee for energy only and no demand charges, such as the A-1 rate plan, will likely see minimal changes.

2. Individual buildings on a TOU rate plan (A-6 or E-19) will likely see reduced annual electrical costs as most of the building's energy use will be earlier in the day before the proposed On-Peak period begins and because of minimal weekend use. While beneficial from a rate point of view, this will have a negative effect on the financial impacts for measures associated with these buildings.
3. The WWTP will likely see an increase in costs due to evening and weekend use hours.
4. Flat-rate Roadway lighting and Traffic Control Lighting should be unaffected by the proposed changes.

PG&E has both *Deemed* and *Customized* Rebate Programs in place based on the current rate plans. What effect the proposed rate plans will have on rebates is currently unknown. Any estimates made in this report are based on the existing programs. Available Utility Programs will be thoroughly assessed in the Investment Grade Audit (IGA).

4 POTENTIAL ENERGY CONSERVATION MEASURES (ECM)

4.1 Introduction

The ECMs were developed through a combination of meetings and interviews with District staff; review of recent studies and preliminary design reports; field visits; analysis of utility and benchmark data; and energy and economic analysis of potential ECM opportunities. This section presents existing conditions, identified solutions, and estimated benefits for each ECM presented in this section.

4.2 Wastewater Fund ECMs

ECM-1	Influent Flow Equalization
ECM-2	Influent Lift Station Modifications
ECM-3	Modified Ludzak-Ettinger Process Upgrade
ECM-4	Blower System Improvements
ECM-5	RAS and WAS Pumping Improvements
ECM-6	Sludge Thickening
ECM-7	Electrical Upgrades
ECM-8	Backup Power
ECM-9	SCADA System
ECM-10	Secondary Water System (3W) Improvements
ECM-11	Effluent Pump Station Improvements
ECM-12	Sewer Lift Stations

4.2.1 ECM-1: Influent Flow Equalization

<u>Existing Conditions</u>

The plant has a design flow of 1 Million Gallons per Day (MGD) and a peak hydraulic capacity of 2.5 MGD during storm events. Of the two existing influent equalization tanks, the oldest tank is severely corroded. The newer welded tank was recoated in the early 1990s and exhibits fewer signs of corrosion. The two tanks are no longer in service. Influent currently flows by gravity from the grit removal system directly to the aeration basins. Incoming flows can cause overflow of the grit chamber when two influent pumps operate, and it is suspected that significant debris may be reducing the capacity of the piping between the grit chamber and the activated sludge basins. During completion of this report, CCSD was completing installation of a new influent screening system upstream of the grit chamber.

Plant flow cannot be reliably managed without addition of equalization and/or improvements to the influent pump station. Management of plant flows becomes particularly important when the existing aeration basins are converted (as proposed in ECM 3 below) to accommodate reliable nitrogen removal through the Modified Ludzak-Ettinger (MLE) process. To implement the MLE process, the volume in the existing aeration basins will be reduced by approximately 16 percent to accommodate an anoxic zone at the influent end of each aeration basin. Each aeration basin will have an anoxic zone and aerated zone. The ability of the process to absorb flow variations is reduced in these smaller receiving basins. Therefore, when the plant implements the MLE process, it will become more important to manage flows to maintain process stability, particularly during wet weather flows.

Based on biological process modeling[1] completed by the District, the existing WWTP has a maximum monthly flow capacity of 0.95 MGD to meet effluent total nitrogen (TN) concentrations of less than 10 mg/L when operated in MLE configuration. This capacity corresponds to a peak hour flow of 2.08 MGD when historical flow records and peaking factors are reviewed. In order to maintain plant performance during peak hour flows, model results indicate influent to the secondary treatment process should be reduced to 1.9 MGD.

Although there is currently no permit condition for nitrogen removal, District staff noted the Regional Water Quality Control Board was recommending further limitations on nitrogen loadings at the San Simeon Creek lagoon within a draft March 2015 total maximum daily loading report. This earlier draft report had a nitrogen target level of 1.3 mg/l (Nitrogen-N) within the lagoon during the dry season to avoid bio-stimulation. Since this report, Water Board staff have indicated they were pleased with the nitrate removal observed since the CCSD began operating its interim MLE process using temporary piping and pumps. Therefore, it is anticipated that permit requirements could become more stringent in the future.

<u>Measure Description</u>

This ECM will include construction of new influent equalization tanks and pump station to maintain steady flow through the planned MLE process.

The existing effluent storage basins are not recommended to be utilized for influent flow equalization due to the condition of the older tank. In addition, the pump pit between the two tanks is subject to flooding from infiltration during high groundwater events.

It is estimated that a total of approximately 120,000 gallons of flow equalization would be required in two tanks. Coarse bubble aeration is recommended to reduce odors and maintain suspension of solids. For

[1] Enhanced Compliance Action Project and 10% Design- Technical Memorandum No. 1 (Carollo, 2014)

the purposes of this report, it is anticipated that the tanks would be partially buried concrete. Tank volume, construction type and configuration would be validated during the IGA.

