BEFORE THE BOARD OF DIRECTORS OF
DELTA DIABLO

Re: Authorizing Filing of WaterSMART Grant)
Application for Funding Recycled Water)
Facility Emergency Backup Generator and)
Authorizing General Manager to Execute)
Grant Agreement) **RESOLUTION NO. 1/2016**

The BOARD OF DIRECTORS OF DELTA DIABLO HAS DETERMINED THAT:

WHEREAS, the United States Department of Interior, Bureau of Reclamation WaterSMART program provides grant funding opportunities on a competitive basis for the efficient use of water and energy; and

WHEREAS, on May 13, 2015, the Board of Directors adopted Resolution No. 5/2015 approving the Fiscal Year 2015/16-2019/20 Capital Improvement Program, which includes this project; and

WHEREAS, Delta Diablo wishes to submit a grant application for said funding program.

NOW THEREFORE, the Board of Directors of Delta Diablo DOES HEREBY RESOLVE AND ORDER as follows:

1. The General Manager or his/her designee is hereby authorized and directed to sign and file, for and on behalf of the Delta Diablo, a grant application.

2. The General Manager or his/her designee is hereby authorized to negotiate and execute a grant agreement with the Bureau of Reclamation and any amendments thereto.

3. Contingent upon award of funding by Reclamation and approval by the General Manager or his/her designee, Delta Diablo has the capability to contribute the non-federal cost share, and work with Reclamation to meet established deadlines for entering into a cooperative agreement.

PASSED AND ADOPTED on January 13, 2016, by the following vote:

AYES:	HARPER, GLOVER and LONGMIRE	ABSENT:	NONE
NOES:	NONE	ABSTAIN:	NONE

I HEREBY CERTIFY that the foregoing is a true and correct copy of a Resolution adopted by the Board of Directors of Delta Diablo on January 13, 2016.

ATTEST: D. Pete Longmire
Board Secretary

By: _____

WaterSMART: Water and Energy Efficiency

Project Grants for FY 2016

Funding Opportunity Announcement No. F16FOADO004

Recycled Water Facility Reliability Project

January 14, 2016

Applicant:

Delta Diablo
2500 Pittsburg-Antioch Highway
Antioch, CA 94509-1373

Project Manager

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Acronyms and Abbreviations

AF	acre-feet
AFY	acre-feet per year
BHP	brake horsepower
DGS	California Department of General Service
CO2e	carbon dioxide equivalent
CEQA	California Environmental Quality Act
CFS	cubic feet per second
CCWD	Contra Costa Water District
CIP	Capital Improvement Program
CVP	Central Valley Project
DEC	Delta Energy Center
DAC	Disadvantaged Communities
DWR	Department of Water Resources
ECCC	East Contra Costa County
GHG	greenhouse gas emissions
GPD	gallons per day
GPM	gallons per minute
kWh	kilowatt-hour
IRWM	Integrated Regional Water Management
lbs.	pounds
LMEC	Los Medanos Energy Center
MG	million gallons
MGD	million gallons per day
mg/L	milligrams per liter
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
PG&E	Pacific Gas and Electric
RWF	recycled water facility
sq. ft.	square feet
WWTP	wastewater treatment plant

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Section 1: Technical Proposal

Executive Summary

Date: January 14, 2015
Applicant Name: Delta Diablo
City, County, State: Antioch, Contra Costa County, California
Project Name: Recycled Water Facility Reliability Project

Delta Diablo is a California special district that provides water resource recovery services to the City of Antioch, the City of Pittsburg, and the unincorporated community of Bay Point. The District also operates a Recycled Water Facility (RWF) designed to treat up to 12.8 MGD of secondary level effluent from the secondary treatment facility to tertiary level standards. The product water from the RWF is primarily used as cooling tower make up water for the Delta and Los Medanos Energy Centers (Energy Centers) with approximately ten percent of that water provided for irrigation use by the local parks, schools and golf courses in Antioch and Pittsburg.

This project involves the design and construction of a 600kW emergency back-up generator for Delta Diablo's recycled water facility (RWF). Without a back-up power supply, the recycled water facility is not able to operate and provide recycled water to the energy centers during a power outage. While the recycled water distribution system includes reservoirs implemented to reduce peak treatment and distribution capacity requirements, the 2 million gallon Delta Energy Center (DEC) reservoir is operated at a near full configuration to ensure sufficient water for the energy centers in the event the RWF loses electrical power. Installing an emergency generator will allow the RWF to operate continuously, providing recycled water reliability. It will allow the water level in the 2 million gallon DEC reservoir to be lowered to 1 million gallons (50%) or less, making additional water available to users. This change in operation will reduce the cycling of the DEC pumps and provide flexibility at the treatment plant, resulting in potential energy reduction of 75,800 kWh/year at the RWF, 66,200 kWh/year at the wastewater treatment plant (WWTP), and water savings of 1,120 Acre-feet/year.

The total estimated project cost is $1,391,500. Delta Diablo is seeking a $300,000 grant from the Bureau of Reclamation to combine with a $225,000 grant from the California Department of Water Resources through the Integrated Regional Water Management Program, Proposition 84. The remaining $866,500 will be funded by Delta Diablo through the Recycled Water Capital Asset Fund. This project is included in the FY 2015/2016-FY2019/2020 Five Year Capital Improvement Program which was approved by the Delta Diablo Board of Directors on May 13, 2015.

Construction will begin in spring 2016 and be completed in spring 2017. This project is not a federal facility location.

Background Data

1.1.1 Project Location

Delta Diablo is located in the Sacramento-San Joaquin Delta, providing wastewater resource recovery services to nearly 200,000 residents in the City of Antioch, City of Pittsburg, and Community of Bay Point. Figure 1 shows the general service area for Delta Diablo. The water resource recovery services consist of secondary treatment of wastewater, recycled water production and distribution, pollution prevention, energy recovery, beneficial reuse of biosolids, street sweeping, and household hazardous waste collection. Delta Diablo is an award winning agency with a mission to protect public health and the environment.

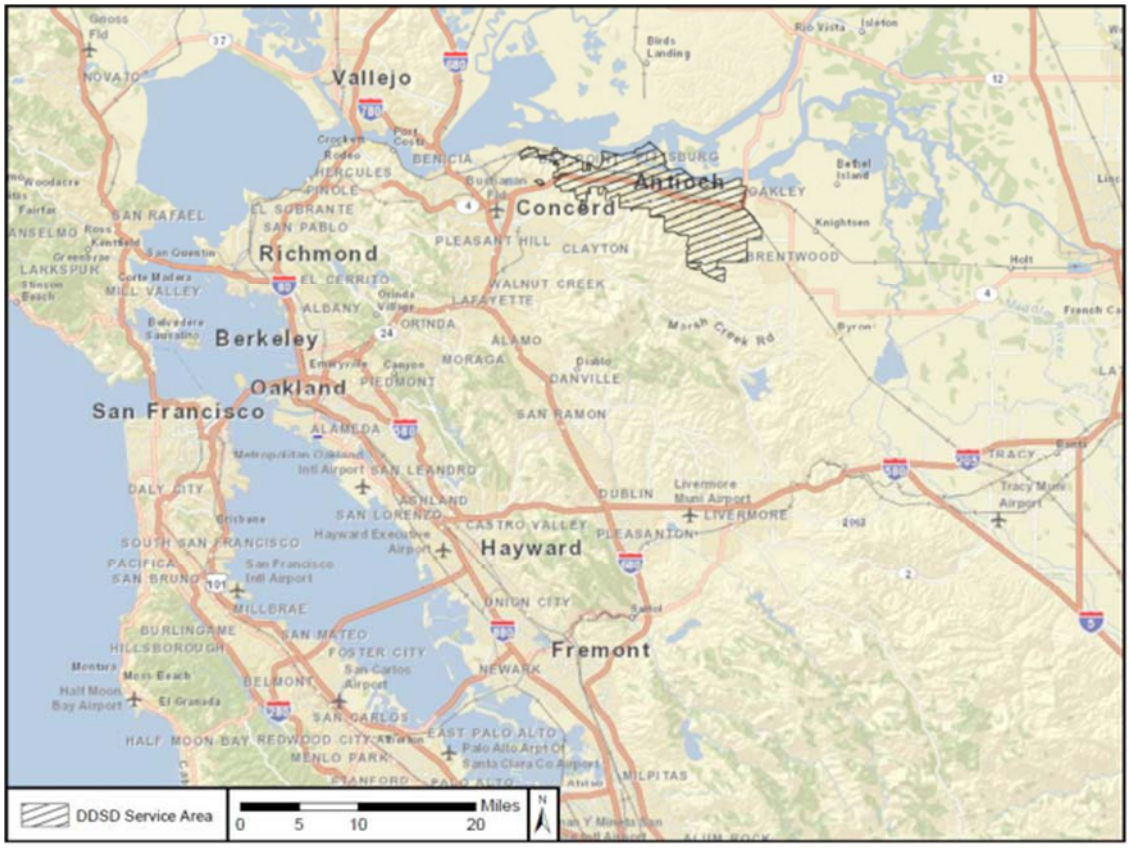


Fig 1 - Location of Delta Diablo in Antioch, California, and service area encompassing the City of Antioch, City of Pittsburg, and Community of Bay Point.

The District also operates a Recycled Water Facility (RWF) designed to treat up to 12.8 MGD of secondary level effluent from the secondary treatment facility to tertiary level standards. The product water from the RWF is primarily used as cooling tower make up water for the Delta and Los Medanos Energy Centers (LMEC). About 2 MGD of cooling tower blowdown from the Energy Centers is returned to the wastewater facility and then combined with the secondary level

treated wastewater. The mixture of secondary level treated wastewater and cooling tower blowdown undergoes chlorination and de-chlorination and then is discharged through the outfall.

Recycle water is provided to DEC at a daily rate of 4.2 MGD and LMEC at 3.0 MGD. A two million gallon onsite recycled water storage tank is provided as a reserve to use in the event the Wastewater Treatment Plant and/or Recycled Water Facility flow is disrupted. Both the DEC and LMEC recycled water contracts require uninterrupted supplies, and without an emergency generator to operate the RWF in the event of a power outage, the onsite 2 million gallon storage tank operating level is continuously pumped to near full capacity (32 feet) to ensure adequate supply.

Figure 2 shows Delta Diablo's property boundary and location of the proposed emergency backup generator adjacent to the Recycled Water Facility.

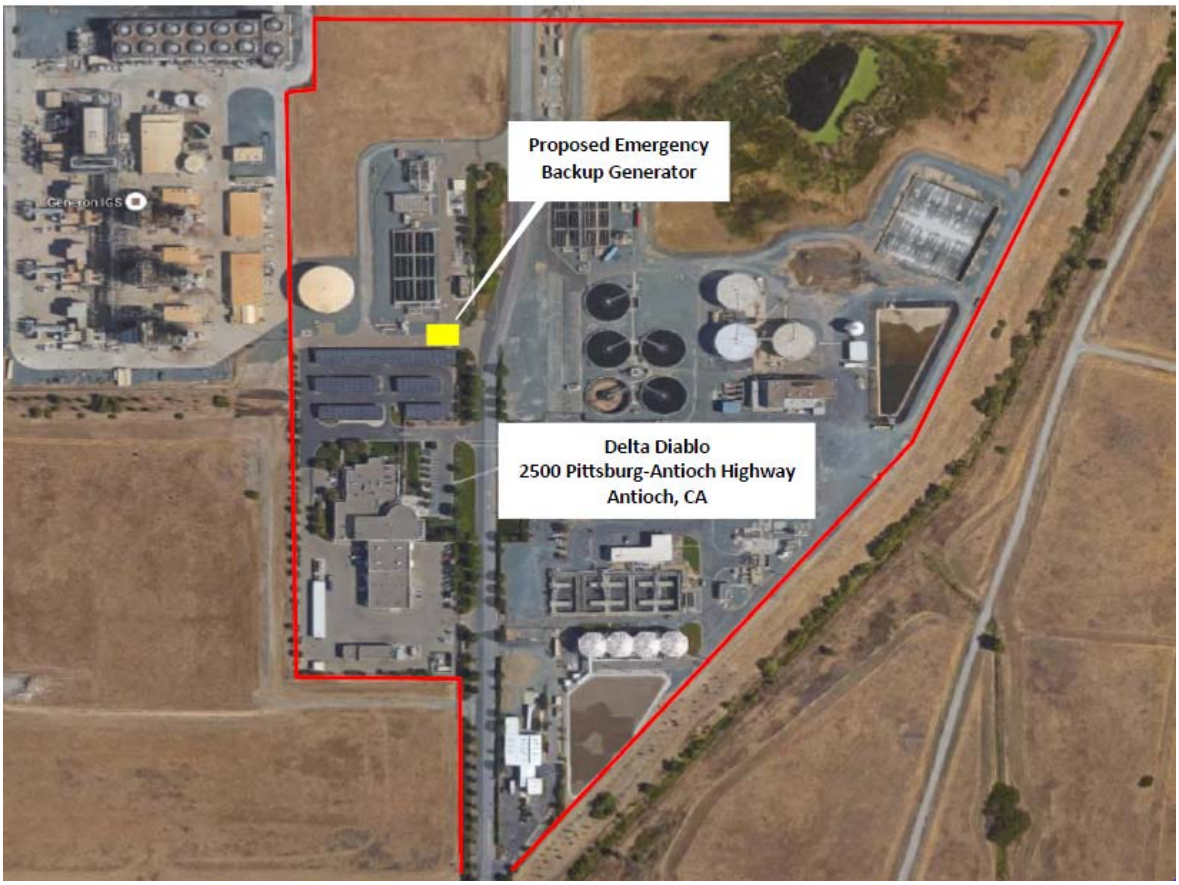


Figure 2 - Delta Diablo Site Map

1.1.2 Water Supply Sources and Uses

The recycled water system for Delta Diablo has delivered disinfected tertiary-treated recycled water to users since 2001. The RWF was originally constructed to produce and deliver recycled water to two Calpine power plants—the Delta Energy Center (DEC) and Los Medanos Energy Center (LMEC)—and the distribution system has been incrementally expanded to serve landscape irrigation customers throughout Delta Diablo's service area. Delta Diablo produces an

average of 12.8 MGD (14,337 AFY) of disinfected tertiary recycled water. This recycled water supply is primarily used for cooling water for the power plants and irrigation water, which both have increased demands on hot days. On peak days, current demands meet or exceed this supply, causing some customers to use potable water to meet peak demands.

