ORANGE WATER AND SEWER AUTHORITY

A public, non-profit agency providing water, sewer and reclaimed water services to the Carrboro-Chapel Hill community.

Agenda
Work Session of the OWASA Board of Directors
Thursday, March 8, 2018, 6:00 P.M.
OWASA Community Room

The Board of Directors appreciates and invites the public to attend and observe its meetings. For the Board's Work Session, public comments are invited on only items appearing on this agenda. Speakers are invited to submit more detailed comments via written materials, ideally submitted at least three days in advance of the meeting to the Clerk to the Board via email or US Postal Service (aorbich@owasa.org/400 Jones Ferry Road, Carrboro, NC 27510).

For items on the agenda, public speakers are encouraged to organize their remarks for delivery within a four-minute time frame allowed each speaker, unless otherwise determined by the Board of Directors.

The Board may take action on any item on the agenda.

Announcements

a. Announcements by the Chair
   - Any Board Member who knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight is asked to disclose the same at this time.

b. Announcements by Board Members
   - Update on February 26, 2018, Natural Resources and Technical Services Committee Meeting (John Young)
   - Human Resources Committee will meet on Monday, March 19, 2018, at 4:30 p.m., OWASA Boardroom, to discuss retiree health benefits for new hires and deferred compensation (457) plan (Barbara Foushee)

c. Announcements by Staff

Consent Agenda
Action

1. Minutes of the February 8, 2018 Work Session of the Board of Directors (Andrea Orbich)
2. Minutes of the February 22, 2018 Closed Session of the Board of Directors for the Purpose of Discussing a Personnel Matter (Barbara Foushee)

Regular Agenda
Discussion and Action

3. Review and Approve Energy Management Plan Update (Mary Tiger)

Discussion

4. Continue Discussion on Unregulated Compounds in Water Resources, Including Recent Regional Analysis of Per-fluorinated Substances (Katie Harrold)
5. Review Preliminary Fiscal Year 2019 Budget Information (Stephen Winters)
6. Review Board Work Schedule (Robert Morgan/Ed Kerwin)
   a. Request(s) by Board Committees, Board Members and Staff
   b. March 22, 2018 Board Meeting

c. April 12, 2018 Work Session
d. 12 Month Board Meeting Schedule
e. Pending Key Staff Action Items

Summary of Work Session Items

7. Executive Director will summarize the key staff action items from the Work Session

Closed Session

8. The Board of Directors will convene in a Closed Session for the Purpose of Discussing a Personnel Matter (Barbara Foushee)

Agenda Item 1

Orange Water and Sewer Authority

Meeting of the Board of Directors

February 8, 2018

The Board of Directors of the Orange Water and Sewer Authority (OWASA) met in a work session on Thursday, February 8, 2018, at 6:00 p.m. in OWASA's Community Room, 400 Jones Ferry Road, Carrboro.

Board Members present: Robert Morgan (Chair), Heather Payne (Vice Chair), Yinka Ayankoya (Secretary), Ray DuBose, Barbara Foushee, John N. Morris, Ruchir Vora and John A. Young. Board Member absent: Jeff Danner.

OWASA staff present: Mary Darr, Robert Epting, Esq., (Epting and Hackney), Stephanie Glasgow, Ed Kerwin, Andrea Orbich, Ruth Rouse, Todd Taylor, Mary Tiger, Stephen Winters and Richard Wyatt.

Others present: Michael Potter, Muriel Williman, Ben Poulson (University of North Carolina (UNC) at Chapel Hill Associate Director of Energy Services) and Margaret Holton (UNC Water, Sewer and Reclaimed Water Coordinator).

Motions

1. Ruchir Vora made a motion to approve the Minutes of the January 11, 2018 Work Session of the Board of Directors; second by Yinka Ayankoya and unanimously approved.

