

Middleton, WI

WWOA Annual Conference

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Energy Savings due to Wastewater Aerated Lagoon Upgrade
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Background Information

- Ladysmith WI – Rusk County
- Population – 3,367
- Preliminary Engineering Report in 2011 estimated substantial energy savings from Upgrade
- Energy savings will be realized from replacing coarse bubble diffusers with fine bubble diffusers
- City started construction on the upgrade project in 2014



Existing Conditions

- WWTP constructed in 1990
- Design Flow – 0.778 mgd
- Existing Flows
 - Average Daily – 0.49 mgd
 - Maximum Daily – 1.74 mgd
 - Average BOD 220 mg/l
- Discharge to the Flambeau River



Background Information

- Existing WWTP consisted of 3 Lagoons
- Lagoon 1 approximately 9.6 million gallons
- Lagoon 2 approximately 9.6 million gallons
- Lagoon 3 approximately 18.2 million gallons, non rectangular.
- Total Volume approximately 37.4 million gallons



Existing Site



Effluent Requirements

- BOD – 30 mg/l
- TSS – 30 mg/l
- Ammonia – varies based on pH of effluent
- Phosphorus - 2 mg/l (at time of design)
 - Current is 1.8 mg/l
 - May eventually need to meet < 1 mg/l

Preplanning

- A preliminary review was performed to determine energy savings if aeration was upgraded from coarse bubble to fine bubble
- Focus on Energy reviewed and offered a construction grant (\$35,000)
- Preliminary estimates determined that \$37,933 per year could be saved by reduced energy usage at WWTP

Additional Work for Upgrade

- Sludge Removal
- Replace four 75 HP blowers with one 60 HP blower
- Fine Screen
- Chemical room for Phosphorus removal and pH adjustment
- UV replacement
- Electrical Upgrade
- Water pressure booster

Upgrade

- Aeration costs approximately \$341,000
- Preliminary Report estimated \$297,000
- Total project cost - \$2,243,400
- Aeration was approximately 15% of project
- Funding by DNR CWF



Upgrade

- Keeping the same design flow, less lagoon volume is needed with fine bubble aeration
- With coarse bubble, total lagoon volume was 37.4 million gallons
- New fine bubble aeration, total volume of lagoon for same design flow is 19.2 million gallons

