AIRCON ENERGY

Presents

Completed Project Analysis Report

For

The City of Orland

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Report Sections

Appendix

1. General Project Information

This section contains general information pertaining to the project for which this report is based on. The project commencement and conclusion dates have been estimated based on the date the contract was signed and the date of the final invoice, respectively.

Client Information

City of Orland
815 4th Street
Orland, CA 95963
Phone: (530) 865-1600
Fax: (530) 865-1632

ESCO/Contractor Information

Aircon Energy, Inc. (Aircon)
830 West Stadium Lane
Sacramento, CA 95834
Phone: (916) 922-2004
Fax: (916) 922-6481

Project Parameters

Project Cost: $2,423,601
Est. kWh Reduction: 1,087,080 kWh
Est. Simple Payback: 10.5 yrs.
Start Date: April 30, 2017

Est. First Year Savings: $230,249
Est. Natural Gas Reduction: 505 Therms
Est. Annual GHG Reduction: 785 Tons
End Date: May 1, 2018

Project Locations

City Hall
815 4th Street

Orland Free Library
333 Mill Street

Orland Fire Department
810 5th Street

Orland Swimming Pool
Roosevelt Ave. & A St.

Orland Police Department
817 4th Street

Carnegie Hall
913 3rd Street

Recreation Department
1002 Hambright Avenue

Tennis Courts (Vinsonhaler Park)
Shasta St. & 1st St.

Well Site #1 (Central)
In Alley Between East St. & walnut Ave.

Lely Park & Well Site #2
200 County Road 200

Well Site #4 (Woodward)
136 Bonnie Lane

Orland Corp. Yard & Well Site #5
431 East South Street

Well Site #7 (Suisun)
Suisun St. & 5th St.

Well Site #8 (Roosevelt)
Roosevelt Ave (West of A St.)

Well Site #9 (Eva)
Eva Drive

Wastewater Treatment Plant
County Road 20 & County Road N

Contacts

Orland City Manager
Peter Carr
Email: citymanager@cityoforland.com
Phone: (530) 865-1603

Orland Project Manager
Ed Vonasek
Email: evonasek@cityoforland.com
Phone: (530) 865-1611

Aircon Project Manager
Brent Dobson
Email: bdobson@airconenergy.com
Phone: (916) 922-2004

Chief Engineer
Robert Hudson
Email: rhudson@airconenergy.com
Phone: (916) 922-2004

Project Engineer
Allan Perotti
Email: aperotti@airconenergy.com
Phone: (916) 922-2004

Aircon President
Jeff Wagner
Email: jwagner@airconenergy.com
Phone: (916) 922-2004

Accounts Payable
Judy Lim
Email: jlim@airconenergy.com
Phone: (916) 922-2004

2. Project Overview

The comprehensive energy conservation project for the City of Orland has been completed. The process of this energy savings project began with identifying areas of excess, or wasteful, energy consumption. From this study, an energy conservation project plan was developed that proposed various Energy Efficiency Measures (EEM) the City could adopt to reduce energy consumption, replace aging infrastructure, and improve building comfort. The City carefully considered which measures to include/exclude from the project. The scope of work for the final project consisted of HVAC system replacements, lighting retrofits/replacements, lighting controls, water system equipment replacements, water system controls (SCADA), and a renewable energy generation system. The following table presents the total project energy savings and renewable energy generation values.

Figure 2.1: Resulting Change in Energy Table

Commodity/Item	Baseline Use	1st M&V Period (07/18-06/19)			Recent M&V Period (04/19-03/20)		
	03/15-02/16	Lighting	Solar	Water	Lighting	Solar	Water
Electricity [kWh]	1,318,133	606,940			642,109		
Natural Gas [Therms]*	2,811	3,310			3,401		
Calculated Electricity Savings [kWh]		118,245	695,203	-72,393	118,245	743,156	-104,249
Adjusted E-Savings [kWh]		813,451			903,895		
Natural Gas Savings [Therms]		-499			-590		
Operational Savings		$5,926			$6,165		
Monetary Savings		$196,274			$217,677		

*Natural gas figures shown are only for OFD & Corp Yard

Based on the final energy consumption analysis the City of Orland Energy Efficiency Project resulted in the energy and monetary savings that have been detailed in the table above. Note that the values in Figure 2.1 reflect the project savings after adjustments have been taken into consideration, which are detailed in Section 4.4 of this report. It should also be noted that solar production during the 1st M&V Period was decreased by roughly 10% as a result of the 2018 wildfire season. The body of this project report will detail the basis and findings of the recent twelve-month M&V (Measurement & Verification) period. The following table of environmental benefits for

this project are based on the electricity savings alone, as this project resulted in no natural gas savings.

Figure 2.2: Environment Benefit for Energy Savings

Energy Savings Environmental Effects		
Equivalent Greenhouse Gas Emissions		
Greenhouse Gas Emission Avoided:	704	Tons
Passenger Vehicles (Average, 1 Year):	138	Cars
Distance Driven by Passenger Vehicle (Average):	1,585,831	Miles
Waste Recycled Instead of Landfilled:	217	Tons
Equivalent CO_2 Emissions		
Gasoline Consumed:	71,913	Gallons
Diesel Consumed:	62,779	Gallons
Coal Burned:	70,419	Pounds
Crude Oil Consumed:	1,480	Barrels
Equivalent Carbon Sequestered		
Tree Seedlings Grown for 10 Years	10,567	Trees
US Forest (1 Year)	835	Acres

Implementation of this project has resulted in great benefit to the environment. The City of Orland has successfully reduced their carbon footprint by reducing GHG (Greenhouse Gas) emissions by 704 tons, a year. This reduction in GHG emission is equivalent to the amount of CO_2 contained in the product of combusting 71,913 gallons of gasoline ($C_8H_{18} + 12.5\ O_2 \xrightarrow{\text{combustion}} 8\ CO_2 + 9\ H_2O$, ideal reaction for a single molecule of octane); this is also equivalent to the amount of carbon sequestered by 835 acres of forest as part of the photosynthesis process ($CO_2 \xrightarrow{\text{photosynthesis}} O_2$). Additional environmental benefits and equivalents have been detailed in the table above (Figure 2.2).

3. Facility Description & Project Scope

3.1 Facility Description

City Hall & Orland Police Department (CH/OPD)

Information regarding these two locations has been combined as they share a building. City Hall occupies the northern half of the building. The City's Public Works, Planning & Building, and governing body all operate out of this building. The secured south half of the building is occupied by the Orland Police Department.

Figure 3.1.1: City Hall/Orland PD (Satellite View)

Operational Schedule:

City Hall	9:00 am to 5:00 pm
Police Department	24 hours

During our initial site visit to the facility it was explained to us that there were no comfort issues at this facility. There was a high interest in upgrading the lighting systems. The interior lighting fixtures consisted mostly of four-foot linear fluorescent lighting fixtures, fitted with anywhere from one to four lamps. Exterior lighting fixtures consisted mostly of high-pressure sodium (HPS) and metal halide (MH) wall packs and shoe box, pole mounted, lighting fixtures.

Orland Free Library (Library)

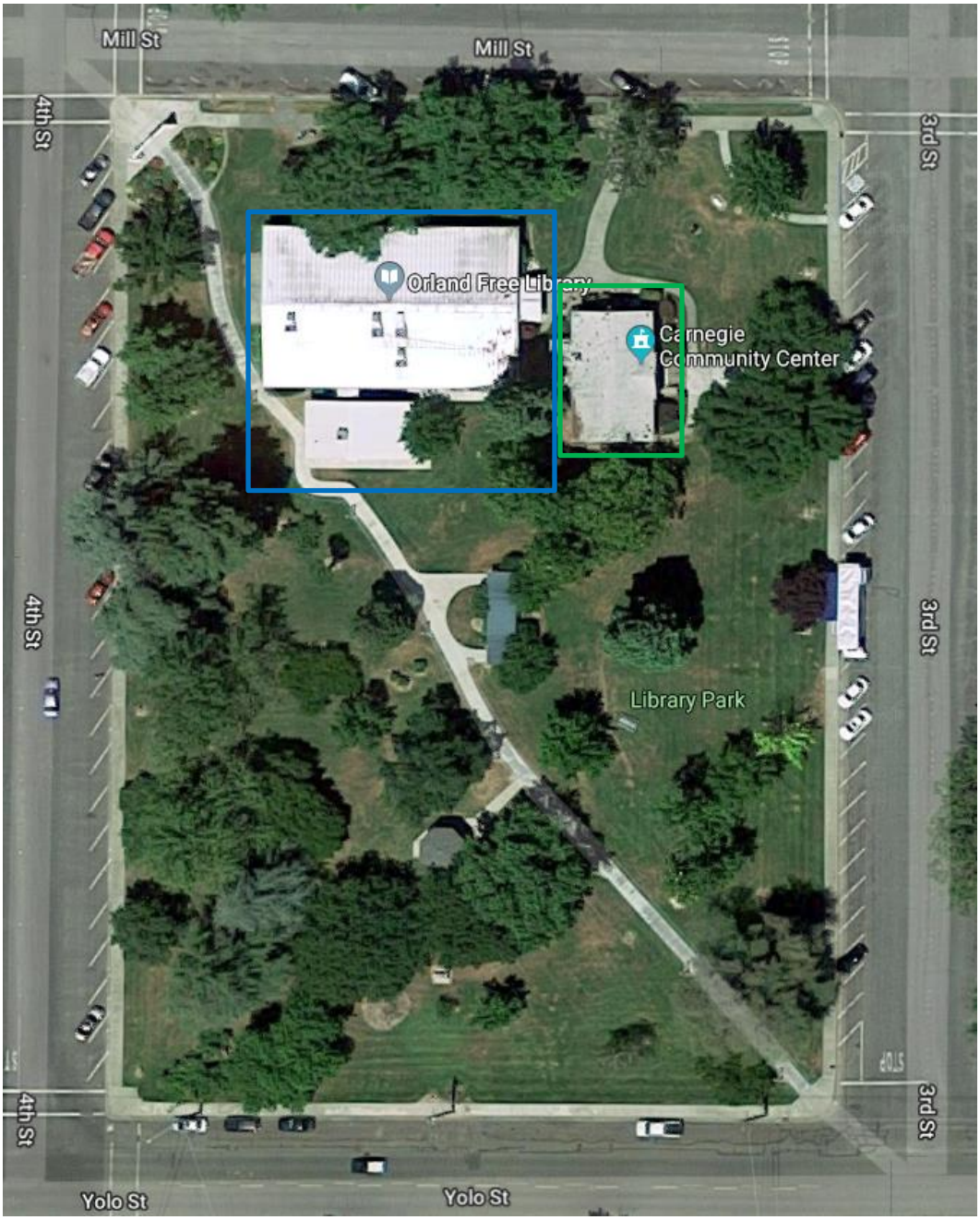
The Orland Free Library is situated in the center of town, surrounded by a park, and neighbored by Carnegie Hall. As addition was added along the south side of the library in 2013. The addition is used as a classroom, meeting room, and used during the weekend book sales.

Operational Schedule:

MWF	11:00 am to 6:00 pm
TR	11:00 am to 7:00 pm
Sat	11:00 am to 3:00 pm

During our initial site visit to the facility it was explained to us that there were no comfort issues at this facility. There was a high interest in upgrading the lighting systems. There was an abundance of interior lighting fixtures. The interior lighting fixtures were almost all 2x4 foot linear fluorescent fixtures fitted with two-lamps. The exterior lighting fixtures consisted mostly of wall packs, barn lights, and decorative pole mounted lights.

Figure 3.1.2: Library, Library Park, & Carnegie Hall (Satellite View)



Carnegie Hall (Carnegie)

Carnegie Hall is right next door to the library, in Library Park. The main floor of this building is used for council meeting and various community group activities. The

basement of this building once served as the classrooms for reading program but is currently used for storage.

Operational Schedule:

Several days a week, mostly in the afternoon and evening times. This location does have some weekend usage with varying hours.

During our initial site visit to the facility it was explained to us that there were no comfort issues at this facility. There was a high interest in upgrading the lighting systems. The interior lighting systems at this facility consisted mostly of four-foot linear fluorescent fixtures, fitted with 28W T8 lamps. There were four (4) eight-foot lighting fixtures in the basement that were fitted with outdated T12s. The exterior light at this location was supplied by 150W HPS wall packs.

Orland Fire Department (OFD)

The OFD fire station consists of two buildings. The main building houses a few ladder trucks and a few engines (eight trucks total, during our most recent visit). Additionally, the main building has a kitchen, recreation room, meeting room, and some offices. The second building (newer) holds the remainder of the OFD vehicles and is used for storage and training.

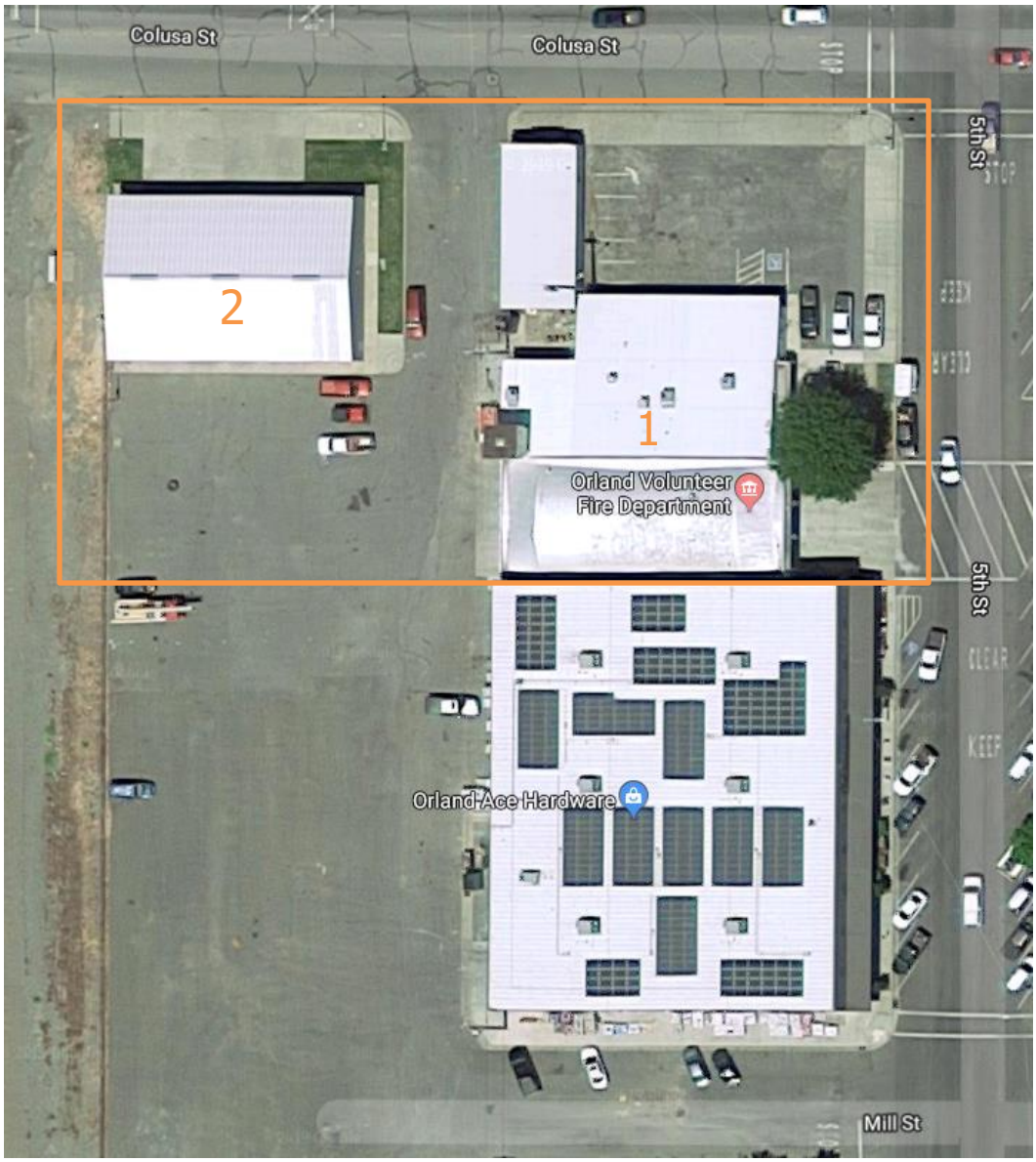
Operational Schedule:

This location does not have regular hours and is used as needed, 24 hours a day.

During our initial site visit to the facility it was explained to us that the only comfort issues at this location stemmed from an inability to keep heat contained within the facility. The large bay doors, which allow the fire trucks the much-needed room to move in and out of the building, evacuate any heat within the building upon opening. Both buildings

There was a high interest in upgrading the lighting systems. Interior lighting in the main building consisted mostly of linear fluorescent lighting fixtures, fitted with one to four fluorescent lamps. Roughly half of the observed lighting fixtures powered eight-foot T12s. The exterior lighting consisted mainly of a mixture of wall packs, recessed squares, and incandescent fixtures. Interior lighting in the second building was supplied by a mixture of linear fluorescents and pendant style 400W MH high bays. Exterior lighting around the second buildings consisted of 250W cobra heads.

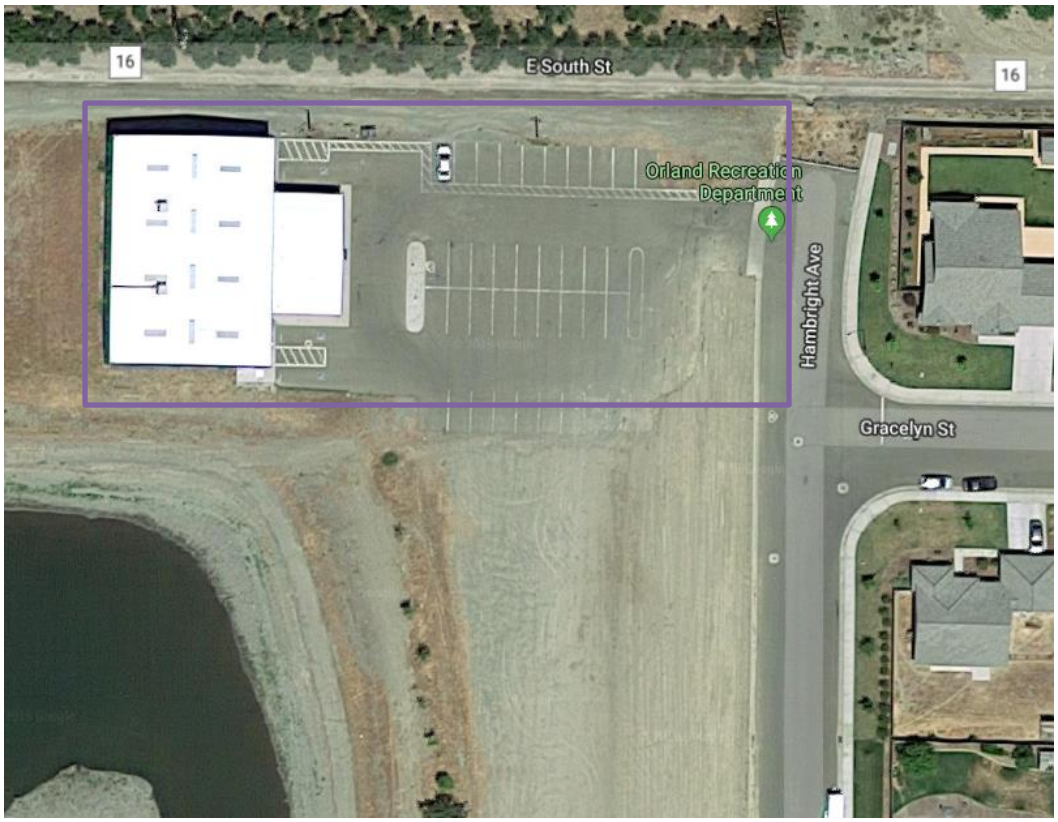
Figure 3.1.3: Orland Fire Department (Satellite View)



Recreation Center (Rec Center)

The Rec Center, just north of Lely Park, lies on the outskirts of town. A majority of the building is a gymnasium. The is an office, meeting room, restrooms, and addition equipment in the front portion of the building.

Figure 3.1.4: Recreation Center (Satellite View)



Operational Schedule:

Daily	9:00 am to 9:00 pm

During our initial site visit to the facility it was explained to us that there were some minor comfort issues, and that attention to them was a little concern. There was a high interest in upgrading the lighting systems. Interior lighting in the main building consisted mostly of linear fluorescent lighting fixtures, fitted with one to four fluorescent lamps. The high bay lighting fixtures in the gymnasium were six-lamp, troffer style, high

bays fitted with T5 fluorescents. Exterior lighting for this facility was supplied by a combination of MH wall packs and flood lights.

Orland Swimming Pool (Pool)

The Orland Swimming Pool is located in the northwest corner of Vinsonhaler park. The Pool sees regular usage during the warmer months and is closed during the colder months. The only time the pool is used during the off-season is for school related events and training purposes.

Figure 3.1.5: Orland Swimming Pool (Satellite View)

Operational Schedule:

MWF & Sat	1:00 pm to 5:00 pm
TR	1:00 pm to 5:00 pm & 7:00 pm to 9:00 pm

As this is not a typical enclosed space no occupant comfort information was obtained. The pool's pumping system had recently been retrofit, at the time of the baseline site

visit. There was a high interest in upgrading the lighting systems. The existing lighting systems were a mixture of flood lights and wall packs.

Tennis Courts (Vinsonhaler Park)

The tennis courts are located in the southwest corner of Vinsonhaler park, near the high school. The courts are open to the public and see regular usage year-round.

Figure 3.1.6: Vinsonhaler Park Tennis Courts (Satellite View)

Operational Schedule:

24 hours/Dawn to dusk lighting

As this is not a typical enclosed space no occupant comfort information was obtained. There was a high interest in upgrading the lighting systems. The existing lighting systems were a mixture of flood lights and barn lights.

Well Site #1 (Central St.)

The Central street well site is the oldest well site in the City. The well site building was one of the oldest structures still standing in the City. During the course of this project, the old structure was torn down and a new housing structure was erected around the well site equipment. Some of the above-ground and below-ground piping was replaced and rerouted along with the replacement of the building.

Figure 3.1.7: Well Site #1 (Satellite View)

Operational Schedule:

24 hours/7 days a week

As this is not a typical enclosed space no occupant comfort information was obtained. There was a high interest in upgrading the lighting systems. City personnel expressed an interest in the replacement and upgrade of the well site equipment. Additionally, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Lely Park & Well Site #2

Lely park is located on the outskirts of town, near the Corporation Yard. The park is open every day and closes from dusk to dawn. Well #2 is located right at the main entrance to the park. The Lely Park well site is one of the City's largest water supplies.

Operational Schedule:

24 hours/7 days a week

As this is not a typical enclosed space no occupant comfort information was obtained. There was a high interest in upgrading the lighting systems. City personnel expressed an interest in the replacement and upgrade of the well site equipment. Additionally, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Figure 3.1.8: Lely Park (Satellite View)

Well Site #4 (Woodward/Bonnie Lane)

The Bonnie Lane well site (also referred to as Woodward) is one of two sites that has a backup, natural gas fed, engine that serves as an emergency motor for the well site pump. As this is not a typical enclosed space no occupant comfort information was obtained. There was a high interest in upgrading the lighting systems. City personnel expressed an interest in the replacement and upgrade of the well site equipment. Additionally, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Operational Schedule:

24 hours/7 days a week

Figure 3.1.9: Well Site #4 (Satellite View)

Corporation Yard & Well Site #5 (Corp Yard)

The Corp Yard is the main facility run by the City's maintenance personnel. This location is used to store and repair the City's vehicles and various pieces of equipment. This facility also happens to house the City's 5th well site.

Operational Schedule:

(Corp Yard) M-F	8:00 am to 4:00 pm (with additional hours for emergencies and as required)
(Well #5)	24 hours/7 days a week

The main structure at this facility is a five-bay garage space, with an office, breakroom, and a restroom. Much like the Fire Station, this location has issues with occupant comfort related to heat during the winter. The large garage doors allow any heat within the space to escape, upon opening. There was a high interest in upgrading the lighting systems at this facility. City personnel expressed an interest in the replacement and upgrade of the well site equipment. Additionally, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Figure 3.1.10: Corp Yard & Well #5 (Satellite View)

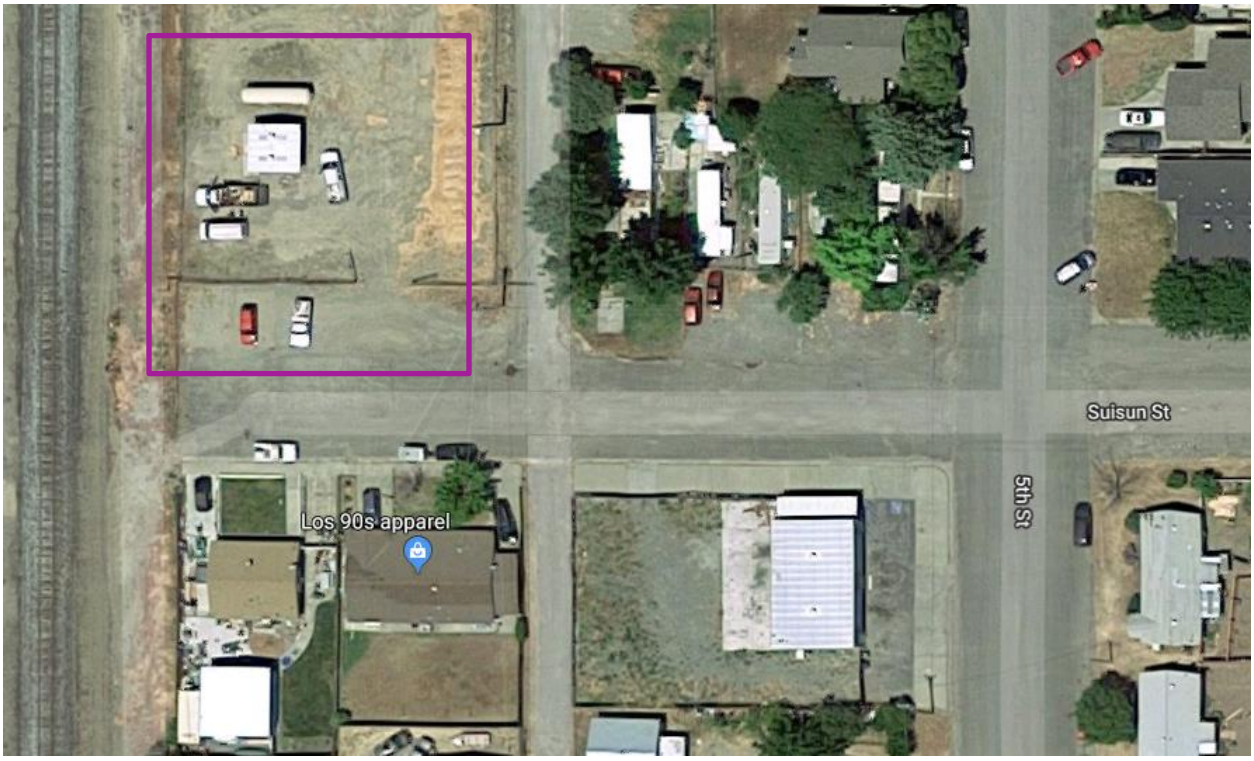
Well Site #7 (Suisun)

Suisun is the other well site that has a natural gas-powered engine that serves as an emergency motor for the well site pump. There was a high interest in upgrading the lighting systems at this facility. City personnel expressed an interest in the replacement and upgrade of the well site equipment. Additionally, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Operational Schedule:

24 hours/7 days a week

Figure 3.1.11: Suisun Well Site (Satellite View)



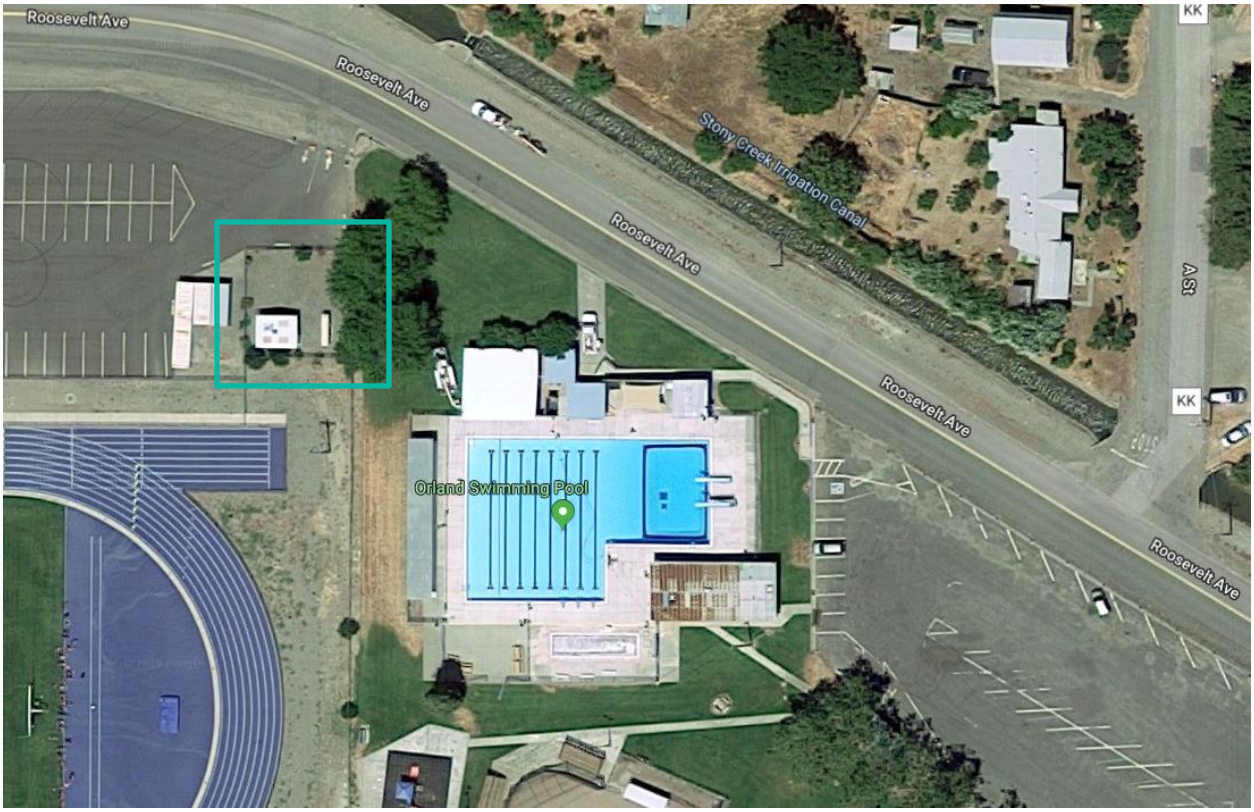
Well Site #8 (Roosevelt)

The Roosevelt well site is located right next to the City Pool and the high school. There was a high interest in upgrading the lighting systems at this facility. City personnel expressed an interest in the replacement and upgrade of the well site equipment. Additionally, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Operational Schedule:

24 hours/7 days a week

Figure 3.1.12: Roosevelt Well Site (Satellite View)



Well Site #9 (Eva Drive)

The Eva Drive well site is the City's newest well site. This well site was under construction and in the process of being tied into the City's water system and brought online as this project was entering the construction phase. As with the other well sites, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Operational Schedule:

24 hours/7 days a week

Figure 3.1.13: Eva Drive Well Site (Satellite View)

Wastewater Treatment Plant (WWTP)

The WWTP is located just west of the airport. A variety of different equipment is used to process, store, and treat the City's wastewater. As with the well sites, the installation of a wireless, and remote accessible, SCADA system was of high interest.

Operational Schedule:

24 hours/7 days a week

Figure 3.1.14: Wastewater Treatment Plant & Ponds (Satellite View)

3.2 Scope of Work

In this section the scope of work that was undertaken during this project will be broken out by facility and described. Tables will be used to detail the fixtures/equipment included in the scope of this project. The tables included in this section contain abbreviations that may not be easily or intuitively understood. For clarity on abbreviations please refer to the Abbreviations Reference Table located in Section E, of the Appendix, of this report. Additional before and after equipment photos can be found in the appendix of this report.

City Hall & Orland Police Department

EEM 1: Comprehensive Interior & Exterior Lighting Retrofit

This measure was the retrofit and replacement of outdated lighting systems, inside and outside of the building. Most of the interior lighting systems in this facility were fitted with two to four 28W T8 lamps. This measure retrofit the existing fixtures with new 12W LED T8 lamps, the most cost-effective approach to upgrading the existing lighting systems. By replacing the fluorescent lamps with reduced wattage LED equivalents, that have a longer life cycle than fluorescent lamps, maintenance costs have been reduced with respect to both parts and labor. Additionally, wall mounted occupancy sensors were installed in ideal locations for optimal energy savings.

For the exterior lighting fixtures, the entire fixtures were replaced by modern LED equivalents. There were a couple of keyless fixtures fitted with 60W incandescent lamps. These two fixtures where not replaced with new fixtures; instead, they were retrofit with 14W LED screw-in lamps. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.1: CH/OPD Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	Fixture Type	Qty	W	Retrofit Code	W
Interior	2x2x2	8	59	R-22-2T8U6-LED	26
Interior	2x4x3	6	89	R-24-3T8-LED	38
Interior	2x4x4	35	118	R-24-4T8-LED	52
Interior	1x4x2	11	59	R-14-2T-LED	14
Exterior	WP	4	188	N-WP30W-LED	30
Exterior	SB- Pole Mt	4	295	N-SB-75W-LED	75
Exterior	Micro Fl	1	128	N-FL30W-LED	26
Interior	Exits	7	40	N-Exit-LED -BB	4
Exterior	Inc	2	60	R-Scr-14W-LED	14
Interior	Std Light Switch	8	-	WM Occ Sensor	-

Solar 1: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the CH/OPD facility. The installed solar array was roof mounted and has a design capacity of 23.47 kW. The system was brought online as of 12/19/2017.

Fire Department

EEM 2: Comprehensive Lighting Retrofit (Building 1)

This measure was the retrofit and replacement of outdated lighting systems, inside and outside of Building 1. Most of the interior lighting systems in this facility were fitted with two or four 28W T8 lamps. This measure retrofit the existing fixtures with new 12W LED T8 lamps, the most cost-effective approach to upgrading the existing lighting systems. There were twenty-seven eight-foot lighting fixtures that were fitted with

T12s. These fixtures were retrofit using kits that adapted the fixture to accommodate two T8s in the place of each T12. By replacing the fluorescent lamps with reduced wattage LED equivalents, that have a longer life cycle than fluorescent lamps, maintenance costs have been reduced with respect to both parts and labor.

For the exterior lighting fixtures, the entire fixtures were replaced by modern LED equivalents. There were a couple of keyless and recessed square lighting fixtures fitted with 60W incandescent lamps. These fixtures where not replaced with new fixtures; instead, they were retrofit with 14W LED screw-in lamps. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.2: FD1 Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	**Fixture Type**	**Qty**	**W**	**Retrofit Code**	**W**
Interior	1x8x2	24	128	R-18-4T8-LED-Kit	52
Interior	1x8x1	3	55	R-18-2T8-LED-Kit	26
Interior	1x4x2	19	59	R-24-2T8-LED	26
Interior	2x4x4	21	112	R-24-4T8-LED	52
Exterior	WP	4	188	N-WP30W-LED	30
Exterior	Q5T3 FL	1	500	N-FL50W-LED	50
Exterior	Cobra H	1	295	N-SB-75W-LED	75
Exterior	Res Sq	6	60	R-Scr-14W-LED	14
Exterior	Misc Inc	6	60	R-Scr-14W-LED	14

EEM 3: Replace Two Unit Heaters

This measure was the replacement of two unit heaters, in Building 1, with custom infrared heating systems. The use of unit heaters in such a large space with high ceiling is highly inefficient. Hot air rises and gets trapped up near the ceiling. This leaves the occupants, at ground level, cold and uncomfortable. This results in the heaters staying on longer to completely warm the space. When the roll-up doors are opened, all the heat escapes to the outside and the space must then be reheated.

The Roberts-Gordon infrared heaters are not designed to heat air, their radiant heat warms surfaces. This improved method of heating minimizes waste energy especially

any times doors are opened and provide much better comfort within the space. The new IR heating systems were designed to heat the spaces between the trucks and areas were occupants tend to congregate. The following table details the equipment that was a part of this measure.

Table 3.2.3: IR Heating System Breakdown

Existing				New			
Location	Equipment	Qty	kbtuh	Equipment	Qty	kbtuh	Length
Building 1	Unit Heater	2	180	IR Heating System	4	80	30'-0"

EEM 4: Comprehensive Lighting Retrofit (Building 2)

This measure was the retrofit and replacement of outdated lighting systems, inside and outside of Building 2. The interior lighting in this building was a mixture of linear fluorescent and high bay lighting fixtures. The high bays were replaced with LED equivalents and the linear fluorescent fixtures were retrofit with LED T8s. By replacing the outdate technology with reduced wattage LED equivalents, that have a longer life cycle, maintenance costs have been reduced with respect to both parts and labor. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.4: FD2 Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	Fixture Type	Qty	W	Retrofit Code	W
Interior	1x4x2	4	59	R-24-2T8-LED	26
Interior	1x4x4	3	118	R-14-4T8-LED	52
Interior	1x8x2	2	128	R-18-4T8-LED-Kit	52
Exterior	High Bay	10	458	N-HB155-LED	155
Exterior	Cobra H	3	295	N-SB-75W-LED	75
Interior	Std Light Switch	6	-	WM Occ Sensor	-

Solar 2: Renewable Energy Generation System

This measure was the installation of two solar energy generation systems at the OFD facility. The installed solar arrays were roof mounted and have a combined design

capacity of 28.71 kW. The systems were brought online as of 11/16/2017 (Building 1) & 12/26/2017 (Building 2).

Carnegie

EEM 5: Comprehensive Lighting Retrofit

This measure was the retrofit and replacement of outdated lighting systems, inside and outside of the Carnegie building, in Library Park. The interior lighting in this building consisted mostly of linear fluorescent lighting fixtures. These fixtures were retrofit using LED T8 lamps. By replacing the outdate technology with reduced wattage LED equivalents, that have a longer life cycle, maintenance costs have been reduced with respect to both parts and labor. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.5: Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	**Fixture Type**	**Qty**	**W**	**Retrofit Code**	**W**
Interior	2x8x2	4	59	R-18-4T8-LED-Kit	26
Interior	2x4x3	27	89	R-24-3T8-LED	39
Interior	2x4x2	4	59	R-24-2T8-LED	26
Interior	Inc	2	60	R-Scr-14W-LED	14
Interior	Van 2L	1	120	R-2Scr-14W-LED	28
Interior	1x4x2	7	59	R-14-2T-LED	26
Exterior	WP	4	188	N-WP30W-LED	30
Interior	Std Light Switch	4	-	Occ Sensors	-

Library & Library Park

EEM 6: Comprehensive Lighting Retrofit

This measure was the retrofit and replacement of outdated lighting systems, inside and outside of the library, in Library Park. The interior lighting in this building consisted mostly of linear fluorescent lighting fixtures. These fixtures were retrofit using LED T8 lamps. There were mostly decorative lighting fixtures in the park. These fixtures were utilizing 60W incandescent screw-in lamps. This measure retrofit the existing fixtures with 14 W LED A-19 screw-ins. By replacing the outdate technology with reduced wattage LED equivalents, that have a longer life cycle, maintenance costs have been reduced with respect to both parts and labor. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.6: Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	**Fixture Type**	**Qty**	**W**	**Retrofit Code**	**W**
Interior	2x4x2	92	59	R-24-2T8-LED	26
Exterior	PT -dec	9	295	R-60W LED kit	60
Exterior	Barn-Pole MT	5	215	N-BL45W-LED	45
Exterior	WP	6	188	N-WP30W-LED	30
Exterior	PT Globes	10	60	R-Scr-14W-LED	14
Exterior	WP Inc	2	60	R-Scr-14W-LED	14
Exterior	JJ Inc	2	60	R-Scr-14W-LED	14
Exterior	Inc Nuck 2L	1	120	R-Scr-14W-LED	28
Exterior	Micro Fl	1	128	N-FL30W-LED	30
Interior	Std Light Switch	4	-	Occ Sensors	-

Vinsonhaler Park (City Pool)

EEM 7: Comprehensive Lighting Retrofit

This measure was the replacement of fourteen (14) exterior lighting fixtures at the Pool facility, in Vinsonhaler Park. The lighting at this facility consisted mostly of 750W flood lights. The existing fixtures were replaced by 150W LED shoe box lighting fixtures. This approach was determined to be better course of action as flood lights provide highly

directional lighting and the shoe boxes supply lighting coverage to a much wider area. By replacing the outdate technology with reduced wattage LED equivalents, that have a longer life cycle, maintenance costs have been reduced with respect to both parts and labor. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.7: Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	**Fixture Type**	**Qty**	**W**	**Retrofit Code**	**W**
Exterior	Inc FL	12	750	N-SB150W-LED	149
Exterior	WP	2	188	N-WP30W-LED	30

Solar 3: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Pool facility. The installed solar array was mounted stop a shade structure and was sized to offset energy consumption at both the Pool and Well Site 8. The portion feeding the Pool has a design capacity of 19.58 kW. The system was brought online as of 4/30/2018.

Vinsonhaler Park (Tennis Courts)

EEM 8: Comprehensive Lighting Retrofit

This measure was the replacement of nine (9) exterior lighting fixtures at the tennis courts, in Vinsonhaler Park. This measure replaced eight (8) 1,000W flood lights with 325W LED equivalents. Additionally, one (1) barn light was replaced by an LED equivalent that reduced power consumption, for this fixture, by just over 86%. By replacing the outdate technology with reduced wattage LED equivalents, that have a longer life cycle, maintenance costs have been reduced with respect to both parts and labor. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.8: Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	**Fixture Type**	**Qty**	**W**	**Retrofit Code**	**W**
Exterior	FL- M1000	8	1,080	N-FL325W-LED	325
Exterior	Barn Lighter	1	215	N-BL30W-LED	30

Corporation Yard

EEM 9: Comprehensive Lighting Retrofit

This measure was the retrofit and replacement of outdated lighting systems at the Corp Yard. The interior lighting in this building consisted mostly of eight-foot, single-lamp, linear fluorescent lighting fixtures that were retrofit using LED T8 lamps. Occupancy sensors were added to certain areas to further energy savings for the facility. By replacing the outdate technology with reduced wattage LED equivalents, that have a longer life cycle, maintenance costs have been reduced with respect to both parts and labor. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.9: Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	Fixture Type	Qty	W	Retrofit Code	W
Interior	1x8x1	13	30	R-24-1T8-LED	14
Interior	HB-T5 6L	3	351	N-HB155-LED	155
Interior	HB-M2	1	458	N-HB155-LED	155
Interior	2x4x1	1	30	R-24-1T8-LED	14
Interior	2x2x2	1	59	R-22-2T8U6-LED	26
Exterior	Nuck FL	5	60	R-Scr-14W-LED	14
Exterior	Keyless	9	60	R-Scr-14W-LED	14
Exterior	Barn Lighter	3	215	N-BL30W-LED	30
Interior	Std Light Switch	3	-	Occ Sensors	-

EEM 10: Replace Two Unit Heaters

This measure was the replacement of two unit heaters in the garage space at the Corp Yard. The two unit heaters at the Corp Yard were replaced by a custom IR heating system. This IR system, like the one at the Fire Department, was designed to direct heat towards walkways and areas of high use. The following table details the interior and exterior lighting retrofits and replacements.

Table 3.2.10: IR Heating System Breakdown

Existing				New			
Location	Equipment	Qty	kbtuh	Equipment	Qty	kbtuh	Length
Garage	Unit Heater	1	200	IR Heating System	2	125	40'-0"
Garage	Unit Heater	1	60				

EEM 11: Time Clock HVAC Controller

This measure was the installation of a time clock controller for the window mounted AC unit in the breakroom, at the Corp Yard. During our initial walkthrough of the facility, it was noticed that the AC system was on in the breakroom while no occupants were present. Based on the temperature in the room, it was determined that the air conditioner had been on, in an unoccupied space, for at least an hour. We were informed that this is a common occurrence, as personnel come and go, in and out, of

the room randomly throughout the day. To avoid wasteful utilization of the AC system a time clock controller was installed to turn the system on and off based on a set schedule. No comparison table has been created for this measure.

Solar 4: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Corp Yard. The installed solar array was mounted stop a carport structure and was sized to offset energy consumption at both the main building of the Corp Yard and Well Site 5. The portion feeding the Corp Yard has a design capacity of 7.83 kW. The system was brought online as of 3/12/2018.

City Well Sites

EEMs 12 & 13: Well Pump Motor Replacement & VFD Installation

Newly installed 100 hp US Motors hollow shaft well pump motor at Well Site 7 (Suisun).

These two measures were the replacement of five (5) well pump motors and the installation of five (5) variable frequency drives at six (6) different well site. Five of the well sites had outdated motors that would have failed a lot sooner than expected would they be driven by a VFD for efficient control. These five motors were replaced by NEMA premium efficiency, inverter rated, well pump motors.

Newly installed 100 hp ABB variable frequency drive (VFD) at Well Site 7 (Suisun).

One of the well sites already had a VFD installed on a general-purpose motor. The old motor was changed out with EEM 12. The existing VFD was connected to the new motor, and the other five well sites receive new VFDs with EEM 13. The following table detail the equipment included in these two measures.

Table 3.2.11: Well Site Motors & VFDs

Existing				New		
Location	Equipment	Qty	HP	Equipment	Qty	HP
Well #1	Well Pump Motor	1	60	Well Pump Motor	1	60
				Variable Frequency Drive	1	60
Well #2	Well Pump Motor	1	100	Well Pump Motor	1	100
				Existing VFD to Remain	-	-
Well #4	Well Pump Motor	1	60	Existing Motor to Remain	-	-
				Variable Frequency Drive	1	60
Well #5	Well Pump Motor	1	50	Well Pump Motor	1	50
				Variable Frequency Drive	1	50
Well #7	Well Pump Motor	1	100	Well Pump Motor	1	100
				Variable Frequency Drive	1	100
Well #8	Well Pump Motor	1	50	Well Pump Motor	1	50
				Variable Frequency Drive	1	50

EEM 14: Comprehensive Lighting Retrofit

This measure was the replacement of various exterior lighting fixtures at six (6) well sites around the City of Orland. All the exterior lighting fixtures were replaced with LED equivalents, except for the jelly-jar fixtures. There was a total of eight (8) jelly-jar style lighting fixtures, housing 60W incandescent lamps, at the included well sites. These

fixtures were replaced by 12W wall packs. The following table details the equipment included in this measure.

Table 3.2.12: Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	Fixture Type	Qty	W	Retrofit Code	W
Exterior	Barn Lighter	6	215	N-BL30W-LED	30
Exterior	JJ Inc	8	60	N-WP12W-LED	12
Exterior	WP	4	215	N-WP30W-LED	30
Exterior	Micro Fl	3	215	N-FL30W-LED	30

EEM 15: SCADA System for Well Water Control

This measure was the installation of a SCADA control system that provided remote, and wireless, control over the City's water system. The installed system has the capability for further expansion to incorporate the City's wastewater system, as well. This measure included equipment retrofits and new installations at seven (7) well sites, the water tower (the existing main control site), and City Hall (the new main control site).

The existing piping networks at each well site we retrofit to accommodate the control system. All of the well sites received some level of component upgrade; new magnetic flow meters, check valves, gate valves, air release valves, gauge & transducer manifolds, and various other components were used to prepare the water delivery systems for tie-in to the control system. The central control station moved from the City's water tower to City Hall. A new frontend was installed with the SCADA software, which is internet accessible for remote control. Various controls components were installed at each well site and City Hall to allow the well sites to communicate with the central control system.

Solar 3 (Continued): Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Pool facility. The installed solar array was mounted stop a shade structure and was sized to offset energy consumption at both the Pool and Well Site 8. The portion feeding the

Well Site 8 (Roosevelt) has a design capacity of 39.15 kW. The system was brought online as of 5/3/2018.

Solar 4 (Continued): Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Corp Yard. The installed solar array was mounted stop a carport structure and was sized to offset energy consumption at both the main building of the Corp Yard and Well Site 5. The portion feeding the Well Site 5 has a design capacity of 46.98 kW. The system was brought online as of 3/2/2018.

Solar 5: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Well Site 2 (Lely Park). The installed solar array was carport mounted and has a design capacity of 38.28 kW. The system was brought online as of 5/18/2018.

Solar 6: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Well Site 4 (Woodward/Bonnie Ln). The installed solar array was ground mounted and has a design capacity of 31.32 kW. The system was brought online as of 2/7/2018.

Solar 7: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Well Site 7 (Suisun). The installed solar array was ground mounted and has a design capacity of 60.9 kW. The system was brought online as of 4/12/2018.

Recreation Center

EEM 16: Comprehensive Lighting Retrofit

This measure was the retrofit and replacement of various interior and exterior lighting fixtures at the City's Rec Center. Most of the interior lighting for this facility was supplied by six-lamp troffer style high bay lighting fixtures housing fluorescent T5s. These fixtures were replaced be similar style LED high bays the cut power consumption by more than 55%, per fixture. Three (3) occupancy sensors were installed in optimal locations for additional energy savings associated with interior lighting.

Exterior lighting for this facility was provided by a mixture of wall packs and flood lights. The exterior lighting fixtures were replaced by LED equivalents. The following table details the equipment included in this measure.

Table 3.2.13: Comprehensive Lighting Retrofit Breakdown

Existing				New	
Location	**Fixture Type**	**Qty**	**W**	**Retrofit Code**	**W**
Interior	HB-T5 6L	20	351	N-HB155-LED	155
Interior	2x4x2	7	59	R-24-2T8-LED	24
Exterior	WP-M2	4	188	N-WP30W-LED	30
Exterior	FL-M2	2	295	N-FL75W-LED	75
Interior	Std Light Switch	3	-	Occ Sensors	-

Solar 8: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the Rec Center. The installed solar array was roof mounted and has a design capacity of 17.4 kW. The system was brought online as of 11/10/2017.