2. John Young made a motion to deny Michael Potter's petition and to accept staff's recommendation that the credit of $394.95 already provided is fair and reasonable; second by Heather Payne and the motion passed with a vote of five to three with Barbara Foushee, John Morris and Ruchir Vora opposed.

3. Ray DuBose made a motion that the Board of Directors approve the proposed Affordability Outreach Program Update and Plan (Year 3) and authorize staff to proceed to implement the program in accordance with the approach described in the Plan; second by Barbara Foushee and unanimously approved.

4. John Young made a motion that the Board select "Accounted for Water as a Percent of Water Pumped" as the next Key Performance Indicator discussion on September 13, 2018; second by Heather Payne and unanimously approved.

5. Heather Payne made a motion that the Board convene in a closed session for the purpose of discussing a personnel matter; second by Yinka Ayankoya and unanimously approved.

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Announcements

Robert Morgan asked if any Board Member knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight to disclose the same at this time; none were disclosed.

Mr. Morgan said that an OWASA orientation will be held for newly elected Chapel Hill Town Council Members on Monday, February 12, 2018, at 4:00 p.m. in the OWASA Boardroom. Mr. Morgan encouraged Chapel Hill OWASA Appointees to attend the meeting; several stated they would attend and a public notice will be prepared.

Barbara Foushee announced that the Human Resources Committee met on February 5, 2018, to discuss and evaluate retiree health benefits for new hires, and OWASA's deferred compensation (457) plan. Ms. Foushee said that the Committee agreed to meet again in March to continue discussing these items.

John Young announced that the Natural Resources and Technical Services Committee will meet on Monday, February 26, 2018, at 5:00 p.m. in the OWASA Boardroom to discuss and evaluate the Drought Response Operating Protocol.

Mr. Young announced that Ed Kerwin and he attended the Chatham/Orange Joint Planning Task Force meeting earlier today. The Task Force was in existence up through 2009 and is being restored to discuss topics of mutual interest between the two counties, such as comprehensive planning and water supply. Today's meeting included information on the frequency of meetings and identifying various topics for future discussion.

Ray DuBose announced that he will provide OWASA's annual update to the Orange County Board of County Commissioners on Tuesday, February 20, 2018, 7:00 p.m., at the Southern Human Services Center in Chapel Hill, and that the update will include items from the January 2018 Annual Report to the local governments. Robert Morgan and Todd Taylor will also attend.

Item One: Minutes

Ruchir Vora made a motion to approve the Minutes of the January 11, 2018 Work Session of the Board of Directors; second by Yinka Ayankoya and unanimously approved. Please see Motion No. 1 above.

Item Two: Response to Petition from OWASA Customer Michael Potter Regarding the Water Meter at His Residence

Stephen Winters reviewed Michael Potter's petition that Mr. Potter receive a credit at the highest rate applicable to his water use, rather than the lowest rate, and that the credit be calculated over a 10-year period rather than the three-year period used by OWASA staff. Mr. Winters said that staff believes the credit of $394.95 provided to Mr. Potter in October 2017 is fair and reasonable. Mr. Winters also pointed out that the rate used to calculate the credit was based on the actual rate paid Mr. Potter.

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Mr. Potter reiterated his petition to the Board that due to a faulty water meter at his residence (over a 10-year period), he was overbilled and should be refunded approximately $1,500.

After discussion, John Young made a motion to deny Michael Potter's petition and to accept staff's recommendation that the credit of $394.95 already provided is fair and reasonable; second by Heather Payne and the motion passed with a vote of five to three with Barbara Foushee, John Morris and Ruchir Vora opposed. Please see Motion No. 2 above.

Item Three: Affordability Program Update

The Board expressed appreciation to staff and partners for a thorough Affordability Outreach Program Update and Plan (Year 3). In their discussion, the Board made several suggestions for improvements, including: suggested that language on customers' bills regarding the Care to Share program be improved; that the affordability website should be updated with video; that staff might provide a tax summary along with thank you letters to Care to Care contributors, and that staff might invite Board review and comment on thank you letters; that staff consider changing the action to be taken from "round up" to "add a dollar"; that staff consider requesting donations to Care to Share at the lakes by rounding up the total cost for rentals; and that an email be sent to the Board informing them of the next Partnership meeting.

