

December 6, 2017

# The Value of Using Benchmarking for Wastewater and City Operations





- City of St. Cloud & B3
- How is St. Cloud using B3
- Wastewater Utility & B3



**“Site has insufficient meter data to calculate a continuous twelve month consumption period.”**

**“No meters defined.”**



**“Site has a suspiciously high actual to benchmark ratio. Make sure building and meter inputs are correct.”**

**“Heating source is targeted to natural gas, but no connected natural gas meters defined.”**

**“Warning. Site has meter readings prior to original occupancy date.”**



**Solar Initiative**



**Wastewater  
Energy Efficiency**



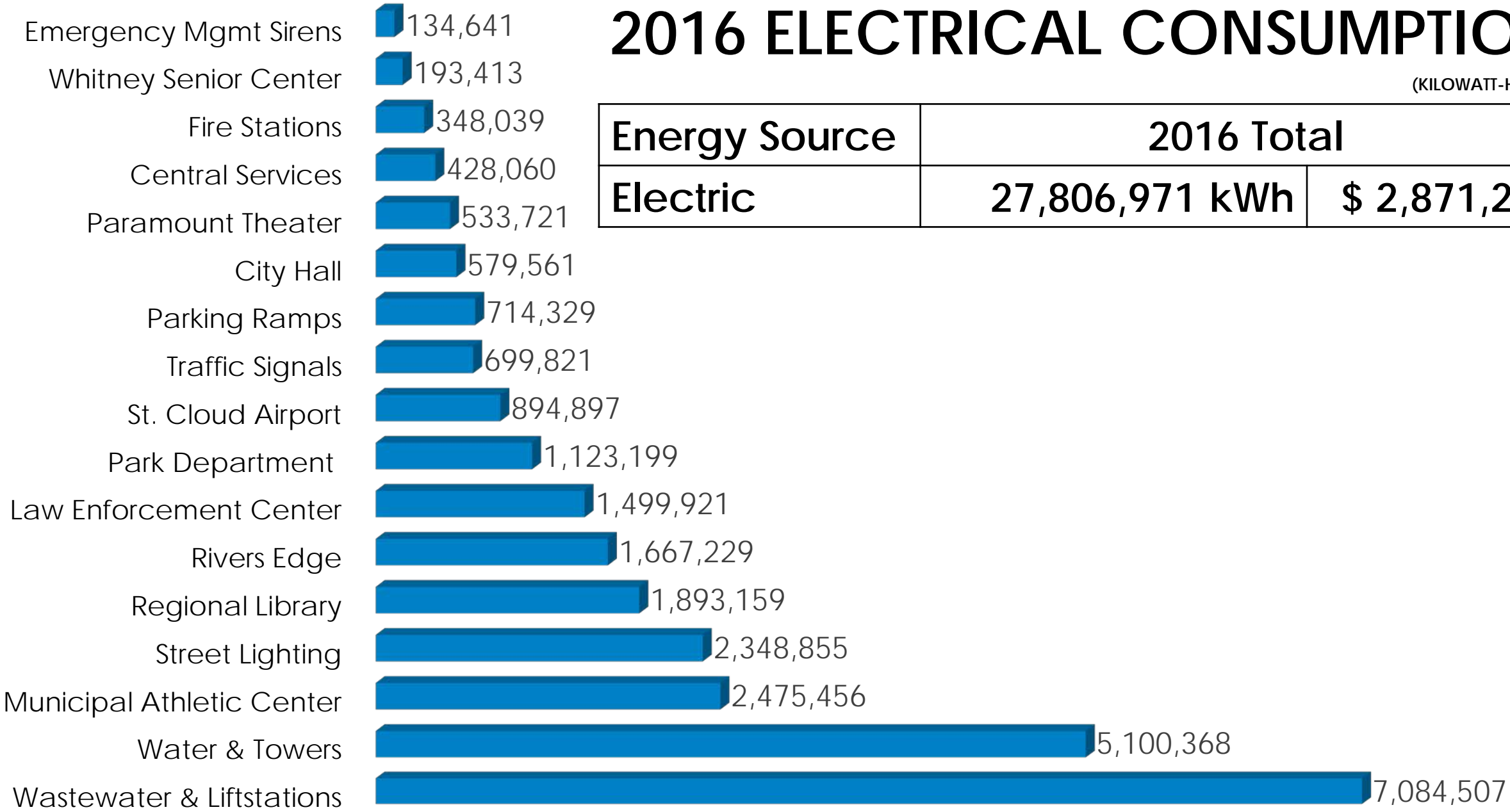
**Biofuel Recovery  
Project**



# 2016 ELECTRICAL CONSUMPTION

(KILOWATT-HOURS)

| Energy Source | 2016 Total     |              |
|---------------|----------------|--------------|
| Electric      | 27,806,971 kWh | \$ 2,871,286 |