The potable water supply within Delta Diablo's service area is primarily provided by Contra Costa Water District (CCWD). CCWD draws its water from the Sacramento-San Joaquin Delta at Rock Slough and Old River under a contract with the federal Central Valley Project (CVP), and transports the water to its service area via the Contra Costa Canal. CCWD depends upon the Bureau of Reclamation's Central Valley Project (CVP). The City of Antioch also supplements their potable supply through a Delta diversion.

1.1.3 Existing Energy Sources and Current Uses

Natural gas energy is purchased for the site through a program operated by the California Department of General Service (DGS). Natural gas is used by the WWTP for cogeneration operation. At the time of the energy audit (2011), the annual gas use was approximately 320,000 therms.

Pacific Gas and Electric Company (PG&E) provides electrical energy to the WWTP and RWF. The electrical energy is delivered through one meter at the WWTP and a second meter at the RWF. At the time of the energy audit, annual purchased and cogen electrical use combined between the RWF and WWTP was approximately 9,933,000 kilo-watt hours.

Table 1 – Typical Site Annual Utility Use

Typical Site Annual Utility Use	
Utility	**Site Utility Use (common units)**
Treatment Plant	
- Purchased Electricity	804,300 kWh
- Cogen Electricity	6,595,400 kWh
- Cogen Natural Gas	320,000 therms
RWF	
- Purchased Electricity	2,533,300 kWh
Total Annual Gas Use	**320,000 therms**
Total Annual Purchased/Cogen Use	**9,933,000 kWh**

1.1.4 Past Working Relationships with Reclamation

Delta Diablo has successfully worked with the Bureau of Reclamation on a several agreements that included planning, design and construction of recycled water projects. These are summarized below with the Cooperative Agreement numbers identified.

> Delta Diablo successfully constructed the Pittsburg Recycled Water Project, which received funding from the Bureau of Reclamation (Cooperative Agreement R10AP2005). This project installed recycled water pipelines and storage to distribute irrigation water to City of Pittsburg facilities.

Delta Diablo successfully constructed the Antioch Recycled Water Project, which received funding from the Bureau of Reclamation (Cooperative Agreements R10AC20004 and R10AC20R46). This project installed recycled water pipelines and storage to distribute irrigation water to City of Antioch facilities.

Delta Diablo successfully completed a Recycled Water Feasibility Study which received funding from the Bureau of Reclamation (Cooperative Agreement R11AC20151). This study identified future recycled water facilities.

While Delta Diablo has previously pursued and received funding for authorized projects through Title XVI, the RWF is not a Title XVI facility, has not received funding through Title XVI, and is not an authorized Title XVI project. Likewise, the emergency generator project is not a Title XVI authorized project, nor is it part of a Title XVI feasibility study or project pursuing Title XVI. Therefore, this application represents a new project with a recycled water component, but it is not in any way a Title XVI project or connected to a past, current or future Title XVI project.

Technical Project Description

1.1.5 Project Description

This project involves the planning, design, and construction of a 600kW emergency back-up generator for Delta Diablo's recycled water facility (RWF). Delta Diablo provides recycled water to energy centers for cooling water. With no backup power, the RWF is not be able to produce recycled water if main utility power is interrupted, so the Delta Energy Center (DEC) 2 MG reservoir is operated at full to provide adequate recycled water supply in the event of an outage. Purchase and installation of an emergency generator will allow the RWF to remain operational during power outages, and the DEC tank will no longer need to be maintained at full capacity, allowing the storage to be repurposed and maximize operations. Operating the tank at a lower static head on off-peak days and reducing the static pumping head for the pump station will result in a minimum energy savings of 75,800 kWh/year. Additionally the wastewater treatment plant will be able to optimize operations for additional energy savings estimated at 66,200 kWh/year. Repurposing the DEC tank will provide Delta Diablo with an additional 1 MGD of peaking capacity, at a minimum. As such, the project will allow Delta Diablo to reliably add an additional 1,120 AFY or more of water supply, without interruptions to service on peak days.

Task 1 – Project Management

This task includes administrative responsibilities associated with the project such as coordinating with partnering agencies and managing consultants/contractors. It also involves managing grant agreements including compliance with grant requirements, and preparation of invoices including relevant supporting documentation.

Deliverables:

- Approved contracts
- Invoices
- Reimbursement requests
- SF425 Financial Reports

Task 2 – Labor Compliance Program

This task includes all measures necessary to ensure compliance with applicable labor code requirements, including California Labor Code.

Deliverables:

- Proof of labor compliance upon request

Task 3 – Reporting

This task involves the preparation of progress reports detailing work completed during the reporting period. It also includes preparing draft and final project completion reports.
Deliverables:

- Periodic Project Progress Reports
- Draft and Final Project Completion Report

Task 4 – Environmental Documentation and Permitting
This task involves ensuring compliance with all applicable State and Federal environmental and regulatory requirements. Due to the nature of this project and it being constructed entirely within existing Delta Diablo property, minimal additional environmental work is anticipated. Delta Diablo expects to prepare and file a Categorical Exemption by spring of 2016. A letter stating no legal challenges (or addressing legal challenges) will be prepared.

Deliverables:

- Copy of Exemption
- No Legal Challenges Letter

Task 5 – Design
Project design tasks include preliminary design, 90% design, and final design.

Subtask 5.a. Preliminary Design – District's consultant will develop generator load estimates, conduct site assessment and develop design criteria summarized in a Preliminary Design Technical Memorandum.

Subtask 5.b. 90% Design – District's consultant will prepare a draft final design submittal including: drawings, specifications, and construction cost estimate.

Subtask 5.c. Final Design – District's consultant will prepare final bid documents including drawings and specifications as well as a final Engineer's Estimate. The expected date of completion is March 2016.

Deliverables:

- Preliminary Design
- 90% Design Documents
- Final Design Documents

Task 6 – Project Performance Monitoring Plan
Develop a Project Performance Monitoring Plan. The Project Performance Monitoring Plan will include baseline conditions, a brief discussion of monitoring systems to be used, methodology of monitoring, frequency of monitoring, and location of monitoring points. The expected date of task completion is May 2017.

Deliverables:

- Project Performance Monitoring Plan

Task 7 – Contract Services
Delta Diablo staff will prepare bid advertisement, conduct pre-bid meetings, bid opening and evaluation, selection of contractor, award contract, and issue Notice to Proceed. Delta Diablo's

consultant will respond to bidder inquiries, prepare written addenda and assist in bid evaluation. The expected date of task completion is March 2016.

Deliverables:

- Bid documents
- Proof of Advertisement
- Award of Contract
- Notice to Proceed

Task 8 – Construction Administration

Delta Diablo staff will administer the construction contract including invoicing. Delta Diablo will provide construction management, addressing contractor questions on-site, reviewing contractor log submittals and pay requests. Delta Diablo will provide engineering services during construction including answering requests for information, reviewing submittals and change orders, and issuing work directives. The expected date of task completion is May 2017.

Task 9 – Construction/Implementation Activities

Project construction will adhere to construction standards, health and safety standards, laboratory analysis protocols, and acceptable standard methods. Construction activities will be implemented as outlined below. The expected date of task completion is May 2017.

- Mobilization – civil site work and contractor mobilization.
- Construction – installation of the 600kW generator and related piping and fittings.
- Performance testing and demobilization – performance testing of the generator, site clean-up, and contractor demobilization.

Deliverables:

- Photographic documentation
- Final As-built drawings
- Inspection and field reports
- Generator performance test results
- District Notice of Final Acceptance

Evaluation Criteria

1.1.6 Evaluation Criteria A: Water Conservation

1.1.6.1 Subcriterion No. A1— Quantifiable Water Savings

This project will save a minimum of 1 MGD, or 1,120 acre-feet per year (AFY). As referenced in the project description, installation of an emergency generator will allow a change in operation of the 2 million gallon DEC reservoir, freeing up a minimum of 1 million gallons per day. This new 1 million gallon operating level is a conservative operating level with the emergency generator. Without the generator, the reservoir must be kept at full capacity to ensure an adequate supply of cooling water for the power plant in the event of a power outage at the RWF. With an emergency generator, the reservoir could easily be maintained at less than half, providing even more than 1 MGD of available recycle water, but the minimum 1 MGD value is used throughout this application as it reflects the value used to calculate electricity savings from reduced pumping static head.

Currently, Delta Diablo produces an average of 14,337 AFY of disinfected tertiary recycled water. Recycled water that exceeds demand and storage capacity is discharged into the New York Slough. However, during hot summer days, recycled water peak demands can exceed supplies, allowing the conserved 1,120 AFY to be made available to existing or new recycled water customers.

Small-scale water recycling and water reuse:

How have current uses been determined? Please provide all relevant calculations, assumptions, and supporting data.

Delta Diablo serves recycled water to several existing recycled water users. User demands were determined through measurement of usage via meters on the respective system in the Cities of Pittsburg and Antioch. The average annual demands are for the years 2012 to 2015.

Table 2 – Existing Recycled Water User Demands

Existing Recycled Water User Demands			
User	**Types of RW Use**	**Current Water Supply Source**	**Average Annual Demand (AFY)**
Calpine			
- LMEC	Cooling Tower and Boiler Feed	District RW	3,050
- DEC	Cooling Tower	District RW and CCWD	3,570
Pittsburg	Landscape Irrigation	District RW	440
Antioch	Landscape Irrigation	District RW	250
Total			**7,310**

Delta Diablo's recycled water distribution system includes four reservoirs, which are operated to reduce peak treatment and distribution capacity requirements. One tank, the DEC tank, is instead being operated to provide redundancy in the event of an outage, as opposed to maximizing RWF output by meeting peak demands. The RWF does not have backup power, so if main utility power is interrupted, the treatment facility would not be able to produce recycled water. To ensure recycled water is available for industrial customers even in the event of an outage, Delta Diablo maintains the 2 MG DEC tank at the full operating level at all times.

As Delta Diablo's service area continues to grow to ultimate build-out, optimization of the recycled water system will be critical to maximize existing infrastructure and meet customer demands efficiently. Delta Diablo is approaching maximum capacity of the existing infrastructure with peak day demands at 100% of recycled water production. Installing the emergency generator will free up storage in the existing DEC tank and allow Delta Diablo to operate the DEC tank to meet peak demands. Repurposing 2 MG of existing storage will allow Delta Diablo to meet an additional 1 MGD of peak demands, which is equivalent to 1,120 AFY of additional customer demands that can be met consistently and reliably without interruption and without the need for additional storage infrastructure. As shown on the following map, entitled Recycled Water Existing and Future Customers, Delta Diablo has additional customers that they are interested in serving but are not able to serve reliably at this time, as the supply is tapped out on peak days. By providing additional peaking capacity, the District will be able to serve additional future customers.

Figure 3 – Recycled Water Existing and Future Customers

Explain in detail how the proposed project will result directly in offsetting current uses, including how the water will be delivered to customers.

Delta Diablo is approaching maximum capacity of the existing infrastructure with peak day demands near or exceeding 100% of recycled water production. This is especially evident during the drought that California has been experiencing, and the hot, dry summer days in which the power plants and irrigation users are in greatest need of recycled water. The irrigation users are interruptible, if demand exceeds supply, but the power plants require an uninterruptible supply. Installing the emergency generator will free up storage in the existing DEC tank and allow Delta Diablo to operate the DEC tank to meet peak demands. Repurposing 1 MG or more of the existing 2 MG storage will allow Delta Diablo to meet an additional 1 MGD or more of peak demands consistently and reliably without interruption and without the need to construct additional costly storage infrastructure.

1.1.6.2 Subcriterion No. A.2: Percentage of Total Supply

Implementing this project will result in a minimum of 1,120 AFY of supply being made available. This conservative estimate is 7.8% of Delta Diablo's recycled water supply.

The current recycled water output for Delta Diablo is 14,337 AFY, and this project conservatively provides an additional 1,120 AFY.

1,120AFY/14,337AFY x 100 = 7.8% of total supply

It is anticipated that Delta Diablo could comfortably operate the DEC tank at 0.5 MG, making 1.5 MGD available. This equates to

1,681 AFY out of 14,337 AFY, or 11.7% of total supply

This is a realistic value, but it is not used consistently throughout this application because the calculated energy savings are based on a tank operating level of 1 MG, making 1,120 AFY available.

Evaluation Criterion B: Energy-Water Nexus

1.1.6.3 Subcriterion No. B.2: Increasing Energy Efficiency in Water Management

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water management project:

In 2011, Delta Diablo participated in an energy audit conducted by TetraTech on behalf of EPA Region 9 to look at energy conservation opportunities. This study identified 142,000 kWh per year of estimated electrical energy use savings by reducing the operating level of the DEC tank to 1 million gallons (50%) and repurposing the tank for peak use. This was based on installing a new 600 kW RWF emergency generator so that the DEC tank operating level could be lowered from 24-26 feet to 12-14 feet. This change in operations will reduce the cycling of the pumps and thereby reduce energy consumption and greenhouse gas emissions, and provide increased recycled water reliability and wastewater treatment operational flexibility. With the new emergency generator and associated controls, the comfortable operating level in the 2 MG tank can be lowered significantly and thus allow the wastewater treatment plant to trim the treatment process and still maintain a reliable source of recycled water for the Calpine energy centers. The 600 kW generator can operate the recycled water treatment process to allow gravity/pumping provisions to Calpine Energy Center via the 16" line, DEC pump operation and pumping to the Los Medanos Energy Center (LMEC).

The 142,000 kWh/year electrical energy savings represents 75,800 kWh/year savings from the RWR and 66,200 kWhr/year savings from the WWTP through the implementation of this project.

Calculations:

Currently, recycled water is provided to DEC at a daily rate of 4.2 MGD and LMEC at 3.0 MGD. A two million gallon onsite recycled water storage tank is provided as a reserve to use in the event the WWTP and/or RWF flow is disrupted. To avoid the consequences of failing to provide recycled water during a power outage, the onsite 2 million gallon storage tank operating level is operating continuously near the full capacity (32 feet).