Ray DuBose made a motion that the Board of Directors approve the proposed Affordability Outreach Program Update and Plan (Year 3) and authorize staff to proceed to implement the program in accordance with the approach described in the Plan; second by Barbara Foushee and unanimously approved. Please see Motion No. 3 above.

Item Four: Key Performance Indicator Selection for Future Review

John Young made a motion that the Board select "Accounted for Water as a Percent of Water Pumped" as the next Key Performance Indicator discussion on September 13, 2018; second by Heather Payne and unanimously approved. Please see Motion No. 4 above.

Item Five: Diversity and Inclusion Program Progress Report

The Board received and supported progress on OWASA's Diversity and Inclusion Program.

Item Six: Review Board Work Schedule

Robert Morgan asked if the Board wanted to schedule a third Board Session with VISIONS, Inc. to discuss Board procedures and educate new Board Members on Board operations; the Board agreed. In coordination with VISIONS, Inc. dates and times will be provided and a third Board Session with VISIONS will be scheduled.

The Board agreed to schedule the Appointment of the Nominating Committee for April 12, 2018.

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John Morris suggested a preliminary outline of staff's work to prepare a Community Engagement Plan (CEP), on forestry management and that the outline be provided for Board review and comment in advance of the Board's discussion in May; the Board agreed.

The Board agreed to move Discuss Revisions to Retiree Health Insurance for New Hires and 457 Deferred Compensation to the April 12, 2018 agenda.

John Young requested that staff provide an update on Agua Vista (Advanced Metering Infrastructure) later this spring; the Board agreed.

Ruchir Vora requested national news articles be distributed to the Board similar to local news articles; the Board agreed.

Item Seven: Executive Director Will Summarize the Key Staff Action Items from the Work Session

Ed Kerwin noted the following items for staff follow-up:

- address various suggestions on the Affordability Outreach Program to include the Care to Share Customer Assistance Program.
- Provide an outline of staff's work to prepare a Community Engagement Plan (CEP) for forestry management in advance of the draft CEP Board discussion on May 10, 2018.
- Provide an update on Agua Vista (Advanced Metering Infrastructure) later this spring.
- Periodically provide national news from professional associations.

Item Eight: Closed Session

Heather Payne made a motion that the Board convene in a closed session for the purpose of discussing a personnel matter; second by Yinka Ayankoya and unanimously approved. Please see Motion No. 5 above.

The Board Work Session was adjourned at 8:35 p.m.

Respectfully submitted by:

Andrea Orbich
Executive Assistant/Clerk to the Board

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Agenda Item 2

Orange Water and Sewer Authority

Closed Session of the Board of Directors

February 22, 2018

The Board of Directors of Orange Water and Sewer Authority met in Closed Session on Thursday, February 22, 2018, following the Board meeting.

Board Members present: Robert Morgan (Chair), Yinka Ayankoya (Secretary), Jeff Danner, Ray DuBose, Barbara Foushee, John Morris, Ruchir Vora and John A. Young. Board Member absent: Heather Payne (Vice Chair).

Other present: Robert Epting (General Counsel).

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ITEM ONE

The Board of Directors met in Closed Session with General Counsel to evaluate the General Counsel's semiannual performance review.

No official action was taken at the meeting.

The meeting was adjourned at 9:15 p.m.

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Barbara Foushee, Chair
Human Resources Committee

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Agenda Item 3:

Review and Approve Energy Management Plan Update

Purpose:

Review Energy Management Plan Update and provide feedback

Background:

The OWASA Board of Directors established the "Implementation of an Energy Management Program" as Strategic Initiative #4 of OWASA's Strategic Plan. Two key actions were established for this initiative: (1) develop an Energy Management Program for OWASA, and (2) prepare and adopt an Energy Management Plan and implement the program.