Benefits

- Reduces the risk of overflow
- Improves treatment plant efficiency, performance, and reliability
- Coordinates with influent lift station improvements to manage incoming flows and maintain biological nutrient removal (BNR) effectiveness
- Reduces burden on staff
- Addresses the hydraulic restriction between the grit removal equipment and the aeration basins

Potential ECM Savings

This ECM may increase pumping energy as it introduces additional pumping and aeration/mixing stages. Additional energy cost would be offset by avoiding potential overloading of mixed liquor suspended solids into the clarifiers from the activated sludge process and enhancements to operations, permit compliance, and staff impact. Table 2 provides a summary of the estimated construction cost and savings for this ECM.

Table 2: ECM 1: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
1	Influent Flow Equalization	8,337	1,060,000

4.2.2 ECM-2: Influent Lift Station Modifications

Existing Conditions

The WWTP influent lift station utilizes three 25 Hp constant speed suction-lift pumps to lift incoming sewage into the treatment process. The pumps operate based on wet well level. The pumps are oversized compared to current flows, since the plant was designed and constructed before water conservation became a common practice. The middle pump does not hold prime, and downstream processes can overflow when two pumps run.

Figure 4: Influent pump station

Measure Description

This ECM will include installing new higher efficiency submersible pumps with variable frequency drives (VFDs). The pumps would be sized to operate more efficiently at existing flows, while ensuring all pumps can pass a minimum 3-inch solid to prevent clogging. The influent wet well will be re-coated and new access hatches will be provided for maintenance of submersible pumps. Baffling will be considered to minimize aeration and prevent cavitation and binding. This ECM complements influent flow equalization (ECM 1 above), but could also be implemented without construction of equalization.

Benefits

- Reduces energy usage by installing appropriately sized pumps and VFDs
- Eliminates existing priming problem in middle pump and improves pump reliability
- Improves balance of running hours between pumps to extend pump life
- Addresses needed repair/replacement project identified in Capital Improvement budget
- Extends useful life of influent wet well by repairing and replacing coatings
- Eliminates existing condition that can cause one pump to cavitate and run continuously, requiring a second pump to operate at the same time
- Can be programmed to perform self-cleaning functions within the wet well and incoming sewer

Potential ECM Savings

Controlling the pumps with a VFD would allow the pumps to operate at reduced speeds, which would decrease fluid velocity in the discharge piping and minimize friction head losses.

Retrofitting the existing influent lift station with submersible pumps on VFDs could reduce average pumping rate by approximately 30%, resulting in lower losses and more efficient pumping. However, pumps would have to operate for longer duration to pass incoming flows. Based on our calculations and assuming an Average Daily Flow (ADF) of 0.539 MGD, the average reduction in electrical consumption would be approximately 16,300 kWh/year or $2,800/year (at $0.171/kWh).

Although the electrical savings associated with this ECM are modest, the benefits to overall operations, reliability, plant efficiency, and maintenance should be carefully considered. Table 3 provides a summary of the estimated construction cost and savings for this ECM.

Table 3: ECM 2: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
2	Influent Lift Station Modifications	15,484	846,250

4.2.3 ECM 3 - Modified Ludzak-Ettinger Process Upgrade

Existing Conditions

In response to the concerns from the draft March 2015 Total Maximum Daily Load (TMDL) Report by RWQCB and underlying groundwater concerns, the CCSD completed interim measures to denitrify WWTP effluent. Water Board staff monitor the nitrogen levels on the San Simeon Creek lagoon and have noted a substantial reduction since CCSD completed its interim denitrification efforts. Therefore, although there is currently no permit condition for nitrogen removal, it is anticipated that permit requirements could become more stringent in the future. Interim MLE denitrification efforts have included temporary pumps and piping to recirculate mixed liquor to a zone near the front of the basins where aeration has been turned off in order to produce the effects of an anoxic zone. While effective, there is

Figure 5: Aeration basin and blower building

no baffling to isolate this zone from the aerated sections of the basins. This lack of isolation limits effectiveness and energy efficiency while increasing the amount of operator time required. Therefore, a more permanent MLE system is needed.

According to the 1993 WWTP plant specifications, fine bubble diffusers were specified. Although details were not found within District records, the retired District Engineer recalled them as being EPDM tubes (socks), which would be periodically changed as they aged. Their replacement was necessary due to the holes stretching over time and allowing for larger, less energy efficient aeration bubbles to be formed. Based on visual observation and staff input, it is suspected that the diffusers have reached the end of their useful life. It is recommended that the existing diffusers be replaced with fine pore bubble diffusers with newer materials that would not stretch and deform over time.

Additionally, the 12-inch header in the basins at the end of the influent piping was removed to reduce hydraulic restriction and accommodate gravity flow from the grit chamber, resulting in uneven flow distribution across the basin.

Measure Description

This ECM will include construction of high efficiency air diffusers, construction of basin divider wall, improvement of recirculation piping, construction of new recirculation pumps, and installation of a new flow distribution header. It is assumed that new submersible pumps would be installed for mixed liquor return, and new submersible mechanical mixers would be installed in the anoxic zones. The new mixers will be protected by the influent screen project which is currently being completed by District staff. Additionally, non-functional skimming troughs and scum pumps will be replaced. Due to the reduction in volume of the basin resulting from the construction of baffle walls, it is anticipated that influent flow equalization will be necessary to maintain reliable nutrient removal, particularly during wet weather events. Accordingly, it is assumed that ECM 1 be completed in coordination with this ECM.