The following assumptions were modeled for daily operations:

DEC Flow Rate: 4.2 MGD operating 25% of the time (~11,600 GPM average)
Operation: 6 hours/day x 365 days/year = 2,190 hours/year

Existing Average Reservoir Delivery Pressure: 15 psig
New Reservoir Delivery Pressure (14 Feet Operating Level): 10 psig
Pump Efficiency: 82%
Motor Efficiency: 88.5%
DEC Brake Horsepower Reduction: DEC BHP Reduction = (DEC Flow Rate) * (Existing psig – New psig)) / (1,714 * pump efficiency)
DEC Electrical Demand Reduction: DEC kW Reduction = (BHP) * (0.747) / (motor efficiency)
DEC Electrical Energy Reduction: DEC kWh Reduction = (kW) * (Operation)

Calculations:

DEC BHP Reduction = (11,600 gpm * (15-10 psig)) / (1,714 * 0.82) = 41 bhp
DEC kW Reduction = (41 bhp) * (0.746) / (0.885) = 34.6 kW
DEC kWh Reduction = (34.6 kW) * (2,190 hours/year) = 75,800 kWh/year
WWTP kWh Reduction = Flow Equalization Control Strategy Estimated Savings = 66,200 kWh/year Total Site kWh Reduction = 75,800 kWh/year + 66,200 kWh/year = **142,000 kWh/year**

These electricity savings also result in reduced carbon emissions. Using the EPA's eGRID emissions factors, the carbon dioxide equivalent (CO2e) emission rate for the (California-Mexico Power Area) CAMX subregion where Delta Diablo is located is 0.661lb/kWh. Therefore, the associated CO2e for 142,000 kWh is approximately 93,862 lbs. /year, or 43 metric tons per year.

1.1.6.4 Evaluation Criterion E: Other Contributions to Water Supply Sustainability

Delta Diablo is part of the East Contra Costa County (ECCC) Integrated Regional Water Management Program (IRWMP). The ECCC IRWM plan identifies expansion of recycled water systems as an adaptation strategy and a contribution to a more sustainable water supply. Increasing recycled water usage will improve water supply reliability, since recycled water is not as affected by hydrologic conditions as other water supplies. This will provide additional dry-year reliability for irrigation customers and other industrial users.

The recycled water reliability and supply will be increased by installing an emergency back-up generator for the RWF. This will provide 1,120 AFY of additional recycled water available to industrial and irrigation customers by repurposing the existing 2 MG DEC storage tank.

1.1.6.5 Subcriterion E.1: Addressing Adaptation Strategies in a WaterSMART Basin Study

Delta Diablo is located within the Sacramento-San Joaquin River Basin, which is part of a current WaterSMART Basin Study. Water in this basin is oversubscribed. Recycling water provides opportunities to use recycled water for irrigation and other industrial uses, thus offsetting potable water supplies. Most of the potable water provided within Delta Diablo's service area is provided by Contra Costa Water District, a Central Valley Project Water Contractor in the Sacramento-San Joaquin Delta. Additional recycled water supplies are a

dependable source of non-potable water for the East Contra Costa County. Making additional recycled water available is a vital piece of expanding the region's reliable water supply.

Currently, California is in the fifth year of a major drought. As a result of the drought, agencies in the ECCC region are experiencing substantial water supply cutbacks that are more extreme than the worst-case-scenarios assumed in previous planning efforts.

As shown in Table 3, the region's CVP allocations have been substantially reduced, below the previously-assumed public health and safety minimum, with increased supplies from Los Vaqueros Reservoir offsetting this drastic reduction. The Los Vaqueros Reservoir Expansion Project expanded the capacity of the Los Vaqueros Reservoir from a 100,000 acre-feet to 160,000 acre-feet, which allows the reservoir (when full) to provide enough storage for approximately 14 to 28 months of normal use. As a result of this expanded capacity, the United States Bureau of Reclamation has further reduced CVP supplies provided to CCWD to 50,500 AFY.

Table 3 - Current Minimum Supply Projections Under Existing Drought Conditions (2015)

Source	Normal (AFY)	Previous Year 3 Health and Safety Assumption	2015 Dry Year Supply (AFY)
CVP	170,000	112,700	50,500
ECCID	6,000	10,000	10,000
Industrial Diversions	10,000	0	0
Mallard Slough	3,100	0	0
Antioch Diversions	6,700	0	0
Groundwater	3,000	3,000	3,000
LV Supply	10,000	10,000	30,000
Recycled Water	8,500	8,500	8,500
Total	**217,300**	**144,200**	**102,000**

ECCC IRWMP 2015 Update:
http://www.ecccirwm.org/Publications/ECCC%20IRWM%20Plan%20Update%20Sept2015_Complete.pdf

1.1.6.6 Subcriterion E.3: Other Water Supply Sustainability Benefits

Will the project make water available to alleviate water supply shortages resulting from drought?

Yes, this project will make a minimum of 1,120 AFY available to alleviate water supply shortages resulting from the drought. During last summer's drought and high temperatures, Delta Diablo's recycled water peak day demand exceeded supplies. Without additional water available, users may revert to potable water for irrigation or industrial use, or have to discontinue irrigating during drought. Having additional recycled water available from this project will improve reliability and help alleviate water supply shortages from a drought.

Describe the impacts that are occurring now or are expected to occur as a result of drought conditions.

In April 2015, the Governor of California mandated water conservation statewide, asking for 25% reductions across the State. Individual water agencies were ordered to reduce water consumption at varying levels. Contra Costa Water District, which provides most of the water in Delta Diablo's service area, was ordered to reduce consumption by 28%. CCWD implemented a Drought Management Program as part of their Water Shortage Contingency Plan.

Delta Diablo is obligated to provide an uninterruptible supply of recycled water to the DEC and LMEC. Therefore, the current irrigation users are subject to interruption when adequate supply is not available. During last summer's drought and high temperatures, there were days when Delta Diablo's recycled water demands exceeded supplies. If recycled water demands continue to exceed Delta Diablo's supply, customers may use potable water for irrigation and other tasks previously utilizing recycled water. These actions would likely impede drought conservation efforts.

Describe the severity and duration of drought conditions in the project area.

California is entering its fifth year of drought. Governor Brown declared a drought state of emergency in January 2014. In April 2015, the Governor mandated water conservation statewide. In October 2015, Governor Brown declared a state of emergency on the unprecedented tree die-off. In November 2015, the Governor issued another Executive order that calls for additional actions to build on the state's ongoing response to record dry conditions and assist recovery efforts from the year's devastating wildfires. As of December 22, 2015, the U.S. Drought Monitor identified this project area as having drought intensity of "D3 Extreme Drought".

Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by drought.

The East Contra Costa County region in which Delta Diablo is located is heavily dependent upon Delta supplies, which are particularly vulnerable during drought periods given the multitude of competing demands on those supplies. Water agencies in the East County region have the western-most Delta diversion facilities and have been significantly impacted from degradation of Delta water quality resulting from the drought. The bulk of the water that is conveyed to the Delta Diablo WWTP is from the potable water supplies provided by Contra Costa Water District (source, Central Valley Project) and City of Antioch (CCWD and Delta diversion). The State Water Resources Control Board sent water right curtailment notices to junior water rights holders throughout the state beginning in January of 2014 and for the first time in history planned to issue curtailment notices to pre-1914 water rights holders due to the severity of the drought. Recycling this water and making it available to users is critical during this time of curtailment and increasing salinity of the western Delta.

Provide a detailed explanation of how the proposed WaterSMART Grant project will improve the reliability of water supplies during times of drought.

Recycled water is the most drought-resistant supply available. This RWF emergency generator project will provide reliability for the RWF and will make at least 1,120 AFY of recycled water supply available for users, allowing Delta Diablo to meet peak day demands during summer drought conditions. This not only increases supply but improves reliability so that existing users do not have their recycled water irrigation supplies interrupted. This additional water can also be made available to residential users through a residential pick-up program, which was piloted by Delta Diablo in July 2015.

Will the project make water available to address a specific concern?

Yes, the specific concern is ensuring that Delta Diablo can continuously operate the RWF even during a power outage. The emergency generator will provide this function. By ensuring continuous recycled water production, Delta Diablo can also repurpose a 2 MG storage tank that is used to ensure short-term water supply to the power plants (DEC, LMEC) in the event of a power outage. With a continuously operating RWF, the typically full level in the DEC tank can now be lowered to meet peak-day demands, which have been pushed to the limit or exceeded during the hot, dry summer days. This project improves recycled water supply reliability, which is especially critical during the drought.

Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?

This project will make 1,120 AFY available for recycled water uses, which can offset potable supplies. Without the project, the District will not meet existing peak days demands and new recycled water customers cannot be added (i.e., recycled water demands would not be met), and Sacramento-San Joaquin Delta and groundwater supplies would continue to be used to meet the non-potable demand. Additionally, there would be no permanent access to recycled water for residential irrigation demands and the community would continue to use Delta and groundwater supplies for this non-potable demand.

Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by climate variation.

Much of the water supply in the project area that is recycled by Delta Diablo is initially provided by Contra Costa Water District, which obtains its water supply from the Central Valley Project. The Central Valley Project obtains much of its water from high elevation reservoirs and dams that rely heavily on snowpack for replenishment. During drought in California, there has been record-low snow levels and thus reservoirs cannot be filled to capacity, resulting in significant shortages and cutbacks for users. This area has the potential to be significantly impacted by climate variation, which projects that weather conditions will be more variable, and droughts more common. Climate change is also expected to impact the Sierra-Nevada Mountains, which could experience times of little rain, or receive more precipitation as rain than snow. The snow-pack is the largest water supply reservoir for the State of California.

Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved?

Yes. The power plants (DEC and LMEC) rely on Delta Diablo recycled water for their cooling towers. They require a non-interruptible supply. In contrast, the irrigation users have interruptible supplies. Interruption can occur on hot, dry summer days when demands exceed available supplies.

As Delta Diablo's service area continues to grow to ultimate build-out, optimization of the recycled water system will be critical to maximize existing infrastructure and meet customer demands efficiently. The District is approaching maximum capacity of the existing infrastructure with peak day demands at 100% of recycled water production. The emergency generator will allow Delta Diablo to ensure that the RWF can operate continuously, even during a power outage. This will then allow Delta Diablo to change operation of the 2 MG DEC storage tank, which is currently operated at full configuration to ensure water for the power plants in the event of a power outage. The storage tank can instead be operated to free up at least 1 MGD and to meet peak demands.

Will the project make additional water available for Indian tribes?

Not directly. There are no known Indian tribes within Delta Diablo's service area, but increased use of recycled water can offset potable water supplies, currently provided from CVP and Sacramento-San Joaquin Delta diversion.

Will the project make water available for rural or economically disadvantaged communities?

According to the California Department of Water Resource's Disadvantaged Community (DAC) Mapping Tool data, Delta Diablo's service area encompasses approximately 34,491 acres, of which 10,472 acres are DACs; 30% of the District's service area includes DACs (census block groups). In response to the drought and mandatory water cutbacks, Delta Diablo opened a recycled water fill station that was free to the community to those residents who wanted to haul water for their personal landscape purposes. During the summer and fall, this pilot project provided over 2 million gallons of highly-treated recycled water for residential landscape irrigation. In addition, Delta Diablo supplies recycled water to irrigate parks and schools in the cities of Pittsburg and Antioch, many of which are located in DACs. This allows the parks to continue to be used for recreation, even during the exceptional drought that this part of California has experienced.

Does the project promote and encourage collaboration among parties?

Yes. Delta Diablo treats wastewater from the City of Pittsburg, City of Antioch, and community of Bay Point, which is then provided to users including Calpine, the cities, and school districts. Delta Diablo has a recycled water service agreement with Contra Costa Water District to meet conservation goals, and recycled water use is highly supported throughout the communities.

Is there widespread support for the project?

Yes, this project is supported by Delta Diablo, whose Board of Directors are the Mayor of the City of Antioch, Mayor of the City of Pittsburg, and Contra Costa County Supervisor, and by Calpine. In general, the public has grown to strongly support recycled water use, especially with the drought. During the drought this past summer, almost 500 residents signed up to use the free residential recycled water fill stations.

What is the significance of the collaboration/support?

The significance of this support and collaboration is the growing recognition of the importance of recycled water. Especially in drought-prone areas, this shift and subsequent collaboration helps recycled water projects move forward, providing increased reuse and recycling.

Will the project help to prevent a water-related crisis or conflict?

This area is not directly involved in a water-related crisis or conflict. However, the proposed project will reduce dependence on Sacramento-San Joaquin Delta water supplies, improve water supply reliability, reduce wastewater discharges, ensure all local water resources are being used to their highest and best use, and increase utilization of existing recycled water facilities. These are important benefits, especially for an area that is dependent on water supplies from the CVP.

Is there frequently tension or litigation over water in the basin?

This project is in the Sacramento-San Joaquin Basin, and most of the potable water provided within Delta Diablo's service area comes from the Central Valley Project. In general, there remains increased tension and litigation over CVP water, especially during drought and significant cutbacks.

Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?

The project improves water supply reliability, reduces wastewater discharges and pollutant loading, and expands recycled water supply. An increase in recycled water supplies will encourage future water conservation as customers become familiar and benefit from a dependable source of recycled water. The awareness that different qualities of water are better suited to different uses may reduce potable water use as individuals expand their use of recycled water.

Will the project increase awareness of water and/or energy conservation and efficiency efforts?

The project will increase awareness of water and energy conservation as Delta Diablo informs customers of its expanded recycled water supplies. The messaging will include education about offsetting potable water use with recycled water and the associated water and energy conservation metrics.

Will the project serve as an example of water and/or energy conservation and efficiency within a community?

The project will serve as an example of water and energy conservation within Delta Diablo's service community. The project improves water supply reliability, reduces wastewater discharges and pollutant loading, and expands recycled water supply. This project also saves significant energy, which translates into cost savings for Delta Diablo and its rate payers. The additional water benefits the region by reducing reliance on Delta and groundwater supplies. This is especially critical during drought conditions, when water supplies have been cut back and restrictions have been placed on uses such as landscape irrigation.

Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?

Providing a reliable, permanent recycled water source will further encourage the 200,000 people in Delta Diablo's service area to trust the recycled water supply for their non-potable needs. As more recycled water will hopefully become available soon, these customers will already be educated and interested in offsetting their potable groundwater and Delta water use.

Does the project integrate water and energy components?

Yes, this project will enable Delta Diablo to provide an additional 1,120 AFY to recycled water customers, thereby reducing potable (Delta) water use, reducing energy usage by 142,000 kwh/year and associated greenhouse gas emissions by 93,862 lbs./year, or 43 metric tons per year.