Wastewater Treatment Plant

Solar 9: Renewable Energy Generation System

This measure was the installation of a solar energy generation system at the WWTP facility. The installed solar array was ground mounted and has a design capacity of 187.92 kW. The system was brought online as of 5/2/2018.

4. Measurement & Verification

This section analyzes the change in energy usage between the baseline twelve-month period and the post-project twelve-month period. In comparing the initial state of energy usage to the final state of energy usage we are able to verify whether or not this project successfully delivered the savings that were estimated and presented to our client. A direct comparison of pre and post data may not tell a complete story. For this reason, key factors that can affect energy usage must be considered in order to see the whole picture.

This section will first explore environmental differences that can potentially impact energy usage. We will then explore additional differences between pre and post-project conditions that would affect energy usage. After all of the potential impacts have been explored the baseline energy usage data will be presented. This will be followed by an analysis of a recent twelve-month period. This section will conclude with a comparison between the baseline and recent energy consumption data.

4.1 Environmental Factors

Weather Effects

This section will compare the historical weather data that was used in our baseline analysis and in the design and calculations for this project to recent weather data aligning with the utility data that was received from Pacific Gas & Electric (PG&E). The weather data used in this analysis was obtained from the Western Regional Climate Center website (see link to site in Appendix A). Changes in weather conditions can have a significant effect on energy usage.

Ideally the analyzed twelve-month period should begin and end on the same months as the Baseline Analysis for easier comparison, but the utility data received does not conform to this ideality. Therefore, the data has been slightly manipulated such that the months line up and can be compared directly to one another; the data points

themselves were not altered, only the order in which the data is presented. Please see the following table for further understanding and clarification.

Figure 4.1.1: Local Weather Data Comparison Table

Local Weather Comparison										
Month	Baseline (04/15 to 03/16)					Recent (04/19 to 03/20)				
	Max	Avg High	Avg Low	Min	Solar Rad	Max	Avg High	Avg Low	Min	Solar Rad
Jan	68	54.8	43.1	34	4,041	67	56.7	40.5	31	4,716
Feb	80	66.9	44.0	33	7,554	78	67.6	41.1	33	9,029
Mar	86	73.9	47.0	36	11,710	82	64.5	43.1	33	11,382
Apr	91	76.6	48.0	35	15,620	91	75.1	53.1	46	12,943
May	92	79.2	53.9	45	13,674	92	77.9	53.0	45	17,659
Jun	111	98.0	66.3	60	12,513	105	93.2	63.9	55	20,886
Jul	109	95.0	67.3	58	18,423	107	95.2	65.6	59	20,751
Aug	104	93.8	63.3	57	17,046	110	96.5	66.0	59	18,205
Sep	109	90.6	59.6	51	13,385	101	87.0	59.3	44	14,005
Oct	98	84.2	55.9	46	10,457	90	79.0	49.1	38	11,609
Nov	76	63.2	39.6	25	6,781	85	71.4	42.2	29	6,998
Dec	63	53.5	39.2	29	3,912	67	55.5	42.1	32	3,518
Month	Difference									
	Max	%	Avg High	%	Avg Low	%	Min	%	Solar Rad	%
Jan	-1	-1.5%	1.9	3.5%	-2.6	-6.0%	-3	-8.8%	675	16.7%
Feb	-2	-2.5%	0.7	1.0%	-2.9	-6.6%	0	0.0%	1,475	19.5%
Mar	-4	-4.7%	-9.4	-12.7%	-3.9	-8.3%	-3	-8.3%	-328	-2.8%
Apr	0	0.0%	-1.5	-2.0%	5.1	10.6%	11	31.4%	-2,677	-17.1%
May	0	0.0%	-1.3	-1.6%	-0.9	-1.7%	0	0.0%	3,985	29.1%
Jun	-6	-5.4%	-4.8	-4.9%	-2.4	-3.6%	-5	-8.3%	8,373	66.9%
Jul	-2	-1.8%	0.2	0.2%	-1.7	-2.5%	1	1.7%	2,328	12.6%
Aug	6	5.8%	2.7	2.9%	2.7	4.3%	2	3.5%	1,159	6.8%
Sep	-8	-7.3%	-3.6	-4.0%	-0.3	-0.5%	-7	-13.7%	620	4.6%
Oct	-8	-8.2%	-5.2	-6.2%	-6.8	-12.2%	-8	-17.4%	1,152	11.0%
Nov	9	11.8%	8.2	13.0%	2.6	6.6%	4	16.0%	217	3.2%
Dec	4	6.3%	2.0	3.7%	2.9	7.4%	3	10.3%	-394	-10.1%
Avgs	**-1.00**	**-0.6%**	**-0.84**	**-0.6%**	**-0.68**	**-1.0%**	**-0.42**	**0.5%**	**1,382**	**11.7%**

While weather data and exterior temperatures are not a measure of interior temperatures, they help in understanding potential occupant comfort requirements. In the Baseline and Recent blocks of Figure 4.1.1, the Max and Min columns indicates the maximum and minimum temperature reach during each month of their respective periods. The Avg High and Avg Low columns contain the average high and low temperatures for each month. The Solar Rad column presents the total solar radiation values recorded during a given month.

The Difference block of Figure 4.1.1 calculates the difference between the baseline and recent period data. The differences have been calculated such that values less than zero indicate lower recent period values than baseline; likewise, differences greater than zero indicate higher recent period values than baseline values. The % Diff columns have been calculated with respect to the baseline data.

It is possible to see from Figure 4.1.1 that there were many significant variations in the data, between the baseline and recent periods. Assuming a conservative ten-degree comfort band (65° to 75°), a difference of five degrees or more can have a significant impact on energy usage. On average, the recent twelve-month period was slightly cooler than the baseline period. The difference in solar radiation indicates that renewable energy generation had the potential for more production during the recent period. The following figures are a visual representation of the some of the data contained in the table above. (The comfort band set points have been added to the plot for further ease of understanding the data.)

Figure 4.1.2: Temperature Comparison Plot

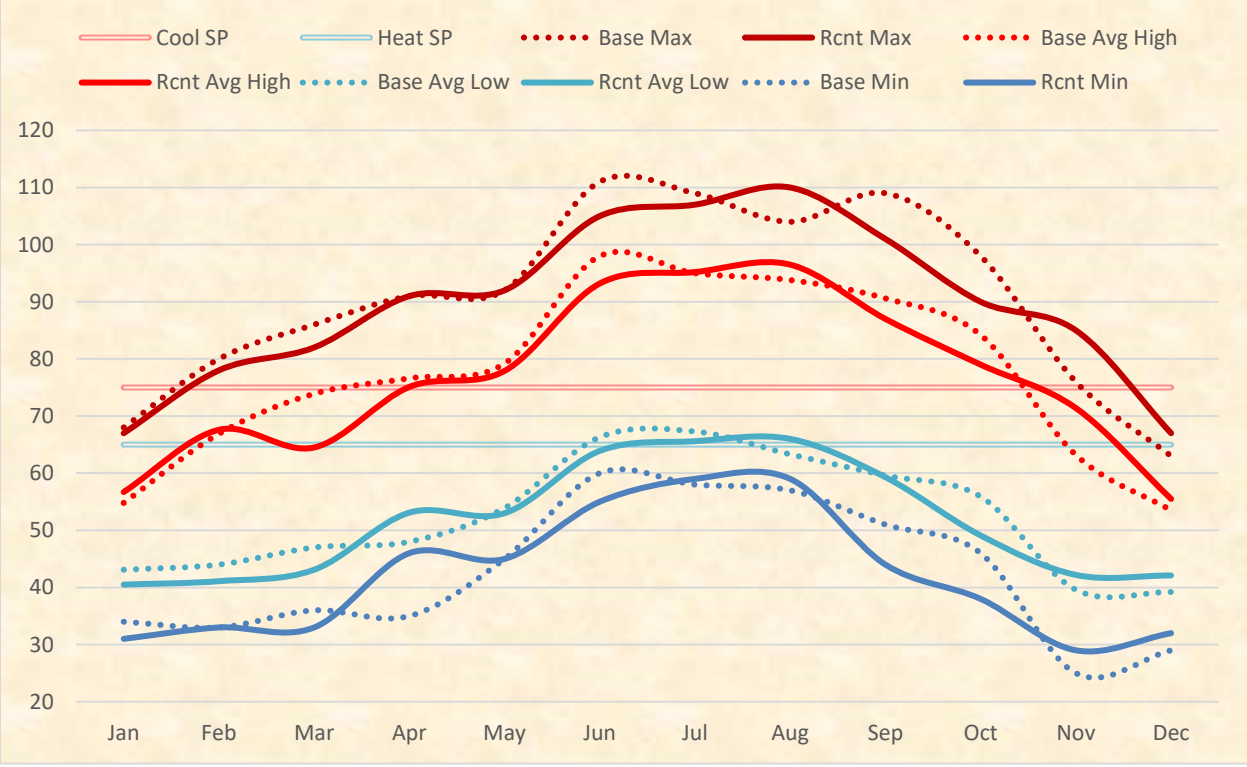
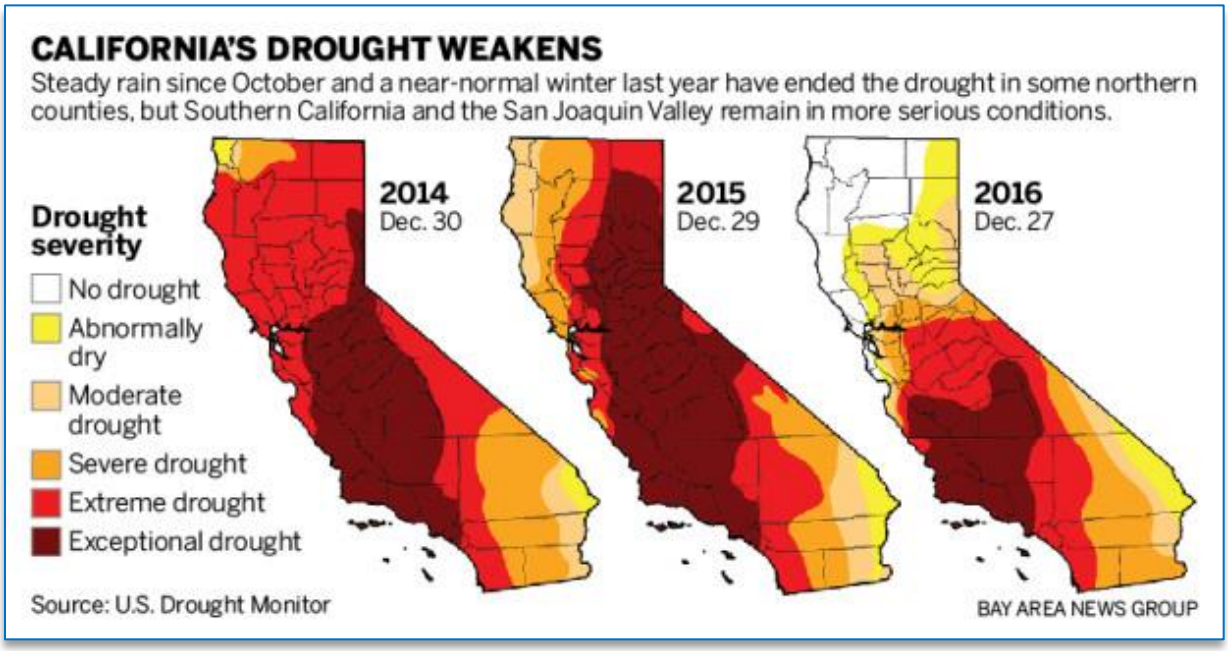


Figure 4.1.2 shows that the recent twelve-month period was cooler, on average, than the baseline period. The result of this would be an increase in energy usage related to heating spaces. This includes both natural gas and electricity consumption related, but not limited, to space heating (gas-fired and electrical resistance), water heating, fan power, and pump motor power.

Drought

The last environmental factor that should be considered is the most recent drought that plagued California for almost five and a half years. The 2011-2017 California Drought (December 2011 to March 2017) was one of the most intense droughts in California's history. The drought resulted in the death of roughly 102 million trees, 62 million of which died in 2016, alone. The driest period of the drought was between late 2011 through 2014. For perspective, the baseline twelve-month energy analysis period was between March 2015 and February 2016.

Figure 4.1.3: California Drought Map



Drought conditions improved a little at the beginning of 2015 but had worsened by May. Governor Jerry Brown instituted a mandatory 25% water restriction in June (that wasn't lifted until April of 2017). Thankfully, things took a turn for the better with a lot of help from Mother Nature. It is possible to see from Figure 4.1.6 that most of the County of Glenn was experiencing "extreme drought" conditions during the entire baseline period. By the end of 2016 most of the County was still experiencing "moderate drought" conditions.

Due to the drought conditions plaguing the state, there was less water consumption, during the baseline period, as residents were doing all they could to conserve water. This means that there was less energy consumed than normal with respect to water movement. Now, that the state is no longer experiencing drought conditions water usage is back up to normal, and most people are no longer taking steps to conserve water.

4.2 Location Dependent Factors

Here we will detail any known changes in various factors and analyzes the impact of these changes on the data used in this M&V analysis. As this analysis is based on utility data and not measured data from individual pieces of equipment, from both the pre and post phases of this project, we are only looking at major factors that would significantly impact energy usage. The major areas of impact that can have significant effect on load profile are personnel changes (reduction, increase, replacement, etc.), operational changes (hours of operation, un-used classrooms, etc.), and physical changes (new/removal of portable buildings, new/removal of facility amenities, etc.).

Personnel/Population Changes

No significant personnel or population changes have been identified.

Operational Changes

One operational change identified from the baseline to now is that the Fire Department is now regularly staffed. The Orland Fire Chief and a few other are on site based on a typical office hour schedule. During the baseline, it is our understanding that the Fire Chief and others did not have a regular schedule and would come and go based on need.

As part of the SCADA System measure for the City's water system, the way the system is used has changed greatly. The system used to be fed by gravitational pressure, by pumping water from various locations around the city up to the water tower in the middle of town. Now, pressure to the system is provided locally by each well site, with the high tank acting as fire storage. This change results in the pumps running more often to maintain system pressure in their respective areas; an increase in system runtime means that more energy will be used by the system.

Equipment Failure & Non-Existent Equipment

Somewhere between Operational Changes and Physical Changes, Equipment Failure & Non-Existent Equipment should be considered. The facilities where project scope measures are implemented are active facilities, sometimes between the various phases of the project equipment fails. If a piece of equipment fails and is vital to normal operation of a facility they often get replaced immediately. This sometimes results in new equipment being replaced or equipment that was not initially included being replaced to account for that which was replaced recently. Please note that the only time a "new" piece of equipment is replaced is when there is a considerable difference in system efficiency. It should also be noted that the replacement doesn't take place unless it is agreed upon by the client appointed Project Manager.

Additionally, if equipment is not identified as non-operational or assumptions are made on the existence of equipment, based on similar locations, during the Baseline and Preliminary Assessment (PA) phase of the project it is assumed that the equipment functions normally or exists, where it does not. When these items are replaced through the implementation of the project scope, they become new loads that were previously unaccounted for. While this results in functionality over a previously inoperable piece of equipment, it also increases energy consumption. Or in the case of non-existent equipment, new equipment is installed, resulting in new energy consumption.

Some of the factors described in this section were present in this project. While gas was present at Building 2 of the Fire Department, no existing unit heaters were present. Instead, gable fans were installed at all the well sites, around the City, to draw heat from the buildings and keeping the equipment inside from over-heating. There were many lighting fixtures included in the scope of this project that were found to be non-functioning during the construction phase of this project. It was unknown how long the existing lighting systems were out of service. Much like the gable fans on the mechanical side of the project, lighting fixtures not initially included in the scope of this project were replaced to maintain fixture counts and energy savings. The restrooms at

both Vinsonhaler park and Lely park are two examples of locations that received new exterior lighting fixtures, when replacements were initially included in the scope of this project. (No energy savings data has been obtained for these two locations.) Aside from the two previously mentioned facilities that were not initially included, additional fixtures were retrofit/replaced at some of the facilities that were included in this project.

Physical Changes

The Eva Drive well site did not exist during the baseline analysis but was examined during the IGA walkthrough. The new well site is now one of the City's main and highest producing well sites. Some of the equipment contained in the pump house was altered (not changed out) and installed through the scope of this project.

Well Site #1 ("Central St.") is the oldest well site in the City. The pump house was one of the oldest structures in the City, and this was easily discernable through the state in which it was in. During the construction phase of this project the building was torn down and a new structure was erected atop the existing foundation. The physical changes didn't stop with the structure, the piping network above and below-ground were altered as well.

4.3 Energy Consumption

This section will analyze utility data obtained from PG&E, for the facilities included in the scope of this project. The raw utility data has been condensed down to show only the total monthly usages and associated costs. Average energy supply rates have been calculated for each facility by dividing the cost by the usage [$/kWh]. We will begin this analysis by taking a look at the Baseline data.

Baseline Energy Consumption Analysis

As previously stated, the City of Orland's utility supplier is PG&E. Prior to conducting our project feasibility walkthrough for this project, we reached out to PG&E for a recent (at that time) twelve-month sample of utility data, with our client's approval. The data received was used as a part of our baseline facility analysis. Only the facilities that were in some way altered through the scope of this project were included in this energy consumption analysis. Any incomplete data sets were excluded from this analysis. Additionally, any missing data has been identified as not being received and was therefore excluded from our baseline analysis. Lastly, any changes or alterations to the datasets will be identified and described for understanding and basis.

Baseline Electricity Consumption Analysis

The baseline analysis period for the electricity consumption data ranged from March 2015 to February 2016. For the Wastewater Treatment Plant (WWTP), no baseline data was received with the baseline data set. For the creation of this report, a recent twelve-month dataset was obtained, and baseline data was received for the WWTP as well. Unfortunately, while the period of the baseline analysis was provided, the data received was from outside of this period. During baseline analysis period, the City of Orland consumed 1,427,653 kWh of electricity. For the consumed electricity the City paid $311,410. Using this data, a combined electricity supply rate of $0.22/kWh was calculated by dividing the cost by the usage. Please note that this analysis does not

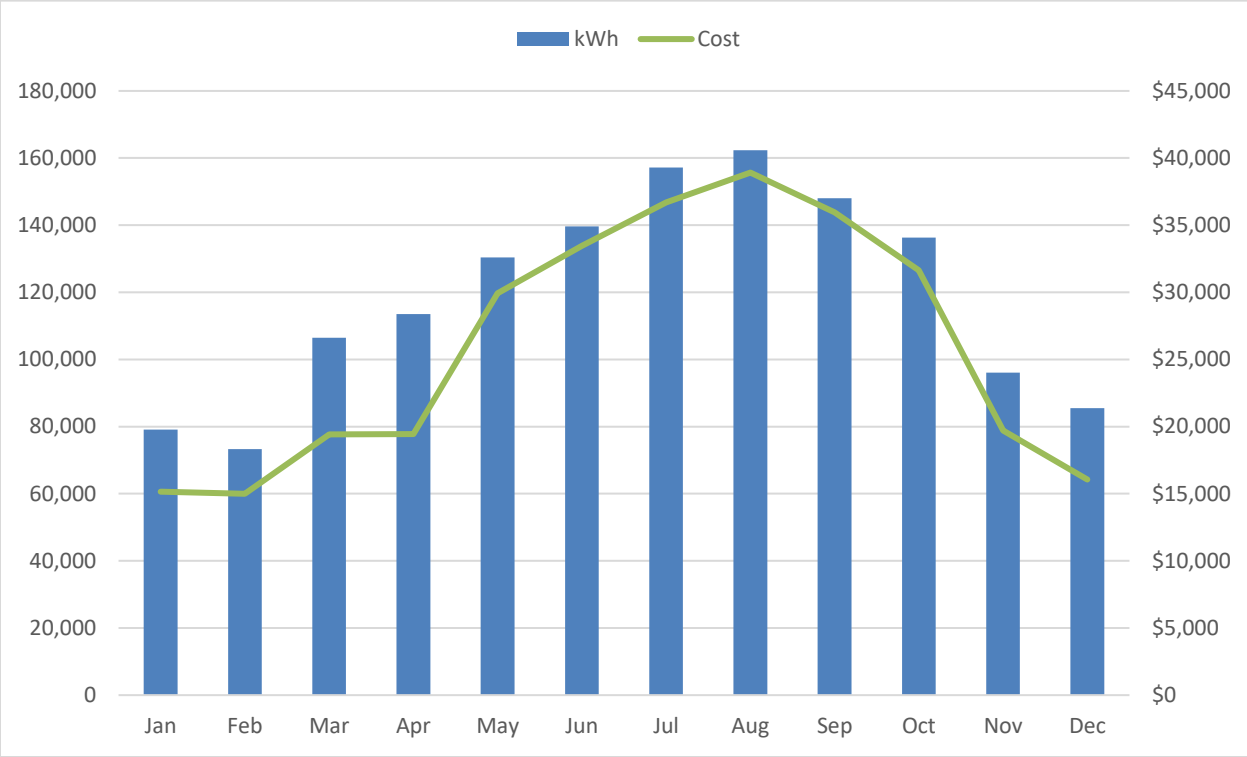
include energy consumption associated with Well Site #9 ("Eva Dr."). The following table beaks down the City's electricity consumption by month. Please note that the data has been rearranged to show the data ranging from January to December of the baseline period.

Figure 4.3.1: Baseline Electricity Consumption Table

Month	kWh	Cost	Rate
Jan	79,090	$15,158	$0.19
Feb	73,296	$14,997	$0.20
Mar	106,456	$19,431	$0.18
Apr	113,502	$19,432	$0.17
May	130,420	$29,938	$0.23
Jun	139,606	$33,454	$0.24
Jul	157,158	$36,697	$0.23
Aug	162,305	$38,920	$0.24
Sep	148,026	$35,952	$0.24
Oct	136,280	$31,654	$0.23
Nov	96,053	$19,712	$0.21
Dec	85,461	$16,066	$0.19
Totals	**1,427,653**	**$311,410**	**$0.22**

It is possible to see from Figure 4.3.1 (or see Figure 4.3.2) that the City consumes more electricity during the warmer months than they do during the cooler months. This is a common trend, as more electricity is required for fluid movement associated with water systems and occupant comfort via HVAC equipment. Lighting is standard, and consumes roughly the same amount of electricity, year-round; there are only slight runtime changes associated with usually exterior lighting that utilizes time clocks or photocells for automatic on/off functionality. The following figure plots the data contained in Figure 4.3.1 for visual representation of the data.

Figure 4.3.2: Baseline Electricity Consumption Plot



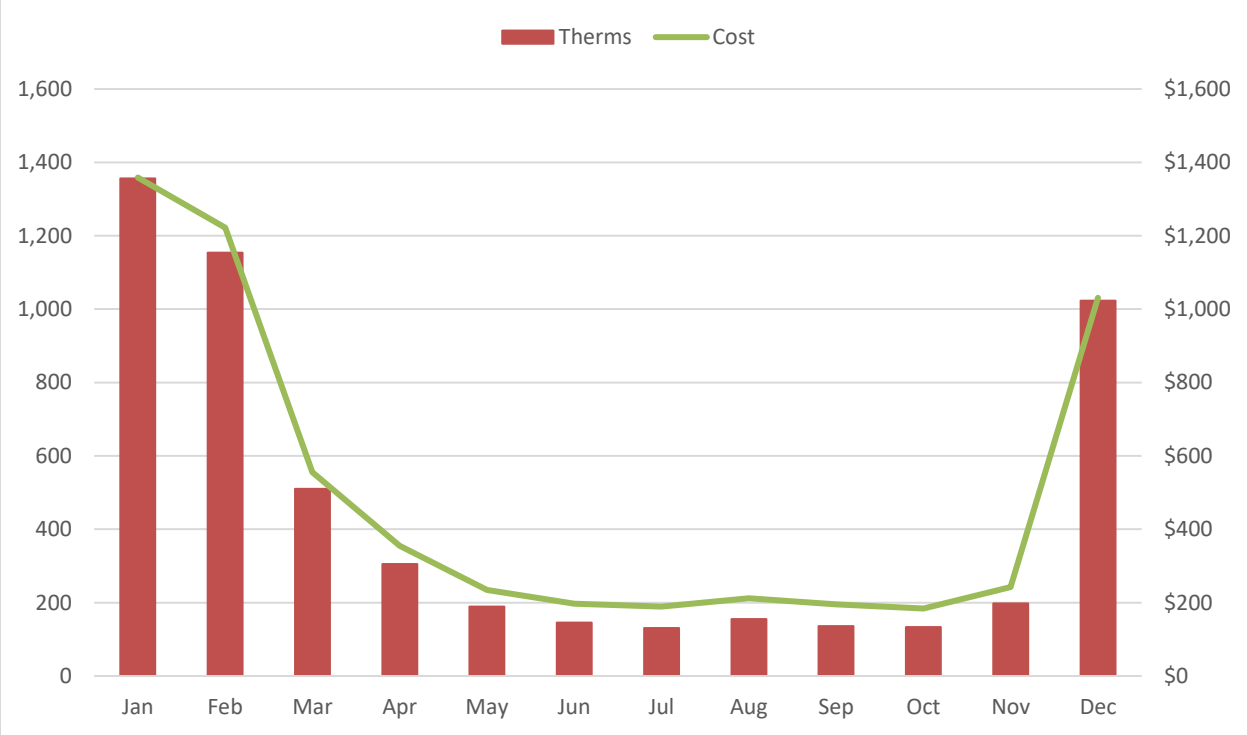
Baseline Natural Gas Consumption Analysis

The twelve-month baseline analysis period for natural gas consumption was the same as for electricity, March 2015 to February 2016. Over the course of the baseline period the City (only for locations included in this project) burned through 5,436 therms of natural gas. For the consumed gas the City paid $5,976.85. Based on this data a combined supply rate for the City has been calculated as $1.10/therm, by dividing the cost by the usage. It should be noted that no utility data, associated with natural gas, was received for many of the location included in this project. In fact, the data received only corresponds to seven of the sixteen facilities included in the scope of this project. The following table and figure beak down the City's natural gas consumption by month. Please note that the data has been rearranged to show the data ranging from January to December of the baseline period.

Figure 4.3.3: Baseline Natural Gas Consumption Table

Month	Therms	Cost	Rate
January	1,356	$1,358.69	$1.00
February	1,154	$1,221.50	$1.06
March	510	$555.90	$1.09
April	305	$355.17	$1.16
May	189	$234.63	$1.24
June	146	$197.41	$1.35
July	131	$188.88	$1.44
August	155	$211.55	$1.36
September	136	$195.70	$1.44
October	133	$183.93	$1.38
November	198	$242.22	$1.22
December	1,023	$1,031.27	$1.01
Totals	**5,436**	**$5,976.85**	**$1.10**

Figure 4.3.4: Baseline Natural Consumption Plot



It is possible to see from Figure 4.3.3 and Figure 4.3.4 that the City consumes more natural gas during the cooler months. As with the electricity consumption trend, this is a very common usage profile. Most facilities consume more natural gas in the cooler

months as there is more energy required to heat fluid associated with HVAC and water systems.

Post-Project Energy Consumption Analysis

This section will analyze energy consumption data for a recent twelve-month period. The data received for the recent period varies for a couple of sites, within the same thirteen-month period. Most sites' data ranges from April 2019 to March 2020. The data for the WWTP and Eva Drive ranges from May 2019 to April 2020.

Multiple requests for utility data were made as there were many issues with obtaining a complete look for a set range of months. The reason for the variation in the recent data set is due to holes in the data from the first request, that were filled through one of the following requests. All the locations that received solar as a part of this project changed rate structures and have new SAID (Service Agreement Identification) number. Factors such as this, and the size of the data request caused datasets to get overlooked and made them difficult to locate.

It should be noted that there is no recent period data for the tennis courts. No utility data was provided for the tennis courts with the first request. A second request was made and again it was missing from the list, along with another location. On the third request, an incomplete set was received (seven months). Upon inspection of the dataset, it appears that solar has been added to this location (new SAID, four months of negative usage, and typical True-Up billing style). For these reasons the data has been excluded from this analysis.

Recent Electricity Consumption Analysis

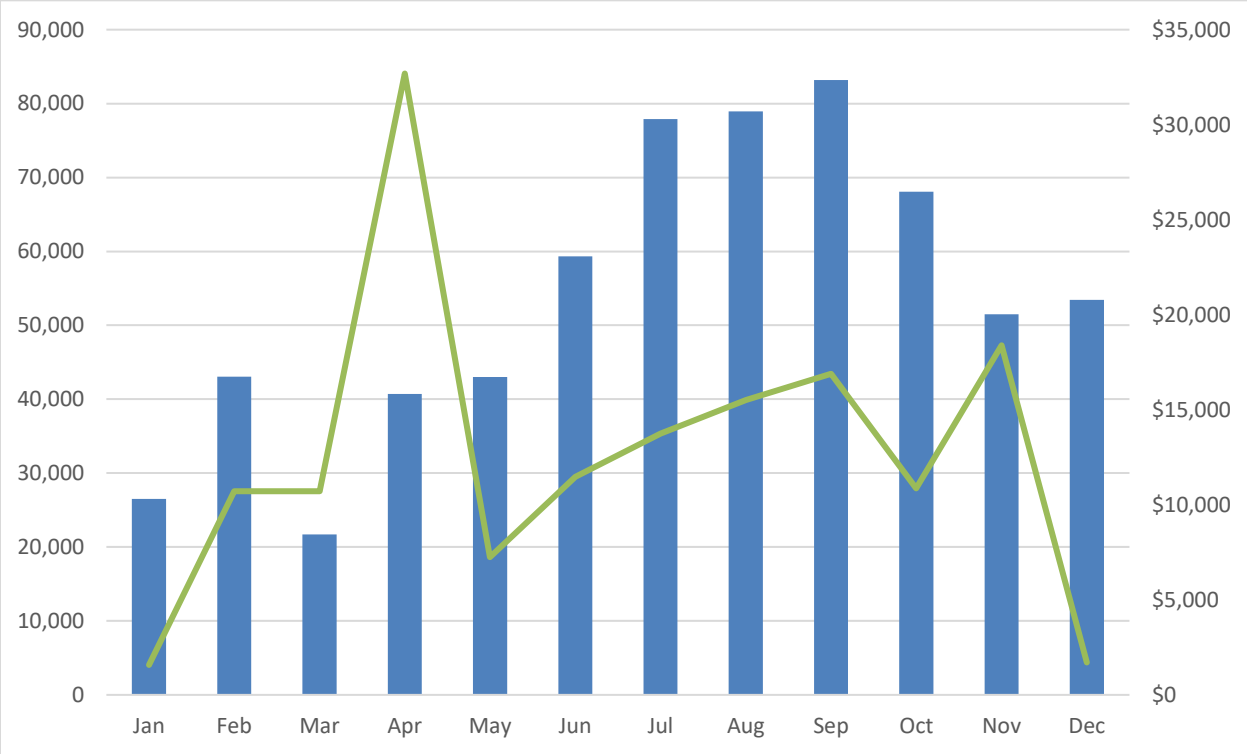
Electricity consumption data for a recent twelve-month period has been analyzed. Over the course of a recent twelve-month period the City consumed 647,367 kWh of electricity. For this amount of usage, the City paid $151,509. Based on this data the

combined supply rate of $0.23/kWh was calculated by dividing the cost by the usage. The following table and plot break down the City's electricity usage by month. Please note that the data has been rearranged to follow the standard form of a year, ranging from January to December.

Figure 4.3.5: Recent Electricity Consumption Table

Month	kWh	Cost	Rate
Jan	26,526	$1,575	$0.06
Feb	43,068	$10,713	$0.25
Mar	21,698	$10,712	$0.49
Apr	40,702	$32,692	$0.80
May	42,993	$7,244	$0.17
Jun	59,339	$11,467	$0.19
Jul	77,900	$13,749	$0.18
Aug	78,952	$15,510	$0.20
Sep	83,196	$16,897	$0.20
Oct	68,089	$10,861	$0.16
Nov	51,480	$18,389	$0.36
Dec	53,424	$1,702	$0.03
Totals	**647,367**	**$151,509**	**$0.23**

Figure 4.3.6: Recent Electricity Consumption Plot



It is possible to see more electricity is consumed when the weather is warmer and solar production is not capable of offsetting the existing level of usage. For solar, energy production is at its highest during the warmer months, when the days are longer. During the cooler months, solar energy generation reduces as the days become shorter and production hours diminish.

The huge spike in electricity cost is due to True-Up in the billing for locations with solar. Later, in this section, when we look at each individual site it will be possible to see the individual True-Up charges. PG&E seems to charge roughly $20/month for eleven months, then a large amount in the twelfth month to bring the account up to date. (This is only true for the locations that now produce renewable energy on-site.)

Renewable Energy Generation

As part of this project several renewable energy generation systems were installed around the City. The following figures have been created to detail calculated values of the renewable energy generated by the new PV systems. Unfortunately, we did not receive solar production values, from AES, in time for the submission of this report. As with the other datasets the datapoints for the solar arrays have been reordered to follow the standard monthly order of January thru December.

Figure 4.3.7: Calculated Solar Production Table

Location	Orland	CH/OPD	OFD	Lely	Rec	Well 4	Well 7	WWTP	Corp	Well 5	Pool	Well 8
PV Size		23.47	28.71	38.28	17.4	31.32	60.9	187.92	7.83	46.98	19.575	39.15
Reference Production	Solar Rad	1,172.56	5,004.76	6,807.95	2,967.68	5,402.40	10,414.66	33,184.05	No Data	No Data	No Data	No Data
		3,205.91	5,470.19	7,358.22	3,316.58	5,879.07	7,546.75	35,398.95				
Jan	4,716	1,079.77	1,324.64	1,791.96	794.21	1,426.80	2,783.54	8,678.56	360.23	2,161.39	900.58	1,801.16
Feb	9,029	2,067.28	2,536.08	3,430.80	1,520.56	2,731.67	5,329.21	16,615.50	689.68	4,138.08	1,724.20	3,448.40
Mar	11,382	2,606.02	3,196.99	4,324.88	1,916.82	3,443.55	6,718.03	20,945.57	869.41	5,216.48	2,173.53	4,347.06
Apr	12,943	2,963.42	3,635.45	4,918.02	2,179.71	3,915.82	7,639.38	23,818.18	988.65	5,931.90	2,471.62	4,943.25
May	17,659	4,043.20	4,960.08	6,709.98	2,973.92	5,342.62	10,422.92	32,496.74	1,348.88	8,093.29	3,372.20	6,744.40
Jun	20,886	4,782.05	5,866.49	7,936.16	3,517.37	6,318.93	12,327.60	38,435.18	1,595.37	9,572.25	3,988.44	7,976.87
Jul	20,751	4,751.14	5,828.57	7,884.86	3,494.64	6,278.08	12,247.92	38,186.75	1,585.06	9,510.38	3,962.66	7,925.31
Aug	18,205	4,168.21	5,113.44	6,917.45	3,065.87	5,507.81	10,745.19	33,501.51	1,390.59	8,343.52	3,476.47	6,952.94
Sep	14,005	3,206.58	3,933.74	5,321.55	2,358.56	4,237.12	8,266.21	25,772.52	1,069.77	6,418.62	2,674.43	5,348.85
Oct	11,609	2,657.99	3,260.75	4,411.13	1,955.05	3,512.23	6,852.01	21,363.31	886.75	5,320.51	2,216.88	4,433.76
Nov	6,998	1,602.26	1,965.61	2,659.07	1,178.52	2,117.20	4,130.45	12,877.98	534.54	3,207.25	1,336.35	2,672.71
Dec	3,518	805.48	988.14	1,336.75	592.46	1,064.35	2,076.44	6,473.95	268.72	1,612.33	671.81	1,343.61
Totals	**151,701**	**34,733**	**42,610**	**57,643**	**25,548**	**45,896**	**89,539**	**279,166**	**11,588**	**69,526**	**28,969**	**57,938**

As previously noted, Figure 4.3.7 is a data table containing calculated solar production values. AES was unable to provide us with monitored monthly production values for all of the sites included in this project. Due to equipment failure and IT issues, system monitoring capability is often lost. As the man power is not available to track energy production monthly, this loss of monitoring is not always caught in a timely manner. Once monitoring is regained, the system total starts back up where it left off. This means that, if AES did provide us with data, it would not have been actual production data.

AES's method for calculating monthly generation data is by using recent system efficiency values to calculated annual production, based on the size of the system. This "total" is then separated out, by way of standard average monthly production percentages, to estimate monthly production values. A similar calculation process was used to estimate the monthly and annual production values contained in Figure 4.3.7.

Figure 4.3.8: Solar Calculation Reference Table

Reference Values								
Solar Rad	**Month**	**Year**	**Location**	**Ref Pro**	**Ref Pro**	**η_1**	**η_2**	**η_{Avg}**
			CH/OPD	1,172.56	3,205.91	2.09%	5.12%	7.20%
			OFD	5,004.76	5,470.19	7.29%	7.15%	7.22%
			Lely	6,807.95	7,358.22	7.43%	7.21%	7.32%
			Rec	2,967.68	3,316.58	7.13%	7.15%	7.14%
17,645	May	2020	Well 4	5,402.40	5,879.07	7.21%	7.04%	7.13%
19,668	June	2020	Well 7	10,414.66	-	7.15%	-	7.15%
			WWTP	33,184.05	35,398.95	7.38%	7.06%	7.22%
			Corp	-	-	-	-	7.20%
			Well 5	-	-	-	-	7.20%
			Pool	-	-	-	-	7.20%
			Well 8	-	-	-	-	7.20%
Calculation Factors					0.01162	kWh/m^2	5.017	m^2/panel
					0.430	kW/panel		

The table of reference values, above, were used to estimate system efficiencies. Production values for the month of May and June were pulled from the monitoring portal just before the end of last month (June 2020, May data) and again today (June data) as our view of production data is limited to last month and this month. Solar radiation totals were obtained for May and June of this year, from WRCC. The following

equation was used to calculate system efficiency with respect to the data obtained from the portal.

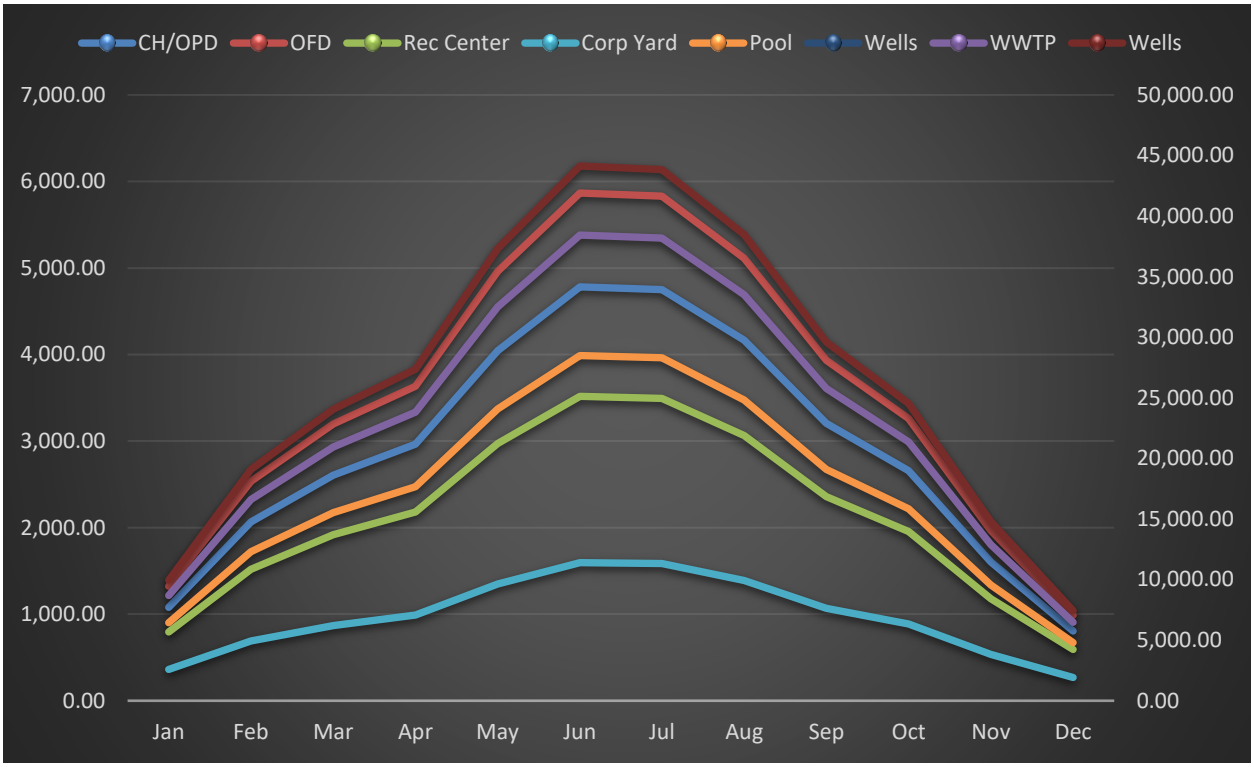
$$\frac{Solar\ Rad[ly] * 0.01162[\frac{kWh}{ly*m^2}] * Size[kW] * 5.017[\frac{m^2}{panel}]}{0.430[\frac{kW}{panel}]} = kWh$$

(Eq. 3)

Equation 3 uses the total solar radiation value of a month to calculate the potential energy production of a PV system that is 100% efficient. In the equation, the solar radiation (ly, "Langley") is multiplied by a conversion factor to convert to $^{kWh}/_{m^2}$. The size of the system is used to estimate the footprint of the system in m^2. Multiplying these terms together results in the 100% efficient energy production of the system. The portal values are divided by the results from Eq. 3 to calculate each system's efficiency. These values can be found in columns η_1 ("eta" sub one) and η_2 ("eta" sub two), in Figure 4.3.8.

The calculated system efficiencies are averaged and detailed in the η_{Avg} column of Figure 4.3.8. It is possible to see that the "Reference Production" values (portal data, Figure 4.3.7) for the City Hall/Orland Police Department system do not align with the calculated efficiencies of the other sites. It is assumed that monitoring capabilities were lost around the beginning of May and not regained until the beginning of June. For this reason, the system efficiencies for CH/OPD and the sites that currently have no monitoring capabilities have been estimated as the average of all other sites, 7.2%. This may seem highly inefficient but solar panel are, at most, just over 30% efficient when new. Factor in the efficiencies of the other system components as well as efficiency losses due to heat, one would be lucky to convert more than 7.5% of solar radiation into usable energy. The following figure plots the calculated production values contained in Figure 4.3.7.

Figure 4.3.9: Calculated Solar Production Plot



In Figure 4.3.9, the energy production data for the WWTP and well sites have been plotted against the right-hand axis, to avoid compressing the other data into indiscernible lines. The data for all of the other locations has been plotted against the left-hand axis. Based on the models for each solar energy generation array, the City was expected to generate 773,229 kWh of renewable energy. The amount of energy actually produced by all of the arrays totals 743,156 kWh. In comparison to the modeled values, the City is producing 96% of the expected energy estimated by the model.

Recent Natural Gas Consumption Analysis

Natural gas usage data for a recent twelve-month period has been analyzed. The data used in this analysis is from the same twelve-month period as the electricity data, April 2019 to March 2020. During this recent twelve-month period, the City burned through 7,314 therms of natural gas. The City paid $7,561 for the consumed natural gas. Based

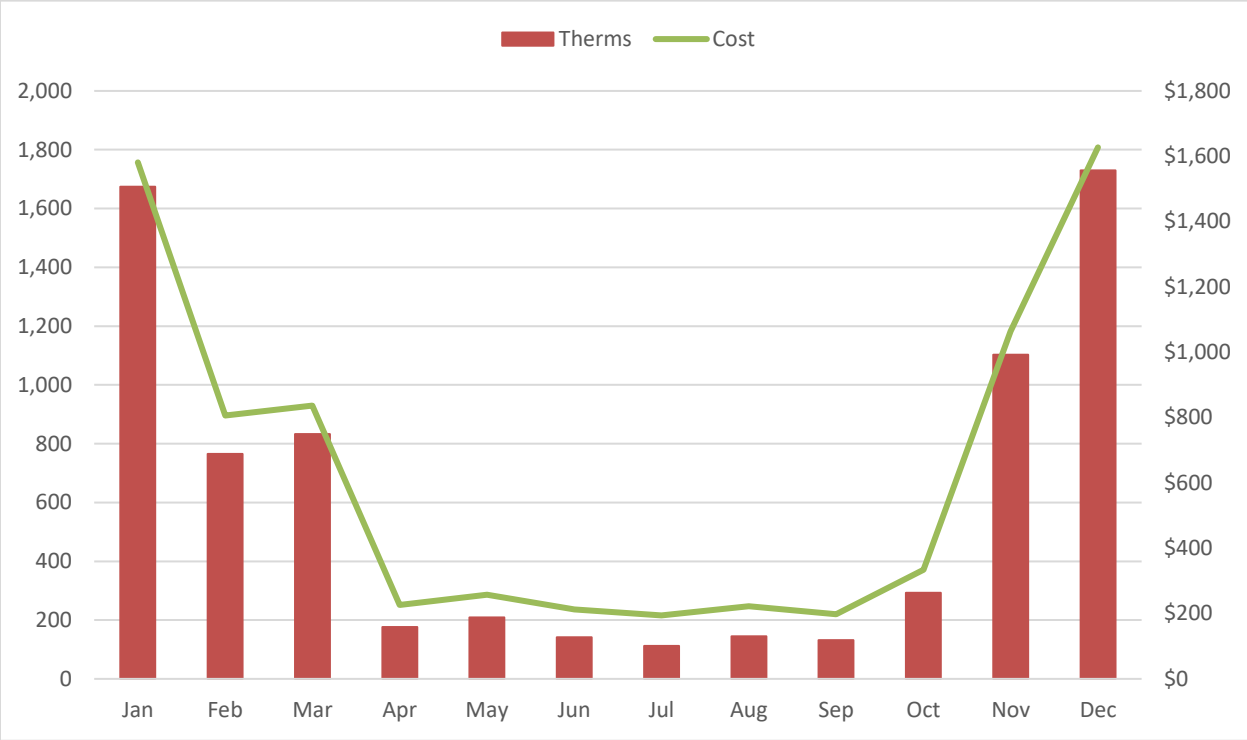
on this data the corresponding supply rate of $1.03/therms was calculated by dividing the cost by the usage. The following table breaks down the City's natural gas usage by month. Please note that the data was rearranged to present it in the order of January thru December.

Figure 4.3.10: Recent Natural Gas Consumption Table

Month	Therms	Cost	Rate
Jan	1,674	$1,581	$0.94
Feb	765	$806	$1.05
Mar	833	$837	$1.00
Apr	176	$226	$1.29
May	209	$257	$1.23
Jun	142	$212	$1.49
Jul	112	$194	$1.73
Aug	145	$223	$1.54
Sep	132	$198	$1.50
Oct	293	$334	$1.14
Nov	1,103	$1,064	$0.96
Dec	1,730	$1,627	$0.94
Totals	**7,314**	**$7,561**	**$1.03**

It is possible to see from Figure 4.3.10 (and Figure 4.3.11) that the City's natural gas usage profile has not changed, from the baseline period. The City consumes more natural gas during the colder months of the year. This increase in gas consumption is due to fluid heating requirements associated with water and HVAC systems. The following figure, Figure 4.3.11, plots the data contained in the table above for visual representation, and ease of understanding.

Figure 4.3.11: Recent Natural Gas Consumption Plot



Energy Consumption Comparison

This section will compare the baseline energy usage to the post-project usage. Ideally the analyzed twelve-month periods should begin and end on the same months for easier comparison, but the data received does not conform to this ideality. The data used in this comparison has been rearranged to be ordered from January to December. The following table summarizes the findings of the energy consumption comparison between the baseline period and the recent twelve-month period.

It is possible to see that comparing energy bill to energy bill, there is tangible energy and monetary savings (815,006 kWh and $167,981, respectively). Although, the table also shows that the utility and solar data combine to a recent energy consumption total that is only slightly lower than that of the baseline, roughly 72,000 kWh less. Examining the Recent block of Figure 4.3.12 shows that most sites have not reduced energy

consumption as much as expected. Additionally, it is possible to see that the OFD and Corp Yard consumed more energy during the recent period than they did during the baseline period. To better understand the changes in energy consumption each facility should be analyzed individually.

Figure 4.3.12: Energy Comparison Summary Table

Electricity Consumption Comparison											
Location	Baseline			Recent				Recent Total		Savings	
	kWh	Cost	Rate	kWh	Solar	Cost	Rate	kWh	ΔUse	kWh	Cost
CH/OPD	62,739	$13,418	$0.21	25,906	34,733	$6,291.64	$0.10	60,639	-2,100	36,833	$7,126
OFD	57,834	$12,927	$0.22	19,686	42,610	$4,200.51	$0.07	62,296	4,462	38,148	$8,726
Library	38,624	$8,774	$0.23	38,307	-	$9,815.74	$0.26	38,307	-317	317	-$1,042
Carnegie	16,935	$3,465	$0.20	9,603	-	$2,400.91	$0.25	9,603	-7,332	7,332	$1,064
Tennis	7,480	$1,584	$0.21	2,222	-	$555.40	$0.25	2,222	-5,258	5,258	$1,029
Pool	38,509	$11,499	$0.30	7,194	28,969	$5,804.90	$0.16	36,163	-2,346	31,315	$5,694
Corp	18,069	$4,002	$0.22	7,133	11,588	$1,979.18	$0.11	18,721	652	10,936	$2,023
Rec Center	30,911	$6,629	$0.21	-5,096	25,548	$333.72	$0.02	20,452	-10,459	36,007	$6,295
WWTP	374,908	$81,559	$0.22	53,250	279,166	$4,645.81	$0.01	332,416	-42,492	321,658	$76,913
Wells	672,124	$141,045	$0.21	483,904	320,542	$114,452.16	$0.14	804,446	132,322	188,220	$26,593
Totals	**1,318,133**	**$284,902**	**$0.22**	**642,109**	**743,156**	**$150,480**	**$0.11**	**1,385,265**	**67,132**	**676,024**	**$134,422**

Natural Gas Consumption Comparison								
Location	Baseline			Recent				Savings
	Therms	Cost	Rate	Therms	Cost	Rate		Therms	Cost
OFD	1,540	$1,526	$0.99	1,558	$1,089	$0.70		-18	$437
Corp	1,271	$1,319	$1.04	1,843	$1,688	$0.92		-572	-$368
Totals	**2,811**	**$2,845**	**$1.01**	**3,401**	**$2,776**	**$0.82**		**-590**	**$69**

Energy Consumption Comparison, by Site

Energy consumption, for each facility, is to be analyzed by comparing the baseline and recent consumption data to one another. The purpose of this analysis is to see how the project panned out on an individual location basis. This focused comparison will help identify areas of greater or less savings than expected, and areas of future savings potential. Please note that as all the well sites feed the City's water system, they will be analyzed as a group; comparing energy consumption at each site, individually, would result large shifts in energy consumption that would make little to no sense on their own. By combining the well sites together, the analysis effectively considers the energy required to move water around the City.