Benefits

- Reduces energy usage by installing high efficiency diffusers for improved oxygen transfer
- Reduces volume requiring aeration by partitioning the anoxic and aerobic zones
- Provides permanent and reliable nutrient removal
- Replaces mechanical equipment which has failed and/or reached the end of its useful life
- Provides improved flow distribution
- Reduces burden on staff

Potential ECM Savings

The savings calculated for this ECM are achieved through the improved Oxygen Transfer Efficiency (OTE) of new fine pore bubble diffusers to replace the ineffective diffusers, the reduced aeration and mixing requirement through isolating the anoxic zone, and the improved flow distribution. The results of this ECM assume that ECM 4 (Blower Improvements) is also completed.

Isolating the anoxic zone reduces the volume in the basin requiring mixing by aeration. Installing new diffusers will also improve overall efficiency since some of the existing diffusers have obviously failed and require replacement. Table 4 provides a summary of the estimated construction cost and savings for this ECM.

Table 4: ECM 3: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
3	Modified Ludzak-Ettinger Process	14,212	853,750

4.2.4 ECM 4 – Blower System Improvements

Existing Conditions

A plant wide air system conveys air to the activated sludge basins and sludge holding tanks from three 125 Hp multistage centrifugal blowers[2]. Blowers are manually operated by District staff and are not controlled by dissolved oxygen (DO) or other parameters in the activated sludge basins. DO control is not used because the existing centrifugal blowers are prone to surging if the air output rates are reduced too much. Therefore, in order to reduce air flow through the submerged diffusers, the plant currently partially closes (throttles) blower inlet valves. Despite throttling inlet air flow, the DO level in the aeration basins can still be higher than target concentration of 2.0 mg/L. The blowers were installed as part of the 1993 upgrades and newer technologies have since evolved, which are more energy efficient and more readily operated under variable speeds. The existing blowers are also at the end of their useful life. Additionally, holes in the existing blower ducts release warm air into the motor control center (MCC), reducing air delivery to the basins, and increasing cooling requirements into the MCC room.

Figure 6: Existing blowers

Table 5: Aeration Blowers

Blower	Manufacturer and Model No.	Blower Type	Qty	Control	Blower Motor (hp)	Status
Main Blowers	Hoffman 38407A1	Centrifugal	1 (active) 2 (standby)	1-VFD 1-Soft Start 1-None	125	1 On
Pony Blower	Hoffman 4208A	Centrifugal	1	None	100	Off

[2] A fourth blower rated at 100 Hp is in place and was used for mixing the influent EQ basing (no longer in use). This blower does not have adequate capacity for other uses and is not utilized for any processes.

Measure Description

This ECM will include construction of two new blowers, aeration piping modifications, duct repair, variable frequency drives, and dissolved oxygen control systems (via SCADA) to improve efficiency and effectiveness. DO control will allow the blowers to run only at the required rate, reducing electrical usage and avoiding over-aeration.

Benefits

- Reduces energy usage by installing high efficiency blowers, variable speed drives, mass air flow meters, and automated SCADA controls
- Reduces over-aerating by introducing DO control via the SCADA system
- Replaces mechanical equipment which has failed and/or reached the end of its useful life
- Reduces air conditioning loads by eliminating hot air entry into conditioned space
- Reduces burden on staff

Potential ECM Savings

The savings associated with this ECM assumes that ECM 3 has already been completed. Blower power requirements were calculated assuming an Oxygen Transfer Efficiency (OTE) of 20%. The majority of savings associated with this ECM are anticipated as a result of improved blower efficiency, providing the ability to reduce aeration during low demand periods, and reducing over-aerating by utilizing DO control. Under 2017-2018 operating conditions, blower power consumption for both aeration and mixing demand was estimated to be approximately 87 kW. Power requirement after this ECM is implemented is estimated at 32 kW, and is based on the minimum air flow required for mixing, which exceeds the air flow required to meet BOD.[3]

Table 6 provides a summary of the estimated construction cost and savings for this ECM.

Table 6: ECM 4: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
4	Blower Room and Aeration Basins	109,154	1,345,000

[3] The air volume required to meet BOD is estimated at 360 cfm, the air volume required for mixing is 1,000 cfm. This mixing requirement only includes the aerated portion of two MLE reactors, not the anoxic zones. Additional aeration demands for mixing for other uses (influent equalization, sludge stabilization, etc.) are included in other ECMs

4.2.5 ECM 5 - RAS and WAS Pumping Improvements

Existing Conditions

The two return activated sludge (RAS) pumps each run continuously at 200 gpm and 20 Hz. They are oversized for current flows and as a result are operating at a very low efficiency (inefficient area of pump curve). Two separate waste activated sludge (WAS) pumps are installed and it would be preferable for WAS flows to be delivered through valve(s) on the RAS piping, thereby eliminating two pumps. Skimming troughs and scum pumps are not functioning.

Figure 7: RAS/WAS Piping

Figure 8: Tipping trough

Measure Description

The existing RAS and WAS pumps were initially installed as part of the 1993 improvements, along with the ability to independently control both systems via the SCADA. However, that feature was never utilized, and the system may no longer have this capability. Scum troughs and scum pumps have failed and must be replaced. This ECM will include construction of a new RAS and WAS pumping systems, manual scum tipping troughs, and scum pumps. The WAS and RAS pumps will be interconnected to the SCADA to allow independent control of each system and to optimize operations.