1.1.6.7 Evaluation Criterion F: Implementation and Results

Subcriterion No. F.1: Project Planning

(1) *Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Basin Study, drought contingency plan, or other planning efforts done to determine the priority of this project in relation to other potential projects.*

Contra Costa Water District (CCWD) received USBR funding for a System Optimization Review (SOR). Through this SOR, Contra Costa Water District stated that it will study ways to improve the efficiency of its water treatment and delivery system for its municipal customers and will evaluate opportunities for water treatment improvements. Additionally, in CCWD's Capital Improvement Plan 2016-2025, they cite recycled water as key component in reaching their goal of reducing water use 20% by 2020.

A Sacramento-San Joaquin River Basin Study is underway, but there are no final documents available. The study will assess impacts to the Basin's water supplies due to climate change. The Recycled Water Facility Reliability Project could help provide a dependable source of water as it will offset potable water use in the region. (http://www.usbr.gov/watersmart/bsp/docs/fy2012/FactSheet-Sacramento-SanJoaquinRiversBasinStudy.pdf)

(2) *Describe how the project conforms to and meets the goals of any applicable planning efforts, and identify any aspect of the project that implements a feature of an existing water plan(s*).

This project is included in and supported by the East Contra Costa County (ECCC) Integrated Regional Water Management Plan, and has been selected to receive approximately 20% grant funding from the California Department of Water Resources. It is supported in the IRWM Plan because it provides multiple benefits and supports the water planning goals and objectives of the region.

The project aligns with the regional priority needs and objectives in the ECCC IRWM plan as follows:

Water Supply and Reliability Objectives:

Pursue water supplies that are less subject to Delta influences and drought, such as recycled water and desalination. This project will provide consistent, permanent potable water offset and reduced reliance on Delta water supply.

Increase water conservation and water use efficiency. The project will enable 1,120 AFY of recycled water to be available to offset potable water use and increase access to recycled water by residential customers.

Pursue regional exchanges for emergencies, ideally using existing infrastructure. This project includes construction of a 600 kW emergency back-up generator for the RWF. Recycled water will be available to users even in an emergency or power outage. The existing 2 MG water tank that previously only stored water will now be available to customers to meet industrial and irrigation demands on a daily or emergency basis.

Protection, Restoration, and Enhancement of the Delta Ecosystem and other Environmental Resource Objectives:

Minimize impacts to the Delta ecosystem and other environmental resources. The project will provide consistent, permanent potable water offset and reduced reliance on Delta water and groundwater supplies by using an existing water tank supply.

Reduce greenhouse gas emissions. This project will reduce energy use by 142,000 kWh/year. Using the EPA's eGRID emissions factors, the carbon dioxide equivalent (CO2e) emission rate for the (California-Mexico Power Area) CAMX sub-region where the District is located is 0.661lb/kWh. Therefore, the associated CO2e for 142,000 kWh is approximately 93,862 lbs./year, or 43 metric tons per year.

(See:http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2012V1_0_year09_SummaryTables.pdf.)

Funding for Water Related Planning and Implementation Objectives:

Increase regional cost efficiencies in treatment and delivery of water, wastewater, and recycled water. This project maximizes the use of existing storage facilities and allows water demands to be met without additional distribution system infrastructure. This alternative will also reduce the energy demands of the recycled water pump station, RWF and WWTP.

Outreach Objectives:

Collaborate with and involve DACs in the IRWM process: By making more recycled water available, especially during drought and hot, dry days, Delta Diablo has been able to provide a free source of irrigation water to DACs through the pilot residential recycled water fill station.

Increase awareness of water resource management issues and projects with the general public. Through this and other recycled water projects, Delta Diablo will promote water resource conservation and use of recycled water.

1.1.6.8 Subcriterion No. F.2: Readiness to Proceed

The project is included in the Delta Diablo's Capital Improvement Program, and design fee estimates have already been obtained allowing Delta Diablo to move forward quickly on this portion of work. All work will be on Delta Diablo WWTP/RWF property, already owned and maintained by Delta Diablo. There is minimal work to ensure environmental compliance, and permitting would be completed quickly as this project is straight forward in the requirement. Because the work is categorized as improvements to public facilities, no significant State environmental work is anticipated and a categorical exemption (for CEQA) takes minimal time to complete and provide public notice. The Notice of Award would be issued to the contractor by April 1, 2016. The project is anticipated to take approximately 1 year to construct with additional time added for site mobilization and demobilization. The project construction is anticipated to be complete in Spring 2017. The schedule presented is realistic, reasonable and accomplishable. See Table 4 below.

Table 4 – Project Schedule

DESCRIPTION	DATE
Direct Project Administration	
Project Administration	March 2016 – October 2017
Labor Compliance Program	March 2017 – September 2017
Reporting	
Quarterly Reports	June 2016 – October 2017
Draft Project Completion Report	November 2017
Final Project Completion Report	December 2017
Land Purchase/Easement – None/Not Applicable	
Planning/Design/Engineering/Environmental Documentation	
Feasibility Studies	Completed
Environmental Documentation	March 2016
Permitting	April 2016 – October 2016
Design	
Preliminary Design	June 2016
90% Design	October 2016

Final Design	November 2016
Bid Period	December 2016
Construction/Implementation	
Contract Services	February 2017
Construction Administration	March 2017 – October 2017
Construction/Implementation Activities	
Mobilization & Site Preparation	March 2017
Project Construction	March 2017 – September 2017
Performance and Demobilization	October 2017

1.1.6.9 Subcriterion No. F3- Performance Measures

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved, marketed, or better managed, or energy saved).

The goal of the project is to improve water supply reliability to existing recycled water customers and reduce energy usage at the District's WWRP and RWF. The primary metric for evaluating the performance of the project is through measurement of the water and energy savings via meters on the respective facility at the WWTP and RWF. There are two pump stations at the RWF. Each pump station has a meter downstream of the pumps. Power to the RWF is provided by PG&E and is metered upstream of the facility. The output indicators and targets are provided in the Table 5 below

Table 5 **–** Project Performance Measures

Project Performance Measures Table				
Project Goal	**Desired Outcome**	**Outcome Indicator**	**Method**	**Target**
Improve water supply reliability	Provide additional supply of 1,120 AFY of recycled water	Reduced interruption of service	Observation of meters	No interruption of service
Improve energy efficiency	Energy savings of 75,800kWh/yr. for RWF and 66,200 kWh/yr. for WWTP	Reduce energy usage	Observation of meters	No interruption of service

1.1.6.10 Subcriterion No. F.4: Reasonableness of Costs

Please include information related to the total project cost, annual acre-feet conserved, energy capacity, or other project benefits and the expected life of the improvement(s).

The costs presented are reasonable for this type of project and have been calculated using previous experience with similar work and industry standard labor costs. Additional cost detail is provided below.

The total cost associated with the Recycled Water Supply Expansion Project is $1,391,500. Of the total project costs, $300,000 is being requested for grant funding. Delta Diablo has been awarded a grant from the California Department of Water Resources through the Integrated Regional Water Management Program for this project, estimated at $225,000. The remaining $866,500 would be provided by Delta Diablo's revenues and is currently included in Delta Diablo's Five-Year Capital Improvement Program (CIP). This funding is currently available from Delta Diablo's Recycled Water Asset fund. In total, the requested funding constitutes 21% percent of the total project cost, meaning that the non-State share of total project cost (funding match) is 79% for this project.

Delta Diablo looked at several alternatives, including building additional storage tanks, pump stations, and pipelines. An additional 0.9 MG recycled water tank was estimated to cost $2,765,000 for construction alone. The Recycled Water Facility Reliability Project will allow 2 MG of existing storage to be repurposed to meet peak demands by adding a generator and maximizing use of the existing facilities.

The Recycled Water Facility Reliability project will also reduce the energy demands of the recycled water pump station and the recycled water facility, resulting in more efficient water distribution and lower operating costs in addition to reduced greenhouse gas emissions. With a 20-year project life, this project is estimated to cost $360/AF, which is extremely cost-effective.

With the implementation of a back-up generator, 1,120 AFY of recycled water will be available, thereby conserving 1,120 AFY of potable water. Additionally, 142,000 kWh/year will be conserved due to reduced pumping required to keep the DEC tank full in case of power outage. Greenhouse gas emissions of CO_2 will be reduced by 93,862 lbs. /yr. or 43 metric tons based on these energy savings.

The life expectancy of a well-maintained standby generator is approximately 10,000 to 30,000 hours. Normally, a standby generator might operate as little as 25 to 30 hours per year. This is based on only 30 minutes of weekly exercise and no outages. However, if there are outages, depending on the duration, it could be up to several hundred hours a year. In either case, a standby generator could conceivably last 20 to 30 years.

1.1.6.11 Evaluation Criteria G: Additional Non-Federal Funding

*Up to **4 points** may be awarded to proposals that provide non-Federal funding in excess of 50 percent of the project costs. State the percentage of non-Federal funding provided.*

At a total estimated project cost of $1,391,500 and maximum federal funding of $300,000, the non-federal share for this project is in excess of 78%.

($1,091,500 / $1,391,500) *100 = **78.4%**

1.1.6.12 Evaluation Criteria H: Connection to Reclamation Project Activities

(1) How is the proposed project connected to Reclamation project activities?

Increasing recycled water supply for irrigation and other uses can offset CCWD water supply. CCWD is almost entirely dependent on the Sacramento-San Joaquin Delta for its water supply, having United States Bureau of Reclamation's Central Valley Project as the primary source.

(2) Does the applicant receive Reclamation project water?

Delta Diablo is a wastewater treatment facility. Most of the water in Delta Diablo's service area is provided by CCWD, which receives Reclamation project water. This water is recycled and provided for cooling tower and irrigation uses, offsetting water from CCWD.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

No.

(4) Is the project in the same basin as a Reclamation project or activity?

Yes – in the Sacramento-San Joaquin Delta.

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

Yes, the project contributes recycled water within the Sacramento-San Joaquin River Basin.

(6) Will the project help Reclamation meet trust responsibilities to Tribes?

It is unlikely that potential offsetting of supplies from this project will help Reclamation meet trust responsibilities to Tribes.

Section 2: Environmental Compliance

This project will be located entirely within Delta Diablo's resource recovery property boundary, all of which is owned and operated by Delta Diablo. This property is covered under the 1988 Environmental Impact Report (EIR) for the expansion of the treatment plant to 22.7 MGD.

1. *Will the project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.*

   This project is not expected to have adverse impacts. Because this project will include construction within the existing treatment plant, no mitigation measures are required.

2. *Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?*

   No.

3. *Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.*

   No.

4. *When was the water delivery system constructed*?

   2001.

5. *Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.*

   No.

6. *Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.*

   No.

7. *Are there any known archeological sites in the proposed project area?*

   No.

8. *Will the project have a disproportionately high and adverse effect on low income or minority populations*?

   No.

9. *Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands*?

   No.

10. *Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area*?

    No.

Section 3: Required Permits or Approvals

All project work will occur on Delta Diablo WWTP and RWF property. The project is Categorically Exempt for CEQA. If awarded funding through this opportunity, Delta Diablo with work with Reclamation to ensure compliance with applicable federal environmental laws and regulations.

Delta Diablo will revise the existing permit with the Bay Area Air Quality Management District to include this emergency back-up generator.

No other permits or approvals are anticipated.

Section 5: Official Resolution

See attached resolution adopted by Delta Diablo Board of Directors on January 13th, 2016 in grants.gov application

FINAL – December 19, 2011

Report of Energy Audit – Phase 2
Delta Diablo Wastewater Treatment Plant and Recycled Water Facility
Antioch, CA

Prepared for Delta Diablo Sanitation District
2500 Pittsburg-Antioch Hwy.
Antioch, CA 94509-1373

1.0 ENERGY CONSERVATION OPPORTUNITIES

1.1 Potential Energy Conservation Opportunities (ECOs)

Based on observations during an onsite walk of the facilities on 7-28-2011 and high level review and analysis of plant and pumping operations, the following ECOs were identified and are summarized in Table 1-1. A follow up meeting was held on 11-1-2011 with site representatives to review these opportunities. Those ECOs which were deemed feasible for future implementation (ECOs #1 and #5) were developed further with analysis provided in Section 5.

Table 1-1: Summary of ECOs at the Delta Diablo Sanitation District

ECO No.	Recommendation	Potential Energy Reduction (kWh/yr)	Potential Demand[1] Reduction (kW)	Potential Water Reduction (Gal/yr)	Potential Cost Savings ($/yr)	Estimated Implem. Cost ($)	Simple Payback (Years)
Investment Grade Measures >$10,000							
1	Reduce Irrigation at Stoneman Park during High Rain Periods of the Year	55,225	46	----	$7,400	$0	0
2	Install Flow Meter on Plant Reuse Water System	TBD	TBD	----	TBD	$25,000	TBD
3	Replace Lower Efficiency Motor with Higher Efficiency Units	31,700	7	0	$8,100[8]	$53,000	6.5
4	Install Utility Sub Metering	----	----	----	TBD	$100,000	----
5a & 5b	DEC Pump Control Adjustment (allow extended tank operating range operating level of 12-14 feet in lieu of 24-26 feet) and Install 600 kW Emergency Generator for RWF	75,800 (RWF) 66,200 (WWTP)	35	----	$27,100	$475,000	17.5
Total Potential Electrical Energy Savings		**228,925 kWh/year**					
Total Potential Electrical Demand Savings			**88 kW Demand**				
Total Potential Water Savings				**0 Gal/year**			
Total Potential Cost Savings					**$42,600 $/year**		
Total Estimated Implementation Cost						**$653,000**	
Total Simple Payback							**15.3 years**

Table 1-1 Notes:

1. Estimated billing demand reduction.
2. ECO = Energy Conservation Opportunity
3. kWh/yr = Kilowatt-hours per year
4. kW = Kilowatts
5. Gal/yr = Gallons per year
6. $/yr = Dollars per year
7. TBD = To Be Determined. Further development and refinement under Phase 2 of Energy Audit if ECO is viable by DDSD.
8. Potential cost savings for ECO #3 do not include demand savings or local incentives for project.

ECO No. 1: Evaluate the recycled water conveyance system to minimize or eliminate the pumping of high pressure recycled water for irrigation purposes at Stoneman Park during higher rain periods of the year. The recycled water pump station would remain at an 80 psig versus 115 psig discharge pressure during periods when precipitation is high and irrigation is not necessary. These reduced pressurization service periods would be during off-peak pumping periods between 10pm-6am and may reduce the Recycled Water Facility pumping needs and energy costs.