# You Can't Manage What You Don't Measure



# WHY B3?



**MEASURE**

ENERGY EFFICIENCY  
ACTIONS

**OPTIMIZATION**

BUILDINGS & PROCESSES

**SAVE \$**

**BASELINE  
COMPARISONS**

**REPORTS**



# SOLAR REWARDS



## COMMUNITY SOLAR GARDENS

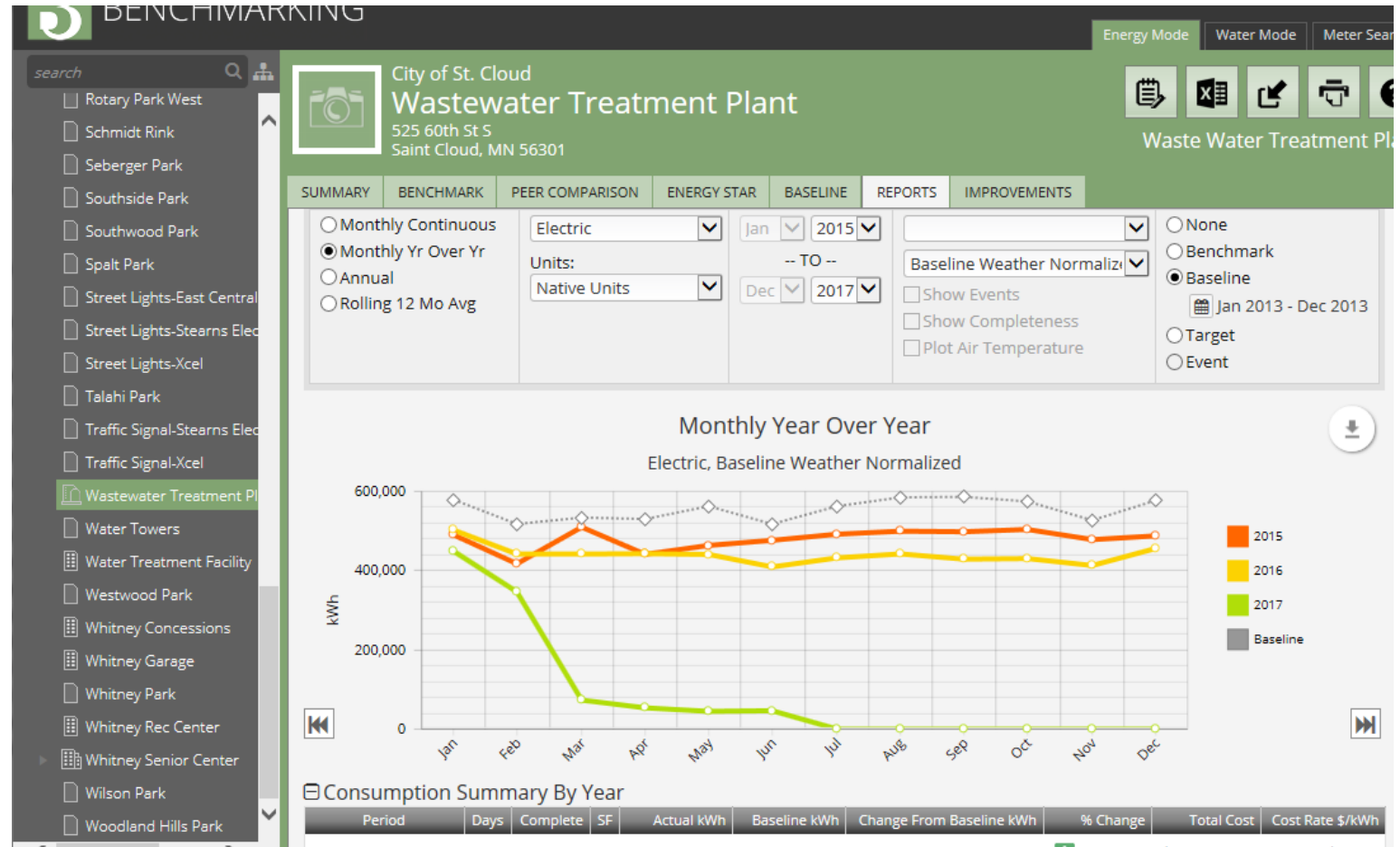
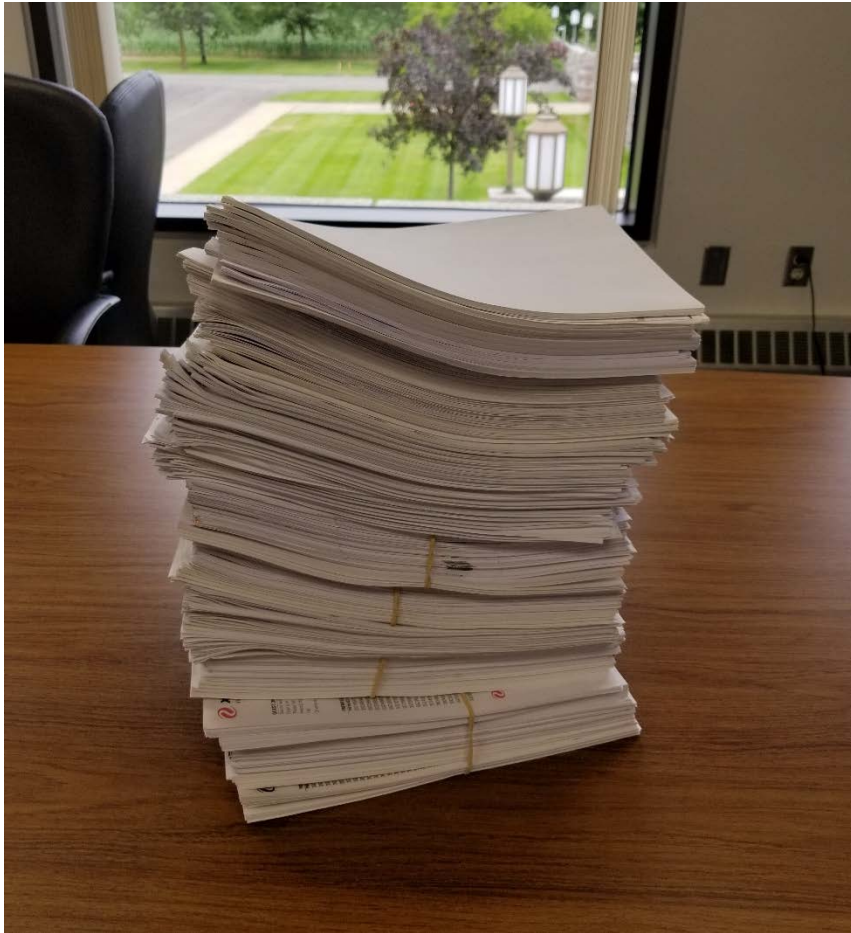
- Total Electrical Demand – 400+ Meters
- Small General Service vs. General Service Meters
- Annual Savings Calculations