Sludge Removal



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Sludge Removal



Construction



New Lagoon 1



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New Lagoon 2



Building a Better World for All of Us®

Precast building construction



Precast building



Fine Screen, Chemical, Water, Electrical Building



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Fine Screen construction



Fine Screen



Blowers

Old Layout



New Layout



UV Disinfection

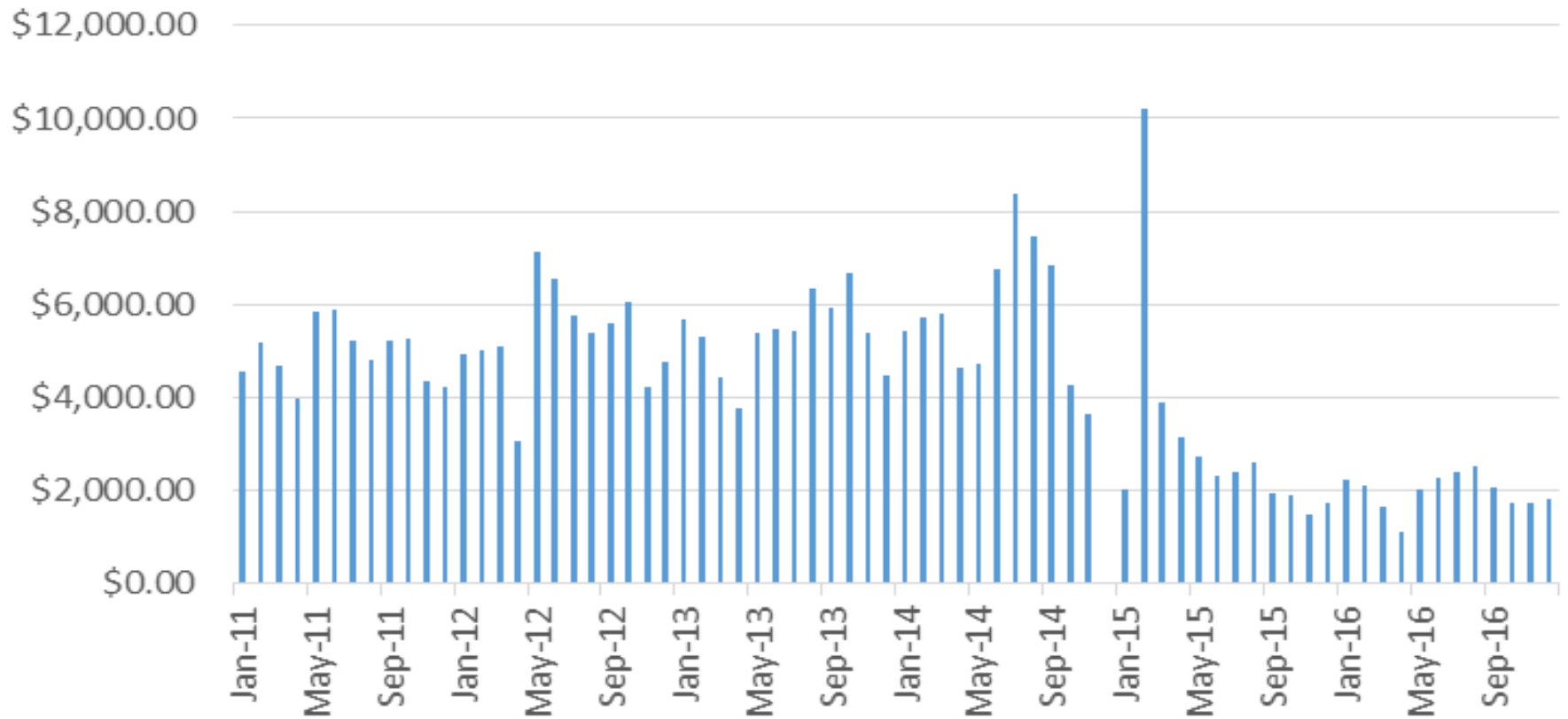


Ladysmith WWTP

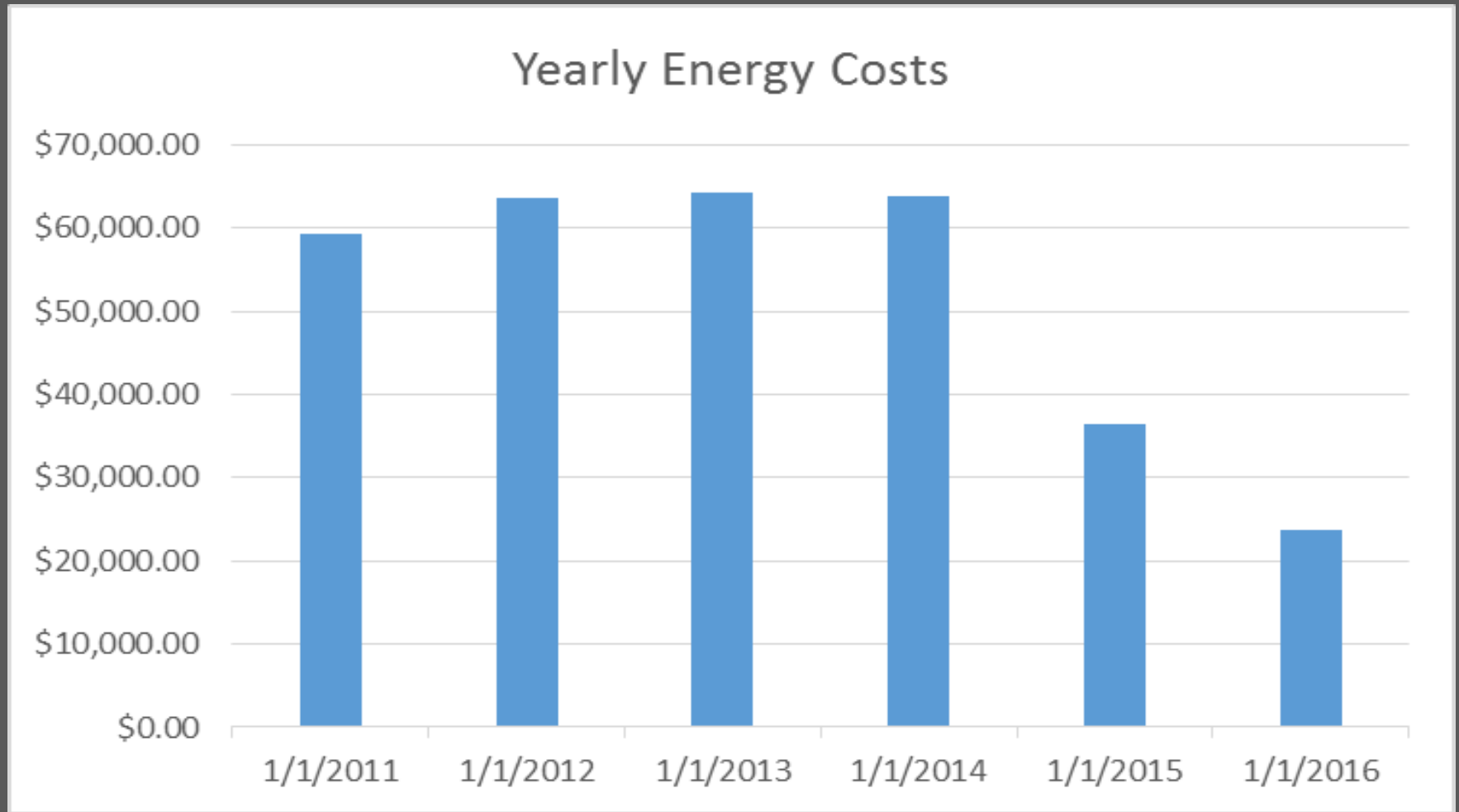


Pre Energy and Post Energy

Monthly Energy Payments WWTP



Yearly Costs



Conclusion

- Last full year of Coarse Bubble was 2014 and yearly energy cost was \$63,776
- First full year of Fine Bubble was 2016 and yearly energy cost was \$23,696
- Saving is \$40,080 actual (with a new fine screen too) compared to an estimated savings calculated in 2011 of \$37,933
- New energy use is approximately 37% of old
- **FINE BUBBLE AREATION IN LAGOONS**
PROVIDE SUBSTANTIAL ENERGY
SAVINGS

Questions