ECO No. 2: Install flow meter on the plant's re-use water distribution system. A portion of the effluent from the Wastewater Treatment P lant is used for process type applications including wash-down water, cleaning cycle for dewatering, injector system, gravity belt thickeners, humidification of biological odor systems and other process related use. Currently, the operational staff estimates the reuse of process water. Installing a flow meter will provide information to staff on the percentage of treated flow being re-circulated through the facility as well as provide metrics for water use reduction.

ECO No.3: Upgrade lower efficiency motors with high efficiency motors for systems which result in less than a 10 year payback. If near end of life, replace up to 27 lower efficiency motors for the following systems: headworks odor control fan, grit chamber air blowers 1-2, sample pumps 1-5, digester sludge circulation pumps 1-3, microsand booster pumps 1-6, sludge scraper mixers 1-2, injection tank mixers 1-2, maturation tank mixers 1-2 and DEC pumps 1-4.

ECO No. 4: Install electrical and city water utility sub metering at the Wastewater and Recycled Water Treatment Plants to improve tracking and load management capability of equipment loads. This would further prepare the site in the event that utility rates increase significantly. It would also allow for improved knowledge of where energy is used among the various systems within the plant.

ECO No. 5a: Evaluate DEC pumping system set points to provide an extended operating range within the 2 million gallon reservoir when RWF emergency generator (ECO No. 5b) is installed. The DEC pumping static head could be reduced from 24-26 feet to 12-14 feet if the staff was comfortable with an operating storage of 1 million gallons in lieu of the 2 million gallon reserve.

ECO No. 5b: Install new emergency generator at the Recycled Water Facility for production and pumping of recycled water to the Energy Centers. Installation of the new 600 kW emergency generator may allow operational staff to reduce the RWF storage inventory within the 2 million gallon reservoir and thus have greater access to use the Wastewater Treatment Plants flow equalization facilities and optimize the treatment process energy. Currently the Recycled Water Facility maintains the two million gallon storage tank in a near full configuration in the event the Recycled Water Facility loses electrical power. Due to stringent Recycled Water contractual requirements with the adjacent Energy Centers substantial fiscal penalties are paid if the source of Recycled Water is interrupted.

With the new emergency generator and associated controls, the comfortable operating level in the two million gallon tank can be lowered and thus allow the wastewater plant to trim the treatment process and still maintain a reliable source of recycled water for Calpine. It is estimated that a 600 kW generator set can operate the recycled water treatment process to allow gravity/pumping provisions to Calpine Energy Center via the 16" line, DEC pump operation and pumping to the LMEC.

2.0 INTRODUCTION

In 2009, Congress passed the American Recovery and Reinvestment Act (ARRA) which contains funding for Environmental Protection Agency (EPA) Region 9 States (AZ, CA, HI, NV), federally recognized Tribes, and Island Territories (America Samoa, Commonwealth of the Northern Marianas Islands, Guam) (States) to construct water infrastructure. ARRA promotes sustainable water infrastructure practices by requiring 20% of the funding to be directed to energy efficiency, water efficiency, green infrastructure, and/or other innovative environmental projects through the Green Project Reserve (GPR). GPR projects are identified on each State's Intended Use Plan, workplan, or Interagency Agreement developed specifically for the funding received under ARRA.

The EPA Region 9 provided for the Energy Assessment at the Delta Diablo Sanitation District Wastewater Treatment Plant (WWTP) and Recycled Water Facility (RWF). An onsite walk of the facilities was conducted on 7-28-2011 with high level review and analysis of plant operations following. A follow up meeting to review energy conservation measure recommendations was conducted on 11-1-2011. Site representatives Dennis Laniohan, Jayne Strommer, Amanda Roa and Joaquin Gonzalez provided valuable site information, plant discussions, led the audit team through the onsite facility walks and attended the follow up ECO review meeting.

The Delta Diablo Sanitation District has been on the forefront of energy management and sustainability initiatives. They have developed and implemented a comprehensive energy management strategy at the WWTP. Over the past several years, numerous initiatives, projects and process optimization programs have been successfully executed, resulting in decreasing energy demands and associated costs. Several of the projects and initiatives include:

- Upgrade of personnel areas with motion sensors to control lighting.
- Upgrade of digester covers and installation of pump recirculation system to enhance digester operations and gas production.
- Replacement of RAS pump motors with high efficiency motors.
- Installation of a digester gas sphere to allow transient gas storage.
- Optimization of digester gas utilization by cogeneration.
- Installed a solar energy project.
- Replaced old dissolved air flotation thickeners with gravity belt units.
- Continue to pursue the digester gas enhancement program which includes investigating the merits of adding a "grease program". Based on recent grease addition programs, the quality of the gas, the solids reduction and ultimate solids dewatering may improve.
- Installation of a Fine Bubble Diffuser Retro-fit is currently under way CY 2011-2012.

This report was prepared by Tetra Tech in support of EPA Region 9 Water Division in implementing the GPR requirements of ARRA. Mr. Donald King and Mrs. Kim Baslock conducted the field audits, analyzed site data and drafted the following report under project manager, Victor D'Amato.

3.0 ELECTRICAL ANALYSIS

3.1 Electrical Energy Balance

Table 3-1: Major Equipment Inventory and Electrical Energy Balance
(Based on an average ~27,200 kilowatt-hours per day (~9,900,000 kWh/yr)[7], 14.4 MGD effluent and recycled water flows)

No.	Equipment Description	Equipment Size / Load[1] (hp / kW)	Estimate Operational Hours[2] (hrs/yr)	Est. Energy Use[3] (kWh/yr)	Est. Energy %[5] (%)	Est. Sys Energy %[5] (%)	Plant System
Wastewater Treatment Plant							
1	Flow Equalization Pumps 1-3	30 / 20.5	2,100	43,100	0.4%	0.4%	Equalization
2	Headworks Odor Control Fan	7.5 / 4.7	8,760	40,800	0.4%	2.4%	Preliminary Treatment
3	Grit Pumps 1&4 (south end)	2@7.5 / 9.3	2,100	19,600	0.2%		
4	Grit Pumps 2&3	2@7.5 / 9.3	950	8,900	0.1%		
5	Grit Chamber Air Blowers 1-2	2@25 / 39	4,347	170,200	1.7%		
6	Primary Clarifier 1-4	4@2 / 5	8,300	41,300	0.4%	0.5%	Primary Treatment
7	Primary Sludge Pumps 1-4	4@10 / 25	375	9,330	0.1%		
8	Primary Scum Pumps 1-4	4@5 / 12.4	150	1,900	0.02%		
9	Tower Pumps 1-6 (Summer 4 in Operation)	4@100 / 208	4,380	908,700	9.2%	30.6%	Fixed Film Treatment
10	Tower Pumps 1-6 (Winter 5 in Operation)	5@100 / 295	4,380	1,291,000	13%		
11	Tower Odor Control Fans 1-2	2@75 / 100	8,760	872,600	8.4%		
12	Mechanical Aerators 1-10	10@40 / 193	8,760	1,688,600	16.5%	16.5%	Secondary Aeration
13	RAS Pumps 1-3	3@40 / 40	3,300	130,900	1.3%	1.3%	RAS
14	TWAS Pumps 1-2	15 / 9.3	2,500	23,200	0.2%	0.2%	WAS
15	Service Water Pumps 1-4	2@30 / 31.2	8,760	273,800	2.7%	2.7%	Service Wtr Pumping
16	Centrifuges 1-2	150 / 87.6	4,380	383,700	3.9%	5.1%	Solids Handling
17	Centrifuge Back Drives 1-2	40 / 24.1	4,380	105,400	0.5%		
18	Centrifuge Feed Pumps 1-2	15 / 9.1	4,380	39,800	0.4%		
19	Dewatered Sludge Conveyor	10 / 6.2	4,380	27,200	0.3%		
20	Digester Hot Water Circulation Pumps 1-3	2@3 / 3.7	8,760	32,700	0.3%	8.8%	Anaerobic Digestion
21	Sludge Gas Compressors 1, 3&4	3@25 / 46.3	5,500	254,600	2.6%		
22	Digester Sludge Circ Pumps 1-3	2@15 / 22.1	8,760	193,900	1.9%		
23	Digester Mix Pumps 1-3	2@75 / 119	3,350	396,900	4.0%		
24	All Other Smaller Process Loads	26 kW	8,760	223,400	2.3%	2.3%	Other Small Motors
25	Lighting	14 kW	8,760	118,260	1.2%	1.2%	Lighting

No.	Equipment Description	Equipment Size / Load[1] (hp / kW)	Estimate Operational Hours[2] (hrs/yr)	Est. Energy Use[3] (kWh/yr)	Est. Energy %[5] (%)	Est. Sys. Energy %[5] (%)	Plant System
26	HVAC	23 kW	8,760	201,500	2%	2%	HVAC
27	Other Building Systems	6 kW	8,760	38,800	0.4%	0.4%	Other Loads
			WWTP Sub Total	**7,399,700**	**75%**	**75%**	**WWTP**
Recycled Water Facility							
28	Influent Pump Station Pumps 1-4 (w/ vfds)	4@40 / 88	4,700	411,630	4.1%	4.1%	Influent Pumping
29	Microsand Booster Pumps 1-6	6@7.5 / 27	5,050	142,060	1.4%	3.7%	Recycled Water Treatment
30	Sludge Scrapper Mixers 1-2	2@2 / 2.2	8,760	19,600	0.2%		
31	Injection Tank Mixers 1-2	2@3 / 3.7	8,760	32,600	0.3%		
32	Maturation Tank Mixers 1-2	2@5 / 6.3	8,760	55,380	0.6%		
33	Bio Scrubber	1@7.5 / 4.7	8,760	40,840	0.4%		
34	Chlorine Contact Tank Mixers 1-2	1@15 / 9.1	8,760	79,570	0.8%		
35	DEC Pump Station Pumps 1-4	4@25 / 60	2,600	155,540	1.6%	17.6%	Distribution Pumping
36	RW Pump Station Pumps 1-5 (w/ vfds)	4@200/377	4,225	1,593,380	16%		
			RWF Sub Total	**2,530,600**	**25%**	**25%**	**RWF**
SITE TOTALS:		**1,870[6] kW**		**9,930,000[7] kWh/yr**	**100%[8]**	**100%[8]**	**SITE**

Notes:

1. Equipment size includes nameplate horsepower (hp) rating and the estimated average power load in kilo-watts (kW) considering the efficiency rating if available and operating characteristics.
2. Plant equipment estimated operating hours per year (hrs/yr).
3. Estimated electrical energy use in Kilowatt-hours per year (kWh/yr) is based on equipment and operating conditions. Due to truncating, energy use may not equal the product of equipment load (kW) and operating hours per year (hrs/yr). Use includes cogenerated energy.
4. Estimated equipment electrical energy use as a percentage of total site use.
5. Estimated system electrical energy use as a percentage of total site use.
6. The plant estimated average power load (1,870 kW) captures all equipment which operates at least 25% of the time or greater than 2,190 hours per year.
7. The plant estimated annual electrical energy use (9,930,000 kWh/yr) captures 100% of typical annual site electrical energy use.
8. The plant estimated electrical energy use percentage (100%) captures 100% of typical annual site electrical energy use and costs.

Figure 3-1 provides a graphical representation of the process by process electrical usage as a percentage of the total.

Figure 3-1: WWTP & RWF Energy Use Breakdown

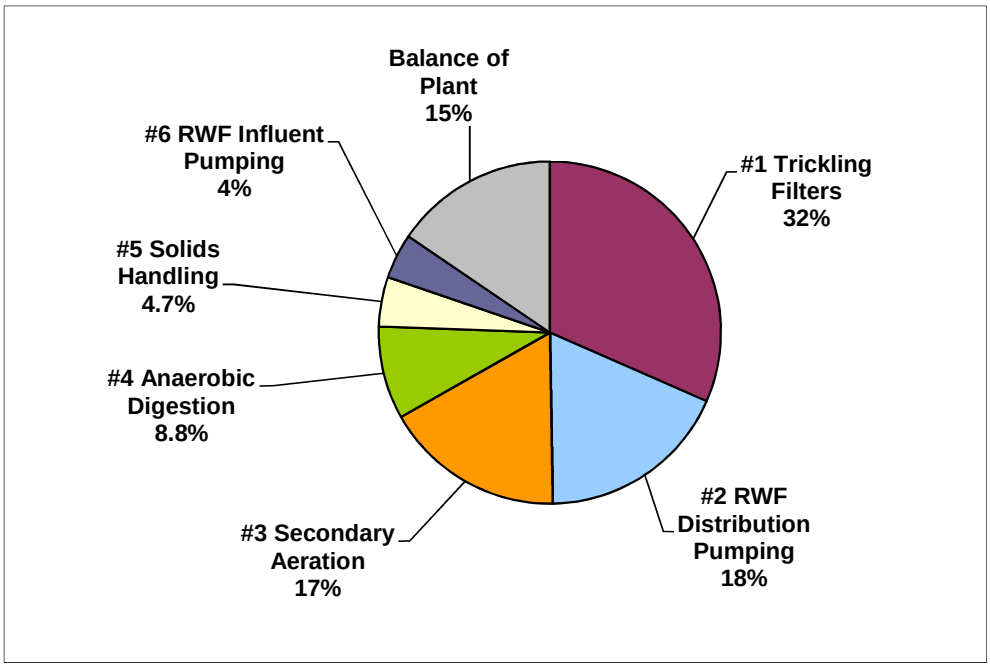
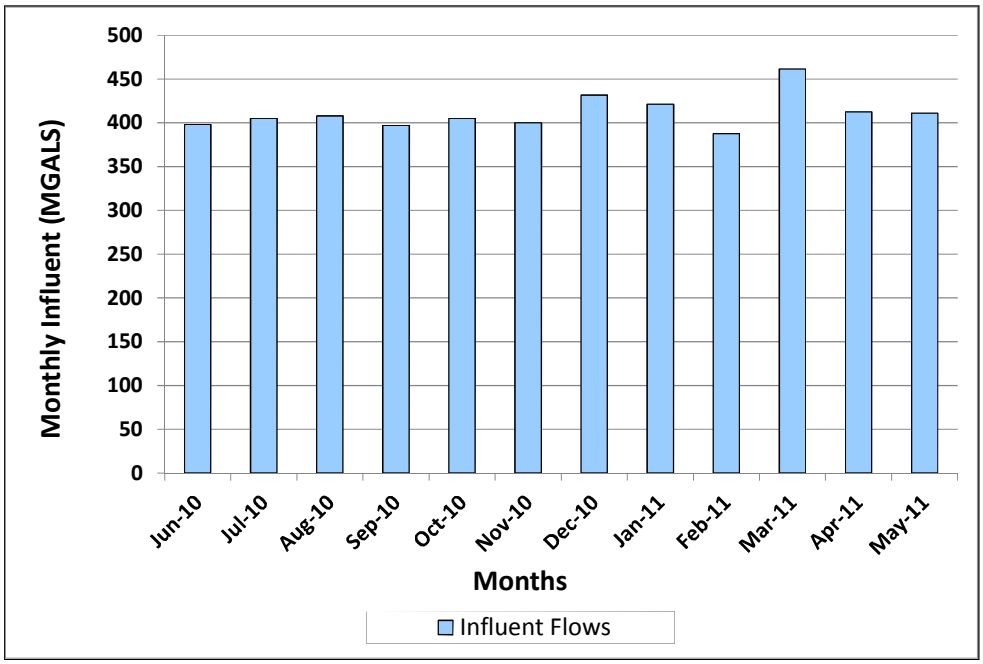


Figure 3-2 provides a graphical representation of the monthly influent wastewater volumes over the last 12 months.