# St. Cloud & CSG's

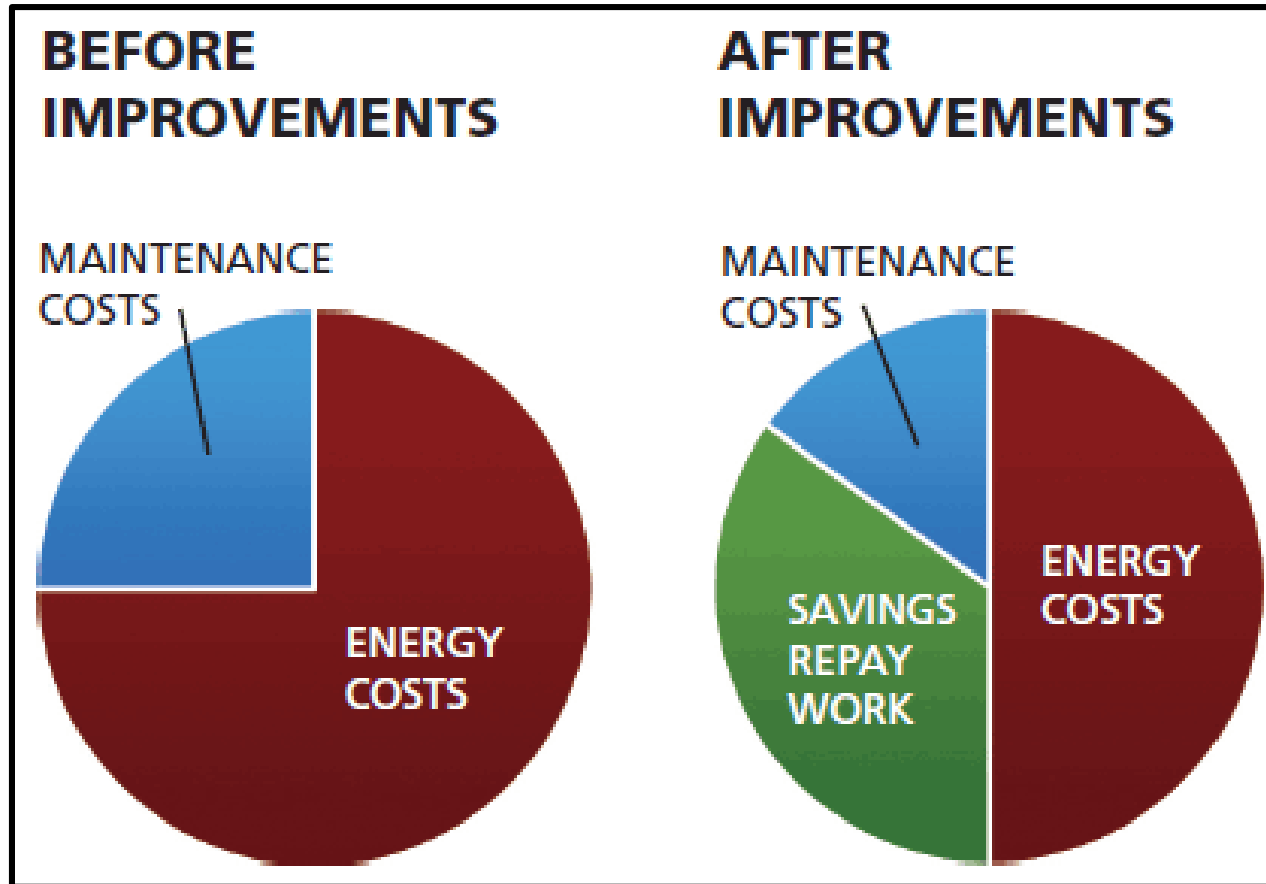


- City is currently subscribed to 20 million + kilowatt-hours
- Projected **Annual Savings in Year 1 is \$177,000** and over **\$28,000,000 over the next 25 years**