Benefits

- Reduces the amount of equipment to operate and maintain
- Reduces energy usage by installing high efficiency pumps with more refined flow ranges

- Replaces mechanical equipment which has failed and/or reached the end of its useful life
- Reduces burden on staff by providing automated control via the SCADA system

Potential ECM Savings

The energy savings for this ECM are minimal; however, renewing the system would result in some annual maintenance and repair and replacement savings. Table 7 provides a summary of the estimated construction cost and savings for this ECM.

Table 7: ECM 5: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
5	RAS and WAS Pumping Improvements	7,444	496,250

4.2.6 ECM 6 - Sludge Thickening

Existing Conditions

Operators pump WAS and sludge from the secondary clarifiers to the sludge holding tank (unused clarifiers) overnight. One sludge tank holding cell is continuously aerated to meet San Luis Obispo County Air Pollution Control District (APCD) odor-mitigation requirements, and sludge from the second cell is transferred to another basin prior to being delivered to the screw press. Holes in cell partition walls allow sludge to leak into adjacent cell. Supernatant is pumped to another cell and some flow is returned to the headworks every other day. The screw press receives approximately 2% solids and operates five days per week, nine hours per day. The sludge storage tanks (repurposed steel clarifiers) have exceeded their useful life. Holes and structural failures are apparent in walls separating sludge storage cells. Due to continuous aeration, the sludge does not thicken readily and requires multiple pumping operations to process solids and ultimately convey them to the screw press.

Figure 9: Sludge holding tank

Figure 10: Sludge thickener and screw press

Figure 11: Sludge thickener

Measure Description

This ECM will include demolition of the two existing (unused) secondary clarifiers, construction of two new 70,000-gallon steel aerated sludge stabilization tanks, rehabilitation of the sludge thickening system, and improvements to the screw press. During the IGA, further evaluation of this ECM will be conducted to determine the most cost-effective method for biosolids handling – either a biosolids handling and storage area to manage dewatered solids or direct discharge to roll-off containers.

Benefits

- Reduces energy usage by installing more efficient pump transfer and sludge aeration systems
- Replaces mechanical equipment which has failed and/or reached the end of its useful life
- Improves solids dewatering and reduces hauling costs
- Reduces burden on staff
- Increasing the de-watering by approximately 5% will reduce hauling costs by over $2,500/year

Potential ECM Savings

The energy savings for this ECM are minimal; however, renewing the system would result in some annual maintenance and repair and replacement savings. Additionally, increasing de-watering by 5% would reduce annual tonnage removed by approximately 55 tons resulting in additional savings. Table 8 provides a summary of the estimated construction cost and savings for this ECM.

Table 8: ECM 6: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
6	Sludge Thickening	15,387	961,250

4.2.7 ECM 7 – Electrical Upgrades

Existing Conditions

The District has experienced disruptions in the quality of electrical service, resulting in failure of critical plant electrical infrastructure. The existing PG&E service transformer is a live-front unit that provides a 480V, three-phase, three-wire ungrounded service to the CCSD service switchboard, which is also rated 480V, three-phase, three-wire. The service switchboard includes an automatic transfer switch for connection of an existing 350kW on-site standby generator.

Measure Description

PG&E plans to replace the existing live-front transformers with dead-front transformers due to safety considerations. PG&E service upgrade is subject to final confirmation through New Service application process. Upon approval of new service, we will install a new 1200A, 480Y/277V, three-phase, four-wire service switchboard. The current electrical code requires the service overcurrent protection to include ground-fault protection.

A new service switchboard would be constructed between the new PG&E dead-front transformer and the existing CCSD service switchboard. This will allow the existing switchboard with its overcurrent devices to remain unchanged. The new service switchboard will include an integral automatic transfer switch that will be connected to the standby generator. A power conditioning and monitoring unit will also be installed.

Benefits

- Provides code- and PGE- compliant solution for upgrade to grounded PGE transformer (PGE pays for transformer)
- Improved voltage stability compared to current ungrounded system
- Avoids need for plant-wide rewiring

Potential ECM Savings

There are no energy savings for this ECM; however, renewing the system would result in some annual maintenance and repair and replacement savings. Table 9 provides a summary of the estimated construction cost and savings for this ECM.

Table 9: ECM 7: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
7	Electrical Upgrades	3,488	232,500

4.2.8 ECM 8 - Backup Power

Existing Conditions

The existing 365 kW diesel backup generator was installed in 1976 and has reached the end of its useful life. The San Luis Obispo County Air Pollution Control District (APCD) limits use of the generator to emergency conditions and a small number of hours annually for maintenance. Currently, District staff can only view generator status via the SCADA system. It is preferred to have remote control of the generator via SCADA.

Figure 12: Emergency generator

Measure Description

This ECM will include installation of a new natural gas-fired generator with propane backup. For this ECM, it is assumed that the new generator will have a capacity of 365 kW; however, we will evaluate the capacity and determine the appropriate size and type during the IGA.