Figure 3-2: WWTP Monthly Influent Flows (June 2010 – May 2011)



4.0 UTILITY ANALYSIS

4.1 Current Utility Use

The Delta Diablo Sanitation District currently consumes three types of utilities, including Electricity, Natural Gas and Water. Electrical and Natural Gas utility usage and cost data were reviewed between June 2010–May 2011. According to this data, the site currently spends over $725,000 annually for the Wastewater Plant and Recycled Water Facility's energy usages. Typical site annual utility use and costs are summarized in Tables 4-1 through 4-2 and described in more detail below.

Table 4-1: WWTP Typical Annual Utilities

Utility	Site Utility Use (common units)	Site Utility Use (equivalent units)	Site Utility Costs	% of Costs
Purchased Electricity	804,300 kWh	2,700 MMBTU	$205,500	54%
Cogen Electricity	6,595,400 kWh	22,500 MMBTU	----	----
Cogen Natural Gas	320,000 therms	32,000 MMBTU	$156,600	41%
Purchased Water	7,900 ccf	5,915,000 Gallons	$18,000	5%
Total		**57,200 MMBTU**	**$380,100**	**100%**

WWTP Annual Influent/Treatment Flow (MGal)	**4,939 MGal**
WWTP Average Influent/Treatment Flow (MGD)	**13.5 MGD**
WWTP Average Energy Cost Per Million Gallons Treated ($/MG)	**$77 / MG**

Table 4-2: RWF Typical Annual Utilities

Utility	Site Utility Use (common units)	Site Utility Use (equivalent units)	Site Utility Costs	% of Costs
Purchased Electricity	2,533,300 kWh	8,600 MMBTU	$339,300	98%
Water	2,700 ccf	2,000,000 Gallons	$6,000	2%
Total		**8,600 MMBTU**	**$345,300**	**100%**

RWF Annual Treatment Flow (MGal)	**1,966 MGal**
RWF Average Treatment Flow (MGD)	**5.4 MGD**
RWF Average Energy Cost Per Million Gallons Treated ($/MG)	**$176 / MG**

Water

Potable water is delivered to the site via one main line which supplies the entire site including the WWTP, RWF, COP and POC facilities. Potable water is used for typical commercial facility uses at the COP/POC and process systems at the WWTP/ RWF. The largest amount (up to 98%) of potable water is likely used at the WWTP and RWF process systems for polymer chemical mixing/dilution, recycled water pump station seal water, cogeneration cooling water make-up, laboratory use, etc. Currently annual potable water use is approximately 8,000,000 gallons, at a cost of approximately $24,000 per year.

The sites major potable city water users are listed below with their annual usages estimated:

City Water - General User List	Est Site Use (Gal/Year)	Est Site Use (%)
Administration People Use	80,000	1.0%
Plant People Use	50,000	0.6%
Building Cleaning Use	10,000	0.1%
Estimated Sub Total (Gallons)	**140,000**	**1.8%**

City Water - Process User List	Est Site Use (Gal/Year)	Est Site Use (%)
Laboratory Use	25,000	0.3%
WWTP Polymer Mixing/Dilution Use	5,500,000	69.5%
RWF Polymer Mixing/Dilution Use	1,000,000	12.6%
Cogen Cooling Water Make-Up	250,000	3.2%
RW Pump Station Seal Water Use	1,000,000	12.6%
Estimated Sub Total (Gallons)	**7,775,000**	**98.2%**
Estimated Total Site Use (Gal/Year)	**7,915,000**	**100%**
Estimated Total Site Use (100 CF/Year)	**10,600**	**100%**
Estimated Total Site Costs ($/Year)	**$24,000**	

Natural Gas

Natural gas energy is purchased for the site through a program operated by the California Department of General Services (DGS). Natural gas is used by the WWTP for cogeneration operation. Today annual gas use is approximately 320,000 therms, at a cost of approximately $156,600 per year.

Electricity

Pacific Gas and Electric Company (PG&E) provides electrical energy to the WWTP and RWF. The electrical energy is delivered through one meter at the WWTP and a second meter at the RWF. Today annual purchased and cogen electrical use combined between the two operations is approximately 9,933,000 kilo-watt hours, at a cost of approximately $544,800 per year. This cost does not include the cost to run the cogen operations.

Table 4-3 provides a summary of the electrical energy use purchased from PG&E and cogenerated at the site for the WWTP and RWF combined for the period of June 2010 through May 2011. Tables 4-4 and 4-5 provide details of the individual accounts respectively.

Table 4-3: WWTP & RWF Monthly Electrical Energy Use

Billing Period	Cogenerated Electrical Energy Use (kWh)	Purchased Electrical Energy Use (kWh)	Total Electrical Energy Use (kWh)	Purchased Electrical Energy Cost ($)
Jun-10	563,526	252,999	816,525	$47,943
Jul-10	578,076	324,479	902,555	$57,100
Aug-10	586,437	299,792	886,229	$52,807
Sep-10	568,176	289,721	857,897	$48,645
Oct-10	585,257	280,164	865,421	$50,656
Nov-10	519,151	283,382	802,533	$42,591
Dec-10	529,757	304,813	834,570	$42,370
Jan-11	581,601	271,425	853,026	$39,477
Feb-11	497,967	281,260	779,227	$41,186
Mar-11	564,192	272,331	836,523	$41,250
Apr-11	440,660	242,788	683,448	$39,238
May-11	580,577	234,486	815,063	$41,579
Monthly Average	**549,615**	**278,137**	**827,751**	**$45,404**
Annual Total	**6,595,377**	**3,337,640**	**9,933,017**	**$544,842**

Note: The costs to operate the cogen (natural gas and operational) are not included as only purchased electrical costs are represented here.

Table 4-4: WWTP Monthly Electrical Energy Use

Billing Period	Cogenerated Electrical Energy Use (kWh)	Purchased Electrical Energy Use (kWh)	Total Electrical Energy Use (kWh)	Purchased Electrical Energy Cost ($)
Jun-10	563,526	61,088	624,614	$16,766
Jul-10	578,076	72,647	650,723	$19,484
Aug-10	586,437	57,973	644,410	$16,456
Sep-10	568,176	31,583	599,759	$10,048
Oct-10	585,257	48,034	633,291	$14,043
Nov-10	519,151	84,738	603,889	$18,804
Dec-10	529,757	99,120	628,877	$20,027
Jan-11	581,601	73,522	655,123	$17,687
Feb-11	497,967	83,923	581,890	$19,755
Mar-11	564,192	90,272	654,464	$20,989
Apr-11	440,660	51,122	491,782	$17,028
May-11	580,577	50,317	630,894	$14,443
Monthly Average	**549,615**	**67,028**	**616,643**	**$17,128**
Annual Total	**6,595,377**	**804,339**	**7,399716**	**$205,530**
% of Total	**89%**	**11%**	**100%**	**n/a**

Note: The costs to operate the cogen (natural gas and operational) are not included as only purchased electrical costs are represented here.

Table 4-5: RWF Monthly Electrical Energy Use

Billing Period	Purchased Electrical Energy Use (kWh)	Electrical Energy Cost ($)
Jun-10	191,911	$31,177
Jul-10	251,832	$37,616
Aug-10	241,819	$36,351
Sep-10	258,138	$38,597
Oct-10	232,130	$36,613
Nov-10	198,644	$23,787
Dec-10	205,693	$22,343
Jan-11	197,903	$21,790
Feb-11	197,337	$21,431
Mar-11	182,059	$20,261
Apr-11	191,666	$22,210
May-11	184,169	$27,136
Monthly Average	**211,108**	**$28,276**
Annual Total	**2,533,301**	**$339,312**

4.2 Electricity Rate Schedule

The Delta Diablo Sanitation District purchases electricity from Pacific Gas and Electric Company "PG&E" and is sometimes under two different Electric Tariff Schedules for the WWTP and RWF. The RWF is under an "E-19" for Medium General Demand-Metered Time-of-Use Service rate schedule. The WWTP is typically under either an "E-20" for Service to Customers with Maximum Demands of 1000 Kilowatts or More rate schedule or an "E-19" for Medium General Demand-Metered Time-of-Use Service rate schedule. A description of each rate schedule is provided separately below.

Recycled Water Facility

The RWF purchases electricity from Pacific Gas and Electric Company "PG&E" and is under the Electric Tariff Schedule "E-19" for Medium General Demand–Metered Service. This rate schedule is applicable typically to sites whose Maximum Billing Demand registers more than 499 kW. However, this rate schedule is available for voluntary sites below 500 kW.

The E-19 rate schedule is broken into Time-of-Use rates for energy demand ($/kW) and energy use ($/kWh).

An all-inclusive electrical energy rate of $0.134/kWh was used to complete the RWF's portion of the electrical energy balance in Table 3-1 of Section 3. This electric rate is also utilized for estimating cost impacts of the Energy Conservation Opportunities at the RWF. Table 4-6 describes the all-inclusive rates calculated from the RWF's electric bill summary from June 2010 through May 2011.

Table 4-6: RWF Monthly Electrical Energy Use Rates Utilized for Electrical Energy Balance and ECO Cost Impact for the Site

	Electrical Energy Use & Costs
Typical Cost Total (12 months)	$339,312 /year
Typical Use Total (12 months)	2,533,301 kWh/year
All Inclusive Rate Used for Electrical Energy Balance & ECOs	$0.134 /kWh

The E-19 rate schedule the RWF is currently billed under for their electric service is broken down into the following charges as of the date of this report:

- ***Customer/Meter Charge*** – this is a flat monthly fee and part of the unbundled distribution component. This fee covers a portion of fixed administrative costs, such as monthly meter reading and payment processing.

- ***Energy Rates by Component*** – the customer's bill provides detail of unbundled component rates as presented below. All rates are based on energy use per kilo-watt hour (kWh).

  The ***Generation and Distribution*** rate components are divided into summer and winter rates. Summer service is use from May 1 through October 31. Winter service includes use from November 1 through April 30. These rates are also further divided into peak, partial-peak and off-peak time periods including:

Summer Peak	12pm-6pm (Monday-Friday; except holidays)
Summer Partial-Peak	8:30am-12pm & 6pm-9:30pm (Monday-Friday; except holidays)
Summer Off-Peak	9:30pm-8:30am (Monday-Friday), All day (Saturday, Sunday and holidays)
Winter Partial-Peak	8:30am-9:30pm (Monday-Friday; except holidays)
Winter Off-Peak	9:30pm-8:30am (Monday-Friday) All day (Saturday, Sunday and holidays)

  The ***Transmission*** rate component is comprised of the transmission, transmission rate adjustments and reliability service charges.

  The ***Public Purpose Programs*** portion of the rate component is a charge which collects the costs of state-mandated low income, energy efficiency and renewable generation programs.

  The ***Nuclear Decommissioning*** portion of the rate component is a charge which collects the funds required for site restoration when a nuclear power plant is removed from service.

  The ***DWR Bond Charge*** portion of the rate component is a charge which recovers the California Department of Water Resources (DWR) bond financing costs, and is set by dividing the annual revenue requirement for DWR's bond-related costs by an estimate of the annual consumption not excluded from this charge.

  The ***Ongoing CTC*** portion of the rate component stands for Competition Transition Charge and recovers the cost of qualifying facilities and power purchase agreements that are in excess of a

market benchmark determined by the California Public Utilities Commission (CPUC), plus employee transition costs, and is determined in the annual Energy Resource Recover Account proceeding.

The ***Energy Cost Recovery Amount (ECRA)*** portion of the rate component recovers the costs associated with the Energy Recovery Amount adopted by the CPUC in Decision 04-11-015 which replaced the regulatory assets charge which recovers the costs associated with regulatory assets.

- ***Demand Rates by Component*** – the customer's bill provides detail of unbundled component rates as presented below. All rates are based on energy demand per kilo-watt (kW).

  The ***Generation and Distribution*** rate components are divided into summer and winter rates. Summer service is use from May 1 through October 31. Winter service includes use from November 1 through April 30. These rates are also further divided into peak, partial-peak and off-peak time periods as provided above in the Energy Rate Component description.

  The ***Transmission Maximum Demand and Reliability Services Maximum Demand*** rate components are presented combined on the customer bill and is comprised of the transmission, transmission rate adjustments and reliability service charges.

Wastewater Treatment Plant

The WWTP purchases electricity from Pacific Gas and Electric Company "PG&E" and is sometimes under the Electric Tariff Schedule "E-20" for Service to Customers with Maximum Demands of 1,000 Kilowatts or More. This rate schedule is applicable typically to sites whose maximum billing demand registers more than 999 kW for at least three consecutive months during the most recent 12-month period. Currently the site has been on the "E-19" rate schedule which was explained under the Recycled Water Facility rate description.

The E-20 rate schedule is broken into Time-of-Use rates for energy demand ($/kW) and energy use ($/kWh). Generation, Distribution and other charge components as described above under the E-19 rate are also similarly developed in the E-20 rate.

An all-inclusive electrical energy rate of $0.256/kWh was used to complete the WWTP's portion of the electrical energy balance in Table 3-1 of Section 3. This electric rate is also utilized for estimating cost impacts of the Energy Conservation Opportunities at the WWTP. Table 4-7 describes the all-inclusive rates calculated from the WWTP's electric bill summary from June 2010 through May 2011.