City Hall & Orland Police Department

The energy data obtained from PG&E for both the baseline and recent analysis periods, and renewable energy generation data have been used to create the following table and plot. It is possible to see, in Figure 4.3.13, that the City Hall & Orland Police Department building has reduced energy consumption by 3.35%. The lighting in the building is operating on the same schedule as before, so the energy savings from the LED replacements has been obtained. It is assumed that HVAC system runtime is responsible for a majority of the energy consumption at this facility.

Figure 4.3.13: CH/OPD Energy Savings Breakdown

Baseline				Recent			Solar	Total		Savings	
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	kWh	ΔUse	kWh	Cost
Jan	4,215	$806.49	$0.19	2,224	$24.64	$0.01	1,080	3,304	-911	1,991	$782
Feb	3,850	$777.73	$0.20	1,522	$26.28	$0.02	2,067	3,589	-261	2,328	$751
Mar	4,127	$680.28	$0.16	455	$24.64	$0.05	2,606	3,061	-1,066	3,672	$656
Apr	4,939	$811.08	$0.16	999	$19.72	$0.02	2,963	3,962	-977	3,940	$791
May	5,245	$1,214.21	$0.23	1,605	$21.03	$0.01	4,043	5,648	403	3,640	$1,193
Jun	6,982	$1,674.61	$0.24	3,382	$19.71	$0.01	4,782	8,164	1,182	3,600	$1,655
Jul	7,527	$1,797.75	$0.24	3,979	$19.71	$0.00	4,751	8,730	1,203	3,548	$1,778
Aug	6,723	$1,616.65	$0.24	2,751	$21.03	$0.01	4,168	6,919	196	3,972	$1,596
Sep	5,901	$1,409.84	$0.24	1,468	$19.06	$0.01	3,207	4,675	-1,226	4,433	$1,391
Oct	5,386	$1,286.41	$0.24	3,365	$20.04	$0.01	2,658	6,023	637	2,021	$1,266
Nov	3,897	$702.55	$0.18	1,937	$6,051.14	$3.12	1,602	3,539	-358	1,960	-$5,349
Dec	3,947	$639.93	$0.16	2,219	$24.64	$0.01	805	3,024	-923	1,728	$615
Totals	**62,739**	**$13,418**	**$0.21**	**25,906**	**$6,292**	**$0.24**	**34,733**	**60,639**	**-2,100**	**36,833**	**$7,126**

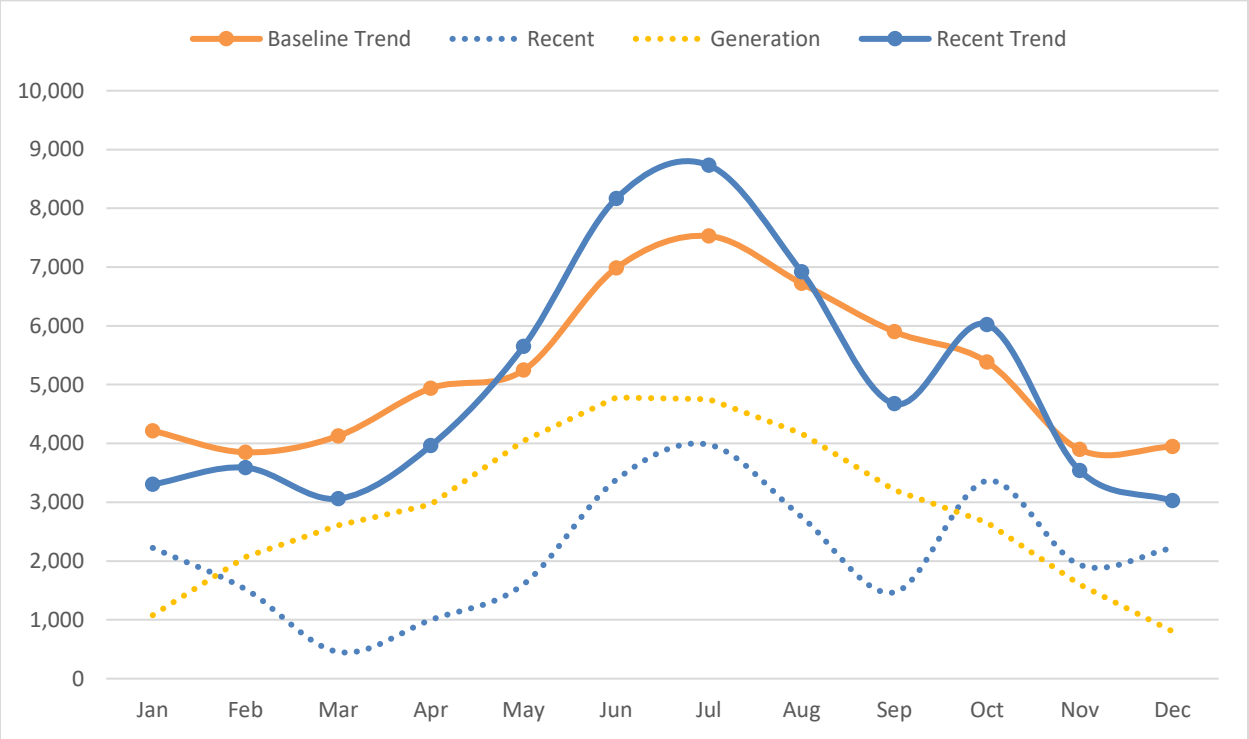
In the table above, the baseline utility data is compared to the recent, twelve-month, utility data to calculate the utility bill savings. It is possible to see that according the PG&E bills the CH/OPD building has reduced billable energy consumption by 36,833 kWh. This reduction equates out to an annual energy bill that is $7,100 less than the baseline period bills.

The Totals block of the table combines the recent utility data with the estimated solar production values to calculate all the energy used on-site. Note that the renewable energy generated on-site is consumed at the time of production, and the excess is sent back to the grid, which is reflected in the kWh column of the Recent block. Should more

energy be generated than consumed, these values will go negative. The True-Up in the data is associated with the billed values, which can be seen in the month of November.

The following figure plots all the energy data against one another to help visualize the data contained in Figure 4.3.13. The recent PG&E data and solar data have been plotted as dotted lines as they combine to equal the actual amount of energy consumed by the facility. For the most part, the facility now consumes less energy on a monthly basis than it did in the baseline period; although, there are a few times during the year the where recent energy consumption exceeds that used during the baseline period. Most of these occurrences are visible during the warmer months of the year.

Figure 4.3.14: CH/OPD Energy Comparison Plot



Orland Fire Department

The energy data obtained from PG&E for both the baseline and recent analysis periods, and calculated renewable energy generation data have been used to create the following tables and plots. The Orland Fire Department consumed 7.72% more

electricity and 1.17% more natural gas during the recent twelve-month period than they did in the baseline period. It is assumed that regular staff schedules and additional HVAC system usage have affected energy consumption at this facility. The following figure details this facility's energy consumption comparing the baseline and recent periods.

Figure 4.3.15: OFD Energy Savings Breakdown

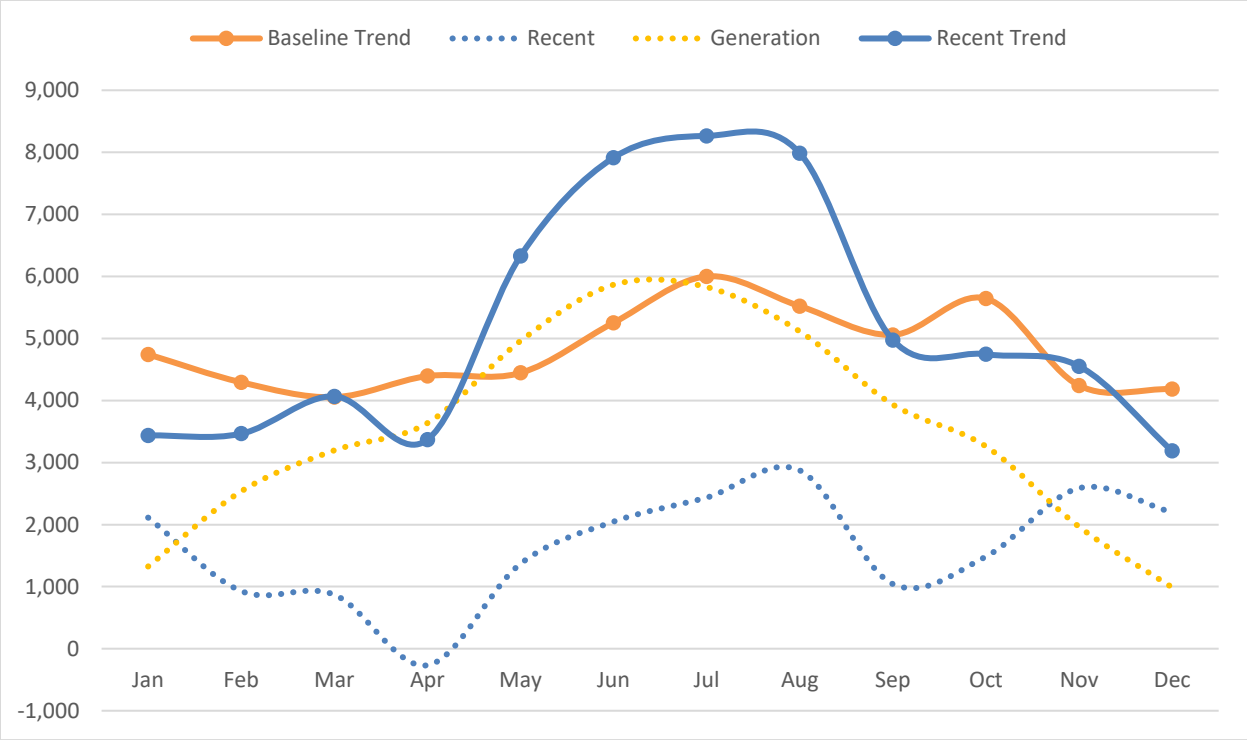
Baseline				Recent			Solar	Total		Savings	
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	kWh	ΔUse	kWh	Cost
Jan	4,744	$792.29	$0.17	2,113	$24.64	$0.01	1,325	3,438	-1,306	2,631	$768
Feb	4,294	$805.54	$0.19	929	$26.28	$0.03	2,536	3,465	-829	3,365	$779
Mar	4,054	$707.27	$0.17	871	$24.64	$0.03	3,197	4,068	14	3,183	$683
Apr	4,394	$740.37	$0.17	-267	$19.72	-$0.07	3,635	3,368	-1,026	4,661	$721
May	4,445	$1,077.12	$0.24	1,369	$21.03	$0.02	4,960	6,329	1,884	3,076	$1,056
Jun	5,254	$1,334.32	$0.25	2,048	$19.71	$0.01	5,866	7,914	2,660	3,206	$1,315
Jul	6,000	$1,652.01	$0.28	2,436	$19.71	$0.01	5,829	8,265	2,265	3,564	$1,632
Aug	5,521	$1,487.68	$0.27	2,874	$21.03	$0.01	5,113	7,987	2,466	2,647	$1,467
Sep	5,058	$1,292.21	$0.26	1,042	$19.06	$0.02	3,934	4,976	-82	4,016	$1,273
Oct	5,644	$1,459.73	$0.26	1,485	$20.04	$0.01	3,261	4,746	-898	4,159	$1,440
Nov	4,242	$827.95	$0.20	2,587	$3,960.01	$1.53	1,966	4,553	311	1,655	-$3,132
Dec	4,184	$750.63	$0.18	2,199	$24.64	$0.01	988	3,187	-997	1,985	$726
Totals	**57,834**	**$12,927**	**$0.22**	**19,686**	**$4,201**	**$0.21**	**42,610**	**62,296**	**4,462**	**38,148**	**$8,727**

The Totals block of the table combines the recent utility data with the estimated solar production values to calculate all the energy used on-site. Note that the renewable energy generated on-site is consumed at the time of production, and the excess is sent back to the grid, which is reflected in the kWh column of the Recent block. Should more energy be generated than consumed, these values will go negative. The true up in the data is associated with the billed values, which can be seen in the month of November.

Looking at the table above, April 2019 is a good example of how the PG&E data will go negative when the energy generated on-site is greater than the energy consumed. Figure 4.3.15 shows that the OFD has reduced its billable energy consumption by more than 38,000 kWh. This reduction resulted in the City paying $8,727 less during the recent analysis period for energy consumed at the Fire Department. This is significant considering the facility has increased its operating schedule.

The following figure plots the data contained in Figure 4.3.15 for ease of understanding. It is possible to see from the plot (Figure 4.3.16) that almost all of the increased energy consumption occurred during the warmer months of the year. I is evident from this plot that our assumed cause for increased energy consumption is associated with HVAC system usage.

Figure 4.3.16: OFD Energy Comparison Plot



The scope of work at the OFD included a measure to replace two outdated unit heaters with a custom IR heating system. For this reason, a natural gas consumption comparison has been included for this facility. Figure 4.3.17, breaks down the Fire Department's natural gas consumption by month, and compares the baseline usage to that of the recent twelve-month period.

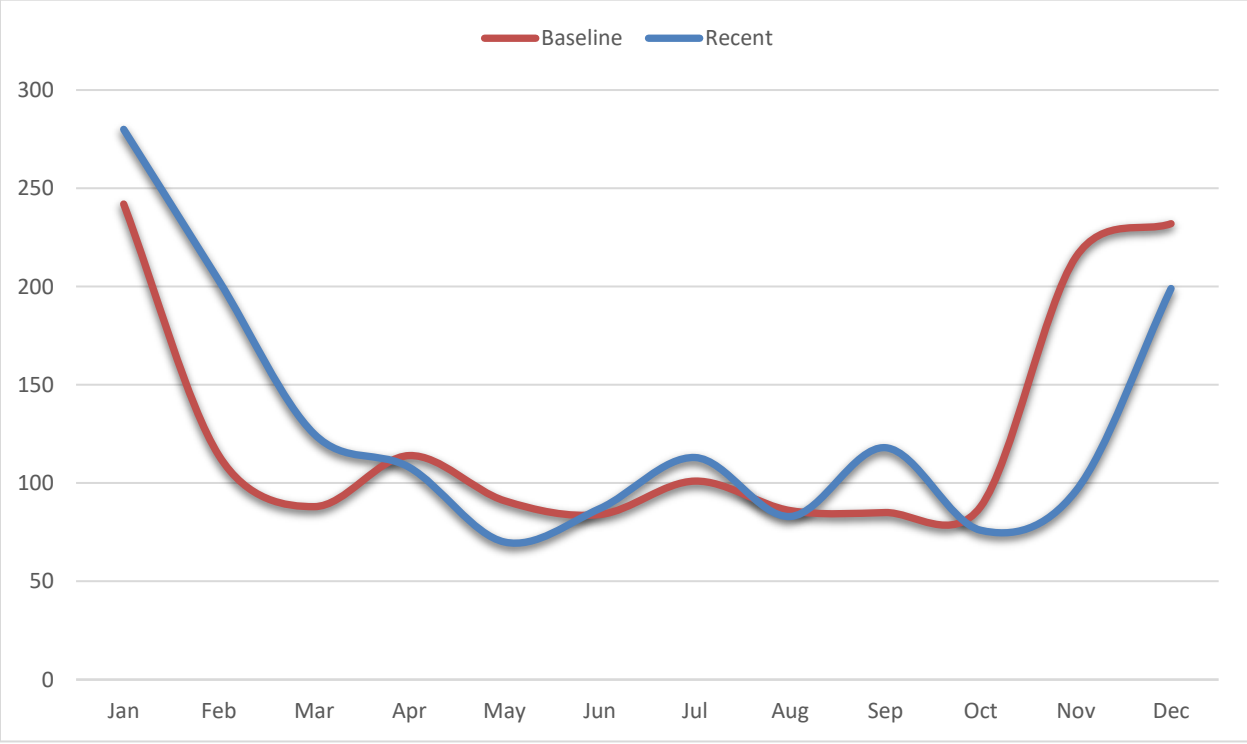
It is possible to see from the table below that natural gas consumption has increased from the baseline period to the recent twelve-month period. According to the data obtained from PG&E the Fire Department burned 18 therms more in the recent period than they did during the baseline period. Due to the decrease in utility supply rate, even

with the increase in natural gas consumption, the City paid $437 dollars less during the recent period when compared to the baseline period.

Figure 4.3.17: OFD Natural Gas Consumption Table

Month	Baseline			Recent			Savings	
	Therms	Cost	Rate	Therms	Cost	Rate	Therms	Cost
Jan	242	$253.43	$1.05	280	$128.82	$0.46	-38	$125
Feb	114	$120.93	$1.06	203	$0.00	$0.00	-89	$121
Mar	88	$93.47	$1.06	125	$26.37	$0.21	-37	$67
Apr	114	$102.68	$0.90	108	$34.90	$0.32	6	$68
May	91	$84.42	$0.93	70	$68.05	$0.97	21	$16
Jun	84	$82.12	$0.98	87	$81.84	$0.94	-3	$0
Jul	101	$94.41	$0.93	113	$107.56	$0.95	-12	-$13
Aug	86	$84.53	$0.98	83	$87.36	$1.05	3	-$3
Sep	85	$78.64	$0.93	118	$117.31	$0.99	-33	-$39
Oct	88	$83.94	$0.95	76	$78.97	$1.04	12	$5
Nov	215	$214.37	$1.00	96	$110.03	$1.15	119	$104
Dec	232	$233.02	$1.00	199	$247.30	$1.24	33	-$14
Totals	**1,540**	**$1,526**	**$0.99**	**1,558**	**$1,089**	**$0.70**	**-18**	**$437**

Figure 4.3.18: OFD Natural Gas Consumption Plot



The usage profiles seen in Figure 4.3.18, above, show that the baseline and recent analysis periods match one another, with little variation. The additional consumption has been attributed mostly to the temperature differences between the baseline and recent periods. It is assumed that the colder weather of the recent twelve-month period led to an increase in space heating requirements. It should be noted that a majority of occupant time is spent in the office area of the building (served by package units) and not the garage area (served by the IR heating systems).

Carnegie Hall

The energy data obtained from PG&E for both the baseline and recent analysis periods have been used to create the following figures. Looking at the table below, it is possible to see that the Carnegie building has reduced energy consumption by roughly 43%. The following table details the energy consumption of this location for both the baseline and recent periods.

Figure 4.3.19: Carnegie Energy Savings Breakdown

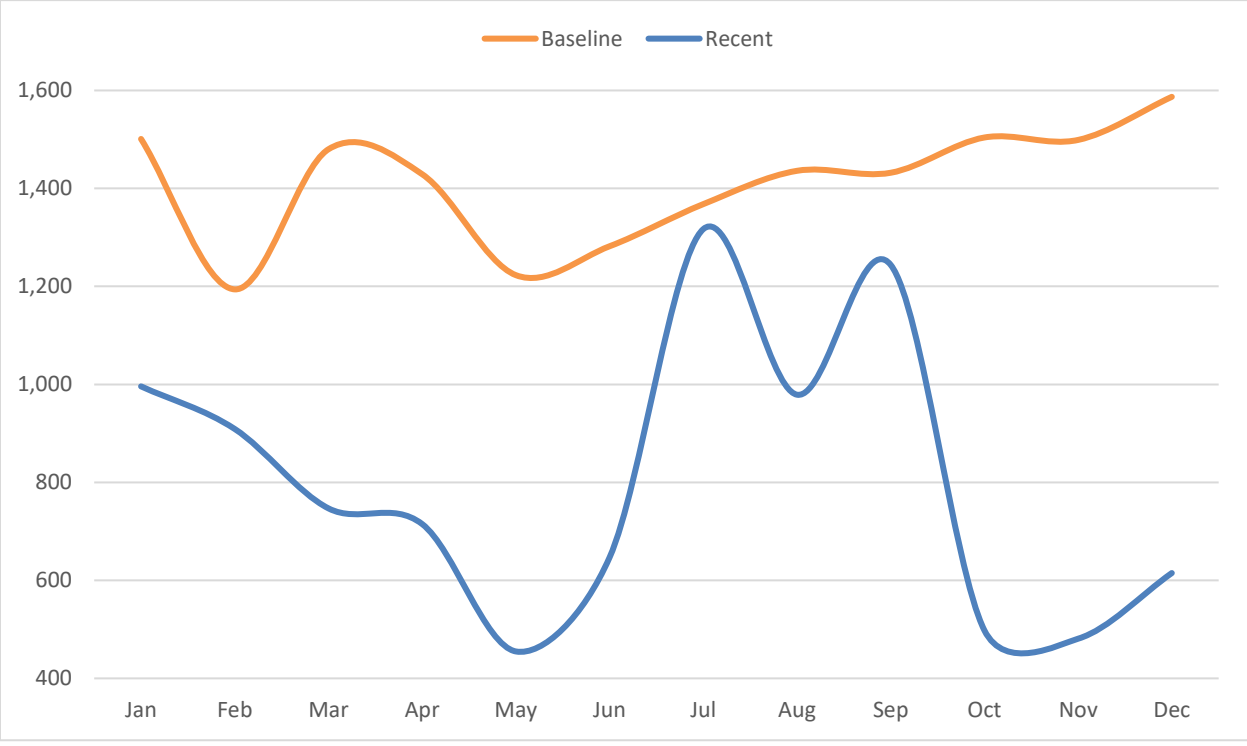
	Baseline			Recent			Savings	
Month	**kWh**	**Cost**	**Rate**	**kWh**	**Cost**	**Rate**	**kWh**	**Cost**
Jan	1,501	$289.51	$0.19	996	$240.63	$0.24	505	$49
Feb	1,194	$240.72	$0.20	909	$220.42	$0.24	285	$20
Mar	1,480	$241.32	$0.16	747	$181.71	$0.24	733	$60
Apr	1,429	$232.89	$0.16	715	$174.53	$0.24	714	$58
May	1,223	$280.13	$0.23	455	$110.44	$0.24	768	$170
Jun	1,282	$306.59	$0.24	647	$159.64	$0.25	635	$147
Jul	1,368	$326.77	$0.24	1,317	$337.28	$0.26	51	-$11
Aug	1,436	$340.98	$0.24	979	$244.59	$0.25	457	$96
Sep	1,432	$336.53	$0.24	1,244	$326.35	$0.26	188	$10
Oct	1,504	$351.82	$0.23	498	$129.30	$0.26	1,006	$223
Nov	1,499	$262.42	$0.18	481	$124.71	$0.26	1,018	$138
Dec	1,587	$255.62	$0.16	615	$151.31	$0.25	972	$104
Totals	**16,935**	**$3,465**	**$0.20**	**9,603**	**$2,401**	**$0.25**	**7,332**	**$1,064**

In the table above, the baseline utility data is compared to the recent, twelve-month, utility data to calculate the utility bill savings. It is possible to see that according the PG&E bills the Carnegie building has reduced billable energy consumption by 7,332 kWh. This reduction equates out to an annual energy bill that is $1,064 less than the baseline period bills.

The negative eleven dollars in the Savings block of the table shows that while less energy was used during the recent month of July, it still cost the City $11 more than in the baseline period. This is due to the five-cent average electricity supply rate increase. No renewable energy generation project was undertaken at this facility. For this reason, the recent PG&E data is representative of the facility's new energy usage.

The following figure plots the baseline and recent energy profiles against one another to help visualize the data contained in figure 4.3.19. The energy consumption profile for this location did not follow a typical weather-dependent profile, due to the way this facility is used. It now seems as though energy consumption at this facility follows a more typical sinusoidal profile. This suggests that the lighting is not only reducing energy consumption, but it is better controlled. The peaks in the energy data are found during the warmer and cooler months of the year suggesting increased HVAC usage to satisfy occupant comfort requirements.

Figure 4.3.20: Carnegie Energy Comparison Plot



Library & Library Park

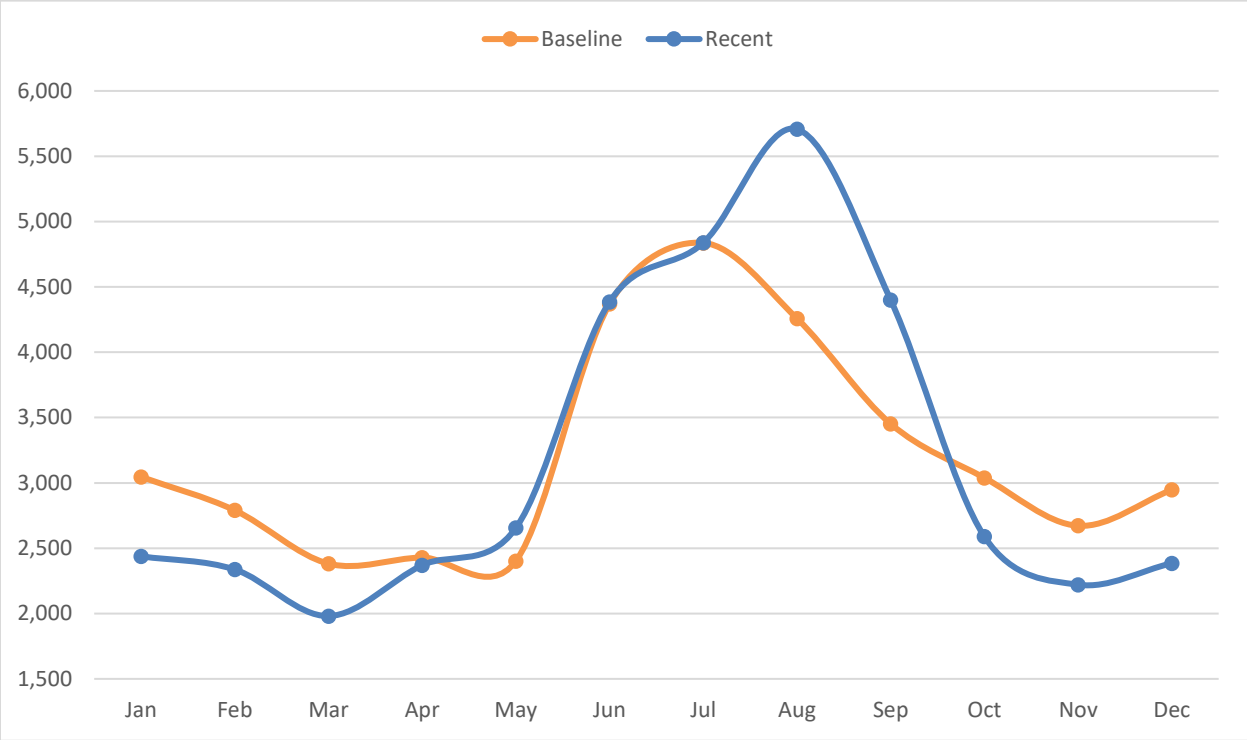
The energy data obtained from PG&E for both the baseline and recent analysis periods has been used to create the following tables and plots. The following table compares electricity consumption for this location for the baseline period and a recent twelve-month period. From this energy comparison, it is possible to see that the Library & Library Park have reduced their energy consumption by a little less than 1%. Increased facility usage and excess HVAC system usage are assumed to be the root causes of the lacking energy savings.

Figure 4.3.21: Library/Library Park Energy Savings Breakdown

	Baseline			Recent			Savings	
Month	**kWh**	**Cost**	**Rate**	**kWh**	**Cost**	**Rate**	**kWh**	**Cost**
Jan	3,046	$611.84	$0.20	2,438	$600.12	$0.25	608	$12
Feb	2,790	$587.93	$0.21	2,337	$578.69	$0.25	453	$9
Mar	2,382	$424.11	$0.18	1,981	$493.43	$0.25	401	-$69
Apr	2,429	$433.94	$0.18	2,370	$556.17	$0.23	59	-$122
May	2,402	$573.08	$0.24	2,655	$689.08	$0.26	-253	-$116
Jun	4,370	$1,178.92	$0.27	4,386	$1,154.41	$0.26	-16	$25
Jul	4,837	$1,346.50	$0.28	4,838	$1,266.89	$0.26	-1	$80
Aug	4,258	$1,309.91	$0.31	5,707	$1,488.65	$0.26	-1,449	-$179
Sep	3,452	$1,082.97	$0.31	4,400	$1,154.78	$0.26	-948	-$72
Oct	3,039	$203.54	$0.07	2,589	$698.17	$0.27	450	-$495
Nov	2,672	$512.16	$0.19	2,221	$556.38	$0.25	451	-$44
Dec	2,947	$509.23	$0.17	2,385	$578.97	$0.24	562	-$70
Totals	**38,624**	**$8,774**	**$0.23**	**38,307**	**$9,816**	**$0.26**	**317**	**-$1,042**

According to the PG&E bills the Library & Library Park have reduced billable energy consumption by 317 kWh. Unfortunately, since the City now pays more for electricity this reduction in energy consumption equates out to an additional $1,042 more than the baseline period bills. The large dollar amount compared to the energy usage points to demand and/or peak time usage; demand charges and peak usage both cause energy bills to increase greatly in a short amount of time. The following figure plots the data from Figure 4.3.21 for visual representation and ease of comparison.

Figure 4.3.22: Library/Library Park Energy Consumption Plot

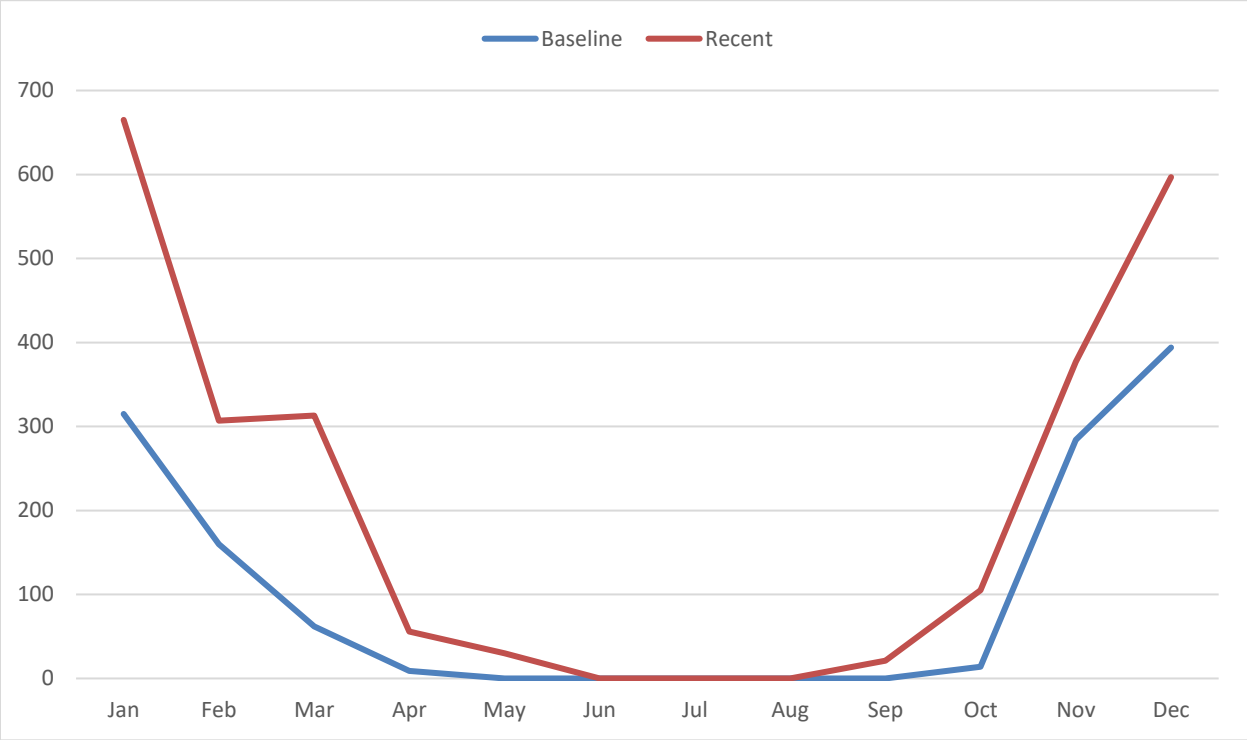


The electricity profile for this facility has not changed from the baseline period to the recent period. Since this facility uses energy the same way, they are simply using more of it. Increased facility and HVAC system operation are the most common contributors in such cases. The assumption of increased HVAC system runtime is supported by the steady rise in energy consumption in the plot, for the warmer months of the year, and the natural gas data for the Library (see the following natural gas consumption analysis). The following table and plot detail the Library's natural gas consumption for both the baseline period and the recent period.

Figure 4.3.23: Library/Library Park Natural Gas Breakdown

Month	Baseline			Recent			Savings	
	Therms	Cost	Rate	Therms	Cost	Rate	Therms	Cost
Jan	315	$325.00	$1.03	665	$581.39	$0.87	-350	-$256
Feb	160	$163.40	$1.02	307	$292.77	$0.95	-147	-$129
Mar	62	$70.31	$1.13	313	$298.57	$0.95	-251	-$228
Apr	9	$23.46	$2.61	56	$68.17	$1.22	-47	-$45
May	0	$15.63	Less Than 1 Therm	30	$51.74	$1.72	-30	-$36
Jun	0	$15.11	Less Than 1 Therm	0	$28.65	Less Than 1 Therm	0	-$14
Jul	0	$16.67	Less Than 1 Therm	0	$28.64	Less Than 1 Therm	0	-$12
Aug	0	$15.63	Less Than 1 Therm	0	$30.56	Less Than 1 Therm	0	-$15
Sep	0	$15.11	Less Than 1 Therm	21	$41.86	$1.99	-21	-$27
Oct	14	$26.06	$1.86	105	$103.04	$0.98	-91	-$77
Nov	284	$277.64	$0.98	377	$334.12	$0.89	-93	-$56
Dec	394	$384.82	$0.98	597	$513.49	$0.86	-203	-$129
Totals	**1,238**	**$1,349**	**$1.09**	**2,471**	**$2,373**	**$0.96**	**-1,233**	**-$1,024**

Figure 4.3.24: Library/Library Park Natural Gas Consumption Plot



As with the electricity, the energy consumption profile has not changed between the baseline to the recent period. Again, as this facility does not have showers or systems that would potential require large amounts of hot water, the increased natural gas consumption can only be attributed to increased HVAC system runtime.

City Pool

The energy data obtained from PG&E for both the baseline and recent analysis periods, and calculated renewable energy generation data have been used to create the following table and plot. It is possible to see that the City Pool facility has reduced energy consumption by 6.09%. The following table details the site's energy consumption and calculated production data.

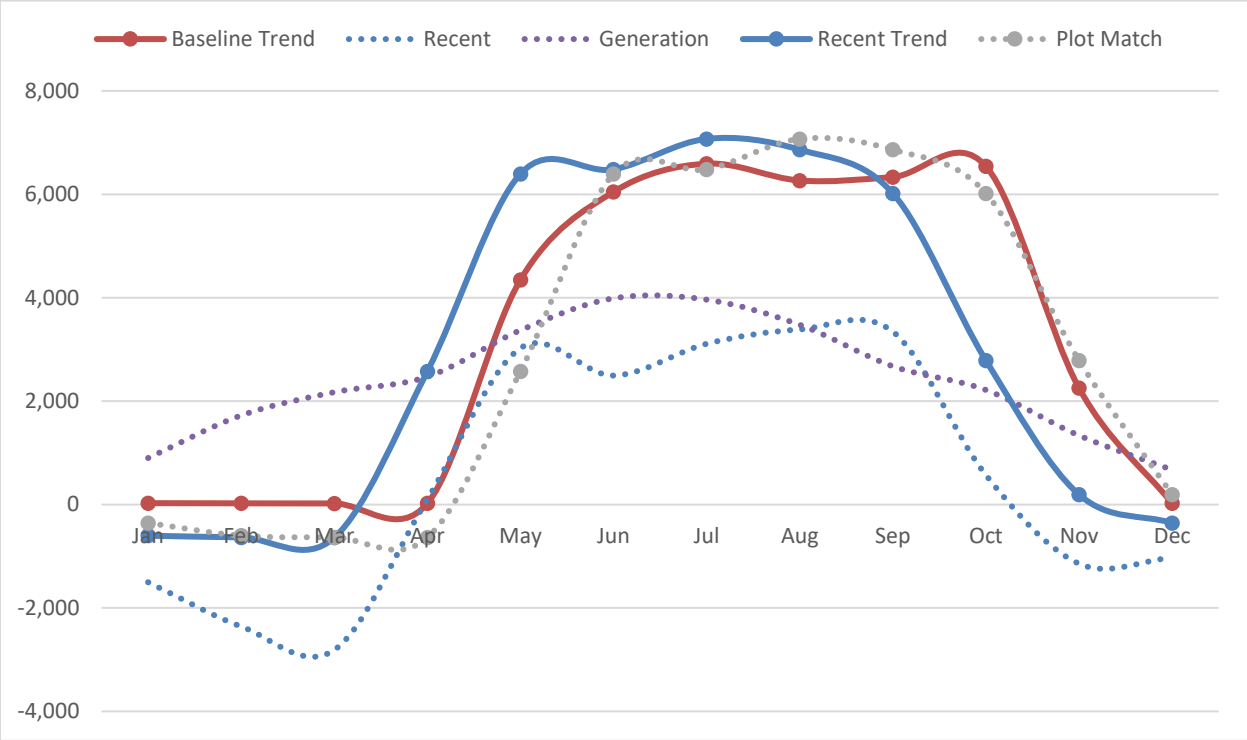
Figure 4.3.25: Pool Energy Savings Breakdown

Baseline				Recent			Solar	Total		Savings	
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	kWh	ΔUse	kWh	Cost
Jan	28	$26.44	$0.94	-1,502	$9.78	-$0.01	901	-601	-629	1,530	$17
Feb	24	$24.00	$1.00	-2,358	-$80.57	$0.03	1,724	-634	-658	2,382	$105
Mar	22	$22.47	$1.02	-2,812	-$111.56	$0.04	2,174	-638	-660	2,834	$134
Apr	24	$24.78	$1.03	106	$486.29	$4.59	2,472	2,578	2,554	-82	-$462
May	4,348	$1,281.17	$0.29	3,025	$995.10	$0.33	3,372	6,397	2,049	1,323	$286
Jun	6,048	$1,852.37	$0.31	2,495	$857.19	$0.34	3,988	6,483	435	3,553	$995
Jul	6,593	$1,946.51	$0.30	3,110	$933.68	$0.30	3,963	7,073	480	3,483	$1,013
Aug	6,267	$1,920.65	$0.31	3,387	$1,031.27	$0.30	3,476	6,863	596	2,880	$889
Sep	6,335	$1,893.45	$0.30	3,344	$1,030.76	$0.31	2,674	6,018	-317	2,991	$863
Oct	6,542	$1,908.24	$0.29	570	$581.87	$1.02	2,217	2,787	-3,755	5,972	$1,326
Nov	2,253	$575.64	$0.26	-1,143	$27.81	-$0.02	1,336	193	-2,060	3,396	$548
Dec	25	$23.58	$0.94	-1,028	$43.28	-$0.04	672	-356	-381	1,053	-$20
Totals	**38,509**	**$11,499**	**$0.30**	**7,194**	**$5,805**	**$0.81**	**28,969**	**36,163**	**-2,346**	**31,315**	**$5,694**

In Figure 4.3.25, the baseline utility data is compared to the recent, twelve-month, utility data to calculate the utility bill savings. The table above shows that the pool facility has reduced billable energy consumption by 31,315 kWh. This reduction equates out to an annual energy bill that is $5,694 less than the baseline period bills.

The Totals block of the table combines the recent utility data with the estimated solar production values to calculate all the energy used on-site. Note that the renewable energy generated on-site is consumed at the time of production, and the excess is sent back to the grid, which is reflected in the kWh column of the Recent block. Should more energy be generated than consumed, these values will go negative. The following plot visually details the data contained in Figure 4.3.25

Figure 4.3.26: City Pool Energy Savings Plot



The recent PG&E data and calculated solar data have been plotted as dotted lines and combine to equal the actual amount of energy consumed by the facility represented by the Recent Trend line. It is possible to see from the plot that the swimming season started and ended a month earlier in the recent year, when compared to the baseline. A grey dotted Plot Match line has been added to the figure to match the facility's active seasons. It is possible to see that the energy usage profile for this facility has not changed, but the total consumption has decreased. It is assumed that the lighting runtimes have not changed and energy savings for those systems have been obtained. An increased energy consumption is most likely due to water movement and processing.

Tennis Courts (Vinsonhaler Park)

As previously stated, the utility data received from PG&E for the tennis courts was incomplete and believed to be for the wrong facility. For this reason, the recent electricity usage for this site was calculated based on the difference between the

existing fixtures and the new fixtures, using the same runtime hours (based on the baseline energy data). The following method was used to calculate the estimated energy consumption for the recent period.

$$\sum(Qty_i * kW_i) * Runtime[hrs] = kWh \quad \text{(Eq. 4)}$$

$$\frac{kWh}{\sum(Qty_i * kW_i)} = Runtime[hrs] \quad \text{(Eq.5)}$$

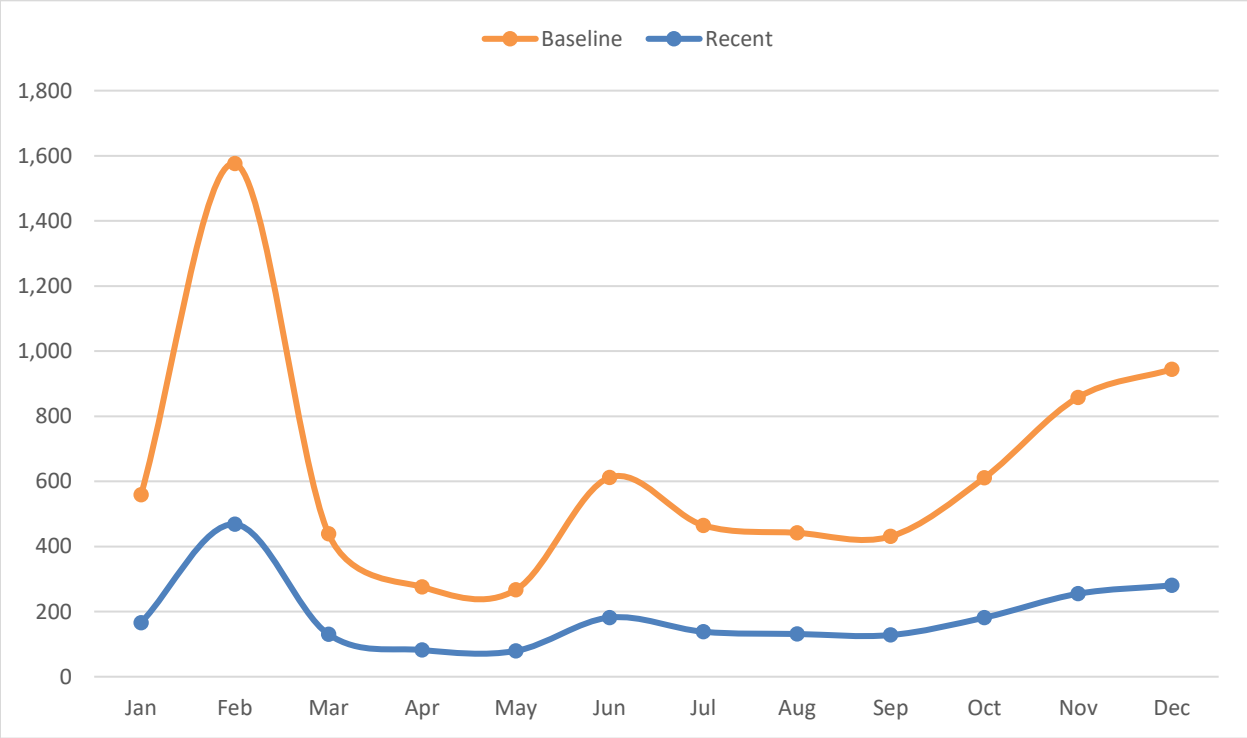
Equation 4 can be used to calculate the total energy used by a group of lighting as long as they all have the same amount of runtime. The lighting at the tennis courts are controlled manually, by way of a timer switch. By summing up the total power input required to run the lighting at the courts and multiplying by the runtime it is possible to calculate the total amount of energy used to run the lighting for that duration of time. Eq. 4 can be algebraically manipulated to produce Eq. 5, which can be used to calculated the runtime of the lighting.

The monthly energy totals found in the Baseline kWh column of Figure 4.3.27 were used to calculate the monthly runtime hours, for the existing lighting. The power requirements of the new lighting were summed and multiplied by the calculated runtime to find the monthly energy consumption of the new lighting. This calculation assumes no change in the runtime between the baseline and recent periods. The following table details the electricity consumption data for the baseline period and compares it to the calculated recent period.

Figure 4.3.27: Tennis Court Electricity Savings Breakdown

Baseline				Recent			Savings	
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	Cost
Jan	559	$106.98	$0.19	166	$41.51	$0.25	-$392.97	-$65.47
Feb	1,576	$295.06	$0.19	468	$117.02	$0.25	-$1,107.92	-$178.04
Mar	439	$79.49	$0.18	130	$32.60	$0.25	-$308.61	-$46.89
Apr	276	$61.85	$0.22	82	$20.49	$0.25	-$194.03	-$41.36
May	267	$59.84	$0.22	79	$19.83	$0.25	-$187.70	-$40.01
Jun	612	$155.49	$0.25	182	$45.44	$0.25	-$430.23	-$110.05
Jul	465	$119.69	$0.26	138	$34.53	$0.25	-$326.89	-$85.16
Aug	442	$114.57	$0.26	131	$32.82	$0.25	-$310.72	-$81.75
Sep	431	$111.71	$0.26	128	$32.00	$0.25	-$302.99	-$79.71
Oct	611	$153.38	$0.25	181	$45.37	$0.25	-$429.53	-$108.01
Nov	858	$167.18	$0.19	255	$63.71	$0.25	-$603.17	-$103.47
Dec	944	$158.94	$0.17	280	$70.09	$0.25	-$663.63	-$88.85
Totals	**7,480**	**$1,584**	**$0.21**	**2,222**	**$555**	**$0.25**	**-5,258**	**-$1,029**

Figure 4.3.28: Tennis Court Electricity Consumption Plot



The estimated energy savings for the Tennis Courts is 5,258 kWh of electricity. The cost associated with the calculated electricity consumption was calculated using the average rate at which the City purchases electricity for PG&E. The difference between this calculated value and the baseline energy cost is the savings. Based on the calculations,

the City has saved $1,029 on electricity at the tennis courts. The figure above (Figure 4.3.28) plots the data contained in Figure 4.3.27. The energy consumption profiles are identical due to the runtime being calculated based on the baseline data. The only difference between the two lines is the amount of energy consumed by the lighting.

Corporation Yard

The energy data obtained from PG&E for both the baseline and recent analysis periods, and the calculated renewable energy generation data has been used to create the following tables and plots. Over the course of the recent twelve-month period the Corp Yard has increased energy consumption by 3.61% for electricity and 45% for natural gas. The following table details the site's electricity consumption, comparing the baseline and recent periods.

Figure 4.3.29: Corp Yard Energy Savings Breakdown

Baseline				Recent			Solar		Total		Savings			
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	kWh*	kWh	ΔUse	kWh	Cost	kWh*	Cost*
Jan	1,334	$271.73	$0.20	725	$26.28	$0.04	360	2,161	1,085	-249	609	$245	2,161	-$829.11
Feb	1,192	$254.49	$0.21	280	$1,737.55	$6.21	690	4,138	970	-222	912	-$1,483	4,138	$24.64
Mar	1,218	$212.99	$0.17	152	$24.64	$0.16	869	5,216	1,021	-197	1,066	$188	5,216	$24.64
Apr	1,336	$233.68	$0.17	127	$19.05	$0.15	989	5,932	1,116	-220	1,209	$215	5,932	$227.07
May	2,330	$524.70	$0.23	166	$21.03	$0.13	1,349	8,093	1,515	-815	2,164	$504	8,093	$91.09
Jun	1,793	$438.83	$0.24	1,268	$19.71	$0.02	1,595	9,572	2,863	1,070	525	$419	9,572	$19.71
Jul	1,562	$389.04	$0.25	1,114	$21.03	$0.02	1,585	9,510	2,699	1,137	448	$368	9,510	$21.03
Aug	1,765	$459.67	$0.26	1,146	$19.71	$0.02	1,391	8,344	2,537	772	619	$440	8,344	$19.71
Sep	1,623	$421.08	$0.26	287	$19.05	$0.07	1,070	6,419	1,357	-266	1,336	$402	6,419	$19.05
Oct	1,450	$346.10	$0.24	344	$20.21	$0.06	887	5,321	1,231	-219	1,106	$326	5,321	$38.89
Nov	1,210	$231.53	$0.19	737	$26.28	$0.04	535	3,207	1,272	62	473	$205	3,207	$26.28
Dec	1,256	$217.93	$0.17	787	$24.64	$0.03	269	1,612	1,056	-200	469	$193	1,612	$24.64
Totals	**18,069**	**$4,002**	**$0.22**	**7,133**	**$1,979**	**$0.28**	**11,588**	**69,526**	**18,721**	**652**	**10,936**	**$2,023**	**69,526**	**-$292**

In the table above, the baseline utility data is compared to the recent, twelve-month, utility data to calculate the utility bill savings. Unlike the previously analyzed facilities this location has two Solar and four Savings columns. The additional data is due to the fact that Well #5 is no longer tied into the solar. The additional solar energy has been left out of the Total column as its addition would not be a true reflection of the energy consumption profile for the Yard. When the well site was in operation it consumed roughly six times the amount of energy the Yard consumed in a year.