Benefits

- Improves treatment plant reliability during power outages
- Reduces burden on staff to maintain the existing generator
- Replaces critical infrastructure before it fails
- Eliminates regulatory restrictions on operations
- Reduces ongoing permitting costs and activities

Potential ECM Savings

There are no energy savings for this ECM; however, renewing the system would result in some annual maintenance and repair and replacement savings. Table 10 provides a summary of the estimated construction cost and savings for this ECM.

Table 10: ECM 8: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
8	Backup Power	7,463	497,500

4.2.9 ECM 9 - SCADA System

Existing Conditions

The WWTP has a limited SCADA system that provides monitoring and some manual operator control. The SCADA system has very little automatic functionality.

The SCADA system hardware consists of an OPTO-22 based platform. The operator workstation is located in the Maintenance Building. The WWTP utilizes an auto-dialer to alert staff in the event of a plant alarm. The auto-dialer is configured to send an alarm which is broken into 12 categories. The WWTP staff has to investigate the causes of the alarm once they reach the WWTP.

Measure Description

This ECM will include a new plant SCADA system for remote control, monitoring, and automation of processes. It is assumed the system would consist of new PLC with cabinet/HMI, new software server with redundant server, historian, and a new rack server with three workstations.

Other alternatives, such as expanding the existing Opto-22 system, will be evaluated during the IGA to determine the most cost-effective method for delivering enhanced SCADA control.

Benefits

- Reduces burden on staff
- Reduces energy usage through automation and optimization of treatment process
- Improves security and plant resilience
- Upgrades existing outdated infrastructure

Potential ECM Savings

Table 11 provides a summary of the estimated construction cost and savings for this ECM.

Table 11: ECM 9: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
9	SCADA System	16,319	721,250

4.2.10 ECM 10 – Secondary Water System (3W) Improvements

Existing Conditions

The existing secondary or plant water (3W) pumps (15 hp each) have reached the end of their useful life. The existing system pumps run at a constant speed while a pressure relief valve (PRV) maintains a set pressure in the plant system and discharges water back to the influent wet well where it is re-pumped by the system.

Figure 13: Secondary water pump station

The existing system was based on a design that simplified operation but was not energy efficient. For example, when the system over-pressurizes non-potable water it returns it to the wet well through a pressure relief valve, only to be pumped again. Additionally, the secondary water system runs continuously.

Measure Description

We recommend a more efficient system that utilizes submersible pumps, VFDs and/or a hydro pneumatic tank to optimize pump performance. This retrofit will also include the installation of new instrumentation and controls to better manage system pressures and reduce operating costs. In addition, the existing bag filtration system will be evaluated to consider a more efficient self-cleaning filtration systems.

Benefits

- Reduces energy usage by eliminated release of pressurized water back to the wet well
- Reduces energy usage by coordinating pump operating point with plant demand
- Replaces mechanical equipment which has reached the end of its useful life
- Reduces burden on staff

Potential ECM Savings

There are no energy savings for this ECM; however, renewing the system would result in some annual maintenance and repair and replacement savings. Table 12 provides a summary of the estimated construction cost and savings for this ECM.

Table 12: ECM 10: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
10	Secondary Water System (3W)	2,775	185,000

4.2.11 ECM 11 - Effluent Pump Station Improvements

Existing Conditions

The existing 40 Hp VFD-controlled effluent pumps do not reliably deliver flow at their rated capacities and have unmatched output. A surge tank was installed but it is no longer connected to the system.

Figure 14: Effluent pump station

The condition of the effluent line is not known, although cleaning is expected to improve pump performance and predictability. Air release valves (ARVs) along the 2.5-mile-long discharge system have reached the end of their useful life. It is believed that non-functional ARVs and sediment buildup in the pipeline may contribute to reduced capacity of the discharge system.

It is also assumed that restrictions in the discharge manifold impact pump operations.

Measure Description

This ECM will include replacement of the effluent pumps, rehabilitation of level control, reconfiguration and replacement of the discharge manifold system, cleaning of the effluent line, and evaluation or replacement of air release valves along the 2.5-mile long discharge alignment. This effort will also consider using the concrete-lined ponds as buffer storage to allow pumping only during non-peak electric periods. Replacement of the surge tank to protect the discharge piping will be evaluated.

Benefits

- Reduces energy usage by effectively controlling pump output
- Improves resiliency for critical plant infrastructure
- Upgrades existing infrastructure
- Reduces burden on staff

Potential ECM Savings

Table 13 provides a summary of the estimated construction cost and savings for this ECM.

Table 13: ECM 11: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
11	Effluent Pump Station Improvements	15,206	733,750

4.2.12 ECM 12 – Sewer Lift Stations

Existing Conditions

The District maintains and operates ten (10) sewer lift stations to convey sewage to the wastewater plant. Most of the District's lift stations have a "dry well/wet well" configuration featuring two pumps for lead/lag operation. Lift Station A is a triplex dry well/ wet well lift station (only two pumps installed) and features a below grade vault housing a 55-kW diesel generator. Lift Stations 4 & 8 consist only of a wet well with two submersible pumps. Maintenance or repair at the majority of the lift stations requires work to be conducted in a "confined space" as defined and regulated by the Division of Occupational Safety and Health (Cal/OSHA).