Table 4-7: WWTP Monthly Electrical Energy Use Rates Utilized for Electrical Energy Balance and ECO Cost Impact for the Site

	Electrical Energy Use & Costs
Typical Cost Total (12 months)	$205,530 /year
Typical Use Total (12 months)	804,339 kWh/year
All Inclusive Rate Used for Electrical Energy Balance & ECOs	$0.256 /kWh

4.3 Energy Baseline

The following Figures 4-1 and 4-2 describe the Wastewater Treatment Plant and Recycled Water Facility actual energy use over the 12-month period from June 2010 through May 2011.

Figure 4-1: WWTP Monthly Energy Use Breakdown

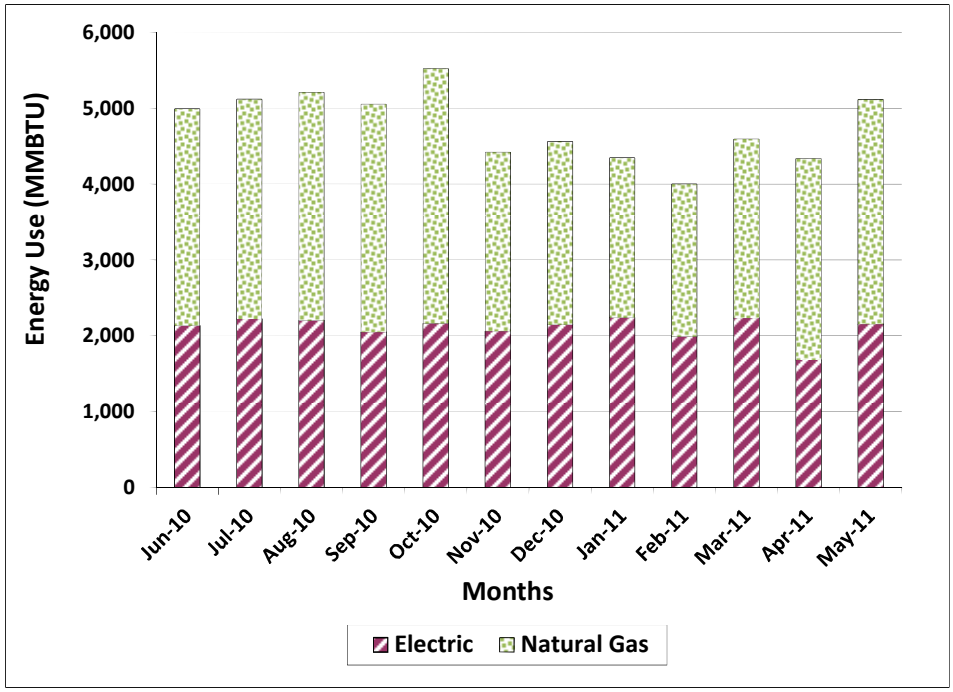
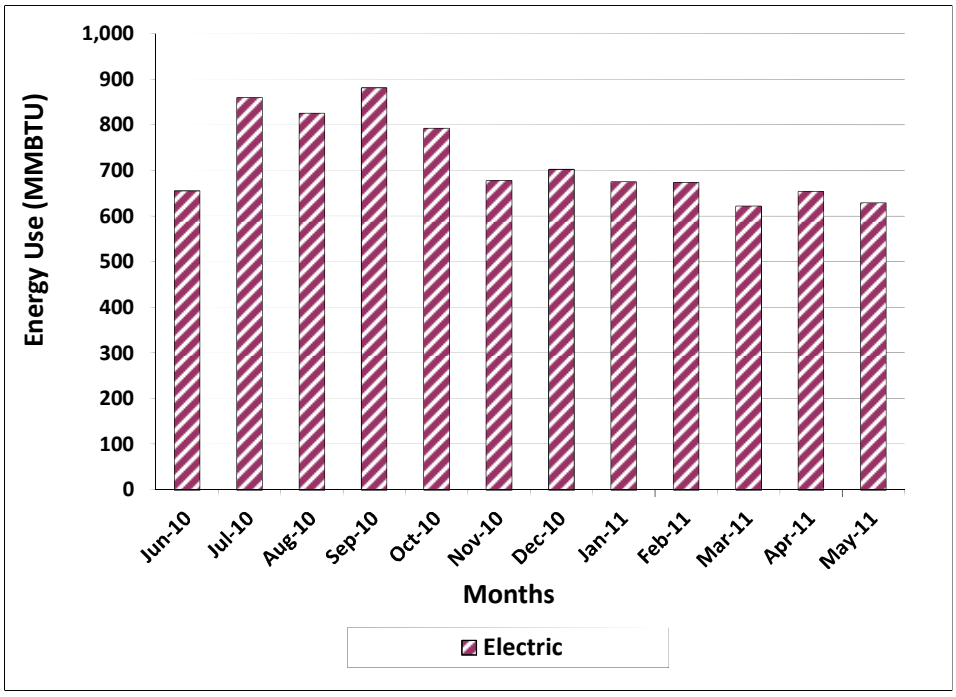
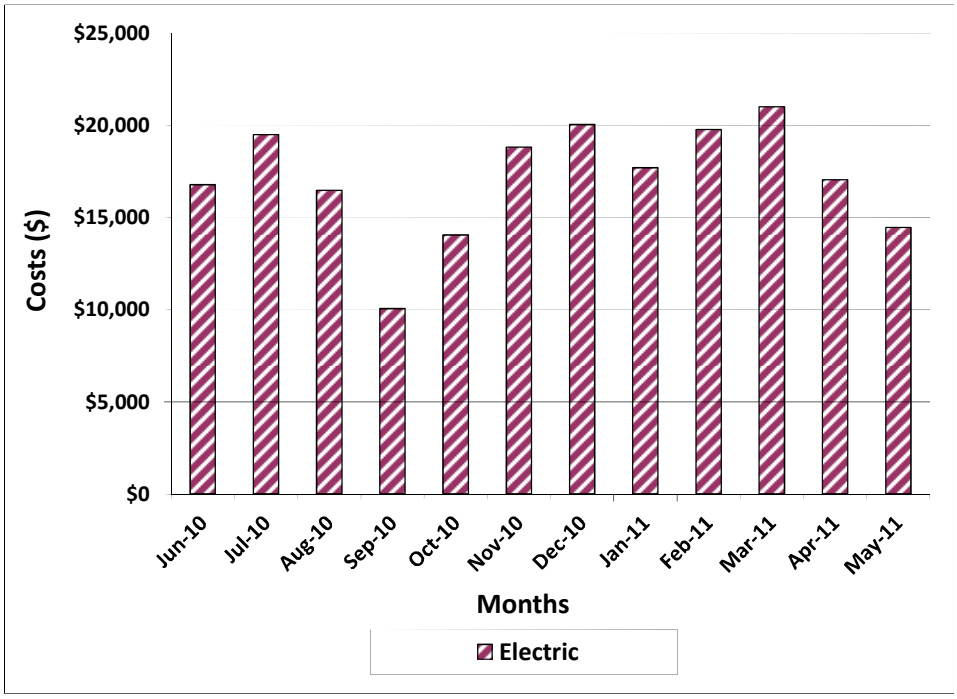


Figure 4-2: RWF Monthly Energy Use Breakdown



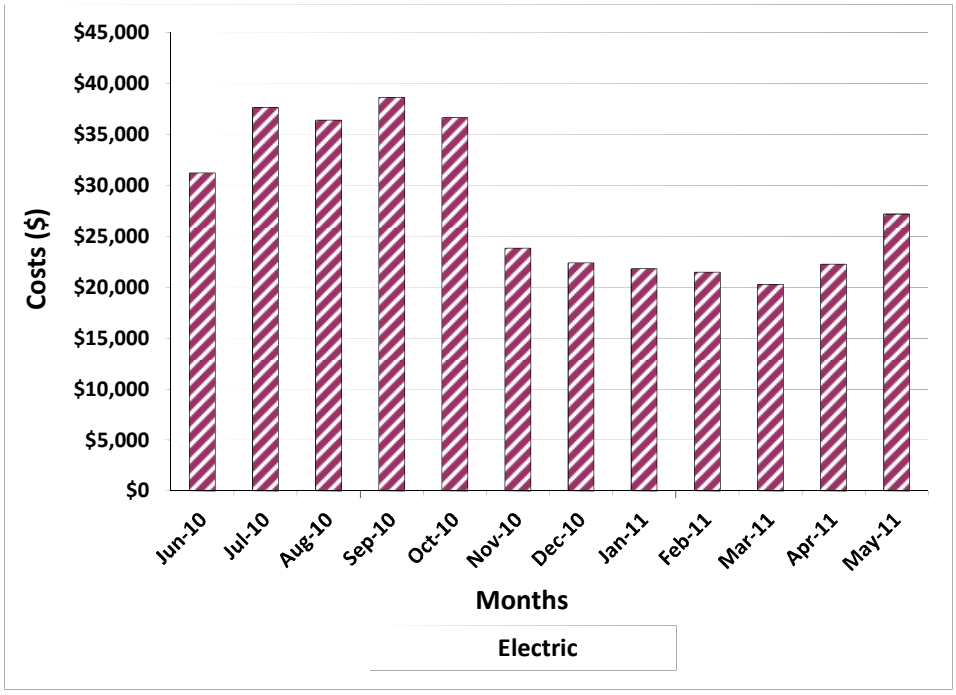
The following Figures 4-3 and 4-4 describe the Wastewater Treatment Plant and Recycled Water Facility actual energy use over the 12-month period from June 2010 through May 2011.

Figure 4-3: WWTP Monthly Energy Cost Breakdown



Note: Costs do not include cost of cogeneration electrical use.

Figure 4-4: RWF Monthly Energy Cost Breakdown



The WWTP and RWF major utility usages are electric energy. The following Figures 4-5 and 4-6 illustrate an overall energy baseline for electric energy use per million gallons of wastewater treated/water recycled for the 12-month period from June 2010 through May 2011. This provides one productivity measurement of an energy utilization index to demonstrate deviations in electrical energy use over time. Both advantages and disadvantages exist in comparing year-to-year energy efficiency improvements and should not be used as a sole source of comparison.

Figure 4-5: WWTP Electric Energy Use Per Million Gallons of Wastewater Treated

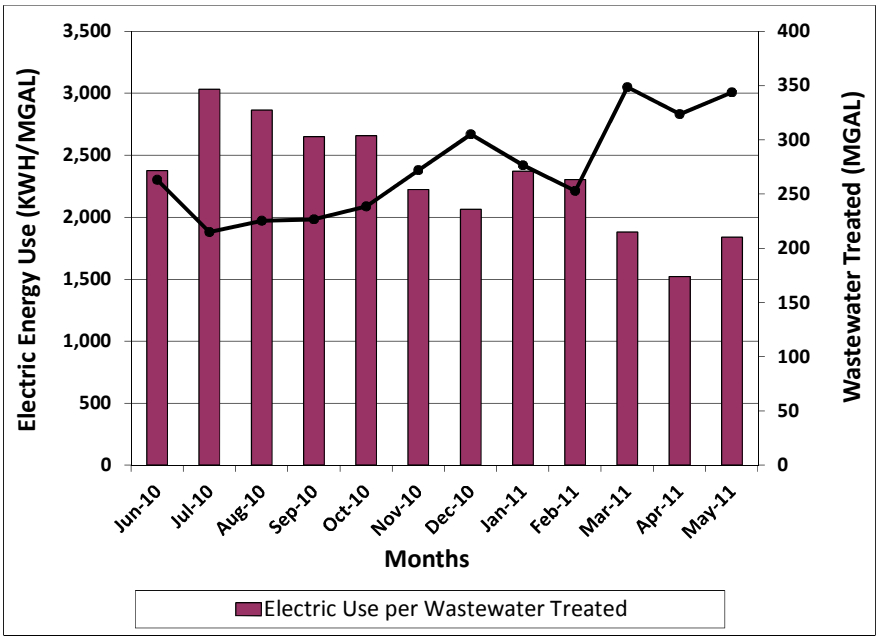
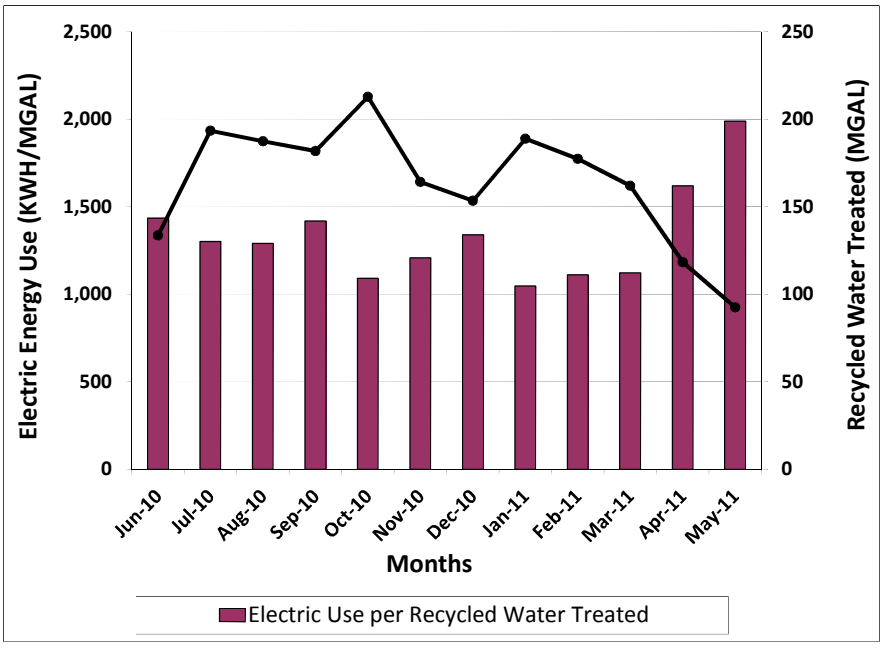


Figure 4-6: RWF Electric Energy Use Per Million Gallons of Recycled Water Treated



5.0 ENERGY CONSERVATION OPPORTUNITIES

5.1 ECO 1 – Reduce Irrigation at Stoneman Park During High Rain Periods of the Year

Recommendation

Decrease the delivery pressure from the recycled water pump station to the Stoneman Park irrigation site during periods when precipitation is high and irrigation is not necessary. The recycled water pump station would remain at 80 psig versus 115 psig discharge pressure during periods of sufficient precipitation. Estimated energy use and demand savings, cost savings, and simple payback from the pressure modifications are summarized below.