# WHY B3?



## Guaranteed Savings Project

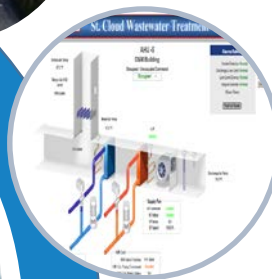


**Monitoring &  
Verification  
Reports**

# ENERGY EFFICIENCY



Lighting



HVAC



Pneumatic System Upgrade



Blower Optimization

# BIOFUEL RECOVERY



Hydrogen Sulfide Removal



Siloxane Removal



633kW Generator



Electrical Generation

# WHY B3?

WORKING

Welcome Tracy Hodel | Sign Out

Energy Mode Water Mode Meter Search



City of St. Cloud  
Wastewater Treatment Plant  
525 60th St S  
Saint Cloud, MN 56301



Waste Water Treatment Plant

SUMMARY BENCHMARK PEER COMPARISON ENERGY STAR BASELINE REPORTS IMPROVEMENTS

- Chart type
- ☐ Monthly Continuous
  - ☒ Monthly Yr Over Yr
  - ☐ Annual
  - ☐ Rolling 12 Mo Avg

Meters & Units

Electric

Units:

Native Units

Duration

Jan  2013

-- TO --

Dec  2017

Options

(No Normalization)