The District sewer collection system was constructed in the mid-1970s. Few improvements have been made since original construction. Due to water conservation measures implemented in recent years, a common issue at District lift stations is oversized pumps. Oversized pumps consume more energy due to high velocities and associated high friction losses. Additionally, oversized pumps cycle more frequently both shortening pump life and unnecessarily increasing electrical use.

The District's Capital Improvement plans include raising electrical panels above grade as a first phase, then converting dry/wet pit lift stations to submersible lift stations.

Table 14: Sewer Lift Station Pumps

Lift Station No.	Manufacturer and Model No.	Pump Type	Qty	Pump Motor (hp)
A	Crown PO6LB-12F	Suction Lift	2	7.5
A1	Ebara Self-Priming	Suction Lift	2	10
B	Ebara Self-Priming	Suction Lift	2	25
B1	Crown PO4LB	Suction Lift	2	5
B2	Crown PO4LB-8D	Suction Lift	2	15
B3	Crown PO4LC	Suction Lift	2	10
B4	Allis Chalmers 400 SER	Suction Lift	2	40
9	Ebara C-EFQT6A	Suction Lift	2	10
4	Paco/58-47001-QDN	Submersible	2	1.5
8	Paco/58-47001-QDN	Submersible	2	1.5

Figure 15: Lift station B1

Figure 16: Lift station B4

Measure Description

Based on operating data from 11/1/2016 – 11/30/2018, pumps at District lift stations operate more than 20,600 hours per year. In addition to the benefits associated with retrofitting with premium efficiency motors and more appropriately sized pumps, the District will benefit from converting from obsolete dry-well lift station configurations which are inefficient, require significant ongoing maintenance, and are a safety hazard for District personnel.

Eight lift stations (A1, B, B1-B4, 3, 9) are in need of total replacement with submersible pumping systems to eliminate confined space entry requirements. LS4 and LS8 are already fitted with submersible pumps and are not recommended for rehabilitation at this time. It is anticipated that replacement of eight District lift stations will be a multi-year effort, requiring significant District resources to complete.

It is recommended that two lift stations be selected for replacement under the SST program. Based on field reconnaissance and discussions with District staff, it is recommended that Lift Stations B1 and B4 be replaced under this program.

	Hp	Notes
Lift Station B1 - Full Replacement	5	
Lift Station B4 - Full Replacement	40	Oversized
Not Recommended:		
Lift Station A - Pump replacement	7.5	LS A - Assumes replace with higher efficiency pumps and motors. Too close to coast for major improvements
Lift Station A1 - Full Replacement	10	LS A-1 pumps subsequently replaced with Ebara Self Primer pumps during ~ 2014
Lift Station B - Full Replacement	25	LS B pumps subsequently replaced with Ebara Self Primer pumps during ~ 2014
Lift Station B2 - Full Replacement	15	
Lift Station B3 - Full Replacement	10	
Lift Station 9 - Full Replacement	10	
LS4	1.5	submersible
LS8	1.5	3-phase submersible pumps. VFDs were added to provide 3-phase power to pumps.
LS9	5	suction lift, no dry pit, very small site next to road. changed approx 3 different times during its history.

Benefits

- Reduces energy usage by replacing inefficient pumps and matching pump capacity and flow
- Eliminates confined-space safety hazards
- Reduces Sanitary Sewer Overflow (SSO) risk and Improves resiliency for critical infrastructure
- Upgrades aging infrastructure

Potential ECM Savings

Table 15 provides a summary of the estimated construction cost and savings for this ECM.

Table 15: ECM 12: Potential Savings

ECM	Description	Total Savings ($)	Implementation Cost ($)
12	Sewer Lift Stations	61,275	3,945,000

5 PRELIMINARY FINANCIAL SUMMARY

From the list of potential measures evaluated in this PEA, the SST team believes that implementing a comprehensive project would enable CCSD to realize much needed infrastructure improvements while generating approximately $380,00/year in energy and operational savings. Table 5.1 provides a summary of all of the ECMs identified during this PEA. As part of the IGA, the SST would work closely with CCSD define each solution and to identify the specific ECM's that the district would like to move into the construction phase.

It is important to recognize that the estimated savings, implementation costs, and other inputs used in the financial analysis are preliminary and will be refined in the Investment Grade Audit (IGA).

Table 16: Preliminary Financial Summary

ECM ID	Description	Facility ID	Facility ID Level 2	Utility Savings Total Utility($)	Avoided Maintenance and R&R Cost	Total Savings ($)	Implementation Costs ($)
1	Influent Flow Equalization	WWTP	Equalization Basins (New)	-7,563	15,900	8,337	1,060,000
2	Influent Lift Station Modifications	WWTP	Influent Lift Station	2,790	12,694	15,484	846,250
3	Modified Ludzak-Ettinger Process Upgrade	WWTP	Aeration Basins	1,405	12,806	14,212	853,750
4	Blower System Improvements	WWTP	Blower Room and Aeration Basins	88,979	20,175	109,154	1,345,000
5	RAS and WAS Pumping Improvements	WWTP	Aeration Basins	0	7,444	7,444	496,250
6	Sludge Thickening	WWTP	Solids Processing Area	968	14,419	15,387	961,250
7	Electrical Upgrades	WWTP	Control and Generator Building	0	3,488	3,488	232,500
8	Backup Power	WWTP	Control and Generator Building	0	7,463	7,463	497,500
9	SCADA System	WWTP	Communications Systems	5,500	10,819	16,319	721,250
10	Secondary Water System (3W) Improvements	WWTP	3W Station	0	2,775	2,775	185,000
11	Effluent Pump Station Improvements	WWTP	Effluent	4,200	11,006	15,206	733,750
12	Sewer Lift Stations	Collection	Lift Stations	2,100	59,175	61,275	3,945,000
					-	-	
Total				**98,379**	**178,163**	**276,542**	**11,877,500**