On June 25, 2015, the Board reviewed an organizational assessment of energy use and supported goals and objectives to guide the development of the Energy Management Plan.

On May 26, 2016, the Board of Directors approved a revised Project Charter describing the proposed process and timetable for development of the plan.

On September 8, 2016, the Board approved the Energy Management Program, including a Stakeholder Engagement Plan and the use of a social cost of carbon to evaluate clean energy projects.

On April 13, 2017, the Board approved OWASA's first formal, comprehensive Energy Management Plan.

On May 25, 2017, the Board discussed how private solar development and energy management integrated into the organization's overall land management approach. The Energy Management Plan Update addresses the next steps identified in that meeting.

The Natural Resources and Technical Systems (NRTS) Committee has met twice over the last year (September 26, 2017 and December 5, 2017) to

discuss potential biogas-to-energy project opportunities. Their recommendation is included in this Energy Management Plan Update.

Action/Recommendation:

Staff requests questions, feedback, and approval on the Energy Management Plan Update. If the Board needs additional information and/or requests changes to the report, approval can occur at a later date.

Key items on which staff seek feedback and approval are:

- Fiscal Year 2019 funding requests for upcoming energy management projects (Summarized on page 3.11)
- Proposed next steps for biogas-to-energy strategy development (Summarized on pages 3.21-3.22)
- Revised proposed next steps for third-party development of a solar photovoltaic system on OWASA land (Summarized on page 3.24)
- Overall progress towards energy management goals and objectives

Attachment:

- Draft Energy Management Plan Update

OWASA'S ENERGY MANAGEMENT PLAN UDATE

March 2018

This document provides an update of Orange Water and Sewer Authority's (OWASA) use of energy in our facilities and what we've done and plan to do to use energy more efficiently, use renewable energy sources, and reduce our greenhouse gas (GHG) emissions. By reducing our use of energy and increasing our use of renewable energy sources, we can help reduce the demand for water resources, improve environmental impact of our operations, reduce costs, and improve reliability.

ORANGE WATER AND SEWER AUTHORITY

A public, non-profit agency providing water, sewer and reclaimed water services to the Carrboro-Chapel Hill community.

Introduction

OWASA uses a lot of energy to operate our water, wastewater and reclaimed water facilities, protect the environment, and provide service to about 83,000 residents through about 21,600 customer accounts in the Carrboro-Chapel Hill community. On the other end of the wire, it takes a lot of water to produce the electricity we use. By reducing our use of energy and increasing our use of renewable energy sources, we can help reduce the demand for water resources, improve environmental impact of our operations, reduce costs, and improve reliability.

In Calendar Year 2017, our facilities used about 65 billion BTUs of energy – enough to power about 1,800 homes for a year. That energy came at a cost of $1.1 million, about 4% of our annual operating expenses in Fiscal Year 2017.

In 2014, the OWASA Board of Directors identified the "Implementation of an Energy Management Program" to be a top strategic priority for the organization. Since that time, with the assistance of OWASA staff, the OWASA Board of Directors has reviewed an assessment of OWASA's energy use, established Calendar Year (CY) 2010 as the baseline year, identified concrete goals and objectives against that baseline, worked with staff to define an energy management program, and developed and approved a plan that seeks to achieves the following objectives:

Objective 1: Reduce use of purchased electricity by 35% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Objective 2: Reduce use of purchased natural gas by 5% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Objective 3: Beneficially use all WWTP biogas by 2022, provided the preferred strategy is projected to have a positive payback within the expected useful life of the required equipment.