Baseline Weather Normalize

☐ Show Events

☐ Show Completeness

☐ Plot Air Temperature

Comparison

☐ None

☐ Benchmark

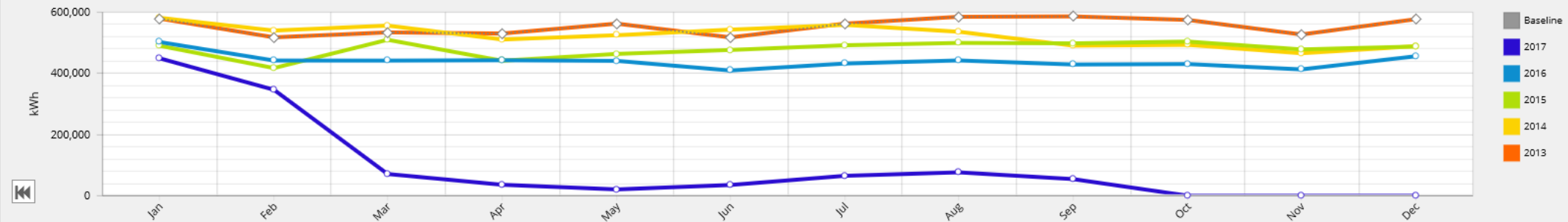
☒ Baseline

☐ Target

☐ Event

Jan 2013 - Dec 2013

Monthly Year Over Year  
Electric, Baseline Weather Normalized

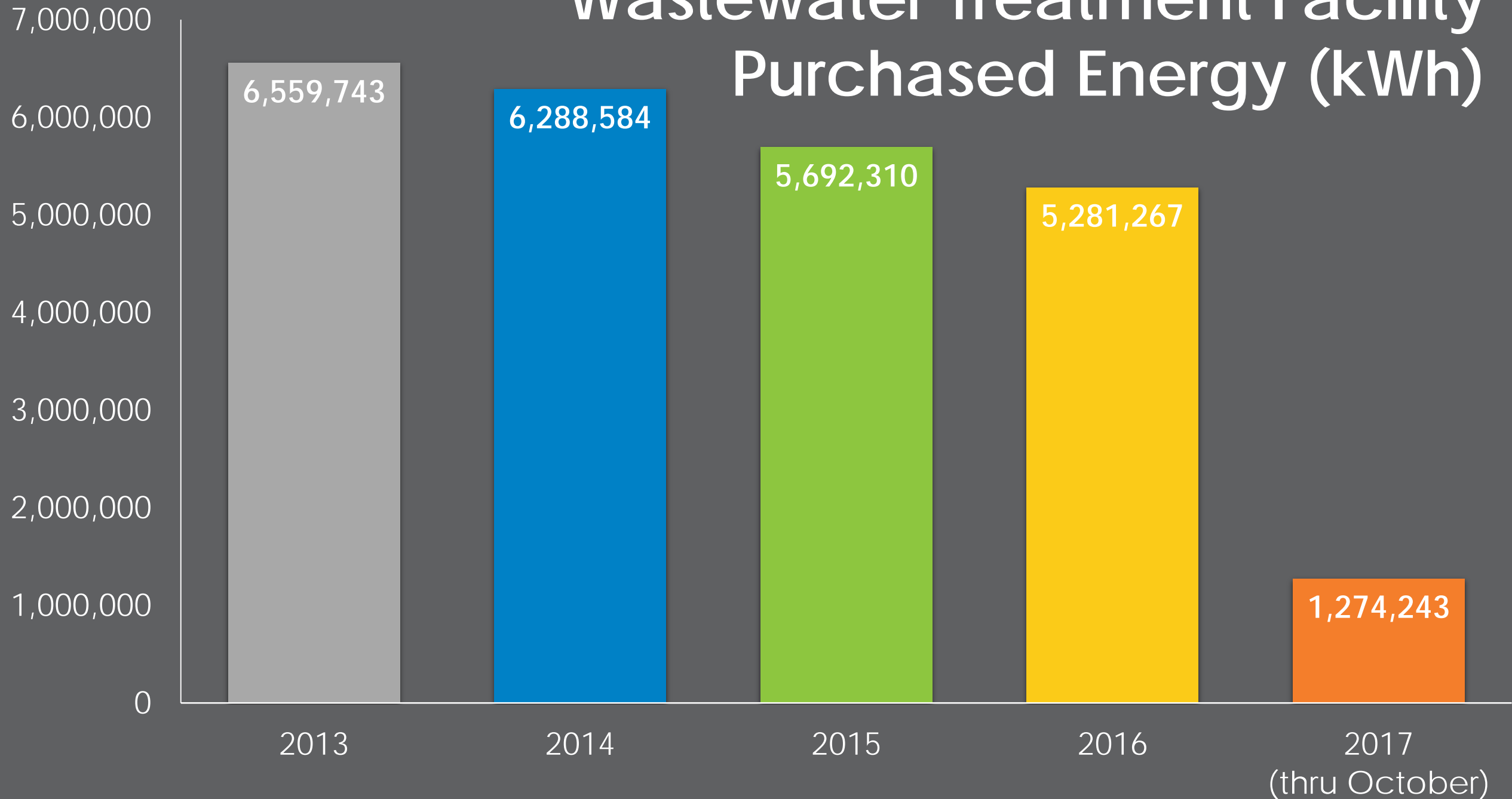


Consumption Summary By Year

| Period            | Days | Complete | SF | Actual kWh   | Baseline kWh | Change From Baseline kWh | % Change | Total Cost   | Cost Rate \$/kWh |
|-------------------|------|----------|----|--------------|--------------|--------------------------|----------|--------------|------------------|
| Jan 2013-Dec 2013 | 365  | 100%     | 0  | 6,653,314.00 | 6,653,314.00 | 0.00                     | 0%       | \$528,405.36 | \$0.079          |
| Jan 2014-Dec 2014 | 365  | 100%     | 0  | 6,288,584.00 | -            | -                        | N/A      | \$453,003.33 | \$0.072          |
| Jan 2015-Dec 2015 | 365  | 100%     | 0  | 5,757,855.00 | -            | -                        | N/A      | \$374,195.44 | \$0.065          |
| Jan 2016-Dec 2016 | 366  | 100%     | 0  | 5,281,267.00 | -            | -                        | N/A      | \$371,656.02 | \$0.070          |
| Jan 2017-Dec 2017 | 365  | 73%      | 0  | 1,153,452.00 | -            | -                        | N/A      | \$120,291.92 | \$0.104          |

Reporting on 1 meter

# Wastewater Treatment Facility Purchased Energy (kWh)





# Energy Savings & Production kWh (2013 Base Year)

4,500,000  
4,000,000  
3,500,000  
3,000,000  
2,500,000  
2,000,000  
1,500,000  
1,000,000  
500,000  
0

January 2014 –  
October 2017  
Total Energy  
Savings/Production:  
6,907,143 kWh