Note:

1. Annual avoided maintenance and repair & replacement (R&R) costs were estimated as 1.5% of the construction costs. This percentage was determined based on industry standards and professional experience. Actual values will be validated during the IGA.
2. Avoided maintenance and R&R cost savings do not anticipate a reduction in operating staff.

5.1 Financing Options

PG&E does not provide financing directly for projects executed through the SST Program. Rather, we work with an experienced group of financiers to support our customer's project financing needs. We have accessed these resources to develop a preliminary projection of funding cost and structure that reflects current market conditions. It is important to note that PG&E does not make any money from the financing of projects. We facilitate the acquisition of project financing purely to assist our customers.

In addition to traditional financing vehicles, CCSD would also qualify for low cost energy financing. The California Energy Commission (CEC) offers loans which are issued at a 1% interest rate for qualifying projects. Similarly, California Investor-Owned Utilities (IOUs) offer 0% interest On-Bill Financing (OBF). Both PG&E and Southern California Gas offer OBF loans. The State Revolving Fund (SRF) and USDA also offer long-term and low interest infrastructure loans. During the IGA, PG&E would work with the District to identify and secure project funding from the available source, or combination of sources, that best meet the according to District's needs and timing.

5.2 Rebates, Grants and Rate Plans

There are multiple opportunities for rebates, grants, and specialized electrical rate plans to be applied to the proposed measures. Availability of funds for qualifying District projects would be fully assessed in the Investment Grade Audit (IGA) to identify and maximize the use of these funds.

6 NEXT STEPS

The Preliminary Energy Assessment (PEA) is the first step in PG&E's comprehensive approach to energy projects through the Sustainable Solutions Turnkey (SST) Program. The goals of the PEA are to characterize the customer's existing energy and facility conditions and to identify opportunities for the customer to improve those conditions to save energy and reduce operating costs.

Following review of the PEA Report, the next step in the SST Process is for the customer to select candidate Energy Conservations Measures (ECMs) for further investigation in the Investment Grade Audit (IGA). The IGA provides detailed evaluation of the candidate ECMs including real-time data collection, energy validation, engineering, final construction costing, and provides the customer with a firm, not-to-exceed, fixed cost for turn-key implementation.

Furthermore, the IGA serves three (3) primary objectives:

For the Customer: The IGA clearly defines the proposed technical solutions, the expected construction schedule and the associated cost for each ECM and the overall project. The IGA identifies the extent of the customer's project risk and characterizes suitable methods for risk mitigation. The IGA confirms the expected savings and financial performance of the project as well as the associated sources of funding/financing. And, finally, the IGA provides the customer with a firm fixed "not to exceed" cost proposal for turnkey implementation.

For PG&E: The IGA validates the technical feasibility of all ECMs, ensures project constructability, characterizes PG&E risk and finalizes all costs required to deliver a successful turn-key project to the customer. It is on the basis of the IGA that PG&E can provide a firm fixed "not to exceed" turn-key proposal for project implementation.

For Financiers: Generally, potential financiers (and/or funding programs) require an IGA as a condition of underwriting and funding energy projects. Financiers share the customer's and PG&E's interest in the technical and financially viability of a project – both at completion and through the life of the financing period. The IGA provides financiers with a full description of the project, with a particular focus on the project's ability to deliver savings and/or revenue through the term of the financing period.

The next step for the CCSD is to decide which ECMs, if any, should be further investigated in an IGA. Armed with the District's selection, the SST Team will promptly prepare and submit an IGA proposal for District consideration.

A sample schedule is outlined below.

- 95% complete PEA for District Staff review: **January 14, 2019**
- Final 100% PEA report to be delivered to the District: **February 20, 1019 (revised May 6, 2019)**
- Draft IGA Proposal to District: **February 20, 2019**
- PG&E to deliver final IGA proposal to District: **May 6, 2019**
- CCSD joint committee meeting: **May 7, 2019**
- Outline of Board Presentation: **TBD**
- Board Packet and Resolution submitted two weeks in advance of Board Meeting: **TBD**
- Public Posting two weeks prior: **TBD**
- Target Board Meeting: **TBD**

7 SST PROGRAM OVERVIEW

For over 40 years, PG&E and our fellow California utilities have been recognized leaders in the advancement of energy efficiency programs and technologies. In collaboration with the California Public Utilities Commission (CPUC) and the Governor's office, California utilities have been able to maintain pre-1980's per capita energy consumption in the face of unprecedented population and economic growth. More recently, we have risen to the challenge of increasing generation from renewable sources in our energy portfolio. As a result of this historic collaboration, PG&E customers enjoy one of the cleanest energy supplies in the country.