Estimated Electrical Energy Use Savings	= 55,225 kWh/year
Estimated Electrical Demand Savings	= 46 kW
Estimated Total Utility Cost Savings	**= $7,400/year**
Estimated Implementation Cost	**= $0**
Simple Payback	**= 0 years**

Background

Currently, the recycled water pump station supplies a distribution system discharge pressure of 80 psig during the hours from 6 a.m. to 10 p.m. The discharge pressure is then increased to 115 psig during the hours from 10 p.m. to 6 a.m. to provide the necessary pressurization for the irrigation system at Stoneman Park.

The increase in delivery pressure is not currently reduced during wet and lower temperature periods of the year. The Antioch area currently receives the following average monthly rainfalls as shown in Table 5-1. Assuming a ¼ inch of precipitation per rain event the following rain events per month were estimated. From this list, a reduction of irrigation needs was assumed for the months highlighted (November through March) or for approximately five months per year.

Table 5-1: Antioch Average Monthly Rainfalls

Month	Inches of Rain Per Month	Estimated Rain Events Per Month (Est. 1/4" per event)
Jan	2.66	10.6
Feb	2.43	9.7
Mar	2.08	8.3
Apr	0.78	3.1
May	0.43	1.7
Jun	0.09	0.4
Jul	0	0
Aug	0.02	0.1
Sep	0.18	0.7
Oct	0.62	2.5
Nov	1.6	6.4
Dec	2.41	9.6
Annual Rainfall	**13.3**	**inches per year**

The following assumptions were modeled for daily operations:
Without Irrigation Operating Hours: 6am-10pm
With Irrigation Operating Hours: 10pm-6am
Flow Rate (Without Irrigation in Operation): 2.8 mgd (~2,000 gpm average)
Flow Rate (With Irrigation in Operation): 3.3 mgd (~2,300 gpm average)
Current Operation (Without Irrigation): 16 hours/day x 12 months/year
Current Operation (With Irrigation): 8 hours/day x 12 months/year
Future Operation (Without Irrigation): 16 hours/day x 7 months/year + 24 hours/day x 5 months/year
Future Operation (With Irrigation): 8 hours/day x 7 months/year
Difference in Operation: 8 hours/day x 5 months/year = 8 hours/day x 151 day/year = 1,208 hours/year
Normal Delivery Pressure (Without Irrigation): 80 psig
Irrigation Delivery Pressure (With Irrigation): 115 psig
Pump Efficiency: 80%
Motor Efficiency: 95.8%
Brake Horsepower Reduction: BHP Reduction = (Flow Rate with Irrigation) * (Irrigation psig – Normal psig)) / (1,714 * pump efficiency)
Electrical Demand Reduction: kW Reduction = (BHP) * (0.747) / (motor efficiency)
Electrical Energy Reduction: kWh Reduction = (kW) * (Difference in Operation)

Calculations:
BHP Reduction = (2,300 gpm * (115-80 psig)) / (1,714 * 0.8) = 59 bhp
kW Reduction = (59 bhp) * (0.746) / (0.958) = 46 kW
kWh Reduction = (46 kW) * (1,208 hours/year) = 55,225 kWh/year

Estimated Energy and Cost Savings
The total estimated annual Cost Savings (CS) is the multiplication of the Electrical Energy Savings (EES) and Electric Use Charge. The energy charges are based on the data as presented above and in Section 4.

CS = EES x Electric Use Charge
CS = 55,225 (kWh/year) x $0.134 ($/kWh)
CS = $7,400 /year

Estimated Implementation Cost and Payback
The total preliminary estimated cost to implement this ECO is $0 as the site manually adjusts for the increase in evening pressurization at the recycled water pump station.

Based on this preliminary assessment, the simple payback period would be 0 years.

The following assumptions were made about this ECO:

1) The recycled water distribution pressure will remain at 80 psig during the hours from 10 pm to 6 am during the wet seasons of the year (November – March).
2) Flow rates to the irrigation site at the increased pressure levels of 115 psig (irrigation in operation) range between 3-6.5 mgd (2,100-4,500 gpm). A conservative average of 3.3 mgd or 2,300 gpm) was estimated.
3) Cost savings estimates were based on current electric rates. Future rates for the site may go up or down and would impact the cost savings estimates in this ECO accordingly.

The following steps are required to implement this ECO:

1) Confirm precipitation level requirements at Stoneman Park and potential irrigation operational changes during high rain periods of the year.
2) Track daily precipitation forecasts and reports to determine when daily irrigation needs can be temporarily suspended at Stoneman Park, especially during the high rain periods of the year from November through March.
3) Review new operations procedure with site staff.

Plant Staffing Impact

Implementation of this ECO may slightly increase the need for site staff to follow precipitation forecasts, however will not require any additional operations than currently completed at the recycled water pump station.

Photo Gallery

RWF Recycled Water Pump Station – 200 HP Distribution Pumps

5.2 ECO 5a & 5b – Install 600 kW Emergency Generator for the RWF and re-set DEC pump controls and reservoir operating levels

Recommendation

Install a 600 kW emergency generator to operate the Recycle Water Facility during periods of interrupted electrical power. This unit will provide more flexibility and greater reliability at the RWF to provide the contracted recycle water to the Energy Centers. The addition of the emergency generator would allow the level in the 2 million gallon reservoir to be lowered to 1 million gallons (50%) in lieu of full, reduce the cycling of the DEC pumps and provide flexibility at the WWTP to treat wastewater with a flow equalization strategy. Estimated energy use and demand savings, cost savings, and simple payback from the scheduling modifications are summarized below.

Estimated Electrical Energy Use Savings	= 142,000 kWh/year
Estimated Electrical Demand Savings	= 35 kW
Estimated Total Utility Cost Savings	**= $27,100/year**
Estimated Implementation Cost	**= $475,000**
Simple Payback	**= 17.5 years**

Background

Currently, recycle water is provided to DEC at a daily rate of 4.2 mgd and LMEC at 3.0 mgd. A two million gallon onsite recycled water storage tank is provided as a reserve to use in the event the Wastewater Treatment Plant and/or Recycled Water Facility flow is disrupted. Both the DEC and LMEC recycled water contracts provide for substantial fiscal penalties if the flow of recycled water is interrupted. To avoid the consequences of failing to provide recycled water during a power outage, the onsite 2 million gallon storage tank operating level is operating continuously near the full capacity (32 feet). The operational staff noted reluctance to reduce the operating level of the storage (saving energy for DEC Pumps) without the emergency generator capabilities.

The following assumptions were modeled for daily operations:

DEC Flow Rate: 4.2 mgd operating 25% of the time (~11,600 gpm average)
Operation: 6 hours/day x 365 days/year = 2,190 hours/year
Existing Average Reservoir Delivery Pressure: 15 psig
New Reservoir Delivery Pressure (14 Feet Operating Level): 10 psig
Pump Efficiency: 82%
Motor Efficiency: 88.5%
DEC Brake Horsepower Reduction: DEC BHP Reduction = (DEC Flow Rate) * (Existing psig – New psig)) / (1,714 * pump efficiency)
DEC Electrical Demand Reduction: DEC kW Reduction = (BHP) * (0.747) / (motor efficiency)
DEC Electrical Energy Reduction: DEC kWh Reduction = (kW) * (Operation)

Calculations:

DEC BHP Reduction = (11,600 gpm * (15-10 psig)) / (1,714 * 0.82) = 41 bhp
DEC kW Reduction = (41 bhp) * (0.746) / (0.885) = 34.6 kW
DEC kWh Reduction = (34.6 kW) * (2,190 hours/year) = 75,800 kWh/year
WWTP kWh Reduction = Flow Equalization Control Strategy Estimated Savings = 66,200 kWh/year
Total Site kWh Reduction = 75,800 kWh/year + 66,200 kWh/year = 142,000 kWh/year

Estimated Energy and Cost Savings

The total estimated annual Cost Savings (CS) is the sum of the Electrical Energy Savings (EES) and Electric Use Charge. The energy charges are based on the data as presented in Section 4.

CS = EES x Electric Use Charge
CS (RWF) = 75,800 (kWh/year) x $0.134 ($/kWh) = $10,150/year
CS (WWTP) = 66,200 (kWh/year) x $0.256 ($/kWh) = $16,950/year
CS (Total Site) = $10,150/year + $16,950/year = $27,100/year

Estimated Implementation Cost and Payback

The total preliminary estimated cost to implement this ECO is $475,000 for the reprogramming of the DEC pumps and Reservoir controls and installation of the 600 kW Emergency Generator.

Based on this preliminary assessment, the simple payback period would be 17.5 years.

The following assumptions were made about this ECO:

1) The reduction in reservoir level operating conditions would result in a net reduction of DEC pumping of 5 psig.
2) The WWTP will implement an energy management flow equalization control strategy.
3) The emergency generator would only be operated during power outage and no O&M costs were considered for ECO payback
4) Cost savings estimates were based on current electric rates. Future rates for the site may go up or down and would impact the cost savings estimates in this ECO accordingly.

The following steps are required to implement this ECO:

1) Evaluate the generator sizing and operational modifications the generator would provide at both the RWF and WWTP

Plant Staffing Impact

Implementation of this ECO may increase the facility staff operational management until the optimization integration is completed.

Photo Gallery

RWF DEC Pump Station

6.0 SUMMARY OF ENERGY CONSERVATION OPPORTUNITIES

Table 6-1 lists the Energy Conservation Opportunities which are summarized for discussion and potential detailed evaluation.

Table 6-1: Energy Conservation Opportunities

ECO	ECO DESCRIPTION	SIMPLE PAYBACK ESTIMATE	INVESTMENT COST ESTIMATE
01	Evaluate the recycled water conveyance system to minimize or eliminate the pumping of high pressure recycled water for irrigation purposes at Stoneman Park during higher rain periods of the year. The recycled water pump station would remain at a 80 psig versus 115 psig discharge pressure during periods when precipitation is high and irrigation is not necessary. These reduced pressurization service periods would be during off-peak pumping periods between 10pm-6am and may reduce the Recycled Water Facility pumping needs and energy costs.	Short Term <5 years	No Cost Measure $0
02	Install flow meter on plant process re-use water distribution system.	TBD	Investment Grade >$10,000
03	Upgrade lower efficiency motors with high efficiency motors for systems which result in less than a 10 year payback. If near end of life, replace up to 27 lower efficiency motors for the following systems: headworks odor control fan, grit chamber air blowers 1-2, sample pumps 1-5, digester sludge circulation pumps 1-3, microsand booster pumps 1-6, sludge scrapper mixers 1-2, injectin tank mixers 1-2, maturation tank mixers 1-2 and DEC pumps 1-4.	Mid Term <10 years	Investment Grade >$10,000
04	Install electrical and city water utility sub metering at the Wastewater and Recycled Water Treatment Plants to improve tracking and load management capability of equipment loads. This would further prepare the site in the event that utility rates increase significantly. It would also allow for improved knowledge of where energy is used among the various systems within the plant.	TBD	Investment Grade >$10,000

05a & 05b	ECO 5a: Evaluate DEC pumping system set points to provide an extended operating range within the 2 million gallon reservoir when RWF emergency generator (ECO No. 5b) is installed. The DEC pumping static head could be reduced from 24-26 feet to 12-14 feet if the staff was comfortable with an operating storage of 1 million gallons in lieu of the 2 million gallon reserve. ECO 5b: Install new emergency generator at the Recycled Water Facility for production and pumping of recycled water to the Energy Centers. Installation of the new 600 kW emergency generator may allow operational staff to reduce the RWF storage inventory within the 2 million gallon reservoir and thus have greater access to use the Wastewater Treatment Plants flow equalization facilities and optimize the treatment process energy. Currently the Recycled Water Facility maintains the two million gallon storage tank in a near full configuration in the event the Recycled Water Facility loses electrical power. Due to stringent Recycled Water contractual requirements with the adjacent Energy Centers substantial fiscal penalties are paid if the source of Recycled Water is interrupted. With the new emergency generator and associated controls, the comfortable operating level in the two million gallon tank can be lowered and thus allow the wastewater plant to trim the treatment process and still maintain a reliable source of recycled water for Calpine. It is estimated that a 600 kW generator set can operate the recycled water treatment process to allow gravity/pumping provisions to Calpine Energy Center via the 16" line, DEC pump operation and pumping to the LMEC.	Long Term >10 years	Investment Grade >$10,000

Payback Ranges: Short Term = <5 years; Mid Term = 5 years to 10 years; Long Term = > 10 years

Capital Investment Ranges: No Cost Measure = $0; Low Cost Measure = <$10,000; Investment Grade Measure = >$10,000

ATTACHMENTS FORM

Instructions: On this form, you will attach the various files that make up your grant application. Please consult with the appropriate Agency Guidelines for more information about each needed file. Please remember that any files you attach must be in the document format and named as specified in the Guidelines.

Important: Please attach your files in the proper sequence. See the appropriate Agency Guidelines for details.

1) Please attach Attachment 1	2016 Delta Diablo WaterSMART	Add Attachment	Delete Attachment	View Attachment
2) Please attach Attachment 2	Reso 01-2016 - Authorizing Fi	Add Attachment	Delete Attachment	View Attachment
3) Please attach Attachment 3	EPA-TetraTech Energy Audit De	Add Attachment	Delete Attachment	View Attachment
4) Please attach Attachment 4		Add Attachment	Delete Attachment	View Attachment
5) Please attach Attachment 5		Add Attachment	Delete Attachment	View Attachment
6) Please attach Attachment 6		Add Attachment	Delete Attachment	View Attachment
7) Please attach Attachment 7		Add Attachment	Delete Attachment	View Attachment
8) Please attach Attachment 8		Add Attachment	Delete Attachment	View Attachment
9) Please attach Attachment 9		Add Attachment	Delete Attachment	View Attachment
10) Please attach Attachment 10		Add Attachment	Delete Attachment	View Attachment
11) Please attach Attachment 11		Add Attachment	Delete Attachment	View Attachment
12) Please attach Attachment 12		Add Attachment	Delete Attachment	View Attachment
13) Please attach Attachment 13		Add Attachment	Delete Attachment	View Attachment
14) Please attach Attachment 14		Add Attachment	Delete Attachment	View Attachment
15) Please attach Attachment 15		Add Attachment	Delete Attachment	View Attachment