Focusing on the Savings columns without the asterisks, it is possible to see that according the PG&E bills the Corp Yard has reduced billable energy consumption by 10,936 kWh. This reduction equates out to an annual energy bill that is $2,023 less than the baseline period bills. The Total block in Figure 4.3.29 combines the recent utility data with the estimated solar production values to calculate all the energy used on-site. Note that the renewable energy generated on-site is consumed at the time of production, and the excess is sent back to the grid, which is reflected in the kWh column of the Recent block. Should more energy be generated than consumed, these values will go negative. The following plot visually details the data contained in Figure 4.3.29.

Figure 4.3.30: Corp Yard Energy Consumption Plot

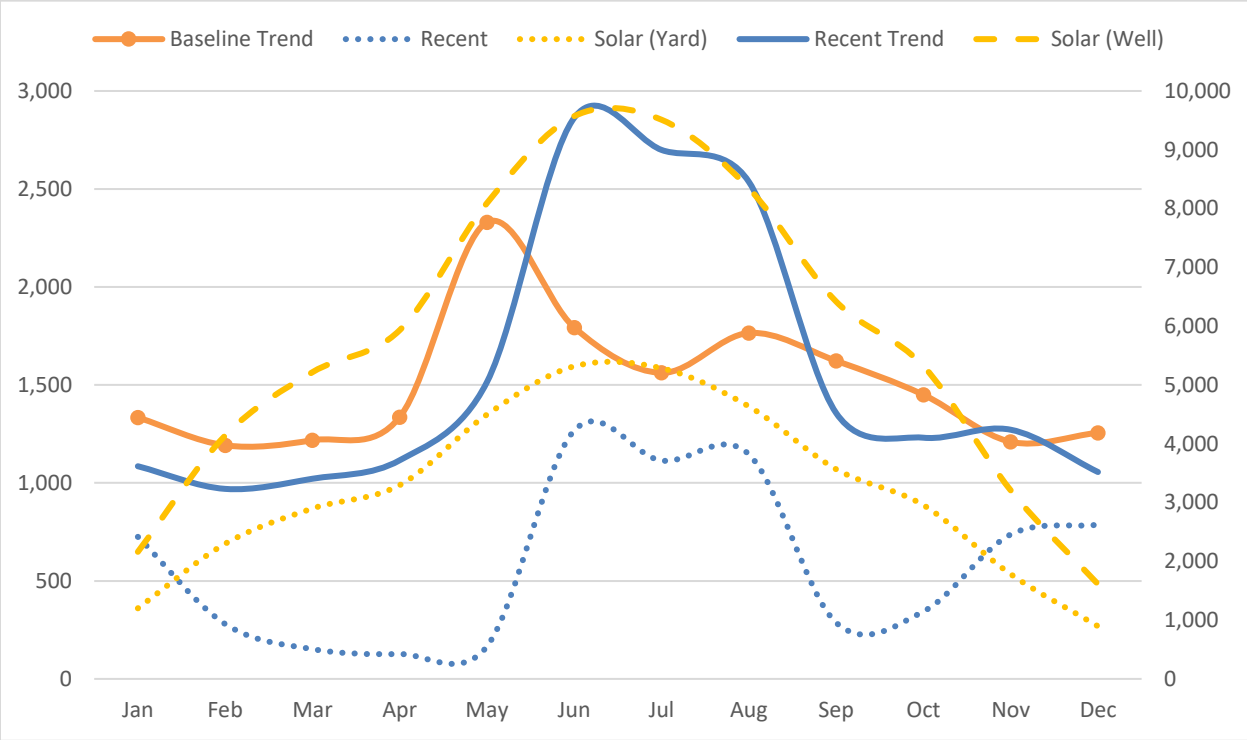


Figure 4.3.30 shows that electricity consumption has reduced for most of the year. The site's electricity consumption peaks during the warmer months of the year, by an average of about 1,000 kWh a month. This is a trend that we have noticed at several locations thus far, and is attributed to increased HVAC runtime during the warmer

months. Most likely, the nine-year-old 4-ton split system is back up and running, and the wall shaker is seeing little to no use.

Our most recent site visit (11/11/2019) revealed that the Corp Yard's layout has slightly changed, and a new building has been erected. The new building, at the time of the visit, was not active nor did it have power. We were informed by City personnel that Well 5, at the Corp Yard, is no longer being utilized due to poor water samples. The City's plan, at the time of our most recent visit, was to tie the new building to the meter that is fed by the solar array. The new structure was not examined in detail, and for this reason we are unable to estimate how much energy consumption the associated renewable energy generation system will be able to offset. For this reason, the calculated solar energy generation values have been added to the Savings columns, with the asterisks, with no loss associated with the new building. As the solar is no longer attached to the well site, it should be considered as part of the Corp Yard's energy analysis. A plot line for the solar has also been added to Figure 4.3.30, and plotted against the secondary (right-hand) axis to avoid compressing the other plots down.

The Corp Yard is one of two location that included an EEM associated with natural gas consumption. For this reason, we will perform an analysis on this facility's natural gas usage. The following table has been created to compare natural gas consumption for this facility. It is possible to see that natural gas consumption has increased by about 45%. Figure 4.3.31 shows that the Corp Yard consumed 572 more therms during the recent twelve-month period than they did during the baseline. The additional therms of natural gas increased utility costs by $368.

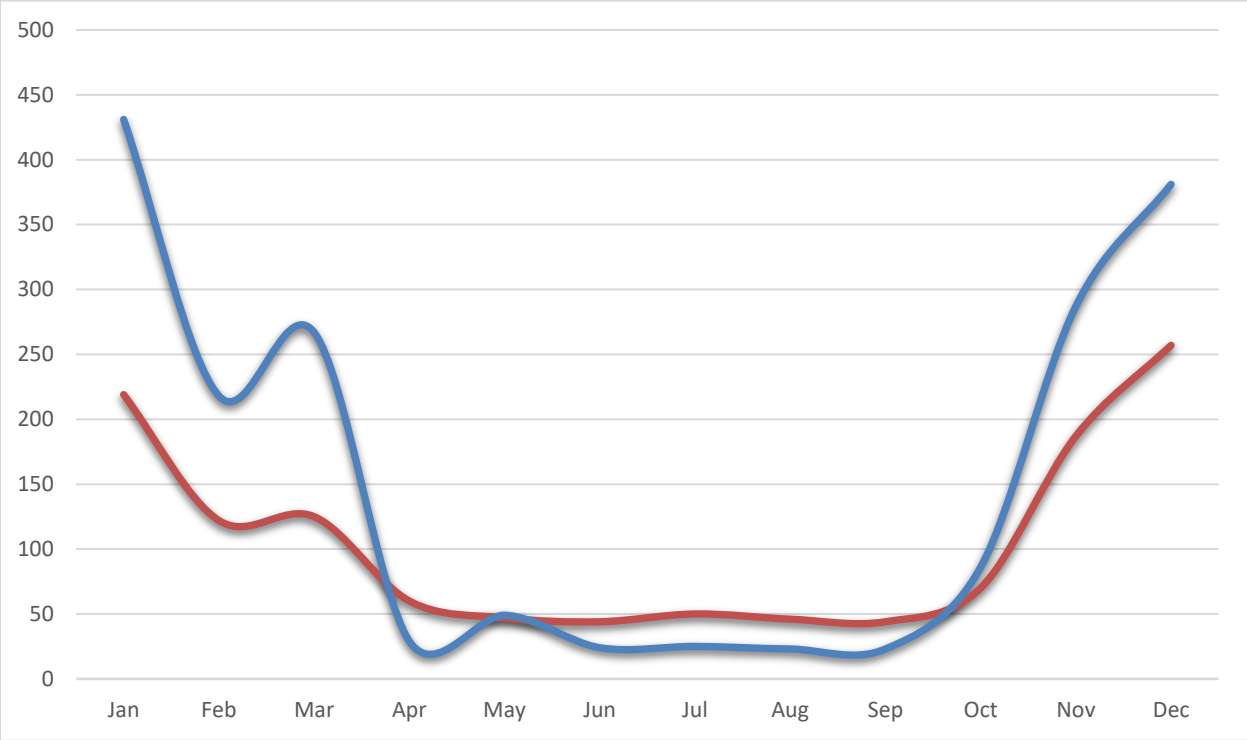
Figure 4.3.31: Corp Yard Natural Gas Savings Breakdown

Natural Gas Data								
Month	Baseline			Recent			Savings	
	Therms	Cost	Rate	Therms	Cost	Rate	Therms	Cost
Jan	219	$231.10	$1.06	431	$374.91	$0.87	-212	-$144
Feb	122	$127.22	$1.04	218	$202.69	$0.93	-96	-$75
Mar	125	$125.67	$1.01	267	$244.64	$0.92	-142	-$119
Apr	60	$61.85	$1.03	29	$35.58	$1.23	31	$26
May	47	$51.32	$1.09	49	$51.26	$1.05	-2	$0
Jun	44	$50.09	$1.14	24	$32.58	$1.36	20	$18
Jul	50	$55.29	$1.11	25	$33.96	$1.36	25	$21
Aug	46	$52.37	$1.14	23	$30.99	$1.35	23	$21
Sep	44	$48.00	$1.09	23	$30.64	$1.33	21	$17
Oct	70	$71.87	$1.03	86	$77.16	$0.90	-16	-$5
Nov	187	$187.72	$1.00	287	$247.75	$0.86	-100	-$60
Dec	257	$256.86	$1.00	381	$325.38	$0.85	-124	-$69
Totals	**1,271**	**$1,319**	**$1.04**	**1,843**	**$1,688**	**$0.92**	**-572**	**-$368**

This increase in natural gas consumption has been attributed to two factors, both of which were explained in detail during the OFD energy analysis. The first factor goes back to the beginning of Section 4, where it was presented that the recent twelve-month period was cooler than the baseline twelve-month period. Colder days equate out to increased gas consumption as occupants will require additional space heating, or space heating for longer periods of time.

The second factor is associated with individual occupant comfort needs or liking. Unlike the Fire Department, the bay doors at the Corp Yard are almost always open. When speaking with personnel from the Corp Yard, it was mentioned that the old unit heaters weren't used if vehicles couldn't be pulled all the way into the garage, allowing the bay doors to be shut. Now that the IR heating system is in place it allows occupants to be comfortable with the bay doors wide open. The following figure plots the data contained in the table above. It is possible to see from Figure 4.3.32 the Corp Yard's natural gas consumption profile has not changed; they are simply burning more fuel.

Figure 4.3.32: Corp Yard Natural Gas Savings Plot



Well Sites

A few significant changes have been made to the City's water system since the baseline period, one of which came about during the implementation of the scope of this project. The first change is that the Eva Dr well site (the new "Well 9") was constructed and put into service. For this reason, there is no baseline energy consumption data associated with this well site. The energy consumed at this site only contributes to the recent period's usage.

The second change, discovered during a recent site visit, is that Well 5 (at the Corp Yard) has been taken out of service. This does not affect the energy consumption analysis, as it is assumed that the other well sites would increase runtime to cover the load supplied by the lost site. As Well #5 is no longer a part of the City's water system the recent utility data for this site has not been included as a part of this analysis. The recent utility data for this site was instead added to the Corp Yard's energy analysis.

Baseline utility data for this site should still be considered as part of the Water System and has been included in this analysis.

The last change to the City's water system is associated with the installation of a new control system, as part of this project. Based on conversations with City personnel, the controls contractor changed the way the City's water system is pressurized. Previously, all of the well site fed water to the water tower at the center of the city. The high tower uses potential energy (resulting from the force of gravity) to pressurize the system. The well site would then supplement with additional pressure, as needed. Now, instead of all the well sites feeding water back to the water tower, each well site has increased operation to maintain pressure local to their area. This means that not only are they supplying supplemental pressure they have to make up the difference lost from the removal of the tower from the system. Pressurizing the system using mechanical power rather than gravity requires additional energy.

These operational changes have increased the water supply system's energy requirements. While this operational change affects each well site differently, totaling the values of energy consumption [for all well sites] will still provide an accurate comparison value for this analysis. The following table details the City's electricity consumption and generation associated with all of the well sites.

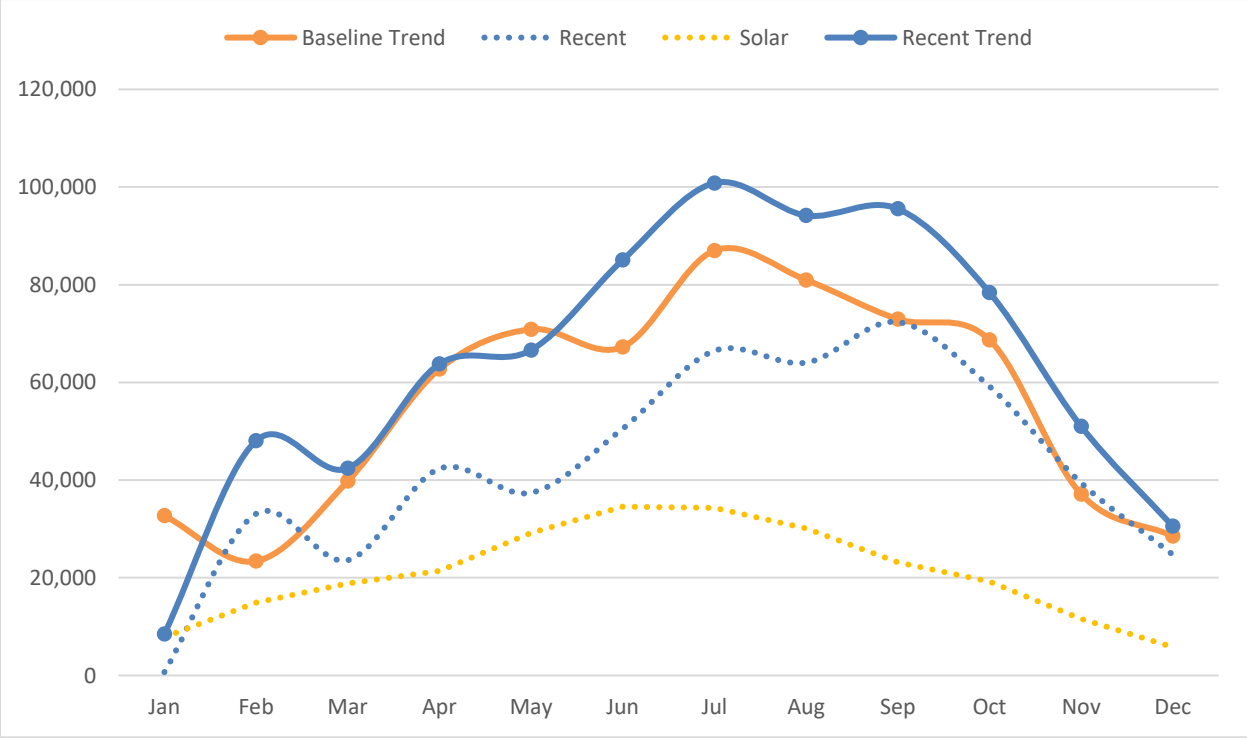
Figure 4.3.33: Combined Well Site Energy Savings Table

Baseline				Recent			Solar	Total		Savings	
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	kWh	ΔUse	kWh	Cost
Jan	32,704	$6,209.91	$0.19	674	$1,317.22	$1.95	7,803	8,477	-24,227	32,030	$4,893
Feb	23,405	$5,162.70	$0.22	33,094	$7,835.53	$0.24	14,940	48,034	24,629	-9,689	-$2,673
Mar	39,781	$6,584.25	$0.17	23,593	$9,920.31	$0.42	18,834	42,427	2,646	16,188	-$3,336
Apr	62,726	$9,818.11	$0.16	42,360	$26,706.04	$0.63	21,416	63,776	1,050	20,366	-$16,888
May	70,881	$16,148.13	$0.23	37,403	$5,194.96	$0.14	29,220	66,623	-4,258	33,478	$10,953
Jun	67,280	$15,794.78	$0.23	50,527	$9,022.25	$0.18	34,560	85,087	17,807	16,753	$6,773
Jul	87,008	$18,696.67	$0.21	66,494	$10,967.61	$0.16	34,336	100,830	13,822	20,514	$7,729
Aug	80,974	$18,053.07	$0.22	64,053	$12,509.77	$0.20	30,123	94,176	13,202	16,921	$5,543
Sep	72,956	$16,742.22	$0.23	72,366	$14,156.67	$0.20	23,174	95,540	22,584	590	$2,586
Oct	68,715	$15,073.40	$0.22	59,192	$9,092.37	$0.15	19,209	78,401	9,686	9,523	$5,981
Nov	37,130	$7,378.93	$0.20	39,431	$7,400.38	$0.19	11,579	51,010	13,880	-2,301	-$21
Dec	28,564	$5,382.70	$0.19	24,736	$621.41	$0.03	5,821	30,557	1,993	3,828	$4,761
Totals	**672,124**	**$141,045**	**$0.21**	**513,923**	**$114,745**	**$0.22**	**251,015**	**764,938**	**92,814**	**158,201**	**$26,300**

The energy data obtained from PG&E for both the baseline and recent analysis periods, and the calculated renewable energy generation data have been used to create Figure 4.3.33. Over the course of the recent twelve-month period the City's water system consumed roughly 14% more total energy (92,814 kWh) for water movement. The PG&E bills show that the City's water system has consumed 158,201 kWh less, billable, energy than it did during the baseline period. This decrease in energy consumption led to the City paying $26,300 less than the baseline period for water movement energy.

The Total block of the table combines the recent utility data with the estimated solar production to calculate all of the energy used on-site. Note that the renewable energy generated on-site is consumed at the time of production, and the excess is sent back to the grid. Should more energy be generated than consumed, the kWh values in the Recent block will go negative. It is possible to see that in January there was such an occurrence; this is surprising, as January is one of the lowest months for renewable energy generation during the year.

Figure 4.3.34: Combined Well Site Energy Consumption Plot



In Figure 4.3.34, the recent PG&E data and calculated solar data have been plotted as dotted lines as they combine to equal the actual amount of energy consumed by the facility. It is possible to see from the plot that the City's water consumption profile has not changed from the baseline period to now. So, why is the City using more energy for water movement?

The SCADA system is currently programed to optimize water movement. Essentially, the system is currently setup to be highly "efficient" at water movement. With the way the system is currently setup, water movement is going to require more energy. A simple analogy would be to think of two, identical, cars traveling down a road. One car is cruising at 65 mph and the other is cruising at 80 mph. The car going faster will be the first to reach the destination, but is going to consume more fuel because the engine is being pushed to run harder. There is a similar lack of "energy efficiency" affecting the water system.

The reduced efficiency can be explained by how the combined efficiencies of a VFD and motor system can result in more energy consumption than a stand-alone motor. Variable frequency drives are designed to adjust the speed of a "driven" motor to adapt to certain real-time load factors, with the intention of reducing energy consumption. At "full load" the VFD/motor combination consumes more energy than the motor would on its own. As an example, let's assume a 100 hp motor and VFD have the following efficiency characteristics.

Figure 3.4.35: 100 HP Motor & VFD Efficiency Table

Load	VFD	Motor
100%	97.1%	95.4%
95%	97.1%	95.4%
85%	97.0%	95.5%
75%	97.0%	95.5%
65%	96.6%	95.3%
55%	96.2%	95.2%
50%	96.0%	95.1%

The values that are highlighted blue, in the table, are given values pulled from product data (US Motors DT79) and a US Department of Energy document (Adjustable Speed Drive Part-Load Efficiency, included in Appendix). The other efficiency values were calculated through interpolation (liner approximation). The following equation is used to calculate the amount of energy consumed by the VFD and motor system.

$$\frac{hp * 0.746[\frac{kW}{hp}] * \frac{freq}{60}^{2.2} * Runtime}{\eta_{motor} * \eta_{vfd}} = kWh \quad \textbf{(Eq. 6)}$$

Note that Equation 6 has a different exponential factor than that used in the DOE document. The DOE document uses a factor of 3 and our standard calculation uses a more conservative factor of 2.2. Simply put, the DOE reduction in horsepower would result in more energy savings and our reduction in horsepower will result in less energy savings, when used in Eq. 6. For our example, hp = 100, the motor and VFD efficiencies (Greek character "eta", η) will be taken from Figure 4.3.35, and Runtime = 1 (for a single hour of runtime). The term "freq" is the frequency at which the VFD is supplying energy to the motor (the higher the frequency, the faster the motor runs, and the lower the frequency, the slower the motor runs). The frequencies used in the Eq. 6 are calculated by multiplying the part-load percentage by 60 Hz, standard electricity supply frequency in the US. The following equation will be used to calculate the amount of energy used by the motor, alone.

$$\frac{hp * 0.746[\frac{kW}{hp}]}{\eta_{motor}} = kWh \quad \textbf{(Eq. 7)}$$

The same values used in Eq. 6 will be used in Eq. 7. For Equation 7, the runtime term has been removed; the lack of that term has the same effect as setting it to a value of 1. When using this equation, the result will be the amount of energy consumed by the motor over the course of an hour. The following table shows the results of applying these two equations to the part-load values given in Figure 3.4.35.

Figure 3.4.36: Motor & VFD Energy Usage Table

Load	VFD	Motor	Freq	VFD/Motor	Motor	Diff	% Diff
100%	97.1%	95.4%	60	80.5	78.2	2.3	3.0%
95%	97.1%	95.4%	57	71.9	78.2	-6.3	-8.0%
85%	97.0%	95.5%	51	56.3	78.2	-21.9	-28.0%
75%	97.0%	95.5%	45	42.8	78.2	-35.4	-45.3%
65%	96.6%	95.3%	39	31.4	78.2	-46.8	-59.8%
55%	96.2%	95.2%	33	21.9	78.2	-56.3	-72.0%
50%	96.0%	95.1%	30	17.8	78.2	-60.4	-77.3%

As previously explained, the frequencies contained in the Freq column are drive frequencies calculated based on 60 Hz supply frequency. The VFD/Motor & Motor columns are kWh used to run each system for one hour, at the specified load, and have been populated through the use of equations 6 and 7, respectively. As the motor is incapable of running at part-load without being driven by the VFD, the motor column values are all based on 100% load efficiency. It is possible to see that at 100% load, the VFD and motor combination use 3% more energy over the course of an hour. Additionally, the other values speak to why a VFD is highly effective at saving energy; running the motor at ¾ load, for one hour, can reduce energy consumption by 45%.

If less energy can be used by slowing down the motor, what about the amount of water moved by the pump the motor is attached to? The answer is, less water will be moved by the pump. That being said, an additional (nearby) pump can be used to make up the difference, while still saving energy. The change in system pressure or water flow rate can be calculated by the Pump Affinity Laws. The following equation (Eq. 8) is one of the pump affinity laws. This law shows that the change in fluid flow (Q, volumetric flow rate) is directly proportionate to the squared change in pump speed (n_i, RPMs) and impeller diameter (d_i). We can assume that the impeller diameter is constant, as we're going to be analyzing a speed change in the same pump. As a result, that term becomes equal to 1, and we get Eq. 9.

$$\frac{Q_1}{Q_2} = (\frac{n_1}{n_2})^2 * (\frac{d_1}{d_2})^2 \quad \text{(Eq. 8)}$$

$$\frac{Q_1}{Q_2} = (\frac{n_1}{n_2})^2$$ (Eq. 9)

Let's assume Well #7 (Suisun), 100 hp pump, is capable of moving 1,000 gpm of water at full-load speed. Let's also assume that the nearby Well #8 (Roosevelt), 50 hp pump, can move half that amount, 500 gpm, at full-load speed. This would mean that at 100% load, Well #7, with motor and VFD, requires 80.5 kWh of energy to move 1,000 gpm. Let's assume the pump speed at Well #7 is limited to 85%.

$$(\frac{n_2}{n_1})^2 * Q_1 = Q_2$$ (Eq. 10)

Plugging the values stated above ($^{freq}/_{60}$ = n_2 = .85, n_1 = 1, and Q_1 = 1,000) into Equations 6 & 10 (Eq. 10 is an algebraically reorganized form of Eq. 9) shows that this change in speed would result in the well site consuming 56.3 kWh to move 722.5 gpm of water. If Well #8 were used to supply the additional 277.5 gpm, Equations 6 & 11 (Eq. 11 is another algebraically reorganized form of Eq. 9) show that it would require 21.6 kWh of electricity to do so.

$$n_1 * \sqrt{\frac{Q_2}{Q_1}} = n_2$$ (Eq. 11)

Adding the energy used by the two sites together we get 77.6 kWh, which is less than 80.5 kWh (56.3 + 21.6 = 77.6 < 80.5). This result shows that the two well sites are capable of supplying the same amount of water flow, at reduced speeds, while reducing energy consumption by 2.6 kWh per hour of runtime. While this difference is small, this is one example of pumps are operational a couple thousand hours a year. While more pumps will be required to be operational at any given time, it is possible to maintain roughly optimal system performance while saving more energy by limiting pump motor

speeds. Additionally, slightly reducing system pressure can also help reduce energy consumption.

Recreation Center

The energy data obtained from PG&E for both the baseline and recent analysis periods, and the calculated renewable energy generation data have been used to create the following table and plot. Over the course of the recent twelve-month period, the Rec Center decreased energy consumption by 34%. The following table details the site's energy consumption and production data.

Figure 4.3.37: Rec Center Energy Savings Table

Baseline				Recent			Solar	Total		Savings	
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	kWh	ΔUse	kWh	Cost
Jan	2,879	$564.14	$0.20	497	$26.28	$0.05	794	1,291	-1,588	2,382	$538
Feb	2,651	$541.26	$0.20	-444	$24.64	-$0.06	1,521	1,077	-1,574	3,095	$517
Mar	1,993	$334.38	$0.17	-1,477	$24.64	-$0.02	1,917	440	-1,553	3,470	$310
Apr	1,949	$330.02	$0.17	-1,612	$19.05	-$0.01	2,180	568	-1,381	3,561	$311
May	1,990	$465.15	$0.23	-1,465	$21.03	-$0.01	2,974	1,509	-481	3,455	$444
Jun	2,686	$662.69	$0.25	-848	$19.71	-$0.02	3,517	2,669	-17	3,534	$643
Jul	3,478	$846.01	$0.24	-194	$21.03	-$0.11	3,495	3,301	-177	3,672	$825
Aug	3,399	$820.91	$0.24	49	$19.71	$0.40	3,066	3,115	-284	3,350	$801
Sep	2,518	$610.98	$0.24	-40	$19.05	-$0.48	2,359	2,319	-199	2,558	$592
Oct	2,589	$627.28	$0.24	-590	$87.66	-$0.15	1,955	1,365	-1,224	3,179	$540
Nov	2,292	$416.68	$0.18	328	$26.28	$0.08	1,179	1,507	-785	1,964	$390
Dec	2,487	$409.38	$0.16	700	$24.64	$0.04	592	1,292	-1,195	1,787	$385
Totals	**30,911**	**$6,629**	**$0.21**	**-5,096**	**$334**	**-$0.07**	**25,548**	**20,452**	**-10,459**	**36,007**	**$6,295**

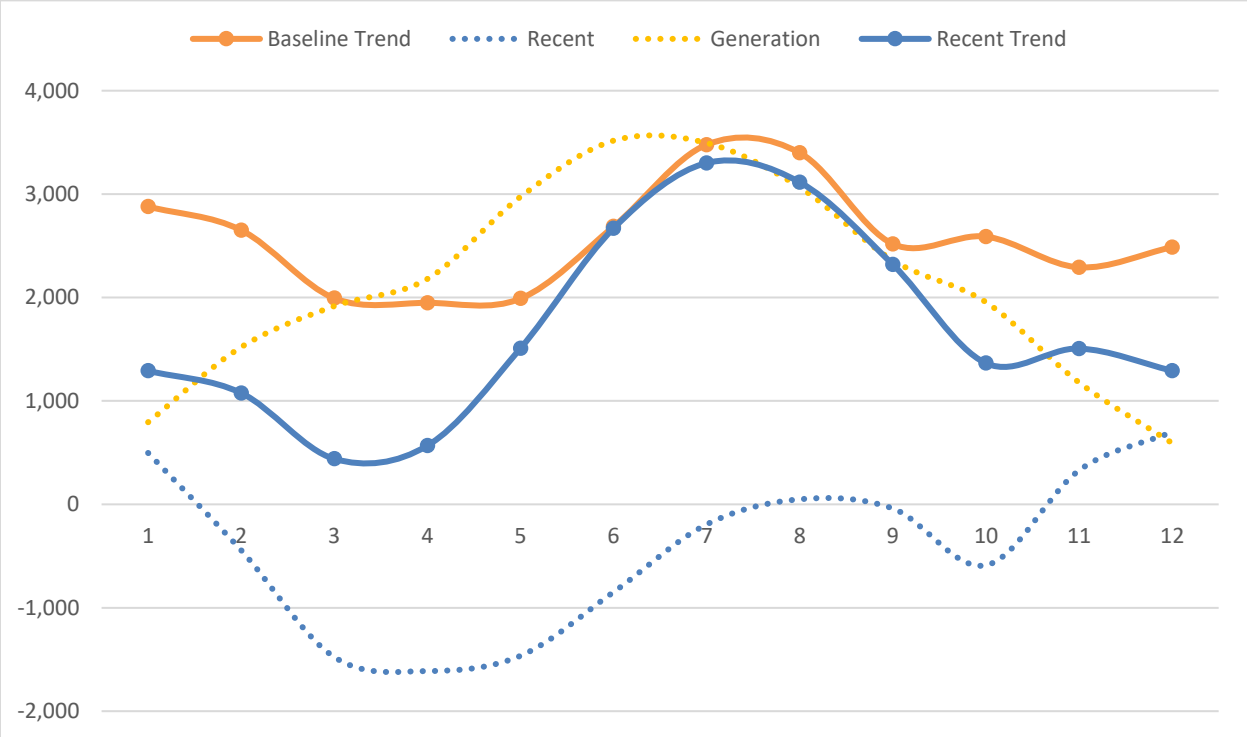
In Figure 4.3.37, the baseline utility data is compared to the recent, twelve-month, utility data to calculate the bill savings. It is possible to see that according the PG&E bills the Rec Center has reduced billable energy consumption by 36,007 kWh. This reduction equates out to an annual energy bill that is $6,295 less than the baseline period bills.

The Total block of the table combines the recent utility data and the estimated solar production to calculate the total energy used at this facility. Note that the renewable energy generated on-site is consumed at the time of production, and the excess is sent

back to the grid. It is possible to see from the energy totals that the facility is consuming 10,459 kWh less, now, than they were during the baseline period.

The following figure plots all of the energy data against one another to help visualize the values in Figure 4.3.37. The recent PG&E data and calculated solar data have been plotted as dotted lines as they combine to equal the actual amount of energy consumed by the facility. Examining Figure 4.3.38, it is possible to see that the energy consumption profile has not changed from the baseline to now. The Recent Trend plot remains below the baseline trend throughout the course of the entire year. This means that the solar array is slightly oversized for this facility's energy usage.

Figure 4.3.38: Rec Center Energy Savings Plot



Wastewater Treatment Plant

The energy data obtained from PG&E for both the baseline and recent analysis periods, and the calculated renewable energy generation data have been used to create the following tables and plots. Based on the data, the WWTP has reduced energy

consumption by just over 11%. In the following table, two months (June 2017 & May 2018) are colored red. The reason for this highlight is to show that the data for these two months has been altered.

Figure 4.3.39: WWTP Energy Savings Table

Electricity Data											
Baseline				Recent			Solar	Total		Savings	
Month	kWh	Cost	Rate	kWh	Cost	Rate	kWh	kWh	ΔUse	kWh	Cost
Jan	27,440	$5,329.78	$0.19	20,959	$27.11	$0.00	8,679	29,638	2,198	6,481	$5,303
Feb	31,680	$6,161.25	$0.19	10,309	$24.64	$0.00	16,615	26,924	-4,756	21,371	$6,137
Mar	31,840	$6,263.38	$0.20	3,319	$25.46	$0.01	20,946	24,265	-7,575	28,521	$6,238
Apr	32,880	$6,496.75	$0.20	3,719	$4,402.18	$1.18	23,818	27,537	-5,343	29,161	$2,095
May	31,929	$6,945.93	$0.22	-1,170	$19.06	-$0.02	32,497	31,327	-602	33,099	$6,927
Jun	30,899	$6,721.87	$0.22	-5,178	$19.71	$0.00	38,435	33,257	2,358	36,077	$6,702
Jul	30,560	$7,479.10	$0.24	-5,659	$21.03	$0.00	38,187	32,528	1,968	36,219	$7,458
Aug	33,840	$8,281.03	$0.24	-2,436	$19.71	-$0.01	33,502	31,066	-2,774	36,276	$8,261
Sep	31,360	$7,674.37	$0.24	-1,346	$21.03	-$0.02	25,773	24,427	-6,933	32,706	$7,653
Oct	31,200	$7,743.87	$0.25	1,351	$19.06	$0.01	21,363	22,714	-8,486	29,849	$7,725
Nov	28,720	$6,156.53	$0.21	7,347	$22.18	$0.00	12,878	20,225	-8,495	21,373	$6,134
Dec	32,560	$6,304.78	$0.19	22,035	$24.64	$0.00	6,474	28,509	-4,051	10,525	$6,280
Totals	**374,908**	**$81,559**	**$0.22**	**53,250**	**$4,646**	**$0.09**	**279,166**	**332,416**	**-42,492**	**321,658**	**$76,913**

Examining the kWh column in the Baseline block of Figure 4.3.39, one can see that there is a steady amount of energy consumption that fluctuates about 30,000 kWh. The raw data for May 2018 and June 2017, obtained from PG&E, did not flow this trend. The first point of the baseline dataset (June 2017) and the last point (May 2018) were values that differed greatly from the rest. It was assumed that the data was not representative of an entire month (or ~30-day period). The following table (Figure 4.3.40) shows the raw data obtained from PG&E.

Averaging all of the data from the other ten months, we see that on average the WWTP consumes 31,208 kWh of electricity, a month. The first and last datapoint differ from this average by 23,848 kWh & 18,008 kWh, respectively. Taking the difference in Read Dates between the ten typical datapoints, it is possible to see that the date of each datapoint ranges between 29-32 days (an average of 30.3 days), from the previous datapoint. Taking the difference between the last two Read Dates reveals a difference of 12 days, not a complete month. After finding this discrepancy in the data, it was assumed that the first datapoint was not representative of a complete month, as well.

To address these findings, the following calculations were completed to estimate the values in Figure 4.3.39.

Figure 4.3.40: WWTP Raw Baseline Data Table

Read Date	kWh	Cost	Rate
6/21/2017	7,360	$1,818.84	$0.17
7/21/2017	30,560	$7,479.10	$0.71
8/22/2017	33,840	$8,281.03	$0.79
9/21/2017	31,360	$7,674.37	$0.73
10/20/2017	31,200	$7,743.87	$0.73
11/18/2017	28,720	$6,156.53	$0.67
12/20/2017	32,560	$6,304.78	$0.76
1/19/2018	27,440	$5,329.78	$0.64
2/20/2018	31,680	$6,161.25	$0.73
3/21/2018	31,840	$6,263.38	$0.74
4/20/2018	32,880	$6,496.75	$0.76
5/2/2018	13,200	$2,733.90	$0.31
	332,640	**$72,443.58**	**$0.22**

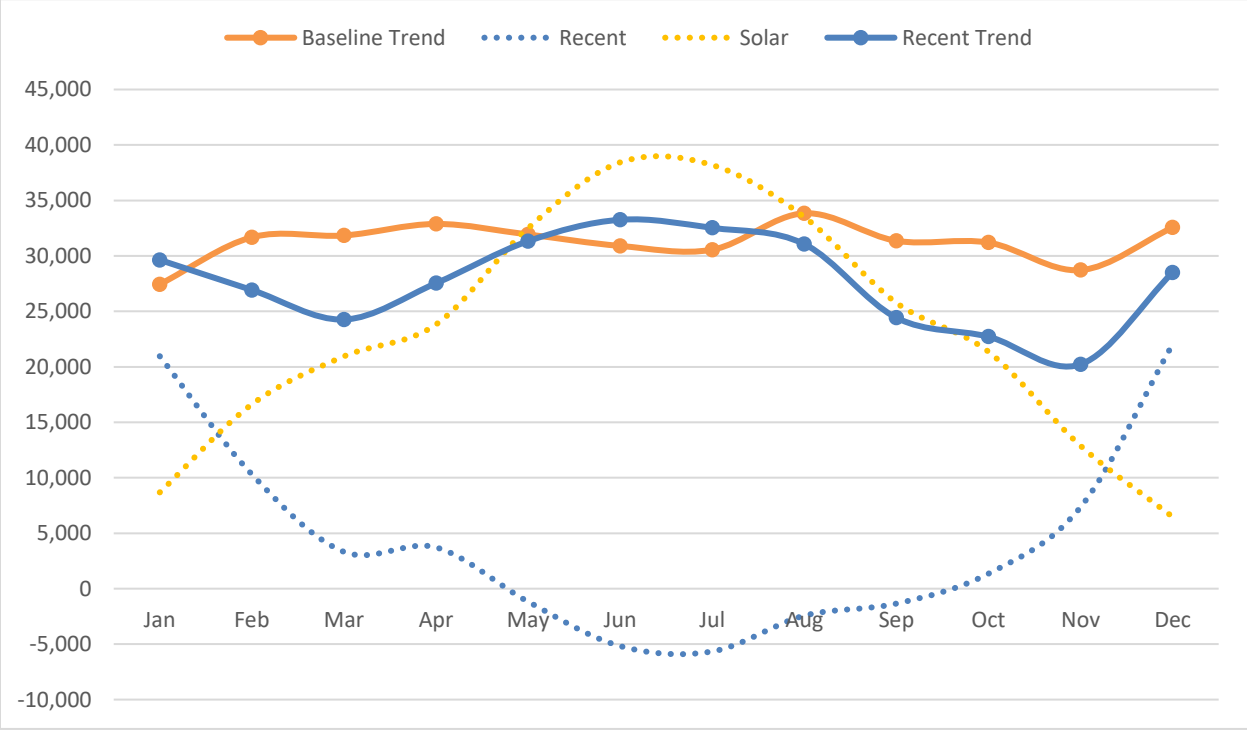
Using the average consumption per month and the average days per month (for the dataset), a daily consumption figure of 1,030 $^{kWh}/_{Day}$ was calculated ($31{,}208_{monthly\ average} \div 30.3_{days\ per\ month} = 1{,}030\ ^{kWh}/_{day}$). Multiplying this factor by 12 (number of days for the last datapoint) we get 12,360 kWh, which is only slightly less than 13,200 kWh (value of the last datapoint). This tells us that 1,030 $^{kWh}/_{day}$ is a safe estimate to use for scaling up the usage for both datapoints because it will most likely not result in an overestimation of energy usage. Multiplying this factor by 30 for the month of June and 31 for the month of May, we get 30,899 kWh and 31,929 kWh, respectively. The same thing was done for the cost associated with the consumption. The complete monthly cost data was averaged, divided by the average number of days between datapoints, and the resulting factor was multiplied by the number of days in each month.

Looking back at Figure 4.3.39, the adjusted baseline utility data is compared to the recent twelve-month data and used to calculate the utility bill savings. It is possible to see that according the PG&E bills the WWTP has reduced billable energy consumption by 321,658 kWh (279,390 kWh, non-adjusted savings). This reduction equates out to

an annual energy bill that is $76,913 ($65,798, non-adjusted savings) less than the baseline period bills.

The Total block of the table combines the recent utility data with the estimated solar production data to calculate all of the energy used on-site. Note that the renewable energy generated on-site is consumed at the time of production and the excess is sent back to the grid, which is reflected in the kWh column of the Recent PG&E block. Should more energy be generated than consumed, these values will go negative. Negative values are seen during the warmer months of the year; this is due to increased renewable energy production (longer days with greater radiation intensities) but a steady amount of energy consumption, that is not dependent on changing weather. The following figure plots all of the energy data against one another to help visualize the data contained in Figure 4.3.39.

Figure 4.3.41: WWTP Energy Savings Plot



The recent PG&E data and calculated solar data have been plotted as dotted lines as they combine to equal the actual amount of energy consumed by the facility, labeled

"Recent Trend." Examining Figure 4.3.41, it is possible to see that the energy consumption profile has not changed from the baseline to now.

4.4 Adjustments

This section will take a look at any adjustments that should be made to the energy savings analysis to account for large discrepancies. There are a few adjustments that should be made to accurately depict the savings this project resulted in. The adjustments will be detailed and summed up in a table at the end of this section.

The first adjustment that should be made to the data has to do with Operational Savings associated with the facilities included in the scope of this project. As part of the project packet we presented the City with an EEM (Energy Efficiency Measure) Table that detailed the costs and savings associated with the various measures included in the scope of this project. Each measure had an associated operational savings that has to do with the replacement of equipment or modern technologies. Replacement of outdate lighting technologies with LED lighting results in operational savings as LED lighting has a longer lifespan; longer lives equate out to no dollars being shelled out for lamp, ballast, or fixture replacements. In replacing mechanical systems, new equipment and warranty periods eliminate costs associated with replacement parts.

Figure 4.4.1: Operational Savings Table

Location	Cost
CH/OPD	$218
OFD	$801
Library	$277
Carnegie	$103
Tennis	$62
Pool	$183
Corp	$96
Rec Center	$63
WWTP	$0
Wells	$4,362
Totals	**$6,165**

The table above (Figure 4.4.1) lists out the operation savings associated with each site included in the project. The figures in this table were presented in the project's EEM Table in a column labeled Maintenance Savings. Please note that while the column was labeled "maintenance savings," it is better to think of these monetary savings as

"operational savings." Maintenance personnel may not have to focus their attention on these items but they are still working on maintaining other things around the City. So, there is no savings associated with their time. These "maintenance savings," labeled Op Sav (Operational Savings) in the table above, are cost savings associated with replacement parts.

The next adjustment that should be made has to do with lost savings "gobbled up" through excess use of other equipment. For the most part, this project was a lighting and solar project; other than the City's water system, no other significant mechanical changes were made through the implementation of the scope of this project. To adjust for lost savings the following calculations were made.

Figure 4.4.2: Electrical Savings Calculation Table

Location	PG&E Savings	Recent Savings			
		Lighting	Solar	Losses	Total
CH/OPD	36,833	21,015	34,733	-18,915	36,833
OFD	38,148	18,665	42,610	-23,127	38,148
Library	317	24,562	-	-24,245	317
Carnegie	7,332	7,855	-	-523	7,332
Tennis	5,258	5,258	-	0	5,258
Pool	31,315	11,292	28,969	-8,946	31,315
Corp	10,936	5,994	11,588	-6,646	10,936
Rec Center	36,007	12,169	25,548	-1,710	36,007
WWTP	321,658	-	279,166	0	279,166
Wells	158,201	11,435	251,015	-104,249	158,201
Totals	**646,006**	**118,245**	**743,155**	**-188,360**	**603,514**

In Figure 4.4.2 the Recent Savings have been broken down into four columns, Lighting, Solar, Losses, and Total. For the lighting savings, minimized savings calculations were made for the lighting at all of the locations included in the scope of this project. Savings values were calculated using the same method detailed for the Tennis Courts, utilizing Eq. 4. This is a straightforward calculation that holds runtimes constant and bases energy savings purely on reductions in fixture wattages. This means that any locations where occupancy sensors were installed are receiving no credit for runtime reductions. The runtimes used in the calculations are based on our estimated hours of operation for the type of facility, between 2,000 (OFD) to 3,500 (averaged CH/OPD) hours for interior

lighting, annually. Exterior lighting runtimes have been estimated as 4,100 hours. Looking back at Figure 4.4.2, our conservative calculations show that the lighting side of the project saved roughly 118,000 kWh of electricity.

The next savings column presents the calculated solar production values. Note that the generation figures for Well #5 have not been included in neither the Corp Yard row nor the Wells row. It has, however, been added to the total at the bottom of the column to keep our totals consistent throughout the report; this is the reason that the total has been highlighted in light red.

The next column in this table is used to identify Losses for each facility. Essentially, these are mechanical savings, which this project didn't result in. For this reason, they are being referred to as Losses, stemming from operational and system changes for all locations. These figures were calculated by minimizing the energy savings to break even with the bill savings. The PG&E bills show the total amount of energy PG&E see being used on their end. Again, PG&E see usage after being supplemented by solar. Adding the solar totals to the PG&E bills results in the total amount of energy being used on-site (Eq. 12). The largest negative value is associated with the City's water system, so let us focus on that system for an example of how the losses were calculated. Entering the water system values into Eq. 12 results in a Total Usage of 743,919 kWh (483,904 kWh + 251,015 kWh = 743,919 kWh).

$$Recent\ Usage + Solar = Total\ Usage \quad \text{(Eq. 12)}$$

$$Baseline\ Usage - Total\ Usage = Energy\ Savings \quad \text{(Eq. 13)}$$

Since the Total Usage, Eq. 12 result, is based on the recent utility data it can be subtracted from the baseline energy usage to calculate the energy savings (Eq. 13). A positive result from Eq. 13 means the water system is using less energy now, or is savings the resulting amount of energy. A negative result means that the water system

is now using more energy than it was during the baseline period. Applying Eq. 13 to the data from the water system results in -92,814 kWh (672,124 kWh – 743,919 kWh = -92,814 kWh). As previously explained, this is negative savings meaning the water system uses more energy now when compared to the baseline.

Quickly jumping ahead, the Total column is the sum of all the calculated savings and losses for each row (Eq. 14). Note that the Losses are being added to calculate the Total Savings. Losses are negative values, but adding a negative number is the same as subtracting a positive number. The adjustments, to be presented at the end of this section, are calculated as the opposite of the Losses, or positive values equal to the loss value. To minimize loss values, we set the Total Savings equal to the bill savings, and utilize the following equations.

$$Lighting + Solar + Losses = Total\ Savings \quad \text{(Eq. 14)}$$

$$Losses = Total\ Savings - Lighting - Solar \quad \text{(Eq. 15)}$$

Equation 15, used to calculate the Losses, is an algebraically manipulated version of Equation 14, the Total Savings calculation. By setting the Total Savings equal to the Bill Savings we get a result of -104,249 kWh (185,201 kWh – 11,435 kWh – 251,015 kWh = -104,249 kWh), for the water system. This is a large amount to be negative by, and the values used to calculate this finding were designed to minimize the resulting amount of excess energy being used by the water system.

Looking back at Figure 4.4.2 (or the Recent Savings block in Figure 4.4.3, below), there are two Losses values of 0 that have been highlighted in light red. The first, for the Tennis Courts, is zero due to the fact that the PG&E Savings were calculated using the Lighting calculation. As there are no mechanical systems or solar at this location there should be no other losses; regardless, since these calculated values resulted in no adjustment, they have been identified in red.

The adjustment value for the WWTP has been highlighted due to the fact that it was forced to be zero. Calculating the losses for the WWTP results in a positive value of 42,492 kWh (321,658 kWh – 279,166 kWh = 42,492 kWh). This means that they saved more energy than our calculations show. We were not notified of any mechanical system changes at the WWTP, so it is more likely that the additional savings is solar energy production that our conservative calculations were short.

Assuming that there were no changes in WWTP operation at this 24-hour location, which there most likely were not, solar is the only other thing tied into that meter. It should be noted that mechanical system efficiency degrades over time; so, it is more likely that a little more energy was used by the equipment at the WWTP during the recent period. This would mean that the solar production missing from our calculated value should be slightly higher than 42,492 kWh. Adding this value to our calculated solar figure will bring it closer to what was actually produced on-site, but no similar adjustments were made to the solar figures at any of the other locations. Increasing the solar production values will make the Losses for each location increase by that same amount. As all of these figures have been calculated to be conservative, or minimized, it would not be fair for our comparison to do so. For this reason, the loss value for the WWTP has been forced to zero and results in no adjustments for this location. The following table details all of the adjustments made to the data used to identify "true" savings.

Figure 4.4.3: Adjusted Energy Savings Table

Electricity Consumption Comparison											
Location	PG&E Data Comparison			Recent Savings				Adjustments		Adj. Savings	
	Base kWh	Rcnt kWh	kWh Sav.	Lighting	Solar	Losses	Total	kWh	Cost	kWh	Cost
CH/OPD	62,739	25,906	36,833	21,015	34,733	-18,915	36,833	18,915	$218	55,748	$13,263
OFD	57,834	19,686	38,148	18,665	42,610	-23,127	38,148	23,127	$801	61,275	$15,140
Library	38,624	38,307	317	24,562	0	-24,246	317	24,246	$277	24,563	$6,024
Carnegie	16,935	9,603	7,332	7,855	0	-523	7,332	523	$103	7,855	$1,941
Tennis	7,480	2,222	5,258	5,258	0	0	5,258	0	$62	5,259	$1,293
Pool	38,509	7,194	31,315	11,292	28,969	-8,946	31,315	8,946	$183	40,261	$9,604
Corp	18,069	7,133	10,936	5,994	11,588	-6,646	10,936	76,172	$96	87,108	$20,479
Rec Center	30,911	-5,096	36,007	12,169	25,548	-1,710	36,007	1,710	$63	37,717	$8,889
WWTP	374,908	53,250	321,658	0	279,166	0	279,166	0	$0	321,658	$75,268
Wells	672,124	513,923	158,201	11,435	251,015	-104,249	158,201	104,249	$4,362	262,450	$65,775
Totals	**1,318,133**	**672,127**	**646,006**	**118,245**	**743,155**	**-188,364**	**603,514**	**257,890**	**$6,165**	**903,895**	**$217,677**

As previously stated, the adjustments for the kWh column have been calculated as the opposite of the Losses column, for each facility. Viewing the table (Figure 4.4.3), it is possible to see that the total amount of energy adjustments made to the savings values is 257,890 kWh. Note that the kWh Adjustment cell for the Corp Yard is red. This is due to the additional solar production, from Well #5, being added to this cell. The additional solar production was added as an adjustment to keep the savings analysis true for the site. The values in the Adj. Savings (Adjusted Savings) block have been calculated as follows.

$$Bill\ Savings\ [kWh] + Adjustments\ [kWh] = Adj.\ Savings\ [kWh]$$

(Eq. 16)

$$Adj.\ Savings\ [kWh] * 0.234\ [\frac{\$}{kWh}] + Adjustments\ [\$] = Adj.\ Savings\ [\$]$$

(Eq. 17)

Combining the adjustments with the PG&E bill savings (Eq. 16) results in the energy savings shown in the Adj. Savings block. Multiplying the adjusted savings by the average rate of electricity for the City results in the values shown in the Cost column, of the Adj, Savings block. If the City had never undertaken an energy efficiency project it would have consumed, at minimum, an additional 903,895 kWh of electricity at the facilities included in this project. For the increased energy consumption, the City would have been required to pay roughly $217,677.