364,730

2014 Savings

895,459

2015 Savings

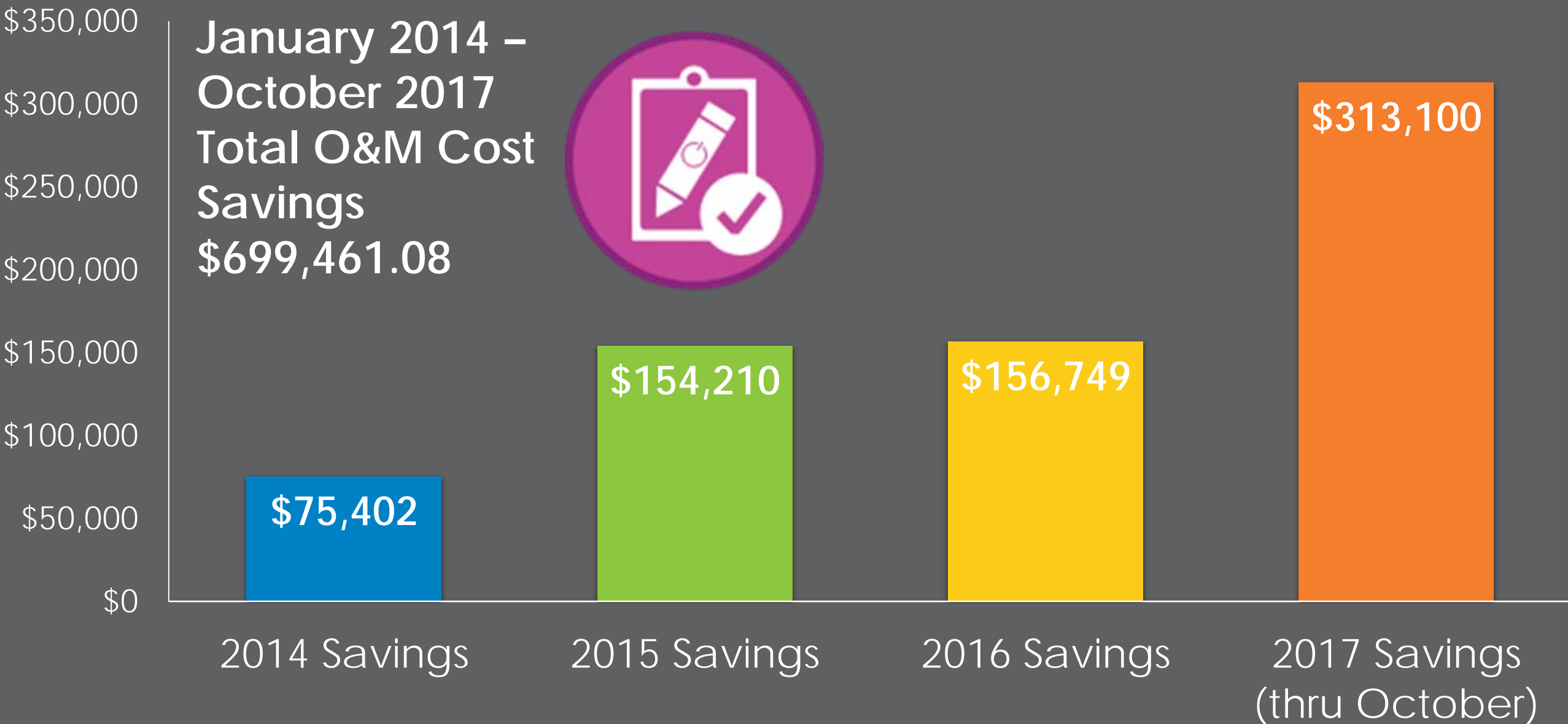
1,372,047

2016 Savings

4,274,906

2017 Savings  
(thru October)

# Energy Cost Savings (2013 Base Year)













## Buildings (This site contains one building)



### Wastewater Treatment Plant

525 60th St S Saint Cloud, MN 56301

## Meters (8 meters)

| Meter Name ↑  | Status | Type               | Utility     |
|---|--------|--------------------|-------------|
|  Biofuel Generator                     | ✓      | PV Renewable Meter | Owner       |
|  Flow Meter                            | ✓      | Flow Meter         | (Unknown)   |
|  WWTF Boilers/Bio Solids Firm          | ✓      | Natural Gas Meter  | Xcel Energy |
|  WWTF Boilers/Bio Solids Interruptible | ✓      | Natural Gas Meter  | Xcel Energy |
|  WWTF Electric                         | ✓      | Electric Meter     | Xcel Energy |
|  WWTF Pilots/Lab                       | ✓      | Natural Gas Meter  | Xcel Energy |
|  WWTF SOLAR PV 220KW                  | ✓      | PV Renewable Meter | (Unknown)   |
|  WWTF SOLAR PV20KW                   | ✓      | PV Renewable Meter | (Unknown)   |



creates an ENERGY STAR® Portfolio  
nts.

following meters do not have 12

missing bills for 05/02/2017 - 06/

Property Attributes

Account With ENERGY

an ENERGY STAR Portfolio Mana

Connection Wizard

Site Editor

GENERAL

ATTRIBUTES

ENERGY STAR

EVENTS

NOTES

ENERGY STAR® includes a variety of additional property attributes to help refine a better score.

Wastewater Treatment Plant

Wastewater Treatment Plant

Plant Design Flow Rate (MGD):

17.9

Average Influent Biological Oxygen Demand (BOD5):

188.22

☐ Use Default Value

Average Effluent Biological Oxygen Demand (BOD5):

2.28

☐ Use Default Value

Fixed Film Trickle Filtration Process:

No

☐ Use Default Value

Nutrient Removal:

Yes

☐ Use Default Value

Save & Close

Cancel

athering an ENERGY STAR score. [Read about](#)

ENERGY STAR

92

or on an ongoing basis.

# B3 & WASTEWATER



City of St. Cloud  
Wastewater Treatment Plant  
525 60th St S  
Saint Cloud, MN 56301