While we are proud of our collective successes, the State, PG&E and our customers are facing a new set of challenges arising from the interrelated effects of Climate Change, severe drought and worldwide goals to reduce the carbon impact of everything we do. Addressing these most pressing challenges in a timely and viable way calls for creative thinking and an innovative response.

PG&E's Utility Energy Services Contract (UESC) is a prime example of doing things differently through collaboration and creativity. Through a Public-Private Partnership with the United States Department of Energy (DoE), UESC authorizes both civilian and military branches of the Federal government to engage their local serving utility for the turnkey delivery of energy-related projects. Through this program, PG&E provides all of the services required to identify and complete comprehensive energy projects, including assessment, development, financial analysis, design, construction, commissioning and acceptance/turn-over. Since the goal of these projects is to reduce energy and water consumption (and the related operating cost), the capital cost of UESC projects is funded from the savings generated – either through financing, incentives, grants or a combination thereof. PG&E provides end-to-end implementation including all elements of assessment, development, design and construction for projects. Since its inception, the UESC program

PG&E's Unique Qualifications

- **PROVEN TRACK RECORD**. PG&E has successfully administered, developed, and executed hundreds of millions of dollars' worth of energy efficiency projects.
- **LOCAL PRESENCE & LONG-TERM PARTNER.** With over 150 years' experience serving Northern and Central California, PG&E has extensive local resources that will support the project's development, implementation, engineering, and service requirements
- **VENDOR NEUTRAL.** PG&E does not make or sell equipment. Our solution and project development are guided exclusively by the unique needs of each individual customer.
- **ROBUST INTERNAL TECHNICAL RESOURCES**. 100% of our energy engineering and project management is delivered in-house by our experienced staff and qualified strategic partners.

has delivered an impressive scorecard of results for Federal facilities across our service territory including NASA, FAA, US Army, GSA, IRS and VA.

Building on the success of the Federal UESC program, PG&E developed the Sustainable Solution Turnkey (SST) Program to offer non-Federal customers the same ability to engage PG&E for the implementation of comprehensive efficiency and renewable energy projects across their facilities. Modeled on the rigorous development and accounting requirements of UESC, the SST Program provides customers the same transparency, open-book cost development and warranties offered to our largest most discriminating customer.

PG&E strongly encourages customers to take a comprehensive and strategic approach to energy planning, sustainability initiatives and related project implementation. The SST Program defines and supports a process that considers a design-build approach, takes advantage of streamlined procurement through California Government Code Section 4217 and properly prioritizes and bundles deep energy-saving retrofits, with renewable generation to achieve overall energy, sustainability, operational and financial goals.

Importantly, the SST methodology, described below, is designed to support the customer's decision-making process and is comprised of several steps to ensure that projects meets the customer's unique priorities and needs.

1) **Preliminary Energy Assessment (PEA):** Establish customer goals and objectives. Identify opportunities and project viability through data analysis, interviews and benchmarking. Determine key opportunities based on customer goals and define the associated technical and financial components:
   a) Advance customer's sustainability & climate action goals
   b) Assess current baseline and opportunities for improvement
   c) Reduce utility and operating costs
   d) Address aging building systems or facility infrastructure
   e) Demonstrate a potential project size that fits the SST program
   f) Determine potential Green House Gas (GHG) savings and environmental impact
   g) Produce recurring annual savings to support financing
2) **Investment Grade Audit (IGA)**: Finalize technical solution and financial details
   a) Detailed Audit
   b) Engineering and Economic Analysis

c) Project Pricing and Financing Plan

d) Monitoring and Verification Plan

e) Equipment specification and subcontractor bid packages

f) IGA Report Preparation

g) Firm, fixed “not to exceed” construction cost/project proposal

3) **Implementation:** Deliver turnkey design/build construction of project, start-up and testing and final commissioning.

4) **Acceptance, Turnover and Closeout:** O&M manuals, training, incentive/rebate procurement and Measurement & Verification (M&V).

8 APPENDIX A - LIST OF ACRONYMS

Acronym	Definition
ADF	Average Daily Flow
APCD	Air Pollution Control District
BNR	Biological Nutrient Removal
BOD	Biological Oxygen Demand
CCSD	Cambria Community Services District
CEC	California Energy Commission
CPUC	California Public Utilities Commission
DO	Dissolved Oxygen
ECM	Energy Conservation Measure
GHG	Green House Gas
GPM	Gallons per minute
IGA	Investment Grade Audit
IOU	Investor Owned Utility
kW	Kilowatt
kWh	Kilowatt Hour
M&V	Measurement and Verification
MCC	Motor Control Center
MG	Million gallons
mg/l	Milligrams per liter
MGD	Million gallons per day
MLE	Modified Ludzak-Ettinger
MW	Megawatt
O&M	Operations and Maintenance
OBF	On-Bill Financing
PEA	Preliminary Energy Assessment
PG&E	Pacific Gas and Electric

Acronym	Definition
PV	Photovoltaic
RAS	Return Activated Sludge
SCADA	Supervisory Control and Data Acquisition
SST	Sustainable Solution Turnkey
SWF	Sustainable Water Facility
TMDL	Total Maximum Daily Load
TOU	Time-of-Use
VFD	Variable Frequency Drive
WAS	Waste Activated Sludge
WWTP	Waste Water Treatment Plant