4.5 Conclusion

Based on the findings of this Measurement & Verification analysis it is possible to see that the implemented project resulted in significant energy savings. The City of Orland has reduced billable energy consumption by 49%, for the facilities included in the scope of this project. While this project has resulted in reducing the City's energy consumption by half, for the facilities included in this project, this report has shown that there is still room for additional energy savings.

Due to unforeseen changes in system operation some of the savings we proposed have not been obtained. The City's water system resulted in increased energy requirements despite having been upgraded with energy efficient components and a SCADA system. Implementation of the desired system configuration required increasing system pressure within the water distribution network, which requires additional energy. The SCADA system's sequence of operation is currently set to optimize system performance. The City's water system is operating at peak performance and it has been expressed to us that adjustment of the system is not desired at this time.

Should the City decide to reach for additional energy savings in the future, we believe that with minor adjustments to some of the system's setting it is possible to maintain system performance while recapturing some of the lost savings. As the system is now pressurized through mechanical power (operational change), it is not possible to regain all of the missed energy savings. Additionally, by limiting access to, and adjusting HVAC controls setpoints, at facilities around the City it is possible to increase savings associated with system runtimes.

Appendix

A. Raw Baseline Weather Data

The following historical weather data was obtained from the Western Regional Climate Center (WRCC) website. WRCC delivers various climate data related services at a nation, regional, and state level. They partner other NOAA research institutes such as the National Climatic Data Center, National Weather Service, the American Association of State Climatologists, and the Regional Sciences and Assessment Program. A link to their website has been provided below.

https://wrcc.dri.edu/

Monthly Summary for

January, 2016

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	1	233	12.0	345	25.0	41	50	36	40	53	32	30	42	21	12	31	0.00
2	2	104	5.8	333	16.0	41	47	34	40	49	29	45	72	34	21	33	0.00
3	3	97	2.0	320	8.0	43	53	36	42	58	34	68	91	46	33	38	0.00
4	4	32	2.9	353	11.0	42	45	38	42	46	37	94	100	73	40	41	0.83
5	5	26	5.9	182	26.0	47	49	42	47	50	42	100	100	96	47	47	1.74
6	6	27	9.4	181	27.0	45	48	41	44	47	41	98	100	90	44	44	1.08
7	7	120	2.5	309	8.0	44	52	41	44	55	40	95	100	71	43	43	0.02
8	8	196	1.8	133	8.0	44	54	32	44	61	29	86	100	60	40	42	0.02
9	9	32	4.4	2	11.0	44	45	43	43	46	42	100	100	99	44	44	0.65
10	10	236	2.9	348	10.0	46	59	39	46	64	35	84	100	44	40	43	0.01
11	11	70	3.5	323	9.0	46	51	40	45	54	39	92	100	75	43	44	0.00
12	12	82	2.6	139	12.0	48	52	43	48	55	43	90	100	72	45	46	0.22
13	13	132	13.0	181	51.0	48	57	37	46	58	33	84	98	43	43	45	0.56
14	14	19	4.2	273	20.0	41	44	35	41	43	30	99	100	96	41	41	1.22
15	15	191	3.5	302	11.0	45	53	38	47	58	34	87	100	59	41	43	0.08
16	16	44	4.0	300	10.0	46	49	43	47	50	43	100	100	100	46	46	0.70
17	17	18	11.3	197	37.0	52	56	48	51	55	48	99	100	92	52	52	1.30
18	18	96	7.1	182	28.0	54	57	50	53	57	49	92	100	80	52	52	0.06
19	19	92	16.5	167	55.0	54	58	52	52	59	49	91	99	80	51	52	0.77
20	20	97	2.0	338	8.0	50	57	45	50	62	44	88	100	73	47	48	0.00
21	21	85	1.8	4	8.0	51	56	46	51	61	46	93	100	75	49	50	0.21
22	22	34	15.2	170	44.0	53	55	51	52	54	49	91	100	80	51	52	0.82
23	23	113	11.5	160	39.0	50	56	41	48	59	38	90	100	77	47	48	0.14
24	24	124	3.0	313	9.0	46	53	38	46	56	35	97	100	78	45	45	0.22
25	25	271	5.3	320	12.0	51	61	44	51	67	41	77	100	46	43	46	0.00
26	26	259	4.1	97	11.0	48	60	37	49	68	34	79	98	51	41	44	0.00
27	27	279	2.8	324	7.0	51	70	38	52	78	35	75	100	34	41	46	0.00
28	28	41	2.4	5	10.0	47	50	43	47	51	42	98	100	90	47	47	0.26
29	29	46	3.8	206	23.0	50	53	48	49	54	46	94	100	68	48	49	1.52
30	30	277	3.9	7	15.0	47	57	39	48	65	34	75	100	42	39	43	0.00
31	31	315	12.9	331	34.0	45	54	36	45	59	33	50	88	30	26	37	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	3787															12.43
Ave.	122	5.9	314	19.5	47.2	53.6	41.1	46.8	56.5	38.9	85	96	67	42	45	
Max.	315	16.5		55.0	54	70	52	53	78	49	100	100	100	52	52	1.74
Min.	18	1.8		7.0	41	44	32	40	43	29	30	42	21	12	31	0.00

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.

° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

February, 2016

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Fahrenheit	Air Temperature Min Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Fahrenheit	Fuel Temperature Min Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Fahrenheit	Total Precip. inches
1	32	296	5.4	343	19.0	43	56	32	43	64	27	53	81	27	26	36	0.00
2	33	164	3.0	343	11.0	41	51	33	41	58	31	81	100	52	35	38	0.04
3	34	89	2.6	337	10.0	41	46	35	41	51	34	88	100	63	37	39	0.04
4	35	267	5.2	325	15.0	48	60	38	47	65	35	78	100	45	40	43	0.01
5	36	279	1.8	16	7.0	47	60	33	47	70	30	77	100	41	39	42	0.00
6	37	270	2.6	346	7.0	51	68	37	51	77	35	71	100	34	40	45	0.00
7	38	320	10.7	343	29.0	64	79	45	63	82	40	46	85	24	40	51	0.00
8	39	335	9.0	342	20.0	67	81	50	65	85	44	34	66	20	36	50	0.00
9	40	284	2.0	213	7.0	55	75	40	55	85	35	66	92	28	42	48	0.00
10	41	289	2.2	352	7.0	55	75	39	56	85	36	69	98	32	43	48	0.00
11	42	301	2.5	3	7.0	57	73	44	58	82	42	70	95	38	46	50	0.00
12	43	236	2.0	347	9.0	54	68	42	55	77	39	75	99	43	46	49	0.00
13	44	300	4.9	328	15.0	58	73	43	57	80	38	56	99	23	39	48	0.00
14	45	283	5.5	325	20.0	60	76	45	60	83	43	64	91	37	46	52	0.00
15	46	330	6.6	325	17.0	63	79	50	63	85	46	56	84	26	45	53	0.00
16	47	295	2.5	346	10.0	57	72	44	58	83	40	69	95	39	46	51	0.00
17	48				39.0		62	47		59	44		96	58			
18	49	250	19.2	160	42.0	51	57	47	51	62	45	80	94	63	45	48	0.14
19	50				43.0		56	45		62	41		95	72			
20	51																
21	52																
22	53				20.0		70	47		77	38		61	16			
23	54	366	4.7	17	14.0	56	69	47	56	80	43	45	78	24	33	44	0.00
24	55	366	2.5	352	9.0	55	72	40	56	84	37	64	93	29	40	47	0.00
25	56	354	2.4	6	7.0	55	75	38	57	87	35	64	94	28	41	47	0.00
26	57	227	3.0	216	14.0	55	67	43	56	76	40	81	100	55	49	51	0.06
27	58	187	3.8	356	18.0	53	63	44	52	69	41	73	96	47	44	48	0.00
28	59	257	2.5	19	9.0	52	66	41	52	76	37	80	100	45	45	47	0.00
29	60	342	3.1	333	9.0	55	71	40	57	80	36	65	99	26	41	48	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Fahrenheit	Air Temperature Min Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Fahrenheit	Fuel Temperature Min Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Fahrenheit	Total Precip. inches
Total	6685															0.29
Ave.	279	4.6	342	16.1	53.9	67.4	41.8	54.1	75.0	38.2	67	92	38	41	47	
Max.	366	19.2		43.0	67	81	50	65	87	46	88	100	72	49	53	0.14
Min.	89	1.8		7.0	41	46	32	41	51	27	34	61	16	26	36	0.00

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.

° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

March, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	60	398	9.4	352	25.0	54	67	42	55	78	38	40	74	24	29	42	0.00
2	61	221	3.2	347	10.0	47	61	38	47	77	34	73	92	46	38	42	0.00
3	62	397	5.4	335	22.0	50	67	36	50	79	31	59	97	22	32	41	0.00
4	63	420	4.6	26	19.0	51	71	32	51	86	24	51	88	15	29	40	0.00
5	64	417	3.2	0	8.0	51	71	32	53	88	26	57	92	21	33	41	0.00
6	65	423	3.2	340	10.0	56	82	33	57	95	28	54	94	15	35	44	0.00
7	66	428	3.2	88	11.0	56	80	36	58	95	30	59	91	16	38	46	0.00
8	67	420	2.1	39	11.0	57	80	37	60	94	32	61	95	23	41	47	0.00
9	68	434	3.0	33	11.0	61	86	38	62	102	34	56	95	13	40	49	0.00
10	69	207	1.8	349	6.0	57	69	43	57	82	39	72	91	46	47	51	0.00
11	70	129	5.1	150	20.0	57	60	54	56	63	52	90	100	75	54	55	0.53
12	71	395	6.2	327	19.0	61	75	48	61	84	44	69	100	33	49	54	0.00
13	72	390	2.1	89	8.0	62	77	46	65	93	42	69	100	36	50	55	0.00
14	73	144	3.2	338	10.0	62	69	59	62	74	56	78	88	64	55	58	0.00
15	74	92	4.6	309	19.0	59	64	54	57	65	50	82	96	50	53	55	0.04
16	75	183	4.0	349	12.0	57	64	52	56	72	49	88	100	70	53	54	0.15
17	76	467	2.9	41	12.0	61	75	50	65	91	43	69	100	29	48	53	0.00
18	77	478	11.2	328	27.0	64	78	54	64	86	47	40	61	22	38	49	0.00
19	78	478	4.8	347	13.0	63	84	47	64	100	39	46	79	13	39	50	0.00
20	79	281	3.5	53	14.0	58	72	45	58	90	40	69	92	39	47	51	0.00
21	80	475	3.4	194	13.0	62	74	50	66	92	46	61	96	30	47	53	0.00
22	81	232	7.1	226	42.0	57	66	50	56	71	48	80	98	57	50	53	0.38
23	82	391	5.8	185	17.0	56	63	47	58	79	40	68	98	45	44	49	0.01
24	83	282	5.4	160	16.0	56	65	48	58	79	43	69	96	52	46	50	0.00
25	84	485	5.6	338	20.0	62	80	45	64	96	39	61	95	29	46	53	0.00
26	85	500	3.8	79	10.0	65	82	48	67	98	42	63	93	26	49	55	0.00
27	86	494	5.5	278	24.0	67	82	47	70	99	42	57	96	34	49	55	0.00
28	87	522	9.9	330	24.0	65	80	47	65	90	39	36	71	17	35	49	0.00
29	88	519	6.6	337	21.0	69	87	52	70	103	45	37	83	14	37	51	0.00
30	89	430	3.9	155	14.0	65	80	48	66	95	43	54	88	30	46	54	0.00
31	90	521	7.9	301	26.0	59	70	43	59	86	35	41	73	20	32	45	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	11654															1.11
Ave.	376	4.9	343	16.6	58.9	73.6	45.2	60.0	86.5	40.0	62	91	33	43	50	
Max.	522	11.2		42.0	69	87	59	70	103	56	90	100	75	55	58	0.53
Min.	92	1.8		6.0	47	60	32	47	63	24	36	61	13	29	40	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

April, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	91	521	10.6	339	25.0	56	70	40	58	83	31	35	71	15	26	42	0.00
2	92	547	9.5	339	26.0	56	70	44	56	83	37	38	62	18	28	42	0.00
3	93	520	5.1	329	18.0	59	74	37	61	91	29	36	78	14	28	44	0.00
4	94	465	7.2	162	33.0	59	69	49	62	88	41	38	60	21	33	46	0.00
5	95	212	6.6	172	26.0	48	54	37	46	61	29	71	95	45	38	43	0.14
6	96	401	9.8	141	30.0	50	59	35	52	69	30	63	96	42	37	43	0.00
7	97	93	7.2	137	37.0	46	53	43	45	51	43	89	97	56	43	44	0.93
8	98	428	2.7	315	11.0	50	61	40	53	80	33	75	99	41	41	45	0.00
9	99	550	3.2	57	11.0	52	70	35	56	88	31	69	97	34	40	46	0.00
10	100	546	4.4	24	19.0	56	71	38	61	91	33	65	96	30	42	48	0.00
11	101	462	4.2	310	19.0	59	74	48	62	95	41	60	92	35	43	50	0.00
12	102	584	6.4	342	21.0	63	82	47	65	98	39	46	87	14	37	49	0.00
13	103	565	7.6	264	31.0	61	79	42	64	93	34	52	95	25	40	49	0.00
14	104	599	8.1	341	29.0	55	66	45	59	84	36	32	50	16	23	41	0.00
15	105	598	13.5	341	34.0	60	75	45	61	85	40	32	50	15	28	44	0.00
16	106	607	8.2	341	26.0	66	85	48	67	99	42	30	79	11	29	47	0.00
17	107	610	3.6	13	11.0	66	87	40	69	105	33	48	89	14	40	51	0.00
18	108	590	5.1	348	18.0	70	90	47	72	109	39	45	89	13	42	54	0.00
19	109	596	6.0	331	18.0	74	92	57	75	109	44	30	76	9	36	53	0.00
20	110	569	4.0	15	13.0	70	90	51	73	107	43	52	85	20	48	56	0.00
21	111	585	5.9	144	20.0	68	82	53	73	102	47	62	92	37	54	59	0.00
22	112	574	6.6	318	22.0	69	85	51	72	104	43	53	91	23	49	56	0.00
23	113	540	8.6	311	29.0	69	85	57	74	105	52	37	71	15	39	52	0.00
24	114	383	7.0	226	23.0	61	70	52	62	90	44	46	94	21	38	48	0.10
25	115	586	6.2	293	20.0	61	73	51	67	96	48	52	97	26	40	50	0.02
26	116	617	6.6	345	21.0	66	80	46	70	98	38	41	72	24	39	51	0.00
27	117	627	7.5	333	23.0	75	91	59	77	111	51	37	74	16	44	56	0.00
28	118	602	5.7	207	21.0	73	86	55	77	108	45	46	83	26	49	58	0.00
29	119	631	6.3	318	21.0	73	87	53	80	112	46	36	88	14	41	55	0.00
30	120	633	13.7	337	42.0	74	90	63	75	101	46	20	33	10	29	51	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	15843															1.19
Ave.	528	6.9	333	23.3	62.1	76.7	46.9	64.8	93.2	39.6	48	81	23	38	49	
Max.	633	13.7		42.0	75	92	63	80	112	52	89	99	56	54	59	0.93
Min.	93	2.7		11.0	46	53	35	45	51	29	20	33	9	23	41	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

May, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	121	636	6.4	327	18.0	76	94	60	79	116	44	25	57	11	35	53	0.00
2	122	630	5.4	158	17.0	73	88	53	77	108	47	43	79	19	46	56	0.00
3	123	623	5.1	163	21.0	72	87	53	77	109	47	46	84	19	47	57	0.00
4	124	628	5.0	138	19.0	70	85	54	75	106	46	49	80	21	47	56	0.00
5	125	624	5.4	175	16.0	68	82	53	74	108	45	47	82	19	44	54	0.00
6	126	675	13.9	342	30.0	68	79	59	72	94	54	20	39	5	22	47	0.00
7	127	663	14.7	347	42.0	66	77	55	70	90	52	23	33	14	26	47	0.00
8	128	640	8.0	123	24.0	67	82	45	72	103	40	45	80	23	42	52	0.00
9	129	651	4.2	336	16.0	70	87	49	76	114	45	47	85	20	45	55	0.00
10	130	527	5.2	164	17.0	69	81	54	74	107	49	53	82	35	50	57	0.00
11	131	613	8.8	234	27.0	67	78	57	73	105	48	37	49	22	39	51	0.00
12	132	513	7.6	8	23.0	61	69	55	66	91	54	46	60	32	39	49	0.00
13	133	535	6.7	184	23.0	62	71	53	66	92	49	47	66	22	40	50	0.00
14	134	579	5.3	229	19.0	62	73	52	69	96	47	49	81	25	41	50	0.00
15	135	507	4.2	248	17.0	61	73	47	67	100	42	60	87	36	46	52	0.00
16	136	629	5.2	169	19.0	65	77	50	72	104	45	58	90	33	48	54	0.22
17	137	496	4.9	216	21.0	66	78	56	70	104	48	62	94	28	51	57	0.00
18	138	567	5.1	168	21.0	67	80	58	73	105	54	55	84	27	49	56	0.00
19	139	596	5.3	175	18.0	68	78	58	75	102	57	56	76	34	50	57	0.00
20	140	558	5.5	112	23.0	67	81	59	74	118	54	65	90	31	54	59	0.14
21	141	641	6.9	171	22.0	69	81	58	76	103	57	60	97	27	52	58	0.02
22	142	566	5.2	189	15.0	69	78	59	76	107	58	55	72	38	51	58	0.00
23	143	634	5.4	166	15.0	70	82	58	77	105	54	50	77	24	49	57	0.00
24	144	658	6.6	280	22.0	76	91	56	83	119	52	45	81	18	49	59	0.00
25	145	626	6.6	167	21.0	74	86	61	80	112	55	45	67	24	50	59	0.00
26	146	675	6.3	156	21.0	73	86	60	80	108	53	48	74	25	50	59	0.00
27	147	677	4.8	162	18.0	74	89	58	82	113	53	41	72	21	47	57	0.00
28	148	650	4.5	116	19.0	77	93	59	84	119	53	44	72	24	51	60	0.00
29	149	605	4.7	106	16.0	79	93	61	85	119	56	41	75	20	50	60	0.00
30	150	542	4.5	27	17.0	78	93	64	83	118	59	34	66	10	44	58	0.00
31	151	513	7.7	185	22.0	74	87	58	79	107	52	37	67	15	44	56	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	18675															0.38
Ave.	602	6.3	176	20.6	69.6	82.5	55.9	75.4	106.5	50.6	46	74	23	45	55	
Max.	677	14.7		42.0	79	94	64	85	119	59	65	97	38	54	60	0.22
Min.	496	4.2		15.0	61	69	45	66	90	40	20	33	5	22	47	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

June, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg.	Air Temperature Max Fahrenheit	Air Temperature Min	Fuel Temperature Mean Deg.	Fuel Temperature Max Fahrenheit	Fuel Temperature Min	Humidity Mean Percent	Humidity Max	Humidity Min	Dew Point Deg.	Wet Bulb Fahrenheit	Total Precip. inches
1	152	590	8.0	160	23.0	67	79	56	74	101	53	58	88	34	51	57	0.50
2	153	672	5.2	189	18.0	74	85	63	82	109	61	47	87	24	50	59	0.00
3	154	625	7.7	287	17.0	76	88	65	83	117	61	33	49	13	44	57	0.00
4	155	494	10.8	335	31.0	74	85	63	77	101	60	45	69	26	51	59	0.01
5	156	662	10.0	334	30.0	83	96	67	87	114	60	33	64	16	48	61	0.00
6	157	698	8.1	335	31.0	85	101	66	89	120	59	36	70	12	50	62	0.00
7	158	703	5.2	309	19.0	87	105	65	94	133	59	35	72	9	49	63	0.00
8	159	687	5.5	271	17.0	90	106	70	97	134	65	34	63	14	54	66	0.00
9	160	594	6.0	323	37.0	85	107	71	91	136	68	49	91	14	58	67	0.05
10	161	608	6.9	143	23.0	78	90	67	84	111	63	60	89	33	62	67	0.00
11	162	721	8.2	343	23.0	86	103	63	90	118	58	35	83	11	47	62	0.00
12	163	724	8.4	334	24.0	94	108	79	98	126	66	19	32	7	43	62	0.00
13	164	712	6.9	332	19.0	89	104	71	95	131	64	26	49	12	47	63	0.00
14	165	703	5.4	131	20.0	83	97	69	90	125	64	39	63	17	53	63	0.00
15	166	703	6.2	143	22.0	81	96	66	89	121	60	39	70	15	51	62	0.00
16	167	705	5.2	0	20.0	83	101	64	91	128	60	35	65	12	49	62	0.00
17	168	702	5.8	53	21.0	85	101	66	93	129	60	33	60	15	49	62	0.00
18	169	706	7.7	151	25.0	83	97	65	89	119	60	31	59	11	46	60	0.00
19	170	721	5.2	89	18.0	81	98	60	88	123	54	25	53	10	38	56	0.00
20	171	614	5.4	8	18.0	82	97	63	88	126	59	29	52	12	44	59	0.00
21	172	686	8.0	155	24.0	79	91	67	83	108	62	29	54	11	42	57	0.00
22	173		4.7	122	22.0	78	94	58		116	51		57	6			0.00
23	174	718	5.2	333	17.0	84	102	60	91	126	56	24	44	9	40	57	0.00
24	175	676	6.3	336	18.0	88	106	67	94	134	62	30	50	10	49	63	0.00
25	176	692	7.2	345	21.0	91	111	69	96	132	64	31	63	11	52	65	0.00
26	177	678	5.0	287	26.0	93	110	75	99	134	68	32	58	13	56	67	0.00
27	178	522	5.6	175	19.0	86	98	75	90	115	70	36	55	22	55	65	0.00
28	179	505	4.9	148	17.0	85	100	74	89	122	69	39	60	14	54	65	0.00
29	180	715	4.5	329	23.0	86	104	65	94	129	61	34	72	11	50	63	0.00
30	181	682	6.0	318	19.0	92	112	67	99	136	62	25	52	6	45	63	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg.	Air Temperature Max Fahrenheit	Air Temperature Min	Fuel Temperature Mean Deg.	Fuel Temperature Max Fahrenheit	Fuel Temperature Min	Humidity Mean Percent	Humidity Max	Humidity Min	Dew Point Deg.	Wet Bulb Fahrenheit	Total Precip. inches
Total	19220															0.56
Ave.	663	6.5	329	22.1	83.7	99.1	66.5	89.8	122.5	61.3	35	63	14	49	62	
Max.	724	10.8		37.0	94	112	79	99	136	70	60	91	34	62	67	0.50
Min.	494	4.5		17.0	67	79	56	74	101	51	19	32	6	38	56	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

July, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Fahrenheit	Air Temperature Min Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Fahrenheit	Fuel Temperature Min Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Fahrenheit	Total Precip. inches
1	182	579	8.3	287	32.0	92	110	74	97	136	70	27	46	12	51	65	0.00
2	183	604	7.4	161	27.0	91	108	74	97	132	71	29	54	17	52	65	0.00
3	184	590	6.2	179	18.0	89	101	78	96	126	75	30	49	20	53	65	0.00
4	185	628	5.7	154	20.0	90	104	74	98	128	70	39	62	22	61	69	0.00
5	186	645	6.9	171	22.0	89	101	77	96	122	74	38	51	22	58	68	0.00
6	187	637	6.3	163	20.0	83	96	71	91	121	67	42	61	23	56	65	0.00
7	188	620	6.7	152	19.0	82	96	70	88	120	65	41	65	23	54	63	0.00
8	189	508	6.8	162	27.0	79	94	71	84	121	68	47	74	27	56	64	0.00
9	190	438	7.2	169	21.0	72	79	66	76	105	64	67	82	52	60	64	0.03
10	191	535	7.2	155	20.0	74	83	65	82	109	64	56	75	39	56	62	0.00
11	192	566	6.2	156	18.0	78	89	66	84	114	61	49	74	30	56	63	0.00
12	193	538	6.0	206	22.0	78	88	67	85	118	64	40	56	23	50	60	0.00
13	194	621	4.4	161	21.0	81	94	65	87	120	60	38	70	19	50	61	0.00
14	195	674	6.0	71	19.0	82	96	67	89	123	62	33	55	17	49	61	0.00
15	196	677	6.5	325	20.0	86	103	65	93	129	60	33	55	14	50	63	0.00
16	197	674	7.1	325	23.0	89	106	68	95	130	64	33	61	13	52	64	0.00
17	198	655	8.3	285	24.0	90	104	74	95	132	70	28	52	15	51	64	0.00
18	199	667	6.5	163	22.0	85	98	73	93	123	66	30	43	12	48	62	0.00
19	200	662	5.0	159	17.0	84	100	64	92	125	59	37	60	21	53	63	0.00
20	201	625	5.8	265	22.0	90	106	72	97	133	69	35	61	10	56	67	0.00
21	202	633	8.0	172	24.0	89	100	74	97	127	70	39	62	24	59	68	0.00
22	203	649	9.5	172	24.0	82	94	71	89	114	67	34	49	21	50	61	0.00
23	204	660	5.9	158	26.0	75	89	62	82	114	55	40	67	18	47	58	0.00
24	205	670	5.3	133	20.0	77	93	58	84	117	53	29	55	10	40	55	0.00
25	206	666	5.7	96	20.0	79	94	60	85	120	53	26	49	9	37	55	0.00
26	207	613	6.8	311	24.0	80	94	58	86	118	53	28	50	16	42	57	0.00
27	208	684	13.4	337	26.0	84	96	72	88	111	69	23	39	10	40	58	0.00
28	209	682	11.3	331	28.0	89	104	75	93	120	63	16	29	7	34	58	0.00
29	210	661	7.9	332	20.0	92	110	72	95	136	66	15	30	5	33	58	0.00
30	211	582	5.5	306	19.0	91	113	67	97	138	62	22	42	8	43	61	0.00
31	212	451	4.6	105	30.0	88	103	71	92	125	66	33	51	16	53	65	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Fahrenheit	Air Temperature Min Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Fahrenheit	Fuel Temperature Min Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Fahrenheit	Total Precip. inches
Total	19094															0.03
Ave.	616	6.9	177	22.4	84.1	98.3	69.1	90.4	122.8	64.5	35	56	19	50	62	
Max.	684	13.4		32.0	92	113	78	98	138	75	67	82	52	61	69	0.03
Min.	438	4.4		17.0	72	79	58	76	105	53	15	29	5	33	55	0.00

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.

° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

August, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	213	593	6.7	164	18.0	85	99	72	92	118	68	42	59	23	58	67	0.00
2	214	370	4.2	210	14.0	82	96	73	86	115	68	43	67	25	56	65	0.00
3	215	621	5.9	147	21.0	82	97	67	88	121	61	43	70	18	54	63	0.00
4	216	402	5.8	165	23.0	74	89	62	78	115	57	47	66	26	52	60	0.00
5	217	508	3.2	355	13.0	76	91	62	81	111	57	48	73	26	53	61	0.00
6	218	484	4.3	63	18.0	81	100	63	84	120	57	38	72	9	48	61	0.00
7	219	560	6.1	167	21.0	83	97	69	88	120	65	35	53	17	50	62	0.00
8	220	566	5.7	161	23.0	79	93	66	84	113	59	40	64	19	51	61	0.00
9	221	596	4.4	235	20.0	81	97	62	88	122	58	35	63	15	48	60	0.00
10	222	496	6.0	159	19.0	80	94	64	84	117	58	37	53	16	50	61	0.00
11	223	567	6.2	165	24.0	78	91	67	84	115	59	39	64	16	49	60	0.00
12	224	618	6.0	254	25.0	77	93	57	84	118	53	36	63	17	45	57	0.00
13	225	621	7.0	167	28.0	78	94	57	84	115	53	34	62	14	44	57	0.00
14	226	560	5.0	212	13.0	77	90	62	82	109	56	35	57	17	46	58	0.00
15	227	617	9.1	322	25.0	85	103	67	88	121	62	21	39	5	36	57	0.00
16	228	617	5.8	338	20.0	83	106	58	87	130	53	20	43	3	30	54	0.00
17	229	580	4.6	332	14.0	84	107	59	89	129	54	22	37	8	38	57	0.00
18	230	575	4.7	357	18.0	84	106	61	89	129	56	29	51	9	44	59	0.00
19	231	466	3.7	113	14.0	80	97	63	84	114	58	37	58	17	50	61	0.00
20	232	479	4.0	139	21.0	78	94	65	82	115	59	43	63	22	52	61	0.00
21	233	544	4.5	136	17.0	78	95	60	84	117	56	43	71	19	52	61	0.00
22	234	571	4.8	75	18.0	80	98	62	86	118	58	41	67	19	51	61	0.00
23	235	542	4.7	138	18.0	79	95	60	85	115	56	41	70	19	51	61	0.00
24	236	576	4.6	186	22.0	80	96	62	86	121	54	37	68	16	48	60	0.00
25	237	550	4.9	98	24.0	80	97	61	85	120	55	33	59	12	45	58	0.00
26	238	532	5.5	285	19.0	80	97	60	86	120	54	32	55	14	45	58	0.00
27	239	526	3.9	180	16.0	82	99	61	87	122	57	32	59	15	47	60	0.00
28	240	433	9.5	171	31.0	85	98	69	87	109	62	30	49	15	47	61	0.00
29	241	522	15.2	171	37.0	78	88	63	81	101	57	41	59	25	52	61	0.00
30	242	527	3.9	352	14.0	74	89	55	79	110	51	39	70	23	46	56	0.00
31	243	553	6.3	328	18.0	80	97	62	84	120	56	32	55	14	44	58	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	16772															0.00
Ave.	541	5.7	164	20.2	80.2	96.2	62.9	85.1	117.4	57.6	36	60	17	48	60	
Max.	621	15.2		37.0	85	107	73	92	130	68	48	73	26	58	67	0.00
Min.	370	3.2		13.0	74	88	55	78	101	51	20	37	3	30	54	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

September, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	244	542	6.4	149	21.0	79	94	60	84	115	56	33	56	15	45	58	0.00
2	245	522	6.6	155	22.0	76	88	63	80	105	59	42	65	24	50	59	0.00
3	246	508	6.2	184	19.0	72	84	61	78	109	52	43	66	25	48	57	0.00
4	247	545	6.2	301	21.0	70	84	55	76	105	50	34	64	12	37	52	0.00
5	248	552	12.8	332	29.0	71	84	60	74	94	57	24	41	10	30	50	0.00
6	249	550	7.5	338	20.0	77	93	61	80	111	55	17	28	5	25	51	0.00
7	250	545	6.2	308	21.0	79	99	55	81	123	47	22	45	6	32	53	0.00
8	251	536	4.9	28	16.0	80	104	54	84	126	49	21	42	5	31	53	0.00
9	252	532	4.0	342	15.0	81	104	56	85	125	50	22	46	7	33	54	0.00
10	253	509	3.9	343	17.0	85	109	60	89	129	56	22	41	9	38	57	0.00
11	254	453	3.8	11	12.0	85	106	65	88	123	61	25	48	9	42	59	0.00
12	255	301	3.9	58	15.0	79	98	63	80	115	59	34	53	15	46	59	0.00
13	256	372	4.0	292	15.0	80	97	68	84	115	64	38	57	14	50	61	0.00
14	257	87	5.1	197	15.0	70	77	66	69	85	63	61	85	40	56	61	0.00
15	258	205	7.2	170	22.0	65	70	56	66	79	50	63	84	39	52	57	0.00
16	259	88	5.5	326	19.0	56	60	52	55	69	47	82	96	60	50	53	0.51
17	260	439	4.1	342	14.0	65	77	57	69	95	55	69	98	35	53	58	0.00
18	261	492	5.8	337	17.0	72	92	58	75	107	53	42	75	12	44	55	0.00
19	262	485	3.6	348	13.0	75	99	52	78	116	48	44	89	8	44	56	0.00
20	263	474	3.0	345	11.0	76	98	54	80	117	51	43	84	13	47	58	0.00
21	264	473	4.0	324	12.0	79	100	58	82	119	54	41	76	13	48	59	0.00
22	265	468	5.4	156	18.0	75	91	56	78	111	52	41	79	18	46	57	0.00
23	266	460	2.5	352	10.0	71	92	53	75	110	48	41	77	13	42	54	0.00
24	267	442	3.4	347	11.0	74	95	56	77	113	52	36	61	12	41	54	0.00
25	268	453	4.4	23	15.0	74	94	53	78	111	48	38	72	13	42	55	0.00
26	269	449	3.4	7	11.0	75	94	56	79	115	51	38	67	15	44	56	0.00
27	270	443	5.4	345	16.0	75	95	55	78	114	52	38	70	14	44	56	0.00
28	271	444	4.7	14	17.0	74	93	54	77	112	50	37	70	12	42	55	0.00
29	272	439	4.7	33	19.0	68	86	51	73	106	47	39	70	16	40	52	0.00
30	273	266	3.2	1	14.0	63	80	49	64	94	45	44	70	22	39	50	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	13074															0.51
Ave.	436	5.1	338	16.6	74.1	91.2	57.2	77.3	108.9	52.7	39	66	17	43	56	
Max.	552	12.8		29.0	85	109	68	89	129	64	82	98	60	56	61	0.51
Min.	87	2.5		10.0	56	60	49	55	69	45	17	28	5	25	50	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

October, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	274	308	3.6	11	15.0	65	76	58	65	88	55	56	76	39	48	54	0.01
2	275	469	6.5	341	24.0	72	92	54	73	101	51	42	90	14	42	55	0.00
3	276	471	14.8	345	39.0	74	82	65	75	91	61	24	33	14	35	52	0.00
4	277	451	11.2	349	33.0	78	92	66	78	98	59	27	55	15	40	55	0.00
5	278	444	3.5	41	15.0	69	88	52	72	98	48	49	72	24	48	56	0.00
6	279	417	3.2	355	15.0	69	85	54	71	98	51	54	79	30	50	57	0.00
7	280	274	2.4	344	8.0	69	85	55	71	96	52	56	79	32	52	58	0.01
8	281	320	3.3	343	11.0	72	87	60	73	100	56	51	76	25	51	59	0.00
9	282	418	3.5	348	13.0	72	92	54	74	105	50	46	78	18	47	56	0.00
10	283	402	5.7	221	23.0	72	89	52	74	101	48	44	75	18	46	56	0.00
11	284	418	4.2	353	14.0	71	92	55	73	105	52	43	72	17	44	55	0.00
12	285	418	3.6	335	9.0	72	97	51	74	109	48	37	70	10	39	53	0.00
13	286	415	2.9	341	10.0	73	99	51	74	111	47	34	64	9	38	53	0.00
14	287	394	3.6	331	12.0	74	97	53	76	110	49	35	59	13	41	54	0.00
15	288	388	3.2	350	15.0	72	90	56	74	104	52	41	66	20	45	56	0.00
16	289	311	2.5	355	11.0	71	88	56	72	103	53	46	69	22	47	56	0.00
17	290	236	3.8	145	17.0	67	77	60	68	88	58	67	94	38	55	59	0.10
18	291	267	3.8	340	21.0	63	77	51	64	90	48	74	97	42	53	57	0.00
19	292	238	4.4	326	13.0	59	73	46	60	88	42	78	96	45	52	54	0.05
20	293	372	13.2	335	31.0	71	84	59	70	89	56	41	66	21	44	55	0.00
21	294	370	7.3	336	22.0	71	87	56	70	95	50	33	57	15	38	52	0.00
22	295	350	5.5	337	18.0	68	88	52	68	97	48	42	71	16	40	52	0.00
23	296	243	4.2	351	11.0	64	84	46	64	96	42	44	71	17	39	50	0.00
24	297	272	2.8	323	12.0	63	78	51	64	89	49	52	74	29	43	51	0.00
25	298	337	5.6	143	20.0	65	81	53	66	90	50	48	75	21	42	52	0.00
26	299	342	3.7	9	15.0	62	82	47	64	91	43	51	81	20	41	50	0.00
27	300	96	3.2	320	11.0	60	69	53	59	72	51	64	87	38	47	52	0.02
28	301	273	3.6	347	13.0	61	74	53	62	84	50	78	96	45	54	56	0.07
29	302	338	8.7	334	25.0	63	77	51	62	83	45	52	93	25	43	51	0.00
30	303	322	3.3	345	13.0	65	86	49	65	96	44	47	73	21	42	52	0.00
31	304	303	3.8	75	18.0	62	78	46	62	89	42	59	88	28	45	52	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	10675															0.26
Ave.	344	5.0	342	17.0	68.1	84.7	53.7	69.0	95.3	50.0	49	75	24	45	54	
Max.	471	14.8		39.0	78	99	66	78	111	61	78	97	45	55	59	0.10
Min.	96	2.4		8.0	59	69	46	59	72	42	24	33	9	35	50	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

November, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	305	106	4.0	174	15.0	60	65	50	59	68	47	79	92	71	53	56	0.00
2	306	228	5.0	27	25.0	56	68	46	56	79	41	70	92	36	46	50	0.00
3	307	324	6.5	359	23.0	55	68	38	54	75	34	42	80	19	30	42	0.00
4	308	323	6.3	345	26.0	50	66	38	49	72	33	42	66	18	26	39	0.00
5	309	261	2.6	348	11.0	47	65	35	47	74	32	52	74	23	28	38	0.00
6	310	312	4.3	358	18.0	52	74	33	51	80	29	52	83	19	31	41	0.00
7	311	297	2.1	342	8.0	51	70	34	53	80	31	55	85	27	34	42	0.00
8	312	60	4.0	208	20.0	50	53	46	49	55	44	90	100	64	47	48	0.23
9	313	51	3.9	352	12.0	45	48	39	45	49	37	97	100	90	45	45	0.22
10	314	291	4.4	347	19.0	47	62	34	46	67	31	75	100	36	37	42	0.00
11	315	286	2.5	23	7.0	45	63	31	45	71	29	73	98	33	35	40	0.00
12	316	278	4.9	342	16.0	50	70	32	49	74	29	64	97	27	35	42	0.00
13	317	275	2.3	48	8.0	50	68	36	51	77	33	68	93	32	38	43	0.00
14	318	266	2.9	330	12.0	49	65	35	50	75	32	74	97	42	40	44	0.00
15	319	99	6.6	321	19.0	48	53	36	46	55	32	80	99	55	42	45	0.72
16	320	264	3.7	355	13.0	44	59	32	44	65	30	65	93	27	31	38	0.00
17	321	167	2.3	344	9.0	47	61	35	46	66	32	76	95	46	38	42	0.00
18	322	256	2.6	335	7.0	49	66	37	50	74	35	79	99	45	42	45	0.00
19	323	238	2.4	312	7.0	51	69	38	52	78	36	81	99	46	44	47	0.00
20	324	247	9.8	331	26.0	61	75	43	59	78	41	56	98	32	42	50	0.00
21	325	236	6.5	334	18.0	59	74	42	57	79	38	43	84	23	35	46	0.00
22	326	197	1.8	32	7.0	51	72	39	50	80	35	72	94	31	40	45	0.00
23	327	217	3.2	155	12.0	52	69	36	52	77	33	71	99	36	42	46	0.00
24	328	189	10.0	262	26.0	48	56	35	47	60	31	70	90	31	37	43	0.15
25	329	174	6.9	11	28.0	42	53	32	41	60	29	66	99	40	30	36	0.00
26	330	255	18.5	2	40.0	46	53	39	45	56	37	29	42	20	15	34	0.00
27	331	257	15.9	4	38.0	46	54	40	45	57	36	25	35	18	12	33	0.00
28	332	256	6.5	351	18.0	42	56	28	40	62	21	36	74	16	14	32	0.00
29	333	251	2.3	350	10.0	37	59	21	36	66	17	58	86	20	20	30	0.00
30	334	103	3.5	343	17.0	38	50	24	38	53	21	67	87	39	28	34	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	6764															1.32
Ave.	225	5.3	350	17.2	48.9	62.8	36.1	48.4	68.7	32.9	64	88	35	35	42	
Max.	324	18.5		40.0	61	75	50	59	80	47	97	100	90	53	56	0.72
Min.	51	1.8		7.0	37	48	21	36	49	17	25	35	16	12	30	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

December, 2015

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	335	210	2.5	42	8.0	44	63	27	44	72	23	68	95	33	32	38	0.00
2	336	91	4.0	324	13.0	49	55	43	49	57	42	85	100	63	45	47	0.06
3	337	13	6.6	219	31.0	47	51	44	46	49	44	98	100	93	47	47	0.69
4	338	140	5.8	221	15.0	48	58	40	47	63	38	89	100	60	45	46	0.00
5	339	96	2.2	24	9.0	44	52	37	43	55	33	90	100	66	41	43	0.05
6	340	31	4.8	357	23.0	46	47	44	46	48	44	100	100	96	46	46	0.78
7	341	30	1.7	0	7.0	49	51	47	49	51	47	100	100	100	49	49	0.05
8	342	114	3.0	120	11.0	53	58	49	53	61	47	99	100	93	53	53	0.01
9	343	32	7.4	221	47.0	52	56	51	52	55	50	100	100	95	52	52	0.95
10	344	154	12.5	201	52.0	52	59	46	51	62	44	79	100	47	45	48	0.71
11	345	83	3.4	225	16.0	46	51	41	45	53	37	94	100	80	45	45	0.02
12	346	59	1.7	312	7.0	42	47	34	41	47	32	99	100	94	42	42	0.15
13	347	117	14.7	261	56.0	48	54	36	46	55	32	73	100	44	39	43	0.80
14	348	182	3.4	342	16.0	41	55	31	40	57	27	74	100	32	31	36	0.00
15	349	227	9.4	334	28.0	44	54	35	42	57	32	58	85	33	29	37	0.00
16	350	192	1.8	7	9.0	43	52	34	43	58	30	69	88	43	33	38	0.00
17	351	50	1.1	352	6.0	44	46	41	44	48	41	83	92	70	39	41	0.00
18	352	10	3.8	346	9.0	42	43	40	41	43	40	100	100	94	42	42	1.03
19	353	162	1.7	310	8.0	44	54	34	43	58	32	91	100	55	41	42	0.05
20	354	23	5.6	184	24.0	40	43	36	40	43	35	100	100	99	40	40	1.13
21	355	15	7.8	210	29.0	46	49	42	46	48	42	100	100	100	46	46	1.51
22	356	70	4.2	311	24.0	49	54	45	48	56	38	90	100	51	46	48	0.27
23	357	221	5.9	156	23.0	45	55	35	45	59	32	69	100	43	35	40	0.00
24	358	124	6.0	219	20.0	41	48	33	40	51	30	81	99	57	36	39	0.04
25	359	227	3.6	319	13.0	41	51	33	41	58	29	76	100	44	33	37	0.00
26	360	230	6.4	344	19.0	41	52	30	39	55	26	54	91	27	24	33	0.00
27	361	102	2.8	339	13.0	38	46	29	38	52	26	76	94	53	31	35	0.00
28	362	223	3.6	305	13.0	42	54	32	42	59	28	75	100	46	34	38	0.00
29	363	226	4.6	349	15.0	43	56	34	42	61	31	59	80	28	28	36	0.00
30	364	114	3.3	343	12.0	40	49	32	39	54	27	87	100	63	36	38	0.03
31	365	237	12.9	342	25.0	43	52	37	41	55	33	39	63	27	19	33	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	3804															8.33
Ave.	123	5.1	315	19.4	44.8	52.1	37.8	44.1	54.8	35.2	82	96	62	39	42	
Max.	237	14.7		56.0	53	63	51	53	72	50	100	100	100	53	53	1.51
Min.	10	1.1		6.0	38	43	27	38	43	23	39	63	27	19	33	0.00

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.

° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

B. Raw Post-Project (Recent 12 Month) Weather Data

The following weather data was obtained from the Western Regional Climate Center (WRCC), just as the data contained in Appendix A. For more information on the WRCC, please see Appendix A.

Monthly Summary for

January, 2019

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	1	241	12.0	341	33.0	47	57	41	46	65	36	29	43	16	16	35	0.00
2	2	232	2.5	111	10.0	41	59	29	41	71	23	62	86	31	28	35	0.00
3	3	151	1.6	341	6.0	39	54	28	38	63	24	78	94	49	32	35	0.00
4	4	222	2.3	12	8.0	41	58	31	41	71	26	71	96	33	31	36	0.00
5	5	20	6.8	245	34.0	40	47	31	39	46	28	91	98	82	37	39	1.08
6	6	17	10.1	162	29.0	45	47	42	44	46	40	94	99	90	43	44	0.90
7	7	52	2.5	342	10.0	45	48	42	45	48	41	95	100	86	44	44	0.00
8	8	35	3.6	358	21.0	49	53	46	48	52	45	97	100	87	48	48	1.24
9	9	67	16.1	160	42.0	54	58	52	52	59	50	89	97	83	51	52	0.29
10	10	145	3.3	327	17.0	50	59	41	49	66	37	89	99	63	47	48	0.06
11	11	147	2.5	13	10.0	47	56	38	47	65	34	89	100	69	44	45	0.01
12	12	240	3.0	347	8.0	49	67	35	49	78	31	75	99	34	40	44	0.00
13	13	249	3.2	339	10.0	48	65	36	48	77	31	71	95	31	37	42	0.00
14	14	204	5.0	345	22.0	46	61	31	47	70	26	66	94	29	34	40	0.00
15	15	52	4.2	6	21.0	47	50	45	46	53	44	94	99	79	45	46	0.65
16	16	18	13.1	185	43.0	49	54	44	49	52	44	96	100	89	48	49	1.84
17	17	128	8.7	194	31.0	49	54	41	47	55	36	85	98	66	44	46	0.06
18	18	60	3.1	337	9.0	46	49	42	46	52	41	97	100	92	45	45	0.32
19	19	49	2.0	343	10.0	49	51	46	49	52	46	100	100	99	49	49	0.40
20	20	84	8.2	175	34.0	52	57	46	51	58	44	89	100	77	49	50	0.74
21	21	272	3.9	346	11.0	45	59	36	45	68	33	76	100	43	37	41	0.01
22	22	261	8.3	327	21.0	50	62	40	48	69	34	47	77	23	28	40	0.00
23	23	248	3.1	319	10.0	44	61	31	45	73	27	73	95	40	35	39	0.00
24	24	287	10.9	340	26.0	57	70	43	56	77	36	41	67	23	33	45	0.00
25	25	292	5.6	355	20.0	53	73	32	52	81	27	52	93	18	31	42	0.00
26	26	192	7.0	349	22.0	59	70	46	55	75	42	40	88	24	33	46	0.00
27	27	273	3.2	313	15.0	53	73	36	53	85	31	67	96	29	41	46	0.00
28	28	96	4.1	19	12.0	52	60	42	50	64	36	72	90	49	43	47	0.00
29	29	244	2.8	41	7.0	54	70	43	54	83	38	77	94	42	45	49	0.00
30	30	241	2.2	359	8.0	52	63	42	54	78	37	82	96	59	46	48	0.00
31	31	293	3.4	2	15.0	53	69	39	55	83	35	74	98	36	44	48	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	5109															7.60
Ave.	165	5.4	342	18.5	48.5	59.2	39.3	48.1	65.6	35.6	76	93	54	40	44	
Max.	293	16.1		43.0	59	73	52	56	85	50	100	100	99	51	52	1.84
Min.	17	1.6		6.0	39	47	28	38	46	23	29	43	16	16	35	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

February, 2019

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	32	51	7.6	175	22.0	53	56	49	52	58	49	87	98	74	49	50	0.67
2	33	115	7.6	107	24.0	51	55	47	49	57	43	86	98	72	46	48	1.55
3	34	71	6.6	69	27.0	47	50	46	47	53	44	93	99	81	45	46	0.69
4	35	176	8.8	200	30.0	43	50	38	42	54	35	69	96	38	33	39	0.29
5	36	302	4.1	1	12.0	41	50	31	42	64	27	67	97	38	29	35	0.05
6	37	269	2.7	358	8.0	39	49	30	41	69	26	77	95	51	32	36	0.00
7	38	224	3.6	10	10.0	40	50	29	41	63	26	76	95	51	32	36	0.00
8	39	189	2.8	283	9.0	43	51	35	44	65	33	75	95	48	35	39	0.00
9	40	108	13.0	186	44.0	42	48	33	40	48	27	78	92	57	35	39	0.17
10	41	236	3.0	66	11.0	37	48	28	37	62	22	75	93	48	29	33	0.00
11	42	157	6.1	217	19.0	42	47	32	42	52	30	73	91	57	33	38	0.00
12	43				13.0		45	32		47	32		97	62			
13	44	77	3.3	331	11.0	35	38	32	35	43	32	98	100	94	35	35	2.01
14	45	162	7.6	196	35.0	42	51	36	40	52	34	90	100	64	39	41	0.45
15	46	277	9.5	176	26.0	44	50	37	44	59	33	75	88	61	36	40	0.01
16	47	333	6.9	189	18.0	45	55	39	47	72	31	65	90	36	33	40	0.00
17	48	342	6.2	337	29.0	42	52	36	44	64	31	63	94	33	29	36	0.01
18	49	389	8.1	345	23.0	43	54	33	44	66	26	47	70	29	23	35	0.00
19	50	344	5.5	358	19.0	44	59	32	44	75	24	52	77	23	26	36	0.00
20	51	320	4.1	13	18.0	44	54	34	46	73	30	66	87	42	32	38	0.00
21	52	405	12.5	357	33.0	44	53	36	45	60	28	42	77	24	21	35	0.00
22	53	410	7.2	343	19.0	44	59	33	44	72	27	36	71	12	16	33	0.00
23	54	212	3.1	112	14.0	43	52	30	44	62	25	60	85	39	29	37	0.00
24	55	60	8.3	182	34.0	46	50	42	45	50	40	75	97	66	39	42	0.18
25	56	38	22.3	158	48.0	49	51	48	48	49	46	83	93	66	44	46	0.61
26	57	46	23.7	150	46.0	50	51	49	48	50	47	90	95	83	47	48	1.04
27	58	101	20.0	156	47.0	52	58	48	50	56	46	84	92	63	47	49	0.36
28	59	308	5.5	181	15.0	49	55	41	50	70	34	61	84	44	35	42	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	5724															8.09
Ave.	212	8.1	152	23.7	44.2	51.5	37.0	44.2	59.5	33.1	72	91	52	34	40	
Max.	410	23.7		48.0	53	59	49	52	75	49	98	100	94	49	50	2.01
Min.	38	2.7		8.0	35	38	28	35	43	22	36	70	12	16	33	0.00

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.

° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

March, 2019

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	60	194	3.2	3	14.0	48	55	40	48	68	36	76	96	53	40	43	0.01
2	61	223	6.6	339	16.0	50	58	45	50	63	44	83	97	60	45	47	0.50
3	62	204	3.0	330	9.0	52	58	48	53	63	46	90	100	74	49	50	0.26
4	63	221	5.8	166	21.0	51	58	46	52	70	43	83	100	59	46	48	0.06
5	64	69	3.9	348	19.0	49	51	46	48	51	45	93	99	83	47	48	0.98
6	65	130	13.2	160	31.0	54	58	51	52	58	48	88	95	76	50	51	0.59
7	66	74	5.1	279	17.0	48	51	46	48	51	45	95	99	86	47	47	0.89
8	67	402	6.5	158	27.0	47	54	42	48	67	38	73	99	47	38	42	0.03
9	68	86	7.9	338	22.0	42	45	40	41	44	39	89	96	74	39	40	0.67
10	69	421	6.2	327	17.0	49	59	41	51	74	39	70	97	42	38	43	0.04
11	70	487	8.4	335	20.0	54	68	41	55	80	35	45	83	22	32	43	0.00
12	71	456	7.5	315	28.0	50	62	40	51	74	32	54	89	20	31	41	0.00
13	72	497	5.1	334	17.0	48	64	33	49	79	27	46	78	21	27	38	0.00
14	73	446	9.0	348	21.0	55	69	39	54	78	30	34	65	14	24	41	0.00
15	74	506	3.0	30	14.0	53	75	34	56	91	28	47	87	14	30	42	0.00
16	75	495	3.2	37	10.0	55	73	35	57	89	29	55	91	21	35	44	0.00
17	76	493	3.1	346	8.0	56	74	41	60	93	37	58	89	26	39	47	0.00
18	77	505	3.4	342	14.0	58	76	39	61	92	34	57	92	22	40	48	0.00
19	78	299	4.8	324	21.0	61	73	48	61	91	42	54	76	28	42	50	0.00
20	79	153	9.5	116	41.0	52	60	48	51	62	46	86	97	57	48	50	0.61
21	80	514	4.5	300	14.0	54	66	44	57	82	40	69	97	34	42	47	0.00
22	81	102	4.3	1	15.0	48	51	44	47	52	40	91	100	80	45	47	0.57
23	82	361	5.2	3	17.0	52	60	47	53	70	42	82	100	55	46	48	0.25
24	83	424	3.3	337	10.0	51	63	38	53	79	33	73	100	41	41	46	0.01
25	84	57	5.5	228	25.0	49	52	47	48	51	44	91	99	79	47	48	0.66
26	85	280	4.6	356	13.0	52	59	46	53	66	44	81	98	58	46	49	0.29
27	86	217	7.9	331	31.0	49	61	40	48	66	35	90	100	64	46	47	1.84
28	87	210	9.0	162	27.0	49	54	41	48	55	39	83	99	69	44	46	0.11
29	88	486	4.2	347	13.0	52	63	44	55	82	35	71	90	41	42	46	0.00
30	89	566	6.0	319	18.0	57	73	42	58	90	33	50	90	18	35	45	0.00
31	90	559	4.6	3	11.0	61	77	42	64	95	35	48	79	17	37	48	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	10136															8.37
Ave.	327	5.7	338	18.7	51.8	61.9	42.5	52.6	71.8	38.2	71	93	47	41	46	
Max.	566	13.2		41.0	61	77	51	64	95	48	95	100	86	50	51	1.84
Min.	57	3.0		8.0	42	45	33	41	44	27	34	65	14	24	38	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

April, 2019

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	91	184	3.6	345	9.0	58	67	52	58	82	50	73	97	47	49	52	0.25
2	92	127	3.5	45	16.0	55	60	51	54	62	51	94	100	72	53	54	0.50
3	93	232	6.0	163	15.0	56	62	53	56	67	51	83	96	64	51	53	0.01
4	94	297	8.7	144	25.0	58	63	53	59	72	50	78	99	62	50	53	0.00
5	95	240	14.3	159	32.0	56	62	53	56	74	52	81	93	68	50	52	0.08
6	96	165	12.0	169	26.0	58	62	53	58	66	51	77	88	65	51	53	0.01
7	97	145	8.5	188	19.0	62	67	58	62	70	57	78	85	71	55	58	0.01
8	98	165	8.2	204	28.0	61	65	54	59	66	44	77	90	49	54	57	0.82
9	99	609	8.2	325	25.0	58	68	50	60	90	36	42	60	24	34	46	0.00
10	100	584	6.8	351	19.0	58	73	44	61	93	32	43	63	20	34	46	0.00
11	101	413	8.1	300	21.0	57	67	48	59	85	43	52	81	33	39	47	0.00
12	102	615	6.8	342	19.0	61	75	45	65	97	39	46	76	25	38	48	0.00
13	103	594	7.1	130	17.0	64	74	53	68	94	41	50	75	32	44	52	0.00
14	104	326	7.2	179	20.0	61	68	56	62	83	48	56	84	32	45	52	0.00
15	105	204	7.0	199	22.0	53	57	47	52	64	44	65	96	30	40	46	0.15
16	106	630	4.7	11	12.0	56	70	47	61	93	40	68	98	33	44	49	0.02
17	107	625	3.9	347	13.0	65	83	44	69	107	37	57	94	22	45	53	0.00
18	108	632	4.0	104	12.0	68	85	49	71	106	40	64	96	31	53	58	0.00
19	109	599	4.2	84	15.0	68	82	52	73	110	43	64	96	38	54	59	0.00
20	110	328	7.2	189	25.0	62	70	52	61	92	43	69	91	49	51	55	0.05
21	111	654	7.8	341	24.0	63	80	51	67	109	41	50	81	25	43	51	0.00
22	112	646	8.5	342	25.0	71	87	52	76	119	46	40	76	19	42	54	0.00
23	113	608	7.3	332	19.0	77	92	64	81	121	55	43	70	24	51	60	0.00
24	114	637	5.6	352	18.0	76	91	62	80	126	51	50	86	24	54	61	0.00
25	115	640	4.8	19	15.0	74	88	58	80	118	52	62	91	34	58	63	0.00
26	116	649	3.4	47	10.0	73	89	55	78	125	46	53	99	18	50	58	0.00
27	117	656	6.8	4	19.0	74	87	60	80	124	44	38	63	19	44	56	0.00
28	118	644	8.2	356	26.0	70	83	55	77	117	47	41	93	19	41	54	0.00
29	119	686	8.6	11	22.0	71	85	61	81	124	57	27	59	10	32	51	0.00
30	120	662	7.5	34	25.0	61	73	45	68	106	33	48	84	16	37	49	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	14194															1.90
Ave.	473	7.0	349	19.8	63.5	74.5	52.6	66.4	95.4	45.5	59	85	36	46	53	
Max.	686	14.3		32.0	77	92	64	81	126	57	94	100	72	58	63	0.82
Min.	127	3.4		9.0	53	57	44	52	62	32	27	59	10	32	46	0.00

Data are subject to further review and editing. Please refer any questions to the Western Regional Climate Center.

° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

May, 2019

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	121	685	4.1	34	13.0	61	78	39	68	116	30	45	89	13	33	47	0.00
2	122	689	4.1	355	12.0	63	81	44	70	116	35	46	86	9	36	49	0.00
3	123	680	3.8	48	13.0	66	84	44	73	118	35	48	89	17	41	52	0.00
4	124	678	3.9	62	17.0	68	86	47	74	117	38	48	90	19	44	53	0.00
5	125	656	5.3	147	23.0	68	85	48	75	115	39	51	92	25	46	55	0.00
6	126	673	5.8	144	20.0	64	78	48	73	108	40	59	93	37	49	55	0.00
7	127	649	4.5	129	22.0	66	81	51	75	115	43	64	94	35	52	57	0.00
8	128	684	5.4	5	22.0	74	92	53	81	123	46	46	95	15	45	57	0.00
9	129	687	7.5	4	26.0	75	90	55	79	118	45	33	75	12	38	54	0.00
10	130	706	8.3	337	27.0	75	92	56	81	123	46	24	50	9	32	52	0.00
11	131	682	4.2	99	16.0	72	88	55	80	119	45	49	77	25	50	58	0.00
12	132	659	4.1	138	21.0	72	87	55	80	117	47	56	92	29	54	60	0.00
13	133	560	5.3	159	18.0	70	81	61	76	115	50	51	76	22	49	57	0.00
14	134	379	5.3	176	17.0	66	74	56	70	92	50	53	77	36	48	55	0.00
15	135	175	13.3	145	36.0	60	64	57	59	66	55	82	96	62	54	56	0.70
16	136	356	17.6	144	43.0	56	63	51	55	71	48	74	92	53	47	51	0.44
17	137	344	7.6	155	21.0	58	66	50	60	75	49	71	90	48	48	52	0.00
18	138	133	6.1	146	27.0	52	57	48	52	62	48	91	100	75	49	50	0.83
19	139	599	7.6	174	20.0	54	62	48	59	79	47	76	100	51	46	50	0.37
20	140	504	9.9	153	28.0	59	68	51	64	85	50	63	84	41	46	51	0.01
21	141	311	9.6	123	25.0	55	60	51	54	61	48	79	97	64	48	51	0.39
22	142	658	7.0	352	21.0	64	78	47	69	105	43	59	100	30	47	53	0.01
23	143	562	7.0	359	25.0	69	81	58	74	115	52	47	83	23	46	55	0.00
24	144	639	5.8	131	24.0	67	79	53	74	106	46	67	97	42	54	59	0.05
25	145	652	9.6	316	25.0	65	78	52	71	106	48	55	99	30	46	54	0.43
26	146	562	7.5	141	21.0	57	64	48	62	81	47	70	100	48	46	51	0.05
27	147	562	5.5	144	18.0	62	72	55	69	95	54	70	100	47	51	55	0.05
28	148	717	5.1	344	16.0	72	87	53	78	111	51	57	100	26	52	59	0.01
29	149	684	6.4	360	35.0	75	92	60	78	107	53	49	79	19	52	60	0.41
30	150	556	4.7	326	22.0	70	85	58	72	102	52	63	90	33	56	61	0.00
31	151	716	7.6	342	24.0	77	92	58	80	106	52	51	91	24	54	62	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	17795															3.75
Ave.	574	6.8	90	22.5	65.6	78.2	51.9	70.5	101.5	46.2	58	89	33	47	54	
Max.	717	17.6		43.0	77	92	61	81	123	55	91	100	75	56	62	0.83
Min.	133	3.8		12.0	52	57	39	52	61	30	24	50	9	32	47	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

June, 2019

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	152	701	8.2	353	24.0	82	96	63	84	111	58	43	81	21	54	64	0.00
2	153	695	6.2	112	19.0	80	95	65	84	112	61	54	81	25	60	66	0.00
3	154	716	4.5	53	14.0	82	97	67	87	114	61	52	87	20	59	67	0.00
4	155	734	5.3	355	18.0	84	101	67	87	116	62	42	85	11	53	64	0.00
5	156	728	7.6	327	22.0	85	97	70	86	113	60	26	52	12	44	60	0.00
6	157	610	8.1	274	24.0	72	84	59	75	102	55	33	73	11	37	53	0.00
7	158	758	13.3	330	27.0	67	78	57	71	91	52	25	43	11	28	48	0.00
8	159	744	16.3	347	34.0	74	86	59	76	97	54	21	38	9	28	50	0.00
9	160	750	8.8	334	26.0	80	96	65	82	109	55	25	67	12	36	56	0.00
10	161	748	4.5	346	14.0	82	103	57	84	119	50	40	80	9	48	61	0.00
11	162	724	4.6	34	13.0	85	104	61	87	119	56	39	78	13	52	63	0.00
12	163	441	4.0	14	10.0	83	96	69	83	107	61	49	76	27	60	67	0.00
13	164	698	5.5	171	21.0	85	101	66	88	119	59	44	84	17	56	65	0.00
14	165	711	5.0	106	16.0	82	98	66	86	113	61	51	80	27	60	67	0.00
15	166	582	5.0	105	24.0	79	94	66	82	109	62	61	88	35	64	68	0.00
16	167	679	4.5	102	16.0	82	100	65	86	112	61	58	93	22	63	69	0.00
17	168	725	10.3	340	26.0	89	104	68	91	119	63	34	87	15	52	65	0.00
18	169	746	11.1	339	28.0	91	104	80	94	119	73	24	39	11	47	63	0.00
19	170	742	10.6	351	26.0	90	103	75	93	119	68	19	27	11	40	60	0.00
20	171	756	14.2	351	32.0	80	90	70	84	105	65	16	25	8	29	53	0.00
21	172	746	13.5	343	33.0	76	88	65	80	104	61	23	32	15	35	53	0.00
22	173	741	11.9	350	31.0	82	95	70	85	107	63	27	51	15	42	58	0.00
23	174	740	7.8	358	25.0	84	99	69	87	115	60	27	49	10	43	59	0.00
24	175	708	8.8	304	27.0	84	97	68	88	112	63	23	48	11	40	58	0.00
25	176	598	5.6	306	22.0	79	91	63	81	110	55	29	53	17	42	57	0.00
26	177	566	8.3	187	27.0	72	82	56	73	94	48	38	68	19	43	55	0.00
27	178	706	5.5	142	18.0	69	81	55	73	97	45	41	64	23	43	54	0.00
28	179	719	6.3	37	19.0	74	88	58	78	103	54	39	68	20	44	56	0.00
29	180	730	5.2	27	19.0	76	90	57	79	106	48	32	70	10	39	55	0.00
30	181	713	5.8	9	17.0	77	93	58	80	111	50	30	63	9	39	55	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	20955															0.00
Ave.	699	7.9	352	22.4	80.3	94.4	64.5	83.1	109.5	58.1	35	64	16	46	60	
Max.	758	16.3		34.0	91	104	80	94	119	73	61	93	35	64	69	0.00
Min.	441	4.0		10.0	67	78	55	71	91	45	16	25	8	28	48	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

July, 2018

Day of Month	Day of Year	Total Solar Rad. Daily.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	182	721	10.0	344	26.0	92	108	77	98	137	70	18	33	8	41	61	0.00
2	183	724	9.7	344	23.0	90	104	77	97	135	69	21	46	9	42	61	0.00
3	184	706	12.5	345	35.0	83	97	72	89	124	65	23	60	11	39	57	0.00
4	185	678	7.4	164	28.0	76	89	65	82	112	54	43	69	15	50	60	0.00
5	186	712	6.2	135	24.0	76	91	55	83	115	49	39	76	16	45	57	0.00
6	187	380	4.8	2	13.0	77	91	63	81	114	57	36	62	16	46	58	0.00
7	188	637	5.8	14	16.0	79	98	57	86	128	50	30	68	5	38	56	0.00
8	189	676	4.8	71	19.0	81	99	60	88	129	53	29	55	6	41	57	0.00
9	190	712	5.5	148	19.0	83	100	61	90	130	53	28	61	9	42	58	0.00
10	191	723	5.9	331	21.0	84	102	61	91	134	54	28	56	8	42	58	0.00
11	192	714	4.8	102	19.0	85	104	62	92	133	54	29	60	10	45	60	0.00
12	193	689	5.5	242	22.0	87	106	66	94	135	57	30	57	10	49	63	0.00
13	194	427	4.2	343	19.0	84	98	69	87	120	63	39	62	20	55	64	0.00
14	195	666	4.9	35	15.0	89	106	68	98	138	62	37	68	15	55	66	0.00
15	196	648	5.3	137	20.0	90	104	74	98	131	69	38	61	21	59	68	0.00
16	197	685	5.4	31	19.0	91	108	72	99	135	66	36	71	12	56	67	0.00
17	198	685	5.2	344	18.0	90	109	69	98	138	63	35	67	12	55	66	0.00
18	199	640	4.6	63	15.0	91	109	70	98	141	63	33	60	11	53	66	0.00
19	200	665	5.8	66	18.0	91	108	70	98	135	63	34	64	15	55	67	0.00
20	201	642	5.3	137	21.0	87	102	70	92	134	63	34	72	9	50	63	0.00
21	202	673	5.7	105	21.0	85	100	65	92	125	59	37	60	13	52	64	0.00
22	203	652	4.8	156	17.0	89	103	72	97	132	66	42	66	23	61	69	0.00
23	204	651	5.0	157	17.0	90	105	74	99	134	69	42	73	19	62	70	0.00
24	205	650	5.5	113	19.0	92	107	76	101	136	69	39	66	19	61	70	0.00
25	206	644	4.2	16	13.0	93	111	73	100	140	66	31	69	9	52	66	0.00
26	207	511	4.9	33	17.0	93	113	74	97	138	67	32	53	7	54	67	0.00
27	208	451	4.5	59	17.0	87	102	71	90	123	64	38	63	18	56	66	0.00
28	209	318	2.9	38	8.0	84	99	70	85	116	64	40	68	17	54	64	0.00
29	210	521	4.6	40	19.0	86	104	66	91	131	59	42	73	18	57	66	0.00
30	211	423	4.3	347	15.0	85	101	72	89	120	66	46	69	22	60	68	0.00
31	212	483	4.1	344	14.0	85	102	69	90	126	64	47	76	22	60	67	0.00

MONTHLY STATISTICS

	Total Solar Rad. Daily.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	19111															0.00
Ave.	616	5.6	38	18.9	86.3	102.6	68.4	92.7	129.6	61.6	35	63	14	51	64	
Max.	724	12.5		35.0	93	113	77	101	141	70	47	76	23	62	70	0.00
Min.	318	2.9		8.0	76	89	55	81	112	49	18	33	5	38	56	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

August, 2018

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	213	524	4.9	83	17.0	85	101	70	90	124	65	44	75	20	58	66	0.00
2	214	566	5.2	72	16.0	83	101	66	88	125	60	42	73	13	54	64	0.00
3	215	519	5.0	75	17.0	82	99	63	86	126	54	36	71	14	48	61	0.00
4	216	531	3.7	22	16.0	81	99	61	85	120	53	34	69	11	45	59	0.00
5	217	487	4.4	88	14.0	77	95	60	81	119	54	38	65	17	47	59	0.00
6	218	501	4.1	3	14.0	81	102	60	85	128	53	39	70	9	48	60	0.00
7	219	471	4.4	95	16.0	80	98	63	83	123	56	42	68	19	52	62	0.00
8	220	531	4.5	43	16.0	81	100	63	85	124	55	44	73	20	54	63	0.00
9	221	450	3.6	21	11.0	82	102	62	85	122	55	43	75	15	53	63	0.00
10	222	530	5.1	23	17.0	86	105	67	90	128	60	35	64	14	51	63	0.00
11	223	592	4.8	34	19.0	83	101	63	89	128	56	36	66	15	50	61	0.00
12	224	593	4.6	77	18.0	81	99	62	86	125	54	34	64	10	47	60	0.00
13	225	603	4.7	87	19.0	81	98	61	86	125	53	34	63	11	46	59	0.00
14	226	593	4.4	93	20.0	80	100	60	86	124	52	35	59	11	46	59	0.00
15	227	589	4.7	124	17.0	80	99	65	86	124	56	40	61	10	50	61	0.00
16	228	583	4.0	137	18.0	80	98	61	85	125	54	35	67	10	46	59	0.00
17	229	552	4.5	2	15.0	82	101	61	86	127	53	32	56	12	45	59	0.00
18	230	503	3.9	39	13.0	82	101	64	86	123	57	36	60	15	50	61	0.00
19	231	528	5.1	43	17.0	81	100	60	85	125	54	37	68	17	49	61	0.00
20	232	513	4.6	64	15.0	81	100	62	85	124	54	34	64	10	46	59	0.00
21	233	509	4.5	109	15.0	75	92	60	79	116	52	44	64	24	50	59	0.00
22	234	534	4.0	104	15.0	75	93	57	79	120	51	48	76	19	51	59	0.00
23	235	566	4.2	101	18.0	74	93	56	79	121	49	46	71	18	49	58	0.00
24	236	508	4.4	101	15.0	72	88	56	77	112	50	49	77	23	50	58	0.00
25	237	495	4.0	83	16.0	73	92	54	77	114	48	41	74	17	45	56	0.00
26	238	514	5.2	40	20.0	74	91	57	78	114	51	37	62	12	43	56	0.00
27	239	556	5.0	156	17.0	74	90	57	79	115	49	42	65	19	47	57	0.00
28	240	563	5.5	122	23.0	75	93	55	80	117	48	48	76	20	51	59	0.00
29	241	566	4.8	146	19.0	75	90	59	80	116	52	53	82	26	54	61	0.00
30	242	553	4.7	158	22.0	71	86	56	77	111	50	52	79	25	51	58	0.00
31	243	558	3.3	34	12.0	74	92	56	81	121	50	43	81	15	46	57	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	16682															0.00
Ave.	538	4.5	84	16.7	78.8	96.7	60.5	83.4	121.5	53.5	40	69	16	49	60	
Max.	603	5.5		23.0	86	105	70	90	128	65	53	82	26	58	66	0.00
Min.	450	3.3		11.0	71	86	54	77	111	48	32	56	9	43	56	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

September, 2018

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Fahrenheit	Air Temperature Min Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Fahrenheit	Fuel Temperature Min Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Fahrenheit	Total Precip. inches
1	244	509	4.9	343	20.0	79	101	57	82	129	49	32	67	7	41	56	0.00
2	245	547	4.3	62	17.0	81	105	58	86	134	50	35	61	8	45	59	0.00
3	246	517	3.9	143	14.0	81	102	60	85	128	52	40	69	11	50	61	0.00
4	247	532	4.7	111	17.0	80	99	61	84	122	55	39	72	17	49	60	0.00
5	248	538	5.5	82	22.0	79	98	60	83	121	53	37	67	10	46	59	0.00
6	249	521	4.6	74	15.0	76	95	56	79	118	49	37	67	14	44	56	0.00
7	250	460	4.2	17	18.0	79	101	59	82	123	53	31	58	10	41	57	0.00
8	251	495	3.7	40	17.0	76	97	57	79	124	49	32	60	9	40	55	0.00
9	252	471	4.4	344	13.0	77	98	55	80	125	49	32	59	9	41	55	0.00
10	253	457	3.7	224	13.0	76	98	54	78	121	47	30	65	6	36	54	0.00
11	254	487	6.8	302	21.0	73	91	52	77	118	44	28	56	9	34	51	0.00
12	255	478	6.3	164	20.0	69	82	50	76	113	42	35	54	19	39	52	0.00
13	256	513	4.6	126	18.0	67	81	52	71	105	45	43	68	23	42	52	0.00
14	257	523	3.5	5	13.0	67	84	49	72	111	43	36	72	11	34	49	0.00
15	258	493	6.2	106	28.0	67	80	53	70	101	45	37	56	26	39	51	0.00
16	259	529	3.7	58	13.0	65	83	46	69	107	38	37	74	11	34	48	0.00
17	260	521	4.3	357	20.0	65	85	45	70	108	38	33	61	14	33	48	0.00
18	261	509	3.0	30	12.0	67	87	47	72	112	40	35	61	13	36	50	0.00
19	262	497	6.1	343	20.0	72	91	49	75	116	43	28	65	8	29	50	0.00
20	263	512	10.0	327	28.0	77	96	59	79	121	49	19	37	6	29	52	0.00
21	264	491	4.4	35	16.0	72	94	48	75	113	42	31	55	11	36	52	0.00
22	265	456	4.1	286	18.0	73	90	52	76	111	45	35	65	15	40	54	0.00
23	266	496	5.2	334	20.0	73	91	54	76	120	47	32	63	8	37	53	0.00
24	267				26.0		94	65		118	57		29	6			
25	268	501	9.3	337	22.0	80	99	58	83	124	51	13	31	4	21	51	0.00
26	269	435	3.2	355	14.0	74	100	49	75	126	41	24	49	5	28	50	0.00
27	270	452	3.8	40	15.0	73	99	50	75	119	42	30	52	8	35	52	0.00
28	271	447	3.9	137	15.0	73	92	51	76	117	45	36	57	15	41	54	0.00
29	272	327	5.5	175	20.0	63	72	55	66	95	46	65	95	43	51	55	0.04
30	273	425	3.5	69	16.0	66	79	57	70	101	52	64	98	32	52	57	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Fahrenheit	Air Temperature Min Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Fahrenheit	Fuel Temperature Min Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Fahrenheit	Total Precip. inches
Total	14140															0.04
Ave.	488	4.9	360	18.0	73.1	92.1	53.9	76.7	116.7	46.7	35	61	13	39	54	
Max.	547	10.0		28.0	81	105	65	86	134	57	65	98	43	52	61	0.04
Min.	327	3.0		12.0	63	72	45	66	95	38	13	29	4	21	48	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

October, 2018

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	274	118	4.0	330	10.0	65	70	59	65	77	56	66	81	53	54	58	0.00
2	275	301	3.5	319	13.0	67	79	60	70	103	57	76	100	49	59	62	0.12
3	276	302	4.8	186	20.0	67	81	57	70	101	52	75	98	45	58	61	0.02
4	277	238	8.3	161	19.0	64	69	61	65	79	59	87	98	71	60	62	0.32
5	278	289	5.0	328	16.0	65	75	56	69	96	53	66	99	36	52	57	0.01
6	279	438	7.9	345	27.0	65	79	52	69	99	47	56	100	23	46	54	0.00
7	280	436	10.5	353	28.0	68	79	60	70	97	54	33	48	19	36	50	0.00
8	281	419	8.6	346	23.0	71	85	58	75	103	50	44	62	28	47	56	0.00
9	282	423	8.2	341	20.0	73	86	64	78	107	60	35	53	13	42	55	0.00
10	283	382	10.8	345	29.0	68	79	61	70	100	54	32	41	19	36	50	0.00
11	284	418	10.7	347	23.0	68	80	57	70	97	44	29	40	19	34	49	0.00
12	285	422	5.7	354	22.0	67	86	48	67	106	38	29	58	12	30	48	0.00
13	286	418	12.6	351	37.0	70	87	44	70	98	38	28	70	8	28	48	0.00
14	287	430	19.0	355	42.0	69	78	62	70	89	57	12	14	9	14	45	0.00
15	288	425	9.0	345	24.0	66	84	48	66	100	41	15	39	7	15	44	0.00
16	289	403	5.8	12	22.0	66	88	42	66	104	34	29	57	10	27	46	0.00
17	290	396	3.2	101	12.0	63	85	43	64	103	35	36	65	11	31	46	0.00
18	291	381	2.6	18	9.0	61	84	42	63	105	34	42	71	16	34	47	0.00
19	292	379	4.0	356	16.0	65	91	43	67	112	37	39	76	10	34	48	0.00
20	293	383	4.4	94	13.0	64	89	44	66	108	38	39	67	10	34	48	0.00
21	294	365	3.4	353	10.0	62	84	43	64	104	37	45	76	20	37	48	0.00
22	295	363	3.8	334	12.0	60	82	41	62	100	36	44	78	17	35	46	0.00
23	296	272	2.6	29	9.0	57	75	41	58	96	35	48	73	25	36	46	0.00
24	297	302	2.7	18	8.0	59	76	44	61	95	39	49	75	23	37	47	0.00
25	298	328	3.0	357	11.0	63	87	44	65	110	40	45	77	16	37	48	0.00
26	299	317	2.3	325	9.0	64	84	47	66	102	42	49	73	24	42	51	0.00
27	300	296	3.1	306	11.0	63	81	47	65	100	42	56	81	28	45	52	0.00
28	301	248	5.1	193	18.0	62	75	51	62	88	42	56	81	28	44	52	0.00
29	302	320	6.9	330	19.0	59	72	43	61	89	35	44	74	23	35	46	0.00
30	303	342	11.8	328	26.0	63	75	55	64	87	50	31	48	15	30	46	0.00
31	304	221	7.9	327	21.0	65	77	53	64	87	48	36	61	22	37	50	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. mph	Wind V. Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	10775															0.47
Ave.	348	6.5	345	18.7	64.8	80.7	50.6	66.6	98.1	44.6	44	69	23	38	51	
Max.	438	19.0		42.0	73	91	64	78	112	60	87	100	71	60	62	0.32
Min.	118	2.3		8.0	57	69	41	58	77	34	12	14	7	14	44	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

November, 2018

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	305	309	7.5	330	23.0	70	86	53	70	100	46	44	71	22	45	55	0.00
2	306	316	4.3	345	15.0	64	84	45	67	103	39	50	84	23	42	51	0.00
3	307	311	13.1	335	28.0	70	83	56	70	95	50	23	38	10	28	49	0.00
4	308	213	4.3	342	18.0	60	75	46	59	88	39	36	49	21	32	46	0.00
5	309	326	11.7	337	27.0	64	75	55	65	87	47	32	52	18	32	47	0.00
6	310	324	12.4	339	28.0	63	75	55	63	87	46	22	35	11	22	44	0.00
7	311	324	12.6	355	33.0	60	72	42	60	82	34	20	40	10	16	41	0.00
8	312	323	16.9	347	36.0	61	72	54	62	82	49	13	20	8	10	41	0.00
9	313	318	5.9	346	18.0	55	77	36	55	95	29	18	38	7	9	37	0.00
10	314	309	8.2	357	28.0	54	75	29	55	87	23	27	56	11	16	38	0.00
11	315	311	12.1	345	34.0	60	72	42	60	84	31	15	30	9	11	40	0.00
12	316	309	4.7	21	21.0	52	77	32	51	91	23	24	45	6	12	36	0.00
13	317	169	2.2	360	6.0	46	65	33	44	77	27	39	56	18	20	35	0.00
14	318	238	2.0	11	7.0	46	71	30	45	84	24	45	69	16	23	36	0.00
15	319	249	2.6	2	7.0	46	68	28	45	83	23	45	75	16	23	35	0.00
16	320	226	2.5	29	7.0	46	70	28	44	82	24	46	73	16	23	35	0.00
17	321	233	2.5	15	8.0	45	68	28	44	82	23	49	71	20	25	36	0.00
18	322	257	2.5	33	8.0	46	72	28	46	88	23	50	76	20	26	37	0.00
19	323	245	2.8	339	7.0	47	76	27	47	92	22	52	81	17	28	38	0.00
20	324	213	2.6	58	9.0	47	68	28	46	83	23	48	78	18	26	37	0.00
21	325	31	3.0	332	15.0	47	50	43	47	50	43	85	100	47	42	45	0.50
22	326	57	13.5	156	39.0	52	56	49	51	54	48	92	100	75	50	51	0.62
23	327	20	11.4	181	30.0	53	55	51	52	54	50	97	100	92	52	52	1.21
24	328	243	6.4	320	17.0	55	63	48	54	70	45	77	100	47	47	50	0.01
25	329	240	3.9	339	17.0	54	69	40	54	81	37	64	92	31	41	47	0.00
26	330	126	2.4	10	11.0	50	64	43	50	73	39	79	96	46	43	46	0.00
27	331	11	4.0	222	18.0	50	53	45	49	52	43	98	100	92	49	50	1.21
28	332	92	3.4	122	16.0	54	57	51	54	59	50	93	100	81	52	53	0.14
29	333	31	5.5	346	31.0	48	53	44	47	51	39	95	99	86	47	48	1.98
30	334	174	3.7	185	16.0	46	56	37	46	63	35	88	100	64	42	44	0.01

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	6546															5.68
Ave.	218	6.4	348	19.3	53.7	68.6	40.9	53.4	78.6	35.8	52	71	32	31	43	
Max.	326	16.9		39.0	70	86	56	70	103	50	98	100	92	52	55	1.98
Min.	11	2.0		6.0	45	50	27	44	50	22	13	20	6	9	35	0.00

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° 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW-hr/m²

Monthly Summary for

December, 2018

Day of Month	Day of Year	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
1	335	168	5.7	175	26.0	47	55	38	46	67	32	78	95	56	40	44	0.12
2	336	236	2.3	351	7.0	41	56	31	41	69	26	79	98	40	34	37	0.00
3	337	220	3.1	330	12.0	41	56	29	42	67	25	71	96	30	31	36	0.00
4	338	138	9.2	333	19.0	51	57	43	51	63	41	50	82	40	33	42	0.00
5	339	114	4.9	320	13.0	48	54	45	46	56	39	75	94	59	40	44	0.07
6	340	235	6.1	333	16.0	49	61	36	47	72	31	59	91	37	34	41	0.00
7	341	184	2.0	359	6.0	41	59	31	41	76	27	78	95	40	34	38	0.00
8	342	188	2.3	327	11.0	46	64	37	47	74	33	79	96	45	39	42	0.00
9	343	87	1.6	13	5.0	44	52	35	43	54	32	88	98	66	40	42	0.05
10	344	232	7.7	315	22.0	51	61	41	50	66	38	71	100	46	41	45	0.01
11	345	171	5.3	329	16.0	50	61	41	50	72	36	61	88	34	36	43	0.00
12	346	199	6.9	312	22.0	50	62	39	48	69	33	58	98	25	33	42	0.00
13	347	231	3.0	346	11.0	45	62	33	45	74	27	63	90	33	31	38	0.00
14	348	60	3.8	270	16.0	42	50	34	41	51	31	89	100	71	39	41	0.18
15	349	32	3.1	326	9.0	46	49	42	46	49	41	98	100	92	46	46	0.18
16	350	16	5.2	223	24.0	49	50	48	49	50	48	98	100	92	49	49	1.64
17	351	76	2.4	227	9.0	49	53	46	49	55	41	95	100	85	48	49	0.01
18	352	77	4.0	27	18.0	50	53	48	50	53	47	95	100	78	49	49	0.19
19	353	199	3.9	325	14.0	52	63	42	51	68	38	88	100	57	48	49	0.00
20	354	61	2.6	221	11.0	49	53	44	50	54	44	97	100	86	49	49	0.34
21	355	206	4.6	328	16.0	50	58	43	50	67	37	80	100	53	43	46	0.09
22	356	113	4.4	306	12.0	46	56	34	45	64	29	68	88	38	36	41	0.00
23	357	79	1.9	298	9.0	46	52	44	46	57	41	94	100	80	44	45	0.05
24	358	14	3.3	133	13.0	44	46	41	44	46	38	99	100	96	44	44	1.20
25	359	234	8.2	322	22.0	48	59	37	47	65	33	69	100	41	37	42	0.01
26	360	189	6.1	346	17.0	47	59	35	46	71	30	56	92	32	31	39	0.00
27	361	233	5.4	344	15.0	44	57	33	43	68	27	58	95	27	28	37	0.00
28	362	232	12.6	344	29.0	48	56	40	47	62	35	40	59	28	24	37	0.00
29	363	219	3.8	359	14.0	47	63	36	47	75	31	59	88	35	33	40	0.00
30	364	216	3.5	358	16.0	42	55	32	43	67	27	76	95	52	35	39	0.00
31	365	240	10.9	354	27.0	46	54	39	45	61	31	36	56	22	19	35	0.00

MONTHLY STATISTICS

	Total Solar Rad. ly.	Wind Ave. V. mph	Wind Dir. Deg	Wind Max. mph	Air Temperature Mean Deg. Fahrenheit	Air Temperature Max Deg. Fahrenheit	Air Temperature Min Deg. Fahrenheit	Fuel Temperature Mean Deg. Fahrenheit	Fuel Temperature Max Deg. Fahrenheit	Fuel Temperature Min Deg. Fahrenheit	Humidity Mean Percent	Humidity Max Percent	Humidity Min Percent	Dew Point Deg. Fahrenheit	Wet Bulb Deg. Fahrenheit	Total Precip. inches
Total	4899															4.14
Ave.	158	4.8	328	15.4	46.9	56.3	38.6	46.3	63.3	34.5	74	93	52	38	42	
Max.	240	12.6		29.0	52	64	48	51	76	48	99	100	96	49	49	1.64
Min.	14	1.6		5.0	41	46	29	41	46	25	36	56	22	19	35	0.00

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C. Raw Baseline Utility Data

The following utility data was obtained from PG&E.

Location	Address	SAID	Meter #	Rate Sch	Read Date	kWh	Cost	Rate
Well #1	YOLO ST S/ EAST ST,E/ IN ALLEY	5335095523	1009570497	HA6	3/26/2015 0:00	1,325	$226.12	$0.17
					4/27/2015 0:00	1,387	$234.48	$0.17
					5/27/2015 0:00	9,087	$1,639.19	$0.18
					6/25/2015 0:00	8,345	$1,450.86	$0.17
					7/26/2015 0:00	12,456	$2,725.95	$0.22
					8/25/2015 0:00	8,703	$1,618.03	$0.19
					9/24/2015 0:00	17,473	$3,887.77	$0.22
					10/25/2015 0:00	8,834	$1,826.50	$0.21
					11/23/2015 0:00	7,299	$1,191.73	$0.16
					12/23/2015 0:00	7,600	$1,207.43	$0.16
					1/25/2016 0:00	3,042	$573.95	$0.19
					2/24/2016 0:00	2,771	$535.38	$0.19
						88,322	**$17,117.39**	**$0.19**
Well #4	136 BONNIE LN	5335095886	1005518977	HA10SX	3/26/2015 0:00	6,472	$1,225.72	$0.19
					4/27/2015 0:00	13,168	$1,994.84	$0.15
					5/27/2015 0:00	677	$760.33	$1.12
					6/25/2015 0:00	18,815	$3,682.97	$0.20
					7/26/2015 0:00	6,720	$1,690.60	$0.25
					8/25/2015 0:00	10,461	$2,368.68	$0.23
					9/24/2015 0:00	8,046	$1,928.29	$0.24
					10/25/2015 0:00	7,762	$1,809.89	$0.23
					11/23/2015 0:00	1,830	$681.53	$0.37
					12/23/2015 0:00	7,033	$1,238.99	$0.18
					1/25/2016 0:00	165	$215.64	$1.31
					2/24/2016 0:00	9,107	$1,602.45	$0.18
						90,256	**$19,199.93**	**$0.21**
Corp Yard/Well #5	RD M & 200	5335095270	1006590505	HA1X	3/26/2015 0:00	1,218	$212.99	$0.17
					4/27/2015 0:00	1,336	$233.68	$0.17
					5/27/2015 0:00	2,330	$524.70	$0.23
					6/25/2015 0:00	1,793	$438.83	$0.24
					7/26/2015 0:00	1,562	$389.04	$0.25
					8/25/2015 0:00	1,765	$459.67	$0.26
					9/24/2015 0:00	1,623	$421.08	$0.26
					10/25/2015 0:00	1,450	$346.10	$0.24
					11/23/2015 0:00	1,210	$231.53	$0.19
					12/23/2015 0:00	1,256	$217.93	$0.17
					1/25/2016 0:00	1,334	$271.73	$0.20
					2/24/2016 0:00	1,192	$254.49	$0.21
					Meter Totals	18,069	$4,001.77	$0.22
	ROAD 200 NS E/ROAD M	5335095654	1008828678	HE19S	3/26/2015 0:00	13,288	$1,940.18	$0.15
					4/27/2015 0:00	5,007	$1,212.19	$0.24
					5/27/2015 0:00	17,432	$3,186.89	$0.18
					6/25/2015 0:00	4,746	$2,104.21	$0.44
					7/26/2015 0:00	8,656	$2,652.58	$0.31
					8/25/2015 0:00	13,882	$3,089.56	$0.22
					9/24/2015 0:00	14,686	$3,229.09	$0.22
					10/25/2015 0:00	12,167	$2,732.76	$0.22
					11/23/2015 0:00	8,774	$1,739.51	$0.20
					12/23/2015 0:00	10,756	$1,690.20	$0.16
					1/25/2016 0:00	9	$487.66	$54.18
					2/24/2016 0:00	6	$489.36	$81.56
					Totals	**127,478**	**$28,555.96**	**$0.22**
Well #7	SUISUN ST NS/ W/5TH ST	5335095477	1005730772	HA10SX	3/26/2015 0:00	1,364	$384.97	$0.28
					4/27/2015 0:00	30,135	$4,311.87	$0.14
					5/27/2015 0:00	4,896	$1,904.74	$0.39
					6/25/2015 0:00	6,056	$2,211.20	$0.37
					7/26/2015 0:00	31,017	$5,978.01	$0.19
					8/25/2015 0:00	24,292	$4,955.95	$0.20
					9/24/2015 0:00	14,912	$3,485.53	$0.23
					10/25/2015 0:00	22,448	$4,553.71	$0.20
					11/23/2015 0:00	6,456	$1,726.74	$0.27
					12/23/2015 0:00	1,740	$967.88	$0.56
					1/25/2016 0:00	17,607	$2,883.95	$0.16
					2/24/2016 0:00	1,279	$624.72	$0.49
						162,202	**$33,989.27**	**$0.21**
Well #8	ROOSEVELT AVE W/VIN PARK	5335095971	5000032853	HA6	3/26/2015 0:00	1,513	$268.06	$0.18
					4/27/2015 0:00	12,869	$2,018.58	$0.16
					5/27/2015 0:00	19,765	$4,379.72	$0.22
					6/25/2015 0:00	16,469	$3,378.28	$0.21
					7/26/2015 0:00	14,595	$2,909.32	$0.20
					8/25/2015 0:00	8,424	$1,459.88	$0.17
					9/24/2015 0:00	9,535	$1,876.83	$0.20
					10/25/2015 0:00	4,116	$696.74	$0.17
					11/23/2015 0:00	155	$44.83	$0.29
					12/23/2015 0:00	1,012	$187.51	$0.19

					1/25/2016 0:00	63	$32.79	$0.52
					2/24/2016 0:00	59	$30.63	$0.52
						88,575	**$17,283.17**	**$0.20**
Lely Park	RD 200 NS,M 0.35 MI E/	5335095344	1008828698	HA6	3/26/2015 0:00	15,819	$2,539.20	$0.16
					4/27/2015 0:00	160	$46.15	$0.29
					5/27/2015 0:00	19,024	$4,277.26	$0.22
					6/25/2015 0:00	12,849	$2,967.26	$0.23
					7/26/2015 0:00	13,564	$2,740.21	$0.20
					8/25/2015 0:00	15,212	$4,560.97	$0.30
					9/24/2015 0:00	8,304	$2,334.71	$0.28
					10/25/2015 0:00	13,388	$3,453.80	$0.26
					11/23/2015 0:00	12,616	$1,994.59	$0.16
					12/23/2015 0:00	423	$90.69	$0.21
					1/25/2016 0:00	11,818	$2,015.92	$0.17
					2/24/2016 0:00	10,183	$1,880.16	$0.18
					Meter Totals	133,360	$28,900.92	$0.22
	RD 200 NS,M 0.35 MI E/	5335095000	1008828680	HA6	3/26/2015 0:00	602	$112.18	$0.19
					4/27/2015 0:00	677	$124.90	$0.18
					5/27/2015 0:00	516	$126.99	$0.25
					6/25/2015 0:00	449	$123.68	$0.28
					7/26/2015 0:00	508	$137.53	$0.27
					8/25/2015 0:00	472	$138.49	$0.29
					9/24/2015 0:00	475	$135.23	$0.28
					10/25/2015 0:00	503	$137.33	$0.27
					11/23/2015 0:00	432	$94.38	$0.22
					12/23/2015 0:00	433	$85.65	$0.20
					1/25/2016 0:00	478	$103.83	$0.22
					2/24/2016 0:00	337	$80.32	$0.24
					Site Total	**#REF!**	**#REF!**	**#REF!**
City Hall/OPD	815 4TH ST	5335095013	1009514054	HA1X	3/26/2015 0:00	4,127	$680.28	$0.16
					4/27/2015 0:00	4,939	$811.08	$0.16
					5/27/2015 0:00	5,245	$1,214.21	$0.23
					6/25/2015 0:00	6,982	$1,674.61	$0.24
					7/26/2015 0:00	7,527	$1,797.75	$0.24
					8/25/2015 0:00	6,723	$1,616.65	$0.24
					9/24/2015 0:00	5,901	$1,409.84	$0.24
					10/25/2015 0:00	5,386	$1,286.41	$0.24
					11/23/2015 0:00	3,897	$702.55	$0.18
					12/23/2015 0:00	3,947	$639.93	$0.16
					1/25/2016 0:00	4,215	$806.49	$0.19
					2/24/2016 0:00	3,850	$777.73	$0.20
						62,739	**$13,417.53**	**$0.21**
Library Park	333 MILL ST	5335095119	1006726592	HA1X	3/26/2015 0:00	2,382	$424.11	$0.18
					4/27/2015 0:00	2,429	$433.94	$0.18
					5/27/2015 0:00	2,402	$573.08	$0.24
					6/25/2015 0:00	4,370	$1,178.92	$0.27
					7/26/2015 0:00	4,837	$1,346.50	$0.28
					8/25/2015 0:00	4,258	$1,309.91	$0.31
					9/24/2015 0:00	3,452	$1,082.97	$0.31
					10/25/2015 0:00	3,039	$203.54	$0.07
					11/23/2015 0:00	2,672	$512.16	$0.19
					12/23/2015 0:00	2,947	$509.23	$0.17
					1/25/2016 0:00	3,046	$611.84	$0.20
					2/24/2016 0:00	2,790	$587.93	$0.21
						38,624	**$8,774.13**	**$0.23**
Carnegie	912 3RD ST	5335095414	1009624285	HA1X	3/26/2015 0:00	1,480	$241.32	$0.16
					4/27/2015 0:00	1,429	$232.89	$0.16
					5/27/2015 0:00	1,223	$280.13	$0.23
					6/25/2015 0:00	1,282	$306.59	$0.24
					7/26/2015 0:00	1,368	$326.77	$0.24
					8/25/2015 0:00	1,436	$340.98	$0.24
					9/24/2015 0:00	1,432	$336.53	$0.24
					10/25/2015 0:00	1,504	$351.82	$0.23
					11/23/2015 0:00	1,499	$262.42	$0.18
					12/23/2015 0:00	1,587	$255.62	$0.16
					1/25/2016 0:00	1,501	$289.51	$0.19
					2/24/2016 0:00	1,194	$240.72	$0.20
						16,935	**$3,465.30**	**$0.20**
Fire Station	810 5TH ST	5335095954	1009514061	HE19S	3/26/2015 0:00	4,054	$707.27	$0.17
					4/27/2015 0:00	4,394	$740.37	$0.17
					5/27/2015 0:00	4,445	$1,077.12	$0.24
					6/25/2015 0:00	5,254	$1,334.32	$0.25
					7/26/2015 0:00	6,000	$1,652.01	$0.28
					8/25/2015 0:00	5,521	$1,487.68	$0.27
					9/24/2015 0:00	5,058	$1,292.21	$0.26
					10/25/2015 0:00	5,644	$1,459.73	$0.26

					11/23/2015 0:00	4,242	$827.95	$0.20
					12/23/2015 0:00	4,184	$750.63	$0.18
					1/25/2016 0:00	4,744	$792.29	$0.17
					2/24/2016 0:00	4,294	$805.54	$0.19
						57,834	**$12,927.12**	**$0.22**
Tennis Court	SHASTA ST NS/ & 1ST ST	5335095110	427J56	A1	3/24/2015 0:00	439	$79.49	$0.18
					4/23/2015 0:00	276	$61.85	$0.22
					5/22/2015 0:00	267	$59.84	$0.22
					6/23/2015 0:00	612	$155.49	$0.25
					7/22/2015 0:00	465	$119.69	$0.26
					8/21/2015 0:00	442	$114.57	$0.26
					9/21/2015 0:00	431	$111.71	$0.26
					10/21/2015 0:00	611	$153.38	$0.25
					11/20/2015 0:00	858	$167.18	$0.19
					12/21/2015 0:00	944	$158.94	$0.17
					1/21/2016 0:00	559	$106.98	$0.19
					2/22/2016 0:00	1,576	$295.06	$0.19
						7,480	**$1,584.18**	**$0.21**
Rec Center	1002 HAMBRIGHT LN	5335095121	1006590528	HA1X	3/26/2015 0:00	1,993	$334.38	$0.17
					4/27/2015 0:00	1,949	$330.02	$0.17
					5/27/2015 0:00	1,990	$465.15	$0.23
					6/25/2015 0:00	2,686	$662.69	$0.25
					7/26/2015 0:00	3,478	$846.01	$0.24
					8/25/2015 0:00	3,399	$820.91	$0.24
					9/24/2015 0:00	2,518	$610.98	$0.24
					10/25/2015 0:00	2,589	$627.28	$0.24
					11/23/2015 0:00	2,292	$416.68	$0.18
					12/23/2015 0:00	2,487	$409.38	$0.16
					1/25/2016 0:00	2,879	$564.14	$0.20
					2/24/2016 0:00	2,651	$541.26	$0.20
						30,911	**$6,628.88**	**$0.21**
Pool	ROOSEVELT AVE SS/,W/ A ST	5335095530	1005815760	HA6	3/26/2015 0:00	22	$22.47	$1.02
					4/27/2015 0:00	24	$24.78	$1.03
					5/27/2015 0:00	4,348	$1,281.17	$0.29
					6/25/2015 0:00	6,048	$1,852.37	$0.31
					7/26/2015 0:00	6,593	$1,946.51	$0.30
					8/25/2015 0:00	6,267	$1,920.65	$0.31
					9/24/2015 0:00	6,335	$1,893.45	$0.30
					10/25/2015 0:00	6,542	$1,908.24	$0.29
					11/23/2015 0:00	2,253	$575.64	$0.26
					12/23/2015 0:00	25	$23.58	$0.94
					1/25/2016 0:00	28	$26.44	$0.94
					2/24/2016 0:00	24	$24.00	$1.00
						38,509	**$11,499.30**	**$0.30**
WWTP					6/21/2017	7,360	$1,818.84	$0.17
					7/21/2017	30,560	$7,479.10	$0.71
					8/22/2017	33,840	$8,281.03	$0.79
					9/21/2017	31,360	$7,674.37	$0.73
					10/20/2017	31,200	$7,743.87	$0.73
					11/18/2017	28,720	$6,156.53	$0.67
					12/20/2017	32,560	$6,304.78	$0.76
					1/19/2018	27,440	$5,329.78	$0.64
					2/20/2018	31,680	$6,161.25	$0.73
					3/21/2018	31,840	$6,263.38	$0.74
					4/20/2018	32,880	$6,496.75	$0.76
					5/2/2018	13,200	$2,733.90	$0.31
						332,640	**$72,443.58**	**$0.22**