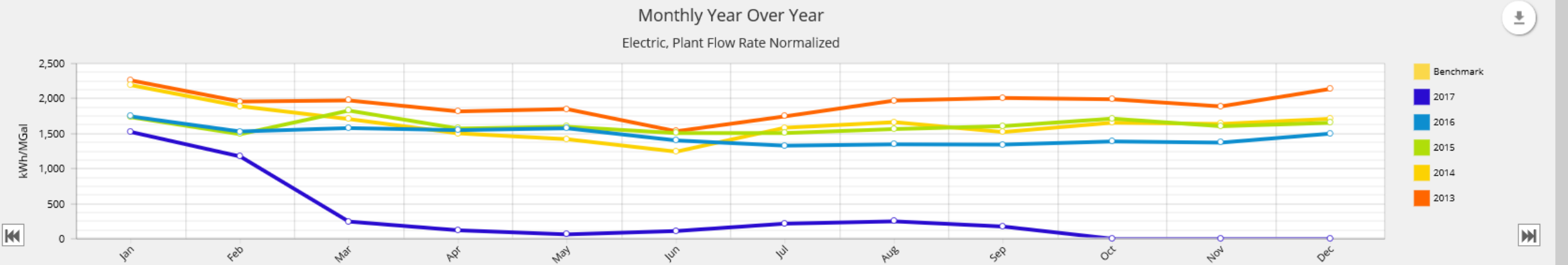


Waste Water Treatment Plant

- SUMMARY
- BENCHMARK
- PEER COMPARISON
- ENERGY STAR
- BASELINE
- REPORTS
- IMPROVEMENTS

Report: Custom Report Hide Report Options

| Chart Type   | Meters & Units                  | Duration                   | Options  | Comparison  |
|--|---------------------------------|----------------------------|--|---|
| <input type="radio"/> Monthly Continuous<br><input checked="" type="radio"/> Monthly Yr Over Yr<br><input type="radio"/> Annual<br><input type="radio"/> Rolling 12 Mo Avg | Electric<br>Units: Native Units | Jan 2013 -- TO -- Dec 2017 | <input checked="" type="checkbox"/> Plant Flow Rate Normalize<br><input type="checkbox"/> Show Events<br><input type="checkbox"/> Show Completeness<br><input type="checkbox"/> Plot Air Temperature | <input type="radio"/> None<br><input checked="" type="radio"/> Benchmark<br><input type="radio"/> Baseline<br><input type="radio"/> Target<br><input type="radio"/> Event |



Consumption Summary By Year

| Period            | Days | Complete | SF | Actual kWh/MGal | Benchmark kWh/MGal | Change From Benchmark kWh/MGal | % Change | Ratio | Total Cost   | Cost Rate \$/kWh/MGal |
|-------------------|------|----------|----|-----------------|--------------------|--------------------------------|----------|-------|--------------|-----------------------|
| Jan 2013-Dec 2013 | 365  | 100%     | 0  | 1,915.62        | 1,915.62           | 0.00                           | 0.00%    | 1.00  | \$528,405.36 | \$275.841             |
| Jan 2014-Dec 2014 | 365  | 100%     | 0  | 1,617.75        | 1,915.62           | -297.87                        | -15.55%  | 0.84  | \$453,003.33 | \$280.021             |
| Jan 2015-Dec 2015 | 365  | 100%     | 0  | 1,612.76        | 1,915.62           | -302.85                        | -15.81%  | 0.84  | \$374,195.44 | \$232.021             |
| Jan 2016-Dec 2016 | 366  | 100%     | 0  | 1,466.41        | 1,915.62           | -449.20                        | -23.45%  | 0.77  | \$371,656.02 | \$253.446             |
| Jan 2017-Dec 2017 | 365  | 73%      | 0  | 421.49          | 1,915.62           | -1,494.13                      | -78.00%  | 0.22  | \$120,291.92 | \$285.397             |

# B3 & WASTEWATER



City of St. Cloud  
Wastewater Treatment Plant  
525 60th St S  
Saint Cloud, MN 56301