Location	Address	SAID	Meter #	Rate Shcedule	Date	Therms	Cost	Rate
Rec Center	1002 HAMBRIGHT LN	1323311022	60662476	GNR1	4/10/2015 0:00	28	$39.87	$1.42
					5/12/2015 0:00	5	$20.44	$4.09
					6/11/2015 0:00	7	$20.95	$2.99
					7/10/2015 0:00	3	$17.49	$5.83
					8/11/2015 0:00	4	$19.76	$4.94
					9/10/2015 0:00	3	$18.03	$6.01
					10/9/2015 0:00	3	$17.36	$5.79
					11/9/2015 0:00	25	$36.05	$1.44
					12/10/2015 0:00	254	$249.20	$0.98
					1/9/2016 0:00	336	$331.01	$0.99
					2/9/2016 0:00	313	$323.37	$1.03
					3/10/2016 0:00	101	$108.00	$1.07
						1,082	**1201.53**	**$1.11**
Well #7	SUISUN ST NS/ W/5TH ST	5335095030	42407222	GNR1	4/9/2015 0:00	0	$7.84	Less Than 1 Therm
					5/11/2015 0:00	0	$8.66	Less Than 1 Therm
					6/10/2015 0:00	0	$8.11	Less Than 1 Therm
					7/9/2015 0:00	0	$7.84	Less Than 1 Therm
					8/10/2015 0:00	0	$8.65	Less Than 1 Therm
					9/9/2015 0:00	0	$8.11	Less Than 1 Therm
					10/8/2015 0:00	0	$7.84	Less Than 1 Therm
					11/6/2015 0:00	0	$7.84	Less Than 1 Therm
					12/9/2015 0:00	0	$8.92	Less Than 1 Therm
					1/8/2016 0:00	1	$9.05	$9.05
					2/8/2016 0:00	0	$8.38	Less Than 1 Therm
					3/9/2016 0:00	0	$8.11	Less Than 1 Therm
						1	**99.35**	**$99.35**
Library	333 MILL ST	5335095035	52113710	GNR1	4/9/2015 0:00	62	$70.31	$1.13
					5/11/2015 0:00	9	$23.46	$2.61
					6/10/2015 0:00	0	$15.63	Less Than 1 Therm
					7/9/2015 0:00	0	$15.11	Less Than 1 Therm
					8/10/2015 0:00	0	$16.67	Less Than 1 Therm
					9/9/2015 0:00	0	$15.63	Less Than 1 Therm
					10/8/2015 0:00	0	$15.11	Less Than 1 Therm
					11/6/2015 0:00	14	$26.06	$1.86
					12/9/2015 0:00	284	$277.64	$0.98
					1/8/2016 0:00	394	$384.82	$0.98
					2/8/2016 0:00	315	$325.00	$1.03
					3/9/2016 0:00	160	$163.40	$1.02
						1,238	**1348.84**	**$1.09**
City Hall & OPD	815 4TH ST	5335095055	2973266X	GNR1	4/9/2015 0:00	2	$9.62	$4.81
					5/11/2015 0:00	1	$9.42	$9.42
					6/10/2015 0:00	1	$8.86	$8.86
					7/9/2015 0:00	0	$7.84	Less Than 1 Therm
					8/10/2015 0:00	0	$8.65	Less Than 1 Therm
					9/9/2015 0:00	1	$8.91	$8.91
					10/8/2015 0:00	0	$7.84	Less Than 1 Therm
					11/6/2015 0:00	1	$8.62	$8.62
					12/9/2015 0:00	83	$85.03	$1.02
					1/8/2016 0:00	136	$135.54	$1.00
					2/8/2016 0:00	65	$72.11	$1.11
					3/9/2016 0:00	13	$20.12	$1.55
						303	**382.56**	**$1.26**
Fire Department	810 5TH ST	5335095070	61204061	GNR1	4/9/2015 0:00	88	$93.47	$1.06
					5/11/2015 0:00	114	$102.68	$0.90
					6/10/2015 0:00	91	$84.42	$0.93
					7/9/2015 0:00	84	$82.12	$0.98
					8/10/2015 0:00	101	$94.41	$0.93
					9/9/2015 0:00	86	$84.53	$0.98
					10/8/2015 0:00	85	$78.64	$0.93
					11/6/2015 0:00	88	$83.94	$0.95
					12/9/2015 0:00	215	$214.37	$1.00
					1/8/2016 0:00	232	$233.02	$1.00
					2/8/2016 0:00	242	$253.43	$1.05
					3/9/2016 0:00	114	$120.93	$1.06
						1,540	**1525.96**	**$0.99**
					4/10/2015 0:00	125	$125.67	$1.01
					5/12/2015 0:00	60	$61.85	$1.03
					6/11/2015 0:00	47	$51.32	$1.09
					7/10/2015 0:00	44	$50.09	$1.14

Corp Yard	RD M & 200	5335095090	26961374	GNR1	8/11/2015 0:00	50	$55.29	$1.11
					9/10/2015 0:00	46	$52.37	$1.14
					10/9/2015 0:00	44	$48.00	$1.09
					11/9/2015 0:00	70	$71.87	$1.03
					12/10/2015 0:00	187	$187.72	$1.00
					1/9/2016 0:00	257	$256.86	$1.00
					2/9/2016 0:00	219	$231.10	$1.06
					3/10/2016 0:00	122	$127.22	$1.04
						1,271	**1319.36**	**$1.04**

Well #4	136 BONNIE LN	5335095105	47075545	GNR1	4/13/2015 0:00	0	$8.39	Less Than 1 Therm
					5/13/2015 0:00	0	$8.12	Less Than 1 Therm
					6/12/2015 0:00	0	$8.12	Less Than 1 Therm
					7/13/2015 0:00	0	$8.39	Less Than 1 Therm
					8/12/2015 0:00	0	$8.12	Less Than 1 Therm
					9/11/2015 0:00	0	$8.12	Less Than 1 Therm
					10/12/2015 0:00	1	$9.14	$9.14
					11/10/2015 0:00	0	$7.84	Less Than 1 Therm
					12/11/2015 0:00	0	$8.39	Less Than 1 Therm
					1/11/2016 0:00	0	$8.39	Less Than 1 Therm
					2/10/2016 0:00	0	$8.11	Less Than 1 Therm
					3/11/2016 0:00	0	$8.12	Less Than 1 Therm
						1	**99.25**	**$99.25**

D. Raw Post-Project (Recent 12 Month) Utility Data

The following utility data was obtained from PG&E.

said	service_address	ratesched	current_read_date	numberofc	revenue	kwh	demand	off peak k	part peak	on peak k	off peak c	part peak	on peak d	statusdesc	meter_number			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	8/26/2019 0:00	39	12.81	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	9/25/2019 0:00	30	9.86	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	10/24/2019 0:00	29	9.52	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	11/24/2019 0:00	31	14.13	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	12/25/2019 0:00	31	15.28	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	1/26/2020 0:00	32	15.77	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	2/25/2020 0:00	30	14.78	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	3/25/2020 0:00	29	14.29	0									1009363146			
5331909136	SOUTH ST SS/ E/RAILRD,D AVE	HTC1	4/26/2020 0:00	32	15.77	0									1009363146			
5332164821	815 4TH ST	A1X	5/8/2019 0:00	30	19.72	999									1009514054	25,906	$6,292	$0.24
5332164821	815 4TH ST	A1X	6/9/2019 0:00	32	21.03	1605									1009514054			
5332164821	815 4TH ST	A1X	7/9/2019 0:00	30	19.71	3382									1009514054			
5332164821	815 4TH ST	A1X	8/8/2019 0:00	30	19.71	3979									1009514054			
5332164821	815 4TH ST	A1X	9/9/2019 0:00	32	21.03	2751									1009514054			
5332164821	815 4TH ST	A1X	10/8/2019 0:00	29	19.06	1468									1009514054			
5332164821	815 4TH ST	A1X	11/6/2019 0:00	29	20.04	3365									1009514054			
5332164821	815 4TH ST	A1X	12/8/2019 0:00	32	6051.14	1937									1009514054			
5332164821	815 4TH ST	A1X	1/7/2020 0:00	30	24.64	2219									1009514054			
5332164821	815 4TH ST	A1X	2/6/2020 0:00	30	24.64	2224									1009514054			
5332164821	815 4TH ST	A1X	3/9/2020 0:00	32	26.28	1522									1009514054			
5332164821	815 4TH ST	A1X	4/8/2020 0:00	30	24.64	455									1009514054			
5332342256	RD 200 NS,M 0.35 MI E/	A6	5/9/2019 0:00	29	23009.07	15538	11833	3327	378	60	38	25			1008828698	127,519	$23,256	$0.18
5332342256	RD 200 NS,M 0.35 MI E/	A6	6/10/2019 0:00	32	21.03	18799	14592	2972	1235	65	41	29			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	7/10/2019 0:00	30	19.71	8222	7624	1186	-588	47	34	21			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	8/11/2019 0:00	32	21.03	15964	12895	2571	498	54	34	22			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	9/10/2019 0:00	30	19.71	15189	12064	2585	540	50	35	23			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	10/9/2019 0:00	29	19.05	12930	10185	2291	454	50	33	25			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	11/7/2019 0:00	29	20.21	11843	9428	2141	274	43	43	28			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	12/9/2019 0:00	32	26.28	4192	4006	186	0	43	43	0			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	1/8/2020 0:00	30	24.64	17233	11695	5538	0	37	37	0			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	2/9/2020 0:00	32	26.28	2663	2205	458	0	37	37	0			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	3/10/2020 0:00	30	24.64	715	1975	-1260	0	43	33	0			1008828698			
5332342256	RD 200 NS,M 0.35 MI E/	A6	4/9/2020 0:00	30	24.64	4231	5296	-1065	0	67	67	0			1008828698			
5332494396	1059 EVA DR	HA1	8/26/2019 0:00	34	3106.85	11540									1009904800	104,914	$26,286	$0.25
5332494396	1059 EVA DR	HA1	9/25/2019 0:00	30	6891.93	25710									1009904800			
5332494396	1059 EVA DR	HA1	10/24/2019 0:00	29	6078.07	22303									1009904800			
5332494396	1059 EVA DR	HA1	11/24/2019 0:00	31	3761.65	15904									1009904800			
5332494396	1059 EVA DR	HA1	12/25/2019 0:00	31	156.27	622									1009904800			
5332494396	1059 EVA DR	HA1	1/26/2020 0:00	32	734.59	3301									1009904800			
5332494396	1059 EVA DR	HA1	2/25/2020 0:00	30	2555.76	11789									1009904800			
5332494396	1059 EVA DR	HA1	3/25/2020 0:00	29	1767.4	8121									1009904800			
5332494396	1059 EVA DR	HA1	4/26/2020 0:00	32	1233.88	5624									1009904800			
5332749509	ROAD 200 NS E/ROAD M	A6	5/9/2019 0:00	29	227.07	-8091	-2303	-4499	-1289	0	0	0			1008828678	-30,019	-$292	$0.01
5332749509	ROAD 200 NS E/ROAD M	A6	6/10/2019 0:00	32	91.09	-1317	-610	-281	-426	0	0	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	7/10/2019 0:00	30	19.71	0	0	0	0	0	0	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	8/11/2019 0:00	32	21.03	0	0	0	0	0	0	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	9/10/2019 0:00	30	19.71	0	0	0	0	0	0	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	10/9/2019 0:00	29	19.05	0	0	0	0	0	0	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	11/7/2019 0:00	29	38.89	-1326	-381	-850	-95	0	0	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	12/9/2019 0:00	32	26.28	-3304	-1257	-2047	0	0	0	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	1/8/2020 0:00	30	24.64	-2168	-660	-1508	0	4	4	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	2/9/2020 0:00	32	-829.11	-3157	-1081	-2076	0	5	5	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	3/10/2020 0:00	30	24.64	-5086	-1385	-3701	0	4	1	0			1008828678			
5332749509	ROAD 200 NS E/ROAD M	A6	4/9/2020 0:00	30	24.64	-5570	-1297	-4273	0	4	4	0			1008828678			
5334762799	1002 HAMBRIGHT LN	A6	5/9/2019 0:00	29	19.05	-1612	-347	-949	-316	6	7	1			1006590528	-5,096	$334	-$0.07
5334762799	1002 HAMBRIGHT LN	A6	6/10/2019 0:00	32	21.03	-1465	-377	-325	-763	8	11	7			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	7/10/2019 0:00	30	19.71	-848	-64	-119	-665	10	12	5			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	8/11/2019 0:00	32	21.03	-194	394	-29	-559	11	10	5			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	9/10/2019 0:00	30	19.71	49	381	51	-383	10	8	8			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	10/9/2019 0:00	29	19.05	-40	139	42	-221	6	9	8			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	11/7/2019 0:00	29	87.66	-590	-40	-162	-388	4	6	5			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	12/9/2019 0:00	32	26.28	328	255	73	0	7	7	0			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	1/8/2020 0:00	30	24.64	700	459	241	0	5	5	0			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	2/9/2020 0:00	32	26.28	497	406	91	0	6	6	0			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	3/10/2020 0:00	30	24.64	-444	211	-655	0	5	4	0			1006590528			
5334762799	1002 HAMBRIGHT LN	A6	4/9/2020 0:00	30	24.64	-1477	-159	-1318	0	4	4	0			1006590528			
5334796561	BIHLER FIELD	HA1	8/26/2019 0:00	34	108.27	321									1009910161			
5334796561	BIHLER FIELD	HA1	9/25/2019 0:00	30	266.28	922									1009910161			
5334796561	BIHLER FIELD	HA1	10/24/2019 0:00	29	523.2	1854									1009910161			
5334796561	BIHLER FIELD	HA1	11/24/2019 0:00	31	379.86	1552									1009910161			
5334796561	BIHLER FIELD	HA1	12/25/2019 0:00	31	88.99	302									1009910161			
5334796561	BIHLER FIELD	HA1	1/26/2020 0:00	32	72.45	216									1009910161			
5334796561	BIHLER FIELD	HA1	2/25/2020 0:00	30	285.05	1213									1009910161			
5334796561	BIHLER FIELD	HA1	3/25/2020 0:00	29	255.14	1077									1009910161			
5334796561	BIHLER FIELD	HA1	4/26/2020 0:00	32	94.35	317									1009910161			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	4/25/2019 0:00	30	108.42	425	282	143	0	2	2	0			1008828680	8,747	$2,413	$0.28
5335095000	RD 200 NS,M 0.35 MI E/	HA6	5/27/2019 0:00	32	156.45	517	359	98	60	2	2	1			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	6/25/2019 0:00	29	170.55	530	337	103	90	2	2	2			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	7/25/2019 0:00	30	183.55	572	373	106	93	3	2	2			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	8/26/2019 0:00	32	185.04	575	378	106	91	2	1	2			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	9/25/2019 0:00	30	154.69	479	315	92	71	2	1	1			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	10/24/2019 0:00	29	162.84	499	316	109	74	2	2	2			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	11/24/2019 0:00	31	160.68	548	353	160	35	2	2	2			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	12/25/2019 0:00	31	249.78	1016	647	369	0	3	3	0			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	1/26/2020 0:00	32	379.78	1579	1036	543	0	3	3	0			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	2/25/2020 0:00	30	285.83	1159	717	442	0	3	3	0			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	3/25/2020 0:00	29	214.98	848	527	321	0	3	3	0			1008828680			
5335095000	RD 200 NS,M 0.35 MI E/	HA6	4/26/2020 0:00	32	208.2	810	534	276	0	3	3	0			1008828680			
5335095002	501 WALKER ST	LS1-A	4/26/2019 0:00	30	1496.23	2027												
5335095002	501 WALKER ST	LS1-A	5/28/2019 0:00	32	1501.6	2162												
5335095002	501 WALKER ST	LS1-A	6/26/2019 0:00	29	1502.35	1959												
5335095002	501 WALKER ST	LS1-A	7/26/2019 0:00	30	1505.31	2027												
5335095002	501 WALKER ST	LS1-A	8/27/2019 0:00	32	1505.77	2162												
5335095002	501 WALKER ST	LS1-A	8/30/2019 0:00	3	150.58	203												
5335095002	501 WALKER ST	LS1-A	9/26/2019 0:00	27	1505.77	1824												
5335095002	501 WALKER ST	LS1-A	10/25/2019 0:00	29	1510.98	1959												
5335095002	501 WALKER ST	LS1-A	11/25/2019 0:00	31	1511.82	2094												
5335095002	501 WALKER ST	LS1-A	12/26/2019 0:00	31	1511.81	2094												
5335095002	501 WALKER ST	LS1-A	1/27/2020 0:00	32	1520.18	2162												
5335095002	501 WALKER ST	LS1-A	2/26/2020 0:00	30	1521.73	2027												
5335095002	501 WALKER ST	LS1-A	3/26/2020 0:00	29	1521.73	1959												
5335095002	501 WALKER ST	LS1-A	3/27/2020 0:00	1	50.73	68												
5335095002	501 WALKER ST	LS1-A	4/27/2020 0:00	31	1521.73	2094												
5335095004	501 WALKER ST	LS1-C	4/26/2019 0:00	30	10.91	25												
5335095004	501 WALKER ST	LS1-C	5/28/2019 0:00	32	10.97	26												
5335095004	501 WALKER ST	LS1-C	6/26/2019 0:00	29	10.98	24												
5335095004	501 WALKER ST	LS1-C	7/26/2019 0:00	30	11.02	25												
5335095004	501 WALKER ST	LS1-C	8/27/2019 0:00	32	11.03	26												
5335095004	501 WALKER ST	LS1-C	9/26/2019 0:00	30	11.03	25												
5335095004	501 WALKER ST	LS1-C	10/25/2019 0:00	29	11.09	24												
5335095004	501 WALKER ST	LS1-C	11/25/2019 0:00	31	11.1	26												
5335095004	501 WALKER ST	LS1-C	12/26/2019 0:00	31	11.1	26												
5335095004	501 WALKER ST	LS1-C	1/27/2020 0:00	32	11.2	26												
5335095004	501 WALKER ST	LS1-C	2/26/2020 0:00	30	11.22	25												
5335095004	501 WALKER ST	LS1-C	3/26/2020 0:00	29	11.22	24												
5335095004	501 WALKER ST	LS1-C	4/27/2020 0:00	32	11.22	26												
5335095008	501 WALKER ST	LS1-E	4/26/2019 0:00	30	1929.74	2306												
5335095008	501 WALKER ST	LS1-E	5/28/2019 0:00	32	1935.86	2460												
5335095008	501 WALKER ST	LS1-E	6/26/2019 0:00	29	1936.74	2229												
5335095008	501 WALKER ST	LS1-E	7/26/2019 0:00	30	1940.08	2306												
5335095008	501 WALKER ST	LS1-E	8/27/2019 0:00	32	1940.61	2460												
5335095008	501 WALKER ST	LS1-E	9/26/2019 0:00	30	1940.61	2306												
5335095008	501 WALKER ST	LS1-E	10/25/2019 0:00	29	1946.54	2229												
5335095008	501 WALKER ST	LS1-E	11/25/2019 0:00	31	1947.5	2383												
5335095008	501 WALKER ST	LS1-E	12/26/2019 0:00	31	1947.49	2383												
5335095008	501 WALKER ST	LS1-E	1/27/2020 0:00	32	1957.02	2460												
5335095008	501 WALKER ST	LS1-E	2/26/2020 0:00	30	1958.8	2306												
5335095008	501 WALKER ST	LS1-E	3/26/2020 0:00	29	1958.8	2229												
5335095008	501 WALKER ST	LS1-E	4/27/2020 0:00	32	1958.8	2460												
5335095014	501 WALKER ST	LS1-F	4/26/2019 0:00	30	202.15	267												
5335095014	501 WALKER ST	LS1-F	5/28/2019 0:00	32	202.86	285												
5335095014	501 WALKER ST	LS1-F	6/26/2019 0:00	29	202.96	258												
5335095014	501 WALKER ST	LS1-F	7/26/2019 0:00	30	203.34	267												

5/22/2019 0:00	5,360	$1,368.79
6/21/2019 0:00	12,400	$3,333.36
7/23/2019 0:00	7,760	$2,096.78

43703	11540	3106.85
43733	25710	6891.93
43762	22303	6078.07
43793	15904	3761.65
43824	622	156.27
43856	3301	734.59
43886	11789	2555.76
43915	8121	1767.4
43947	5624	1233.88

5335095014	501 WALKER ST	LS1-F	8/27/2019 0:00	32	203.41	285											
5335095014	501 WALKER ST	LS1-F	9/26/2019 0:00	30	203.41	267											
5335095014	501 WALKER ST	LS1-F	10/25/2019 0:00	29	204.1	258											
5335095014	501 WALKER ST	LS1-F	11/25/2019 0:00	31	204.2	276											
5335095014	501 WALKER ST	LS1-F	12/26/2019 0:00	31	204.21	276											
5335095014	501 WALKER ST	LS1-F	1/27/2020 0:00	32	205.33	285											
5335095014	501 WALKER ST	LS1-F	2/26/2020 0:00	30	205.52	267											
5335095014	501 WALKER ST	LS1-F	3/26/2020 0:00	29	205.52	258											
5335095014	501 WALKER ST	LS1-F	4/27/2020 0:00	32	205.52	285											
5335095016	501 WALKER ST	LS1-F	4/26/2019 0:00	30	194.59	223											
5335095016	501 WALKER ST	LS1-F	5/28/2019 0:00	32	195.18	238											
5335095016	501 WALKER ST	LS1-F	6/26/2019 0:00	29	195.25	216											
5335095016	501 WALKER ST	LS1-F	7/26/2019 0:00	30	195.58	223											
5335095016	501 WALKER ST	LS1-F	8/27/2019 0:00	32	195.63	238											
5335095016	501 WALKER ST	LS1-F	9/26/2019 0:00	30	195.63	223											
5335095016	501 WALKER ST	LS1-F	10/25/2019 0:00	29	196.2	216											
5335095016	501 WALKER ST	LS1-F	11/25/2019 0:00	31	196.31	230											
5335095016	501 WALKER ST	LS1-F	12/26/2019 0:00	31	196.3	230											
5335095016	501 WALKER ST	LS1-F	1/27/2020 0:00	32	197.23	238											
5335095016	501 WALKER ST	LS1-F	2/26/2020 0:00	30	197.39	223											
5335095016	501 WALKER ST	LS1-F	3/26/2020 0:00	29	197.39	216											
5335095016	501 WALKER ST	LS1-F	4/27/2020 0:00	32	197.39	238											
5335095022	501 WALKER ST	LS1-A	4/26/2019 0:00	30	11.08	25											
5335095022	501 WALKER ST	LS1-A	5/28/2019 0:00	32	11.14	26											
5335095022	501 WALKER ST	LS1-A	6/26/2019 0:00	29	11.15	24											
5335095022	501 WALKER ST	LS1-A	7/26/2019 0:00	30	11.19	25											
5335095022	501 WALKER ST	LS1-A	8/27/2019 0:00	32	11.19	26											
5335095022	501 WALKER ST	LS1-A	9/26/2019 0:00	30	11.19	25											
5335095022	501 WALKER ST	LS1-A	10/25/2019 0:00	29	11.25	24											
5335095022	501 WALKER ST	LS1-A	11/25/2019 0:00	31	11.27	26											
5335095022	501 WALKER ST	LS1-A	12/26/2019 0:00	31	11.27	26											
5335095022	501 WALKER ST	LS1-A	1/27/2020 0:00	32	11.37	26											
5335095022	501 WALKER ST	LS1-A	2/26/2020 0:00	30	11.39	25											
5335095022	501 WALKER ST	LS1-A	3/26/2020 0:00	29	11.39	24											
5335095022	501 WALKER ST	LS1-A	4/27/2020 0:00	32	11.39	26											
5335095038	E/END APRICOT CIR	LS1-E	4/26/2019 0:00	30	11.27	9											
5335095038	E/END APRICOT CIR	LS1-E	5/28/2019 0:00	32	11.29	10											
5335095038	E/END APRICOT CIR	LS1-E	6/26/2019 0:00	29	11.3	9											
5335095038	E/END APRICOT CIR	LS1-E	7/26/2019 0:00	30	11.31	9											
5335095038	E/END APRICOT CIR	LS1-E	8/27/2019 0:00	32	11.31	10											
5335095038	E/END APRICOT CIR	LS1-E	9/26/2019 0:00	30	11.31	9											
5335095038	E/END APRICOT CIR	LS1-E	10/25/2019 0:00	29	11.34	9											
5335095038	E/END APRICOT CIR	LS1-E	11/25/2019 0:00	31	11.33	10											
5335095038	E/END APRICOT CIR	LS1-E	12/26/2019 0:00	31	11.34	10											
5335095038	E/END APRICOT CIR	LS1-E	1/27/2020 0:00	32	11.38	10											
5335095038	E/END APRICOT CIR	LS1-E	2/26/2020 0:00	30	11.39	9											
5335095038	E/END APRICOT CIR	LS1-E	3/26/2020 0:00	29	11.39	9											
5335095038	E/END APRICOT CIR	LS1-E	4/27/2020 0:00	32	11.39	10											
5335095084	CEDAR CRT	LS1-E	4/26/2019 0:00	30	11.56	11											
5335095084	CEDAR CRT	LS1-E	5/28/2019 0:00	32	11.58	12											
5335095084	CEDAR CRT	LS1-E	6/26/2019 0:00	29	11.59	11											
5335095084	CEDAR CRT	LS1-E	7/26/2019 0:00	30	11.61	11											
5335095084	CEDAR CRT	LS1-E	8/27/2019 0:00	32	11.61	12											
5335095084	CEDAR CRT	LS1-E	9/26/2019 0:00	30	11.61	11											
5335095084	CEDAR CRT	LS1-E	10/25/2019 0:00	29	11.64	11											
5335095084	CEDAR CRT	LS1-E	11/25/2019 0:00	31	11.64	11											
5335095084	CEDAR CRT	LS1-E	12/26/2019 0:00	31	11.64	11											
5335095084	CEDAR CRT	LS1-E	1/27/2020 0:00	32	11.69	12											
5335095084	CEDAR CRT	LS1-E	2/26/2020 0:00	30	11.7	11											
5335095084	CEDAR CRT	LS1-E	3/26/2020 0:00	29	11.7	11											
5335095084	CEDAR CRT	LS1-E	4/27/2020 0:00	32	11.7	12											
5335095119	333 MILL ST	HA1X	4/25/2019 0:00	30	556.17	2370	790	1580	0	9	17	0	1006726592	38,307	$9,816	$0.26	
5335095119	333 MILL ST	HA1X	5/27/2019 0:00	32	689.08	2655	953	811	891	12	12	17	1006726592				
5335095119	333 MILL ST	HA1X	6/25/2019 0:00	29	1154.41	4386	1379	1123	1884	19	25	24	1006726592				
5335095119	333 MILL ST	HA1X	7/25/2019 0:00	30	1266.89	4838	1712	1221	1905	19	18	24	1006726592				
5335095119	333 MILL ST	HA1X	8/26/2019 0:00	32	1488.65	5707	2136	1362	2209	19	24	26	1006726592				
5335095119	333 MILL ST	HA1X	9/25/2019 0:00	30	1154.78	4400	1571	1065	1764	18	18	23	1006726592				
5335095119	333 MILL ST	HA1X	10/24/2019 0:00	29	698.17	2589	909	634	1045	10	16	18	1006726592				
5335095119	333 MILL ST	HA1X	11/24/2019 0:00	31	556.38	2221	946	1076	200	12	11	14	1006726592				
5335095119	333 MILL ST	HA1X	12/25/2019 0:00	31	578.97	2385	1059	1326	0	8	8	0	1006726592				
5335095119	333 MILL ST	HA1X	1/26/2020 0:00	32	600.12	2438	1099	1339	0	8	8	0	1006726592				
5335095119	333 MILL ST	HA1X	2/25/2020 0:00	30	578.69	2337	959	1378	0	8	8	0	1006726592				
5335095119	333 MILL ST	HA1X	3/25/2020 0:00	29	493.43	1981	811	1170	0	7	11	0	1006726592				
5335095119	333 MILL ST	HA1X	4/26/2020 0:00	32	292.93	1139	623	515	0	3	5	0	1006726592				
5335095178	732 4TH ST	HA1X	4/25/2019 0:00	30	30.39	48	20	27	0	4	7	0	1006499492				
5335095178	732 4TH ST	HA1X	5/27/2019 0:00	32	58.39	149	55	37	57	7	7	7	1006499492				
5335095178	732 4TH ST	HA1X	6/25/2019 0:00	29	311.45	1162	547	265	350	5	7	8	1006499492				
5335095178	732 4TH ST	HA1X	7/25/2019 0:00	30	419.96	1609	885	346	378	8	8	8	1006499492				
5335095178	732 4TH ST	HA1X	8/26/2019 0:00	32	582.22	2262	1286	459	517	8	8	8	1006499492				
5335095178	732 4TH ST	HA1X	9/25/2019 0:00	30	403.39	1534	806	323	405	8	8	8	1006499492				
5335095178	732 4TH ST	HA1X	10/24/2019 0:00	29	105.21	335	146	73	116	4	5	5	1006499492				
5335095178	732 4TH ST	HA1X	11/24/2019 0:00	31	34.85	44	32	6	6	6	3	4	1006499492				
5335095178	732 4TH ST	HA1X	12/25/2019 0:00	31	63.34	166	98	67	0	1	1	0	1006499492				
5335095178	732 4TH ST	HA1X	1/26/2020 0:00	32	75.08	211	141	71	0	1	1	0	1006499492				
5335095178	732 4TH ST	HA1X	2/25/2020 0:00	30	47.25	98	66	31	0	1	1	0	1006499492				
5335095178	732 4TH ST	HA1X	3/25/2020 0:00	29	36.87	56	38	19	0	1	1	0	1006499492				
5335095178	732 4TH ST	HA1X	4/26/2020 0:00	32	28.42	9	6	3	0	0	0	0	1006499492				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	4/25/2019 0:00	30	26.2	31	19	12	0	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	5/27/2019 0:00	32	30.04	33	22	7	5	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	6/25/2019 0:00	29	27.85	30	18	6	5	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	7/25/2019 0:00	30	28.92	31	20	6	5	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	8/26/2019 0:00	32	30.85	34	21	7	6	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	9/25/2019 0:00	30	29.08	32	20	6	6	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	10/24/2019 0:00	29	28.04	30	18	6	5	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	11/24/2019 0:00	31	32.13	33	22	10	1	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	12/25/2019 0:00	31	32.81	33	21	12	0	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	1/26/2020 0:00	32	34	34	22	12	0	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	2/25/2020 0:00	30	31.7	31	20	12	0	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	3/25/2020 0:00	29	30.61	30	18	12	0	0	0	0	1010041282				
5335095222	8TH ST WS,COLUSA ST OPP /	HA6	4/26/2020 0:00	32	33.76	33	21	12	0	0	0	0	1010041282				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	4/25/2019 0:00	30	500.42	2295	1404	891	0	5	5	0	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	5/27/2019 0:00	32	515.72	2000	1295	427	278	3	3	3	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	6/25/2019 0:00	29	475.49	1735	1077	358	299	4	3	3	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	7/25/2019 0:00	30	556.5	2058	1298	417	342	4	5	4	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	8/26/2019 0:00	32	395.88	1340	874	257	209	4	3	3	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	9/25/2019 0:00	30	216.95	756	482	155	119	3	2	2	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	10/24/2019 0:00	29	277.05	999	632	205	162	3	3	2	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	11/24/2019 0:00	31	230.6	900	597	269	34	2	4	2	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	12/25/2019 0:00	31	266.75	1093	694	398	0	3	4	0	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	1/26/2020 0:00	32	261.16	1048	679	369	0	3	3	0	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	2/25/2020 0:00	30	127.58	456	269	187	0	1	1	0	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	3/25/2020 0:00	29	85.72	274	162	112	0	1	1	0	1009481247				
5335095246	RAILROAD AVE WS SOUTH ST,0.1 MI S/	HA6	4/26/2020 0:00	32	83.88	256	160	96	0	2	1	0	1009481247				
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	4/26/2019 0:00	30	8.74	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	5/28/2019 0:00	32	8.77	12											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	6/26/2019 0:00	29	8.78	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	7/26/2019 0:00	30	8.79	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	8/27/2019 0:00	32	8.79	12											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	9/26/2019 0:00	30	8.79	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	10/25/2019 0:00	29	8.82	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	11/25/2019 0:00	31	8.83	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	12/26/2019 0:00	31	8.83	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	1/27/2020 0:00	32	8.87	12											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	2/26/2020 0:00	30	8.88	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	3/26/2020 0:00	29	8.88	11											
5335095272	SHASTA ST ALLEY BTW 4TH ST & 5TH ST - STREI	LS1-A	4/27/2020 0:00	32	8.88	12											
5335095304	608 5TH ST (WAREHOUSE)	HA1X	4/25/2019 0:00	30	320.65	1408	847	561	0	3	3	0	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	5/27/2019 0:00	32	391.91	1648	1072	350	225	3	3	3	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	6/25/2019 0:00	29	397.55	1624	987	341	296	3	3	3	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	7/25/2019 0:00	30	413.68	1688	1051	341	296	3	3	2	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	8/26/2019 0:00	32	466.21	1817	1145	363	309	3	3	3	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	9/25/2019 0:00	30	419.06	1678	1024	347	307	3	3	3	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	10/24/2019 0:00	29	384.6	1555	936	328	290	3	3	3	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	11/24/2019 0:00	31	369.29	1555	1002	485	67	2	3	3	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	12/25/2019 0:00	31	345.5	1470	929	541	0	2	2	0	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	1/26/2020 0:00	32	362.65	1522	979	543	0	2	2	0	1009397170				

5335095304	608 5TH ST (WAREHOUSE)	HA1X	2/25/2020 0:00	30	340.93	1423	882	541	0	2	2	0	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	3/25/2020 0:00	29	331.29	1381	836	545	0	2	2	0	1009397170				
5335095304	608 5TH ST (WAREHOUSE)	HA1X	4/26/2020 0:00	32	368.14	1538	962	576	0	2	2	0	1009397170				
5335095334	ROOSEVELT AVE	HA1X	4/25/2019 0:00	30	152.25	643	361	282	0	3	3	0	1009724039	15,395	$3,861	$0.25	
5335095334	ROOSEVELT AVE	HA1X	5/27/2019 0:00	32	265.85	1088	635	248	205	6	5	7	1009724039				
5335095334	ROOSEVELT AVE	HA1X	6/25/2019 0:00	29	541.97	2139	981	510	648	11	9	9	1009724039				
5335095334	ROOSEVELT AVE	HA1X	7/25/2019 0:00	30	576.45	2290	1121	507	662	9	9	12	1009724039				
5335095334	ROOSEVELT AVE	HA1X	8/26/2019 0:00	32	552.74	2075	1048	497	530	9	9	11	1009724039				
5335095334	ROOSEVELT AVE	HA1X	9/25/2019 0:00	30	359.29	1411	773	318	321	10	7	7	1009724039				
5335095334	ROOSEVELT AVE	HA1X	10/24/2019 0:00	29	270.75	1067	549	260	257	4	5	5	1009724039				
5335095334	ROOSEVELT AVE	HA1X	11/24/2019 0:00	31	227.57	936	544	349	43	5	4	3	1009724039				
5335095334	ROOSEVELT AVE	HA1X	12/25/2019 0:00	31	266.08	1109	559	549	0	4	4	0	1009724039				
5335095334	ROOSEVELT AVE	HA1X	1/26/2020 0:00	32	281.68	1159	598	560	0	4	4	0	1009724039				
5335095334	ROOSEVELT AVE	HA1X	2/25/2020 0:00	30	202.54	820	417	403	0	5	4	0	1009724039				
5335095334	ROOSEVELT AVE	HA1X	3/25/2020 0:00	29	164.01	658	339	319	0	4	3	0	1009724039				
5335095334	ROOSEVELT AVE	HA1X	4/26/2020 0:00	32	221.47	898	460	438	0	4	6	0	1009724039				
5335095339	501 WALKER ST	LS1-E	4/26/2019 0:00	30	199.64	207											
5335095339	501 WALKER ST	LS1-E	5/28/2019 0:00	32	200.21	221											
5335095339	501 WALKER ST	LS1-E	6/26/2019 0:00	29	200.28	200											
5335095339	501 WALKER ST	LS1-E	7/26/2019 0:00	30	200.58	207											
5335095339	501 WALKER ST	LS1-E	8/27/2019 0:00	32	200.63	221											
5335095339	501 WALKER ST	LS1-E	9/26/2019 0:00	30	200.63	207											
5335095339	501 WALKER ST	LS1-E	10/25/2019 0:00	29	201.16	200											
5335095339	501 WALKER ST	LS1-E	11/25/2019 0:00	31	201.24	214											
5335095339	501 WALKER ST	LS1-E	12/26/2019 0:00	31	201.25	214											
5335095339	501 WALKER ST	LS1-E	1/27/2020 0:00	32	202.1	221											
5335095339	501 WALKER ST	LS1-E	2/26/2020 0:00	30	202.26	207											
5335095339	501 WALKER ST	LS1-E	3/26/2020 0:00	29	202.26	200											
5335095339	501 WALKER ST	LS1-E	4/27/2020 0:00	32	202.26	221											
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	4/25/2019 0:00	30	49.93	181	99	82	0	1	1	0	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	5/27/2019 0:00	32	53.01	183	113	46	24	1	1	0	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	6/25/2019 0:00	29	47.87	159	89	40	30	1	1	1	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	7/25/2019 0:00	30	49.4	164	93	40	30	1	1	1	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	8/26/2019 0:00	32	56.02	180	105	44	31	1	1	1	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	9/25/2019 0:00	30	50.82	168	100	43	25	1	1	1	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	10/24/2019 0:00	29	49.54	166	93	45	28	1	1	1	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	11/24/2019 0:00	31	203.5	834	512	278	44	3	3	2	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	12/25/2019 0:00	31	50.03	174	100	74	0	1	1	0	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	1/26/2020 0:00	32	51.64	177	103	74	0	1	1	0	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	2/25/2020 0:00	30	58.35	206	105	102	0	5	6	0	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	3/25/2020 0:00	29	48.01	164	85	79	0	1	1	0	1009723537				
5335095385	JACQUELYN DR S/END PUMP STATION	HA1X	4/26/2020 0:00	32	55.47	192	100	91	0	1	1	0	1009723537				
5335095400	RD 19 SS/ W/RD 200	HA1X	4/25/2019 0:00	30	474.62	2106	1279	827	0	3	3	0	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	5/27/2019 0:00	32	521.39	2208	1443	462	302	3	3	3	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	6/25/2019 0:00	29	493.82	2031	1243	425	362	3	3	3	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	7/25/2019 0:00	30	527.13	2163	1349	440	375	3	3	3	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	8/26/2019 0:00	32	574.98	2244	1425	440	379	3	3	3	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	9/25/2019 0:00	30	525.83	2127	1332	429	366	3	3	3	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	10/24/2019 0:00	29	493.06	2009	1240	412	357	3	3	3	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	11/24/2019 0:00	31	510.68	2171	1423	665	84	3	3	3	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	12/25/2019 0:00	31	506.99	2179	1391	788	0	3	3	0	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	1/26/2020 0:00	32	531.35	2252	1452	799	0	3	3	0	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	2/25/2020 0:00	30	498.63	2101	1310	791	0	3	3	0	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	3/25/2020 0:00	29	483.31	2034	1235	799	0	3	3	0	1009724067				
5335095400	RD 19 SS/ W/RD 200	HA1X	4/26/2020 0:00	32	525.15	2215	1405	810	0	3	3	0	1009724067				
5335095414	912 3RD ST	HA1X	4/25/2019 0:00	30	110.44	455	271	184	0	3	8	0	1009624285				
5335095414	912 3RD ST	HA1X	5/27/2019 0:00	32	159.64	647	358	224	66	8	9	8	1009624285				
5335095414	912 3RD ST	HA1X	6/25/2019 0:00	29	337.28	1317	709	328	280	7	9	8	1009624285				
5335095414	912 3RD ST	HA1X	7/25/2019 0:00	30	244.59	979	527	247	206	7	9	10	1009624285				
5335095414	912 3RD ST	HA1X	8/26/2019 0:00	32	326.35	1244	656	318	270	9	9	14	1009624285				
5335095414	912 3RD ST	HA1X	9/25/2019 0:00	30	129.3	498	280	134	84	7	9	8	1009624285				
5335095414	912 3RD ST	HA1X	10/24/2019 0:00	29	124.71	481	291	111	78	6	10	6	1009624285				
5335095414	912 3RD ST	HA1X	11/24/2019 0:00	31	151.31	615	405	193	16	3	6	7	1009624285				
5335095414	912 3RD ST	HA1X	12/25/2019 0:00	31	139.67	568	363	205	0	3	7	0	1009624285				
5335095414	912 3RD ST	HA1X	1/26/2020 0:00	32	240.63	996	661	335	0	5	5	0	1009624285				
5335095414	912 3RD ST	HA1X	2/25/2020 0:00	30	220.42	909	607	302	0	4	6	0	1009624285				
5335095414	912 3RD ST	HA1X	3/25/2020 0:00	29	181.71	747	535	211	0	4	4	0	1009624285				
5335095414	912 3RD ST	HA1X	4/26/2020 0:00	32	174.53	715	551	164	0	2	3	0	1009624285				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	4/25/2019 0:00	30	9.87	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	5/27/2019 0:00	32	10.56	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	6/25/2019 0:00	29	9.59	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	7/25/2019 0:00	30	9.93	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	8/26/2019 0:00	32	10.65	1	1	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	9/25/2019 0:00	30	10	1	1	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	10/24/2019 0:00	29	9.66	1	1	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	11/24/2019 0:00	31	10.3	1	1	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	12/25/2019 0:00	31	10.19	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	1/26/2020 0:00	32	10.51	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	2/25/2020 0:00	30	9.86	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	3/25/2020 0:00	29	9.58	0	0	0	0	0	0	0	1009361055				
5335095478	115 ALEXANDRA PARK IRRIGATION	HA1X	4/26/2020 0:00	32	10.57	0	0	0	0	0	0	0	1009361055				
5335095541	MEADOWOOD ESTATES	LS1-E	4/26/2019 0:00	30	11.27	9											
5335095541	MEADOWOOD ESTATES	LS1-E	5/28/2019 0:00	32	11.29	10											
5335095541	MEADOWOOD ESTATES	LS1-E	6/26/2019 0:00	29	11.3	9											
5335095541	MEADOWOOD ESTATES	LS1-E	7/26/2019 0:00	30	11.31	9											
5335095541	MEADOWOOD ESTATES	LS1-E	8/27/2019 0:00	32	11.31	10											
5335095541	MEADOWOOD ESTATES	LS1-E	9/26/2019 0:00	30	11.31	9											
5335095541	MEADOWOOD ESTATES	LS1-E	10/25/2019 0:00	29	11.34	9											
5335095541	MEADOWOOD ESTATES	LS1-E	11/25/2019 0:00	31	11.33	10											
5335095541	MEADOWOOD ESTATES	LS1-E	12/26/2019 0:00	31	11.34	10											
5335095541	MEADOWOOD ESTATES	LS1-E	1/27/2020 0:00	32	11.38	10											
5335095541	MEADOWOOD ESTATES	LS1-E	2/26/2020 0:00	30	11.39	9											
5335095541	MEADOWOOD ESTATES	LS1-E	3/26/2020 0:00	29	11.39	9											
5335095541	MEADOWOOD ESTATES	LS1-E	4/27/2020 0:00	32	11.39	10											
5335095555	BLAIR ESTATES	LS1-E	4/26/2019 0:00	30	46.22	44											
5335095555	BLAIR ESTATES	LS1-E	5/28/2019 0:00	32	46.35	47											
5335095555	BLAIR ESTATES	LS1-E	6/26/2019 0:00	29	46.36	43											
5335095555	BLAIR ESTATES	LS1-E	7/26/2019 0:00	30	46.42	44											
5335095555	BLAIR ESTATES	LS1-E	8/27/2019 0:00	32	46.44	47											
5335095555	BLAIR ESTATES	LS1-E	9/26/2019 0:00	30	46.44	44											
5335095555	BLAIR ESTATES	LS1-E	10/25/2019 0:00	29	46.54	43											
5335095555	BLAIR ESTATES	LS1-E	11/25/2019 0:00	31	46.56	46											
5335095555	BLAIR ESTATES	LS1-E	12/26/2019 0:00	31	46.57	46											
5335095555	BLAIR ESTATES	LS1-E	1/27/2020 0:00	32	46.75	47											
5335095555	BLAIR ESTATES	LS1-E	2/26/2020 0:00	30	46.78	44											
5335095555	BLAIR ESTATES	LS1-E	3/26/2020 0:00	29	46.78	43											
5335095555	BLAIR ESTATES	LS1-E	4/27/2020 0:00	32	46.78	47											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	4/26/2019 0:00	30	11.56	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	5/28/2019 0:00	32	11.58	12											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	6/26/2019 0:00	29	11.59	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	7/26/2019 0:00	30	11.61	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	8/27/2019 0:00	32	11.61	12											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	9/26/2019 0:00	30	11.61	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	10/25/2019 0:00	29	11.64	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	11/25/2019 0:00	31	11.64	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	12/26/2019 0:00	31	11.64	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	1/27/2020 0:00	32	11.69	12											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	2/26/2020 0:00	30	11.7	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	3/26/2020 0:00	29	11.7	11											
5335095578	E/S 9TH ST 140' S/O FRANCES LN	LS1-E	4/27/2020 0:00	32	11.7	12											
5335095593	604 E WALKER ST	HA1X	4/25/2019 0:00	30	43.6	108	59	49	0	6	4	0	1006590489				
5335095593	604 E WALKER ST	HA1X	5/27/2019 0:00	32	44.54	100	56	27	17	3	3	3	1006590489				
5335095593	604 E WALKER ST	HA1X	6/25/2019 0:00	29	42.43	96	50	24	22	7	3	3	1006590489				
5335095593	604 E WALKER ST	HA1X	7/25/2019 0:00	30	42.76	94	50	23	21	4	3	1	1006590489				
5335095593	604 E WALKER ST	HA1X	8/26/2019 0:00	32	50.3	114	61	28	24	3	3	3	1006590489				
5335095593	604 E WALKER ST	HA1X	9/25/2019 0:00	30	43.29	95	52	23	20	5	6	4	1006590489				
5335095593	604 E WALKER ST	HA1X	10/24/2019 0:00	29	45.46	108	55	30	23	3	3	4	1006590489				
5335095593	604 E WALKER ST	HA1X	11/24/2019 0:00	31	53.5	125	68	51	7	7	6	1	1006590489				
5335095593	604 E WALKER ST	HA1X	12/25/2019 0:00	31	49.85	106	57	49	0	4	5	0	1006590489				
5335095593	604 E WALKER ST	HA1X	1/26/2020 0:00	32	50.3	102	52	50	0	4	5	0	1006590489				
5335095593	604 E WALKER ST	HA1X	2/25/2020 0:00	30	49.79	107	53	54	0	1	3	0	1006590489				
5335095593	604 E WALKER ST	HA1X	3/25/2020 0:00	29	48.2	104	55	49	0	4	4	0	1006590489				

5335095593	604 E WALKER ST	HA1X	4/26/2020 0:00	32	55.06	122	61	62	0	3	1	0	1006590489
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	4/26/2019 0:00	30	22.53	19							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	5/28/2019 0:00	32	22.59	20							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	6/26/2019 0:00	29	22.59	18							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	7/26/2019 0:00	30	22.62	19							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	8/27/2019 0:00	32	22.62	20							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	9/26/2019 0:00	30	22.62	19							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	10/25/2019 0:00	29	22.67	18							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	11/25/2019 0:00	31	22.68	19							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	12/26/2019 0:00	31	22.68	19							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	1/27/2020 0:00	32	22.75	20							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	2/26/2020 0:00	30	22.77	19							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	3/26/2020 0:00	29	22.77	18							
5335095642	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	4/27/2020 0:00	32	22.77	20							
5335095659	4TH & WALKER STS	HA1X	4/25/2019 0:00	30	12.98	14	12	2	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	5/27/2019 0:00	32	13.57	14	13	1	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	6/25/2019 0:00	29	12.06	11	11	1	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	7/25/2019 0:00	30	12.52	12	11	1	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	8/26/2019 0:00	32	13.64	14	13	1	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	9/25/2019 0:00	30	13.17	15	13	2	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	10/24/2019 0:00	29	13.2	16	13	3	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	11/24/2019 0:00	31	14.37	18	15	4	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	12/25/2019 0:00	31	36.68	116	76	40	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	1/26/2020 0:00	32	24.07	59	44	15	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	2/25/2020 0:00	30	13.64	17	13	3	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	3/25/2020 0:00	29	12.87	15	12	3	0	0	0	0	1009093663
5335095659	4TH & WALKER STS	HA1X	4/26/2020 0:00	32	13.8	14	13	2	0	0	0	0	1009093663
5335095700	JFK SUBDIVISION	LS1-E	4/26/2019 0:00	30	101.7	86							
5335095700	JFK SUBDIVISION	LS1-E	5/28/2019 0:00	32	101.92	92							
5335095700	JFK SUBDIVISION	LS1-E	6/26/2019 0:00	29	101.95	83							
5335095700	JFK SUBDIVISION	LS1-E	7/26/2019 0:00	30	102.08	86							
5335095700	JFK SUBDIVISION	LS1-E	8/27/2019 0:00	32	102.1	92							
5335095700	JFK SUBDIVISION	LS1-E	9/26/2019 0:00	30	102.1	86							
5335095700	JFK SUBDIVISION	LS1-E	10/25/2019 0:00	29	102.32	83							
5335095700	JFK SUBDIVISION	LS1-E	11/25/2019 0:00	31	102.35	89							
5335095700	JFK SUBDIVISION	LS1-E	12/26/2019 0:00	31	102.35	89							
5335095700	JFK SUBDIVISION	LS1-E	1/27/2020 0:00	32	102.71	92							
5335095700	JFK SUBDIVISION	LS1-E	2/26/2020 0:00	30	102.78	86							
5335095700	JFK SUBDIVISION	LS1-E	3/26/2020 0:00	29	102.78	83							
5335095700	JFK SUBDIVISION	LS1-E	4/27/2020 0:00	32	102.78	92							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	4/26/2019 0:00	30	34.67	33							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	5/28/2019 0:00	32	34.75	36							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	6/26/2019 0:00	29	34.77	32							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	7/26/2019 0:00	30	34.82	33							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	8/27/2019 0:00	32	34.83	36							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	9/26/2019 0:00	30	34.83	33							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	10/25/2019 0:00	29	34.91	32							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	11/25/2019 0:00	31	34.93	34							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	12/26/2019 0:00	31	34.93	34							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	1/27/2020 0:00	32	35.07	36							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	2/26/2020 0:00	30	35.09	33							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	3/26/2020 0:00	29	35.09	32							
5335095712	SOUTH ST @ CORTINA DR	LS1-E	4/27/2020 0:00	32	35.09	36							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	4/26/2019 0:00	30	159.48	142							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	5/28/2019 0:00	32	159.85	151							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	6/26/2019 0:00	29	159.91	137							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	7/26/2019 0:00	30	160.11	142							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	8/27/2019 0:00	32	160.14	151							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	9/26/2019 0:00	30	160.14	142							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	10/25/2019 0:00	29	160.51	137							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	11/25/2019 0:00	31	160.57	147							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	12/26/2019 0:00	31	160.57	147							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	1/27/2020 0:00	32	161.15	151							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	2/26/2020 0:00	30	161.26	142							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	3/26/2020 0:00	29	161.26	137							
5335095725	LINWOOD PARK SUBDIVISION PHASE 1	LS1-E	4/27/2020 0:00	32	161.26	151							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	4/26/2019 0:00	30	11.56	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	5/28/2019 0:00	32	11.58	12							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	6/26/2019 0:00	29	11.59	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	7/26/2019 0:00	30	11.61	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	8/27/2019 0:00	32	11.61	12							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	9/26/2019 0:00	30	11.61	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	10/25/2019 0:00	29	11.64	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	11/25/2019 0:00	31	11.64	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	12/26/2019 0:00	31	11.64	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	1/27/2020 0:00	32	11.69	12							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	2/26/2020 0:00	30	11.7	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	3/26/2020 0:00	29	11.7	11							
5335095766	VILLA LA MICHELE SUBDIVISION	LS1-E	4/27/2020 0:00	32	11.7	12							
5335095816	501 WALKER ST	LS1-E	4/26/2019 0:00	30	123.94	103							
5335095816	501 WALKER ST	LS1-E	5/28/2019 0:00	32	124.2	110							
5335095816	501 WALKER ST	LS1-E	6/26/2019 0:00	29	124.25	100							
5335095816	501 WALKER ST	LS1-E	7/26/2019 0:00	30	124.4	103							
5335095816	501 WALKER ST	LS1-E	8/27/2019 0:00	32	124.42	110							
5335095816	501 WALKER ST	LS1-E	9/26/2019 0:00	30	124.42	103							
5335095816	501 WALKER ST	LS1-E	10/25/2019 0:00	29	124.69	100							
5335095816	501 WALKER ST	LS1-E	11/25/2019 0:00	31	124.73	107							
5335095816	501 WALKER ST	LS1-E	12/26/2019 0:00	31	124.73	107							
5335095816	501 WALKER ST	LS1-E	1/27/2020 0:00	32	125.16	110							
5335095816	501 WALKER ST	LS1-E	2/26/2020 0:00	30	125.24	103							
5335095816	501 WALKER ST	LS1-E	3/26/2020 0:00	29	125.24	100							
5335095816	501 WALKER ST	LS1-E	4/27/2020 0:00	32	125.24	110							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	4/26/2019 0:00	30	209.46	208							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	5/28/2019 0:00	32	210.02	222							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	6/26/2019 0:00	29	210.1	201							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	7/26/2019 0:00	30	210.4	208							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	8/27/2019 0:00	32	210.45	222							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	9/26/2019 0:00	30	210.45	208							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	10/25/2019 0:00	29	210.99	201							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	11/25/2019 0:00	31	211.08	215							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	12/26/2019 0:00	31	211.07	215							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	1/27/2020 0:00	32	211.92	222							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	2/26/2020 0:00	30	212.08	208							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	3/26/2020 0:00	29	212.08	201							
5335095833	VILLA LA MICHELE SUBDIVISION	LS1-E	4/27/2020 0:00	32	212.08	222							
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	4/25/2019 0:00	30	9.91	0	0	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	5/27/2019 0:00	32	10.64	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	6/25/2019 0:00	29	9.72	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	7/25/2019 0:00	30	10.03	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	8/26/2019 0:00	32	10.77	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	9/25/2019 0:00	30	10.17	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	10/24/2019 0:00	29	9.82	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	11/24/2019 0:00	31	10.39	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	12/25/2019 0:00	31	10.18	0	0	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	1/26/2020 0:00	32	10.51	0	0	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	2/25/2020 0:00	30	9.92	0	0	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	3/25/2020 0:00	29	9.71	1	1	0	0	0	0	0	1010384378
5335095864	566 LYNN DR IRRIGATION CONTROLLER	HA1X	4/26/2020 0:00	32	10.79	1	1	0	0	0	0	0	1010384378
5335095908	ROOSEVELT AVE	HA6	4/25/2019 0:00	30	89.17	359	0	359	0	0	17	0	1009720528
5335095908	ROOSEVELT AVE	HA6	5/27/2019 0:00	32	61.68	198	4	177	17	15	17	17	1009720528
5335095908	ROOSEVELT AVE	HA6	6/25/2019 0:00	29	32.69	102	62	38	1	17	17	0	1009720528
5335095908	ROOSEVELT AVE	HA6	7/25/2019 0:00	30	9.85	0	0	0	0	0	0	0	1009720528
5335095908	ROOSEVELT AVE	HA6	8/26/2019 0:00	32	10.51	0	0	0	0	0	0	0	1009720528
5335095908	ROOSEVELT AVE	HA6	9/25/2019 0:00	30	17.19	29	0	29	0	0	17	0	1009720528
5335095908	ROOSEVELT AVE	HA6	10/24/2019 0:00	29	80.46	271	0	262	9	0	17	16	1009720528
5335095908	ROOSEVELT AVE	HA6	11/24/2019 0:00	31	34.07	69	0	31	38	0	16	16	1009720528
5335095908	ROOSEVELT AVE	HA6	12/25/2019 0:00	31	10.18	0	0	0	0	0	0	0	1009720528
5335095908	ROOSEVELT AVE	HA6	1/26/2020 0:00	32	10.51	0	0	0	0	0	0	0	1009720528
5335095908	ROOSEVELT AVE	HA6	2/25/2020 0:00	30	49.24	166	0	166	0	0	16	0	1009720528
5335095908	ROOSEVELT AVE	HA6	3/25/2020 0:00	29	48.8	168	25	143	0	16	16	0	1009720528
5335095908	ROOSEVELT AVE	HA6	4/26/2020 0:00	32	10.51	0	0	0	0	0	0	0	1009720528

5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	4/25/2019 0:00	30	254.41	1066		667	398	0	22	4	0	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	5/27/2019 0:00	32	271.7	1087		730	223	134	16	21	8	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	6/25/2019 0:00	29	201.58	776		504	165	107	5	34	9	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	7/25/2019 0:00	30	192.79	733		488	145	100	6	13	4	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	8/26/2019 0:00	32	234.4	869		571	186	112	47	30	6	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	9/25/2019 0:00	30	225.79	860		565	175	119	26	16	7	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	10/24/2019 0:00	29	237.12	912		581	202	129	12	22	6	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	11/24/2019 0:00	31	269.47	1066		732	300	35	48	12	2	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	12/25/2019 0:00	31	348.78	1419		919	500	0	48	26	0	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	1/26/2020 0:00	32	366.09	1469		941	527	0	4	36	0	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	2/25/2020 0:00	30	319.68	1272		832	440	0	49	23	0	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	3/25/2020 0:00	29	285.11	1125		721	404	0	10	22	0	1009514880					
5335095918	AIRPARK DR WS (DOM WELL/FIRE PROT)	HA1X	4/26/2020 0:00	32	294.06	1156		775	381	0	48	26	0	1009514880					
5335095977	ROAD 200 SS/ E/RD N	HA1X	4/25/2019 0:00	30	9.86	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	5/27/2019 0:00	32	10.51	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	6/25/2019 0:00	29	9.53	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	7/25/2019 0:00	30	9.85	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	8/26/2019 0:00	32	10.51	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	9/25/2019 0:00	30	9.86	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	10/24/2019 0:00	29	9.52	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	11/24/2019 0:00	31	10.18	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	12/25/2019 0:00	31	10.18	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	1/26/2020 0:00	32	10.51	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	2/25/2020 0:00	30	9.86	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	3/25/2020 0:00	29	9.52	0		0	0	0	0	0	0	5000008268					
5335095977	ROAD 200 SS/ E/RD N	HA1X	4/26/2020 0:00	32	10.51	0		0	0	0	0	0	0	5000008268					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	8/26/2019 0:00	34	100.46	334								1010331133	5,937	$10,659	$1.80		
5335338997	SHASTA ST NS/ & 1ST ST	HA1	9/25/2019 0:00	30	94.93	318								1010331133					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	10/24/2019 0:00	29	76.79	248								1010331133					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	11/24/2019 0:00	31	107.04	437								1010331133					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	12/25/2019 0:00	31	111.85	483								1010331133					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	1/26/2020 0:00	32	94.65	394								1010331133					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	2/25/2020 0:00	30	80.26	328								1010331133					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	3/25/2020 0:00	29	77.36	316								1010331133					
5335338997	SHASTA ST NS/ & 1ST ST	HA1	4/26/2020 0:00	32	84.77	346								1010331133					
5336429921	RD N E/S .8MI N/O RD 24	A6	4/22/2019 0:00	32	9811.7	3903		9560	-5657	0	43	42	0	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	5/21/2019 0:00	29	19.06	-1170		8691	-4700	-5161	43	42	37	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	6/20/2019 0:00	30	19.71	-5178		7309	-3049	-9438	43	42	41	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	7/22/2019 0:00	32	21.03	-5659		6388	-2649	-9398	43	42	4	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	8/21/2019 0:00	30	19.71	-2436		8618	-1828	-9226	43	42	17	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	9/22/2019 0:00	32	21.03	-1346		8485	-1730	-8101	43	42	40	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	10/21/2019 0:00	29	19.06	1351		9606	-1039	-7216	43	42	36	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	11/19/2019 0:00	29	22.18	7347		11105	-1681	-2077	47	47	41	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	12/19/2019 0:00	30	24.64	22035		16599	5436	0	47	47	0	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	1/21/2020 0:00	33	27.11	20959		18798	2161	0	47	47	0	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	2/20/2020 0:00	30	24.64	10309		12831	-2522	0	46	46	0	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	3/22/2020 0:00	31	25.46	3319		9935	-6616	0	46	46	0	1010114046					
5336429921	RD N E/S .8MI N/O RD 24	A6	4/21/2020 0:00	30	4386.19	3719		12063	-8344	0	46	46	0	1010114046					
5336522690	429S HWY 99W	HTC1	8/26/2019 0:00	39	17.88	25								1009363566					
5336522690	429S HWY 99W	HTC1	9/25/2019 0:00	30	11.26	7								1009363566					
5336522690	429S HWY 99W	HTC1	10/24/2019 0:00	29	9.71	1								1009363566					
5336522690	429S HWY 99W	HTC1	11/24/2019 0:00	31	14.13	0								1009363566					
5336522690	429S HWY 99W	HTC1	12/25/2019 0:00	31	15.28	0								1009363566					
5336522690	429S HWY 99W	HTC1	1/26/2020 0:00	32	15.77	0								1009363566					
5336522690	429S HWY 99W	HTC1	2/25/2020 0:00	30	14.78	0								1009363566					
5336522690	429S HWY 99W	HTC1	3/25/2020 0:00	29	14.29	0								1009363566					
5336522690	429S HWY 99W	HTC1	4/26/2020 0:00	32	15.77	0								1009363566					
5336632554	136 BONNIE LN	A6	5/12/2019 0:00	31	20.36	1279		2407	-248	-880	34	29	12	1009888873	1,543	$972	$0.63		
5336632554	136 BONNIE LN	A6	6/11/2019 0:00	30	19.71	-3070		-18	-948	-2104	26	30	13	1009888873					
5336632554	136 BONNIE LN	A6	7/11/2019 0:00	30	19.71	4141		4992	349	-1200	38	32	18	1009888873					
5336632554	136 BONNIE LN	A6	8/12/2019 0:00	32	21.03	3178		4967	283	-2072	29	28	10	1009888873					
5336632554	136 BONNIE LN	A6	9/11/2019 0:00	30	19.71	-913		1793	-688	-2018	29	29	18	1009888873					
5336632554	136 BONNIE LN	A6	10/10/2019 0:00	29	19.05	-1954		880	-891	-1943	29	19	6	1009888873					
5336632554	136 BONNIE LN	A6	11/11/2019 0:00	32	22.83	3309		3006	197	106	35	30	30	1009888873					
5336632554	136 BONNIE LN	A6	12/10/2019 0:00	29	23.82	668		232	-900	0	22	22	0	1009888873					
5336632554	136 BONNIE LN	A6	1/9/2020 0:00	30	24.64	-1484		-425	-1059	0	7	7	0	1009888873					
5336632554	136 BONNIE LN	A6	2/10/2020 0:00	32	730.38	-2230		-727	-1503	0	0	0	0	1009888873					
5336632554	136 BONNIE LN	A6	3/11/2020 0:00	30	24.64	-1291		651	-1942	0	41	40	0	1009888873					
5336632554	136 BONNIE LN	A6	4/12/2020 0:00	32	26.28	1246		2661	-1415	0	40	40	0	1009888873					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	5/8/2019 0:00	30	1291.89	931	74	5437	-3650	-856	74	72	24	1010609859	194,520	$47,313	$0.24		
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	6/9/2019 0:00	32	3649.42	12300	88	13142	1493	-2335	88	81	36	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	7/9/2019 0:00	30	5564.42	25831	90	20562	4686	583	90	90	67	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	8/8/2019 0:00	30	8760.3	42355	90	30381	8802	3172	90	90	68	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	9/9/2019 0:00	32	8188.5	37126	109	28685	6804	1637	109	97	47	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	10/8/2019 0:00	29	7145.84	31020	105	23824	6361	835	105	102	48	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	11/8/2019 0:00	29	2531.34	5542	88	6175	800	-1433	88	73	51	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	12/8/2019 0:00	32	3507.39	18162	71	13587	4575	0	71	63	0	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	1/7/2020 0:00	30	346.26	-2516	44	-639	-1877	0	37	44	0	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	2/6/2020 0:00	30	-238.47	-3728	7	-1041	-2687	0	7	0	0	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	3/9/2020 0:00	32	4103.24	19789	89	15024	4765	0	89	89	0	1010609859					
5337426936	SUISUN ST NS/ W/5TH ST	A10SX	4/8/2020 0:00	30	2462.98	7708	90	7489	219	0	89	90	0	1010609859					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	5/12/2019 0:00	31	486.29	106	12	727	-601	-20	12	12	7	1005815760	7,194	$5,805	$0.81		
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	6/11/2019 0:00	30	995.1	3025	12	2079	821	125	12	12	12	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	7/11/2019 0:00	30	857.19	2495	12	1821	740	-66	12	12	8	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	8/12/2019 0:00	32	933.68	3110	12	2183	926	1	12	12	8	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	9/11/2019 0:00	30	1031.27	3387	13	2212	978	197	13	13	10	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	10/10/2019 0:00	29	1030.76	3344	12	2198	962	184	12	12	12	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	11/11/2019 0:00	32	581.87	570	12	548	13	9	12	12	11	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	12/10/2019 0:00	29	27.81	-1143	0	-338	-805	0	0	0	0	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	1/9/2020 0:00	30	43.28	-1028	0	-310	-718	0	0	0	0	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	2/10/2020 0:00	32	9.78	-1502	0	-512	-990	0	0	0	0	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	3/11/2020 0:00	30	-80.57	-2358	0	-655	-1703	0	0	0	0	1005815760					
5337427687	ROOSEVELT AVE SS/ W/ A ST	E19S	4/12/2020 0:00	32	-111.56	-2812	0	-896	-1916	0	0	0	0	1005815760					
5337778294	RD M & 200	A1X	5/9/2019 0:00	29	19.05	127								1006590505	7,133	$1,979	$0.28		
5337778294	RD M & 200	A1X	6/10/2019 0:00	32	21.03	166								1006590505					
5337778294	RD M & 200	A1X	7/10/2019 0:00	30	19.71	1268								1006590505					
5337778294	RD M & 200	A1X	8/11/2019 0:00	32	21.03	1114								1006590505					
5337778294	RD M & 200	A1X	9/10/2019 0:00	30	19.71	1146								1006590505					
5337778294	RD M & 200	A1X	10/9/2019 0:00	29	19.05	287								1006590505					
5337778294	RD M & 200	A1X	11/7/2019 0:00	29	20.21	344								1006590505					
5337778294	RD M & 200	A1X	12/9/2019 0:00	32	26.28	737								1006590505					
5337778294	RD M & 200	A1X	1/8/2020 0:00	30	24.64	787								1006590505					
5337778294	RD M & 200	A1X	2/9/2020 0:00	32	26.28	725								1006590505					
5337778294	RD M & 200	A1X	3/10/2020 0:00	30	1737.55	280								1006590505					
5337778294	RD M & 200	A1X	4/9/2020 0:00	30	24.64	152								1006590505					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	5/12/2019 0:00	31	20.36	13509		11256	1930	323	36	36	26	5000032853	34,842	$4,587	$0.13		
5338919494	ROOSEVELT AVE W/VIN PARK	A6	6/11/2019 0:00	30	19.71	3687		5078	155	-1546	36	36	32	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	7/11/2019 0:00	30	19.71	-266		3740	-1021	-2985	37	37	19	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	8/12/2019 0:00	32	21.03	-2873		1960	-1620	-3213	37	36	0	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	9/11/2019 0:00	30	19.71	-3579		439	-1364	-2654	36	36	26	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	10/10/2019 0:00	29	19.05	4483		4643	714	-874	36	36	32	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	11/11/2019 0:00	32	22.83	14313		11682	2240	391	35	35	35	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	12/10/2019 0:00	29	23.82	1673		2191	-518	0	35	35	0	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	1/9/2020 0:00	30	24.64	10755		6555	4200	0	35	35	0	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	2/10/2020 0:00	32	26.28	578		870	-292	0	35	35	0	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	3/11/2020 0:00	30	24.64	-3462		-874	-2588	0	35	35	0	5000032853					
5338919494	ROOSEVELT AVE W/VIN PARK	A6	4/12/2020 0:00	32	4345.65	-3976		-655	-3321	0	35	35	0	5000032853					
5339911948	732 4TH ST	HA1	8/26/2019 0:00	34	163.39	569								1010331163					
5339911948	732 4TH ST	HA1	9/25/2019 0:00	30	154.85	542								1010331163					
5339911948	732 4TH ST	HA1	10/24/2019 0:00	29	129.48	441								1010331163					
5339911948	732 4TH ST	HA1	11/24/2019 0:00	31	128.56	529								1010331163					
5339911948	732 4TH ST	HA1	12/25/2019 0:00	31	109.03	470								1010331163					
5339911948	732 4TH ST	HA1	1/26/2020 0:00	32	140.64	609								1010331163					
5339911948	732 4TH ST	HA1	2/25/2020 0:00	30	75.47	306								1010331163					
5339911948	732 4TH ST	HA1	3/25/2020 0:00	29	64.59	256								1010331163					
5339911948	732 4TH ST	HA1	4/26/2020 0:00	32	67.52	266								1010331163					
5339967221	810 5TH ST	A6	5/8/2019 0:00	30	19.72	-267		1130	-1061	-336	14	20	1	1009514061	19,686	$4,201	$0.21		
5339967221	810 5TH ST	A6	6/9/2019 0:00	32	21.03	1369		1811	115	-557	16	20	14	1009514061					
5339967221	810 5TH ST	A6	7/9/2019 0:00	30	19.71	2048		2097	477	-526	22	24	17	1009514061					
5339967221	810 5TH ST	A6	8/8/2019 0:00	30	19.71	2436		2315	484	-363	19	17	11	1009514061					
5339967221	810 5TH ST	A6	9/9/2019 0:00	32	21.03	2874		2320	528	26	20	25	16	1009514061					

5339967221	810 5TH ST	A6	10/8/2019 0:00	29	19.05	1042	1386	166	-510	18	16	13	1009514061
5339967221	810 5TH ST	A6	11/6/2019 0:00	29	20.04	1485	1425	185	-125	12	14	16	1009514061
5339967221	810 5TH ST	A6	12/8/2019 0:00	32	3960.01	2587	2171	416	0	13	13	0	1009514061
5339967221	810 5TH ST	A6	1/7/2020 0:00	30	24.64	2199	1801	398	0	9	9	0	1009514061
5339967221	810 5TH ST	A6	2/6/2020 0:00	30	24.64	2113	1736	377	0	13	13	0	1009514061
5339967221	810 5TH ST	A6	3/9/2020 0:00	32	26.28	929	1507	-578	0	12	11	0	1009514061
5339967221	810 5TH ST	A6	4/8/2020 0:00	30	24.64	871	1582	-711	0	9	9	0	1009514061

said	service_address	current_read_date	numberofd	revenue	thm	meter_num	ratesch				
1323311022	1002 HAMBRIGHT LN	5/10/2019 0:00	29	27.82	18	60662476	GNR1	Jan	259	231.95	
1323311022	1002 HAMBRIGHT LN	6/11/2019 0:00	32	46.32	42	60662476	GNR1	Feb	79	83.42	
1323311022	1002 HAMBRIGHT LN	7/11/2019 0:00	30	17.74	3	60662476	GNR1	Mar	102	103.12	
1323311022	1002 HAMBRIGHT LN	8/12/2019 0:00	32	19.44	4	60662476	GNR1	Apr	18	27.82	
1323311022	1002 HAMBRIGHT LN	9/11/2019 0:00	30	17.64	3	60662476	GNR1	May	42	46.32	
1323311022	1002 HAMBRIGHT LN	10/10/2019 0:00	29	20.52	8	60662476	GNR1	Jun	3	17.74	
1323311022	1002 HAMBRIGHT LN	11/8/2019 0:00	29	17.28	3	60662476	GNR1	Jul	4	19.44	
1323311022	1002 HAMBRIGHT LN	12/10/2019 0:00	32	166.43	186	60662476	GNR1	Aug	3	17.64	
1323311022	1002 HAMBRIGHT LN	1/9/2020 0:00	30	296.92	346	60662476	GNR1	Sep	8	20.52	
1323311022	1002 HAMBRIGHT LN	2/10/2020 0:00	32	231.95	259	60662476	GNR1	Oct	3	17.28	
1323311022	1002 HAMBRIGHT LN	3/11/2020 0:00	30	83.42	79	60662476	GNR1	Nov	186	166.43	
1323311022	1002 HAMBRIGHT LN	4/10/2020 0:00	30	103.12	102	60662476	GNR1	Dec	346	296.92	
									1053	1048.6	
5330312000		6/21/2019 0:00	30	0	0						
5330312000		7/23/2019 0:00	32	0	0						
5330312000		8/22/2019 0:00	29	0	0						
5330312000		9/23/2019 0:00	31	0	0						
5330312000		10/22/2019 0:00	28	0	0						
5330312000		11/20/2019 0:00	28	0	0						
5330312000		12/20/2019 0:00	29	0	0						
5330312000		1/22/2020 0:00	32	0	0						
5330312000		2/21/2020 0:00	29	0	0						
5330312000		3/23/2020 0:00	30	0	0						
5330312000		4/22/2020 0:00	29	0	0						
5330919521		6/11/2019 0:00	32	29.91	43						
5330919521		7/11/2019 0:00	30	2.15	3						
5330919521		8/12/2019 0:00	31	2.85	4						
5330919521		9/11/2019 0:00	29	2.15	3						
5330919521		10/10/2019 0:00	28	5.72	8						
5330919521		11/8/2019 0:00	28	2.14	3						
5330919521		12/10/2019 0:00	31	132.48	192						
5330919521		1/9/2020 0:00	29	246.97	358						
5330919521		2/10/2020 0:00	31	184.48	267						
5330919521		3/11/2020 0:00	29	56.39	82						
5330919521		4/10/2020 0:00	29	70.38	102						
5331908908		6/10/2019 0:00	32	0.71	1						
5331908908		7/10/2019 0:00	30	0.71	1						
5331908908		8/9/2019 0:00	29	0	0						
5331908908		9/10/2019 0:00	31	0.71	1						
5331908908		10/9/2019 0:00	28	0.71	1						
5331908908		11/7/2019 0:00	28	2.15	3						
5331908908		12/9/2019 0:00	31	38.46	56						
5331908908		1/8/2020 0:00	29	89.94	130						
5331908908		2/7/2020 0:00	29	82.8	120						
5331908908		3/10/2020 0:00	31	25.64	37						
5331908908		4/9/2020 0:00	29	29.67	43						
5332692403		4/23/2019 0:00	32	37.33	48		WG1TCOM				
5332692403		5/22/2019 0:00	29	18.8	1		WG1TCOM				
5333745399		5/10/2019 0:00	29	23.41	18		WG1TCOM				
5333755075		4/23/2019 0:00	32	20.48	0		WG1TCOM				
5333755075		5/22/2019 0:00	29	18.56	0		WG1TCOM				
5334307255		5/13/2019 0:00	31	19.84	0		WG1TCOM				
5335095030	SUISUN ST NS/ W/5TH ST	5/9/2019 0:00	30	8.11	0	42407222	GNR1	Jan	0	8.11	0
5335095030	SUISUN ST NS/ W/5TH ST	6/10/2019 0:00	32	8.65	0	42407222	GNR1	Feb	0	8.65	0
5335095030	SUISUN ST NS/ W/5TH ST	7/10/2019 0:00	30	8.81	1	42407222	GNR1	Mar	0	8.11	0
5335095030	SUISUN ST NS/ W/5TH ST	8/9/2019 0:00	30	8.11	0	42407222	GNR1	Apr	0	8.11	0
5335095030	SUISUN ST NS/ W/5TH ST	9/10/2019 0:00	32	8.65	0	42407222	GNR1	May	0	8.65	0
5335095030	SUISUN ST NS/ W/5TH ST	10/9/2019 0:00	29	9.86	3	42407222	GNR1	Jun	1	8.81	1
5335095030	SUISUN ST NS/ W/5TH ST	11/7/2019 0:00	29	7.84	0	42407222	GNR1	Jul	0	8.11	0
5335095030	SUISUN ST NS/ W/5TH ST	12/9/2019 0:00	32	8.65	0	42407222	GNR1	Aug	0	8.65	0
5335095030	SUISUN ST NS/ W/5TH ST	1/8/2020 0:00	30	8.11	0	42407222	GNR1	Sep	3	9.86	3
5335095030	SUISUN ST NS/ W/5TH ST	2/7/2020 0:00	30	8.11	0	42407222	GNR1	Oct	0	7.84	0
5335095030	SUISUN ST NS/ W/5TH ST	3/10/2020 0:00	32	8.65	0	42407222	GNR1	Nov	0	8.65	0
5335095030	SUISUN ST NS/ W/5TH ST	4/9/2020 0:00	30	8.11	0	42407222	GNR1	Dec	0	8.11	0
									4	101.66	4
5335095035	333 MILL ST	5/9/2019 0:00	30	68.17	56	52113710	GNR1	Jan	665	581.39	
5335095035	333 MILL ST	6/10/2019 0:00	32	51.74	30	52113710	GNR1	Feb	307	292.77	
5335095035	333 MILL ST	7/10/2019 0:00	30	28.65	0	52113710	GNR1	Mar	313	298.57	
5335095035	333 MILL ST	8/9/2019 0:00	30	28.64	0	52113710	GNR1	Apr	56	68.17	
5335095035	333 MILL ST	9/10/2019 0:00	32	30.56	0	52113710	GNR1	May	30	51.74	
5335095035	333 MILL ST	10/9/2019 0:00	29	41.86	21	52113710	GNR1	Jun	0	28.65	
5335095035	333 MILL ST	11/7/2019 0:00	29	103.04	105	52113710	GNR1	Jul	0	28.64	

5335095035	333 MILL ST	12/9/2019 0:00	32	334.12	377	52113710	GNR1	Aug	0	30.56	
5335095035	333 MILL ST	1/8/2020 0:00	30	513.49	597	52113710	GNR1	Sep	21	41.86	
5335095035	333 MILL ST	2/7/2020 0:00	30	581.39	665	52113710	GNR1	Oct	105	103.04	
5335095035	333 MILL ST	3/10/2020 0:00	32	292.77	307	52113710	GNR1	Nov	377	334.12	
5335095035	333 MILL ST	4/9/2020 0:00	30	298.57	313	52113710	GNR1	Dec	597	513.49	
									2471	**2373**	
5335095055	815 4TH ST	5/9/2019 0:00	30	10.23	3	2973266X	GNR1	Jan	116	104.52	
5335095055	815 4TH ST	6/10/2019 0:00	32	9.35	1	2973266X	GNR1	Feb	36	39.4	
5335095055	815 4TH ST	7/10/2019 0:00	30	8.81	1	2973266X	GNR1	Mar	43	45.2	
5335095055	815 4TH ST	8/9/2019 0:00	30	8.11	0	2973266X	GNR1	Apr	3	10.23	
5335095055	815 4TH ST	9/10/2019 0:00	32	9.31	1	2973266X	GNR1	May	1	9.35	
5335095055	815 4TH ST	10/9/2019 0:00	29	8.51	1	2973266X	GNR1	Jun	1	8.81	
5335095055	815 4TH ST	11/7/2019 0:00	29	9.99	3	2973266X	GNR1	Jul	0	8.11	
5335095055	815 4TH ST	12/9/2019 0:00	32	52.13	54	2973266X	GNR1	Aug	1	9.31	
5335095055	815 4TH ST	1/8/2020 0:00	30	110.44	126	2973266X	GNR1	Sep	1	8.51	
5335095055	815 4TH ST	2/7/2020 0:00	30	104.52	116	2973266X	GNR1	Oct	3	9.99	
5335095055	815 4TH ST	3/10/2020 0:00	32	39.4	36	2973266X	GNR1	Nov	54	52.13	
5335095055	815 4TH ST	4/9/2020 0:00	30	45.2	43	2973266X	GNR1	Dec	126	110.44	
									385	416	
5335095090	RD M & 200	5/10/2019 0:00	29	35.58	29	26961374	GNR1	Jan	431	374.91	0.869861
5335095090	RD M & 200	6/11/2019 0:00	32	51.26	49	26961374	GNR1	Feb	218	202.69	
5335095090	RD M & 200	7/11/2019 0:00	30	32.58	24	26961374	GNR1	Mar	267	244.64	
5335095090	RD M & 200	8/12/2019 0:00	32	33.96	25	26961374	GNR1	Apr	29	35.58	
5335095090	RD M & 200	9/11/2019 0:00	30	30.99	23	26961374	GNR1	May	49	51.26	
5335095090	RD M & 200	10/10/2019 0:00	29	30.64	23	26961374	GNR1	Jun	24	32.58	
5335095090	RD M & 200	11/8/2019 0:00	29	77.16	86	26961374	GNR1	Jul	25	33.96	
5335095090	RD M & 200	12/10/2019 0:00	32	247.75	287	26961374	GNR1	Aug	23	30.99	
5335095090	RD M & 200	1/9/2020 0:00	30	325.38	381	26961374	GNR1	Sep	23	30.64	
5335095090	RD M & 200	2/10/2020 0:00	32	374.91	431	26961374	GNR1	Oct	86	77.16	
5335095090	RD M & 200	3/11/2020 0:00	30	202.69	218	26961374	GNR1	Nov	287	247.75	
5335095090	RD M & 200	4/10/2020 0:00	30	244.64	267	26961374	GNR1	Dec	381	325.38	
									1843	1687.54	
5335095105	136 BONNIE LN	5/13/2019 0:00	31	8.39	0	47075545	GNR1	Jan	0	8.66	
5335095105	136 BONNIE LN	6/12/2019 0:00	30	8.12	0	47075545	GNR1	Feb	0	8.12	
5335095105	136 BONNIE LN	7/12/2019 0:00	30	8.12	0	47075545	GNR1	Mar	0	8.66	
5335095105	136 BONNIE LN	8/13/2019 0:00	32	8.66	0	47075545	GNR1	Apr	0	8.39	
5335095105	136 BONNIE LN	9/12/2019 0:00	30	8.12	0	47075545	GNR1	May	0	8.12	
5335095105	136 BONNIE LN	10/11/2019 0:00	29	7.85	0	47075545	GNR1	Jun	0	8.12	
5335095105	136 BONNIE LN	11/12/2019 0:00	32	8.66	0	47075545	GNR1	Jul	0	8.66	
5335095105	136 BONNIE LN	12/11/2019 0:00	29	7.85	0	47075545	GNR1	Aug	0	8.12	
5335095105	136 BONNIE LN	1/10/2020 0:00	30	8.11	0	47075545	GNR1	Sep	0	7.85	
5335095105	136 BONNIE LN	2/11/2020 0:00	32	8.66	0	47075545	GNR1	Oct	0	8.66	
5335095105	136 BONNIE LN	3/12/2020 0:00	30	8.12	0	47075545	GNR1	Nov	0	7.85	
5335095105	136 BONNIE LN	4/13/2020 0:00	32	8.66	0	47075545	GNR1	Dec	0	8.11	
									0	99.32	
5335095165	RAILROAD AVE-W SOUTH ST-S	4/23/2019 0:00	32	8.65	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	5/22/2019 0:00	29	7.84	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	6/21/2019 0:00	30	8.11	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	7/23/2019 0:00	32	8.65	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	8/22/2019 0:00	30	8.11	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	9/23/2019 0:00	32	8.65	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	10/22/2019 0:00	29	7.84	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	11/20/2019 0:00	29	7.84	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	12/20/2019 0:00	30	8.11	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	1/22/2020 0:00	33	8.93	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	2/21/2020 0:00	30	8.11	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	3/23/2020 0:00	31	8.38	0	60836321	GNR1				
5335095165	RAILROAD AVE-W SOUTH ST-S	4/22/2020 0:00	30	8.11	0	60836321	GNR1				
5335095296	732 4TH ST	4/23/2019 0:00	32	52.08	48	45079276	GNR1				
5335095296	732 4TH ST	5/22/2019 0:00	29	15.82	1	45079276	GNR1				
5335095296	732 4TH ST	6/21/2019 0:00	30	15.63	0	45079276	GNR1				
5335095296	732 4TH ST	7/23/2019 0:00	32	16.67	0	45079276	GNR1				
5335095296	732 4TH ST	8/22/2019 0:00	30	15.63	0	45079276	GNR1				
5335095296	732 4TH ST	9/23/2019 0:00	32	16.67	0	45079276	GNR1				
5335095296	732 4TH ST	10/22/2019 0:00	29	15.11	0	45079276	GNR1				
5335095296	732 4TH ST	11/20/2019 0:00	29	20.5	7	45079276	GNR1				
5335095296	732 4TH ST	12/20/2019 0:00	30	141.24	156	45079276	GNR1				
5335095296	732 4TH ST	1/22/2020 0:00	33	259.84	295	45079276	GNR1				
5335095296	732 4TH ST	2/21/2020 0:00	30	124.52	131	45079276	GNR1				
5335095296	732 4TH ST	3/23/2020 0:00	31	82.57	75	45079276	GNR1				
5335095296	732 4TH ST	4/22/2020 0:00	30	15.63	0	45079276	GNR1				
5335427298		6/10/2019 0:00	32	21.37	31						
5335427298		7/10/2019 0:00	30	0	0						
5335427298		8/9/2019 0:00	29	0	0						

5335427298		9/10/2019 0:00	31	0	0							
5335427298		10/9/2019 0:00	28	15.01	22							
5335427298		11/7/2019 0:00	28	75.04	109							
5335427298		12/9/2019 0:00	31	268.52	389							
5335427298		1/8/2020 0:00	29	426.14	618							
5335427298		2/7/2020 0:00	29	474.67	688							
5335427298		3/10/2020 0:00	31	218.66	317							
5335427298		4/9/2020 0:00	29	215.97	313							
5335480311		6/10/2019 0:00	32	0	0							
5335480311		7/10/2019 0:00	30	0.71	1							
5335480311		8/9/2019 0:00	29	0	0							
5335480311		9/10/2019 0:00	31	0	0							
5335480311		10/9/2019 0:00	28	2.14	3							
5335480311		11/7/2019 0:00	28	0	0							
5335480311		12/9/2019 0:00	31	0	0							
5335480311		1/8/2020 0:00	29	0	0							
5335480311		2/7/2020 0:00	29	0	0							
5335480311		3/10/2020 0:00	31	0	0							
5335480311		4/9/2020 0:00	29	0	0							
5335596452		6/21/2019 0:00	30	0	0							
5335596452		7/23/2019 0:00	32	0	0							
5335596452		8/22/2019 0:00	29	0	0							
5335596452		9/23/2019 0:00	31	0	0							
5335596452		10/22/2019 0:00	28	0	0							
5335596452		11/20/2019 0:00	28	5	7							
5335596452		12/20/2019 0:00	29	111.36	161							
5335596452		1/22/2020 0:00	32	209.91	304							
5335596452		2/21/2020 0:00	29	93.51	136							
5335596452		3/23/2020 0:00	30	53.48	78							
5335596452		4/22/2020 0:00	29	0	0							
5336590143		5/9/2019 0:00	30	19.2	0		WG1TCOM					
5337425317		5/9/2019 0:00	30	20.02	3		WG1TCOM					
5337461205		6/12/2019 0:00	30	0	0							
5337461205		7/12/2019 0:00	30	0	0							
5337461205		8/13/2019 0:00	31	0	0							
5337461205		9/12/2019 0:00	29	0	0							
5337461205		10/11/2019 0:00	28	0	0							
5337461205		11/12/2019 0:00	31	0	0							
5337461205		12/11/2019 0:00	28	0	0							
5337461205		1/10/2020 0:00	29	0	0							
5337461205		2/11/2020 0:00	31	0	0							
5337461205		3/12/2020 0:00	29	0	0							
5337461205		4/13/2020 0:00	31	0	0							

		5/9/2019		$68.05	70			Jan	203	271.59	1.337882	
		6/10/2019		$81.84	87			Feb	125	170.98		
		7/24/2019		$107.56	113			Mar	108	128.82		
5339169727	810 5TH ST	8/22/2019 0:00	29	87.36	83	62176772	GNR1	Apr	70	68.05		
5339169727	810 5TH ST	9/23/2019 0:00	32	117.31	118	62176772	GNR1	May	87	81.84		
5339169727	810 5TH ST	10/22/2019 0:00	29	78.97	76	62176772	GNR1	Jun	113	107.56		
5339169727	810 5TH ST	11/20/2019 0:00	29	110.03	96	62176772	GNR1	Jul	83	87.36		
5339169727	810 5TH ST	12/20/2019 0:00	30	247.3	199	62176772	GNR1	Aug	118	117.31		
5339169727	810 5TH ST	1/22/2020 0:00	33	364.74	280	62176772	GNR1	Sep	76	78.97		
5339169727	810 5TH ST	2/21/2020 0:00	30	271.59	203	62176772	GNR1	Oct	96	110.03		
5339169727	810 5TH ST	3/23/2020 0:00	31	170.98	125	62176772	GNR1	Nov	199	247.3		
5339169727	810 5TH ST	4/22/2020 0:00	30	128.82	108	62176772	GNR1	Dec	280	364.74		
									1558	1834.55		
5339348553		5/10/2019 0:00	29	26.37	29		WG1TCOM					
5339860090		6/11/2019 0:00	32	34.9	51							
5339860090		7/11/2019 0:00	30	17.13	25							
5339860090		8/12/2019 0:00	31	17.81	26							
5339860090		9/11/2019 0:00	29	16.42	24							
5339860090		10/10/2019 0:00	28	16.43	24							
5339860090		11/8/2019 0:00	28	61.46	89							
5339860090		12/10/2019 0:00	31	204.42	296							
5339860090		1/9/2020 0:00	29	271.96	394							
5339860090		2/10/2020 0:00	31	306.98	445							
5339860090		3/11/2020 0:00	29	155.61	226							
5339860090		4/10/2020 0:00	29	184.23	267							
5339874697		5/9/2019 0:00	30	34.45	56		WG1TCOM					

E. Adjustable Speed Drive Part-Load Efficiency (US DOE)

The following document was obtained from the United States Department of Energy website. Due to its length, the document will begin on the following page.

Adjustable Speed Drive Part-Load Efficiency

An adjustable speed drive (ASD) is a device that controls the rotational speed of motor-driven equipment. Variable frequency drives (VFDs), the most common type of ASD, are solid-state electronic motor controllers that efficiently meet varying process requirements by adjusting the frequency and voltage of power supplied to an alternating current (AC) motor to enable it to operate over a wide speed range. External sensors monitor flow, liquid levels, or pressure and then transmit a signal to a controller that adjusts the frequency and speed of the motor to match process requirements.

Variable Torque Loads

Pulse-width-modulated (PWM) VFDs are most often used in variable torque applications in the 1 to 1,000 horsepower (hp) motor size range. For centrifugal fans or pumps with no static lift, the fan or affinity laws state that the fluid or airflow provided varies directly with the pump or fan rotational speed. The input power requirement varies as the cube or third power of the speed ratio, as shown in Figure 1. Small decreases in equipment rotating speed or fluid flow yield significant reductions in energy use. For example, reducing rotating equipment speed (flow) by 20% can reduce input power requirements by approximately 50%.

$$hp_2 = hp_1 \times (RPM_2 / RPM_1)^3 = hp_1 \times (Flow_2/Flow_1)^3$$

Where:

hp_1 = driven-equipment shaft horsepower requirement at original operating speed

hp_2 = driven-equipment shaft horsepower requirement at reduced speed

RPM_1 = original speed of driven equipment, in revolutions per minute (RPM)

RPM_2 = reduced speed of driven equipment, in RPM

$Flow_1$ = original flow provided by centrifugal fan or pump

$Flow_2$ = final flow provided by centrifugal fan or pump

Figure 1. Power requirement for variable torque loads

Constant Torque Loads

A constant torque load is one where the torque requirement is independent of speed. Because horsepower requirements equal the product of required torque and speed, input power varies linearly with speed for constant torque applications. Examples of constant torque loads include cranes, hoists, conveyors, extruders, mixers, positive displacement pumps, reciprocating air compressors, and rotary screw air compressors.

Determining Energy Savings

To establish the energy savings that are possible when a VFD is applied to a variable or constant torque load, you must determine the load duty cycle, or percentage of time that the driven equipment operates at each system operating point. You must also know the efficiency of the variable speed drive and the drive motor when the motor is operating partially loaded and at a reduced speed to satisfy variable flow requirements.

When considering PWM VFDs, you may use manufacturer's data or Table 1 to obtain efficiency values for drives of various ratings that supply power to motors connected to either variable or constant torque loads. Note that motor efficiency is also reduced at light loads and when the motor is supplied with a nonsinusoidal waveform.

Suggested Actions

- Contact your supplier to obtain information about drive efficiency as a function of motor operating speed or drive power output.
- When VFD part-load performance values are not readily available, use the values given in Table 1. Use this information to accurately determine the energy savings due to the use of VFD versus throttle or damper flow control.
- **Drive Performance**
  Variable and constant torque loads are expressed in terms of the shaft horsepower supplied by the motor. A motor "load" is the brake or shaft power requirement imposed upon the motor by the driven equipment divided by the motor's full horsepower rating. The load on the ASD is the actual power supplied by the device (shaft horsepower divided by the motor efficiency at its load point) divided by the drive rated output power. Drive distributors or manufacturers can provide efficiency values for ASDs as a function of operating speed or load for both variable and constant torque loads.

Table 1. Adjustable Speed Drive Part-Load Efficiency*

Variable Drive hp Rating	Efficiency (%)						
	Load, Percent of Drive Rated Power Output						
	1.6	12.5	25	42	50	75	100
5	35	80	88	91	92	94	95
10	41	83	90	93	94	95	96
20	47	86	93	94	95	96	97
30	50	88	93	95	95	96	97
50	46	86	92	95	95	96	97
60	51	87	92	95	95	96	97
75	47	86	93	95	96	97	97
100	55	89	94	95	96	97	97
200	61	81	95	96	96	97	97

*These efficiency values may be considered representative of "typical" PWM VFD performance. There is no widely accepted test protocol that allows for efficiency comparisons between different drive models or brands. In addition, there are many ways to set up a VFD that can affect the operating efficiency. *Source: Saftronics, Inc.*

VFD efficiency decreases with decreasing motor load. The decline in efficiency is more pronounced with drives of smaller horsepower ratings. As shown in the following example, this reduction in efficiency is not as detrimental as it first seems.

Example

Consider a VFD coupled to a motor that requires 16.4 kilowatts (kW) to deliver 20 shaft hp to an exhaust fan when operated at its full rated speed. At half its rated operating speed, the fan delivers 50% of its rated airflow but requires only 1/8 full-load power. Even with a reduced motor efficiency of 77.8% and drive efficiency of 86%, with adjustable speed operation the power required by the fan and the VFD is only 2.8 kW. For this example, input power requirements are reduced by 82.9%.

$$kW\ 50\% = 0.746\ kW/hp \times (20\ hp \times (1/2)^3 / (0.778 \times 0.86) = 2.8\ kW$$

Remember that the system efficiency is the product of the VFD efficiency, the motor efficiency at its load point, and the driven equipment efficiency ($\eta system = \eta_{VFD} \times \eta_{Motor} \times \eta_{Equipment}$). Efficiencies for integral horsepower NEMA Design A and B motors at full and part load can readily be obtained from the U.S. Department of Energy's MotorMaster+ 4.0 software tool. Efficiencies for driven equipment must be extracted from the appropriate pump or fan performance curves.

Additional Information

For additional information regarding adjustable speed drive applications, refer to Motor Systems Tip Sheet #14, *When Should Inverter-Duty Motors be Specified* and Motor Systems Tip Sheet #15, *Minimize Adverse Motor and Adjustable Speed Drive Interactions* at: *www.eere.energy.gov/manufacturing/tech_deployment/motors.html.*

Resources

National Electrical Manufacturers Association (NEMA)—Visit *www.nema.org* for information on motor standards, application guides, and technical papers.

U.S. Department of Energy (DOE)—For more information on motor and motor-driven system efficiency and to download the MotorMaster+ software tool, visit the Advanced Manufacturing Office (AMO) website at *manufacturing.energy.gov.*

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

Manufacturing converts a wide range of raw materials, components, and parts into finished goods that meet market expectations. The Advanced Manufacturing Office (AMO) partners with industry, small business, universities, and other stakeholders to identify and invest in emerging technologies with the potential to create high-quality domestic manufacturing jobs and enhance the global competitiveness of the United States.

Advanced Manufacturing Office
Energy Efficiency and Renewable Energy
U.S. Department of Energy
Washington, DC 20585-0121
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DOE/GO-102012-3730 • November 2012

F. Abbreviations Reference Table

The following table is a guide to the various abbreviations used in the text and tables of this report.

Abbreviations Reference Table	
US DOE	United States Department of Energy
ESCO	Energy Services Company
Est.	Estimated
E-Savings	Electricity Savings
Qty	Quantity
W	Wattage
2x2x2	Width x Length x Number of Lamps (in feet, fluorescent lighting fixture)
WP	Wall Pack (style of lighting fixture)
SB	Shoe Box (style of lighting fixture)
Mt	Mount
Fl/FL	Flood/Flood Light (style of lighting fixture)
Exits	Exit Sign (style of lighting fixture)
Inc	Incandescent
Std	Standard
R-22-2T8U6-LED	Retrofit - Fixture Type - # of Lamps & Type (2 x T8 U6) - Replacement Technology
N-WP30W-LED	New - Fixture Type & Power Rating - Replacement Technology
Scr	Screw-in Lamp
WM Occ Sensor	Wall Mounted Occupancy Sensor
Cobra H	Cobra Head (style of lighting fixture)
Res Sq	Recessed Square (style of lighting fixture)
kbtuh	Thousands of British Thermal Units
Van	Vanity
PT-dec	Pole Type - Decorative (style of lighting fixture)
JJ	Jelly Jar (style of lighting fixture)
Nuck	Knuckle (type of movement architecture, style of lighting fixture)
BL	Barn Light (style of lighting fixture)
HB	High Bay (style of lighting fixture)
HP	Horsepower
PV	Photovoltaic