Waste Water Treatment Plant

- SUMMARY
- BENCHMARK
- PEER COMPARISON
- ENERGY STAR
- BASELINE
- REPORTS
- IMPROVEMENTS

Report: Custom Report

Hide Report Options

Chart Type

Meters & Units

Duration

Options

Comparison

☐ Monthly Continuous

☒ Monthly Yr Over Yr

☐ Annual

☐ Rolling 12 Mo Avg

Electric

Units: Native Units

Jan 2013

-- TO --

Dec 2017

BOD Removed Normalize

☐ Show Events

☐ Show Completeness

☐ Plot Air Temperature

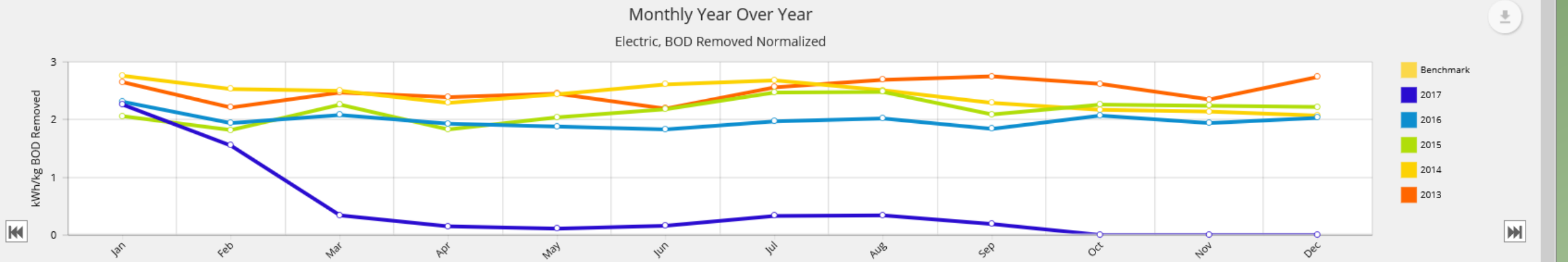
☐ None

☒ Benchmark

☐ Baseline

☐ Target

☐ Event



Consumption Summary By Year

| Period            | Days | Complete | SF | Actual kWh/kg BOD Removed | Benchmark kWh/kg BOD Removed | Change From Benchmark kWh/kg BOD Removed | % Change | Ratio | Total Cost   | Cost Rate \$/kWh/kg BOD Removed |
|-------------------|------|----------|----|---------------------------|------------------------------|--|----------|-------|--------------|---------------------------------|
| Jan 2013-Dec 2013 | 365  | 100%     | 0  | 2.50                      | 2.50                         | 0.00                                     | 0.00%    | 1.00  | \$528,405.36 | \$211,386.706                   |
| Jan 2014-Dec 2014 | 365  | 100%     | 0  | 2.41                      | 2.50                         | -0.09                                    | -3.57%   | 0.96  | \$453,003.33 | \$187,931.539                   |
| Jan 2015-Dec 2015 | 365  | 100%     | 0  | 2.15                      | 2.50                         | -0.35                                    | -13.97%  | 0.86  | \$374,195.44 | \$174,005.444                   |
| Jan 2016-Dec 2016 | 366  | 100%     | 0  | 1.98                      | 2.50                         | -0.52                                    | -20.61%  | 0.79  | \$371,656.02 | \$187,275.246                   |
| Jan 2017-Dec 2017 | 365  | 73%      | 0  | 0.58                      | 2.50                         | -1.92                                    | -76.80%  | 0.23  | \$120,291.92 | \$207,435.689                   |



Wastewater Treatment Plant  
525 60th St S Saint Cloud, MN 56301

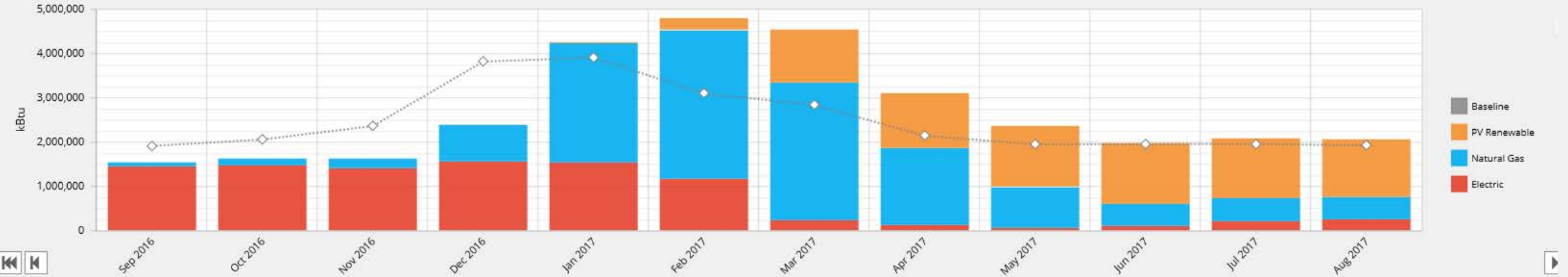
Waste Water Treatment Plant

Plant Design Flow Rate: 17.9 MGD

Meters (8 meters)

Current To 9/25/2017 Add a Meter

| Meter Name ↑   | Status | Type               | Utility     | Meter #  | Acct #       | First Reading | Last Reading | Conn |   |
|--|--------|--------------------|-------------|----------|--------------|---------------|--------------|------|---|
|  Biofuel Generator                     | ✓      | PV Renewable Meter | Owner       | 16120559 | 51-5187789-1 | 1/12/2017     | 9/25/2017    | 1    | ↓ |
|  Flow Meter                            | ✓      | Flow Meter         | (Unknown)   |          |              | 12/1/2009     | 10/1/2017    | 1    | ↓ |
|  WWTF Boilers/Bio Solids Firm          | ✓      | Natural Gas Meter  | Xcel Energy | 628482   | 51-5187789-1 | 12/29/2007    | 9/25/2017    | 1    | ↓ |
|  WWTF Boilers/Bio Solids Interruptible | ✓      | Natural Gas Meter  | Xcel Energy | 594392   | 51-5187789-1 | 12/4/2007     | 9/25/2017    | 1    | ↓ |
|  WWTF Electric                         | ✓      | Electric Meter     | Xcel Energy | 17955943 | 51-5187789-1 | 12/29/2007    | 9/25/2017    | 1    | ↓ |
|  WWTF Pilots/Lab                       | ✓      | Natural Gas Meter  | Xcel Energy | 20339497 | 51-5187789-1 | 12/29/2007    | 9/25/2017    | 1    | ↓ |
|  WWTF SOLAR PV 220KW                   | ✓      | PV Renewable Meter | (Unknown)   | 16120551 | 51-5187789-1 | 5/19/2017     | 9/25/2017    | 1    | ↓ |
|  WWTF SOLAR PV20KW                     | ✓      | PV Renewable Meter | (Unknown)   | 18980348 | 51-5187789-1 | 1/26/2016     | 9/25/2017    | 1    | ↓ |



# QUESTIONS?

## Tracy Hodel

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