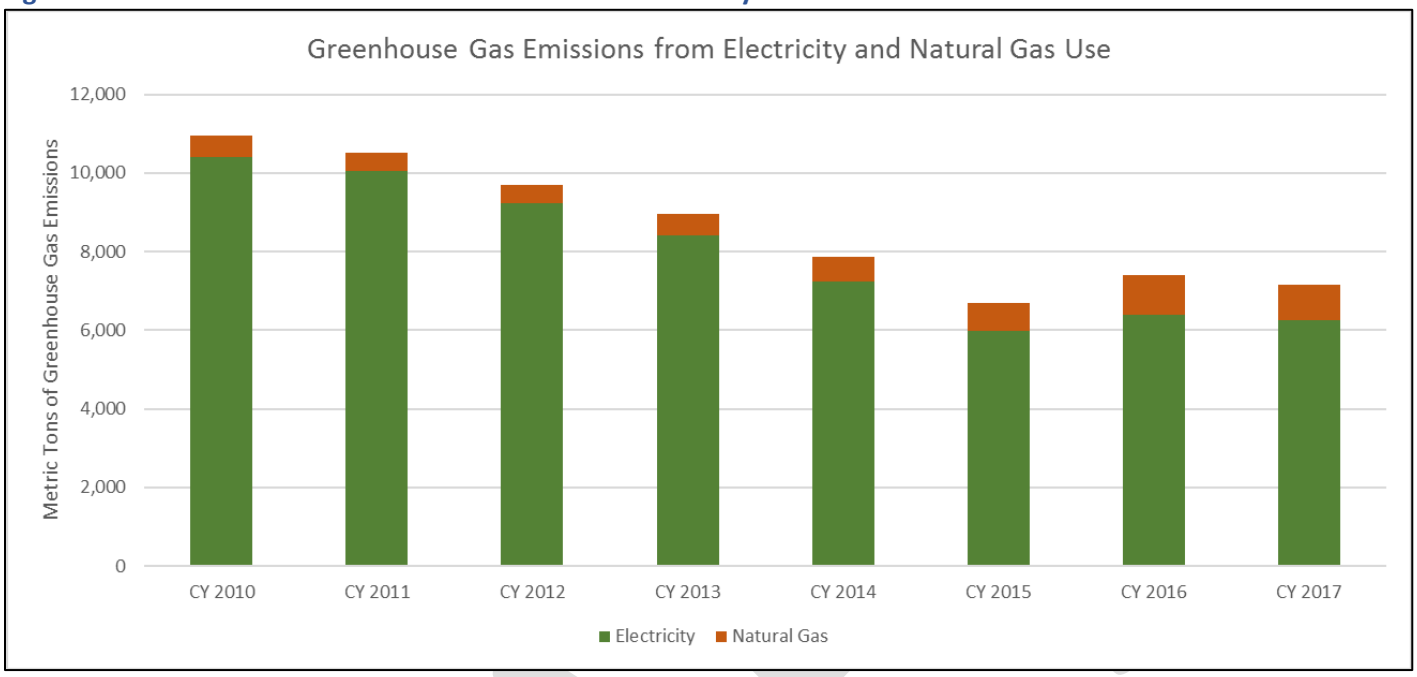
Objective 4: Formally engage local governments and partners in discussion about potential development of biogas-to-energy project at the Mason Farm WWTP.

Objective 5: Seek proposals for third-party development of renewable energy projects on OWASA property.

In the pursuit of these objectives, OWASA has and will continue to reduce our direct emissions of greenhouse gases. Since 2010, we have reduced our greenhouse gas emissions associated with our use of purchased natural gas and electricity from nearly 11,000 metric tons per year to a little more than 7,000 metric tons per year, a 35% reduction. About 1,200 metric tons of this reduction is due to a decline in the carbon intensity of Duke Energy's generation portfolio (from 0.93 pounds per kWh in 2010 to 0.76 pounds per kWh in 2016). Figure 1 shows the annual greenhouse gas emissions attributed to OWASA's electricity and natural gas over the past eight years.

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Figure 1: Greenhouse Gas Emissions from OWASA's Electricity and Natural Gas Use



OWASA's Energy Management Program is structured to not just identify energy conservation and efficiency measures, but to more directly integrate energy management and clean energy strategies into our everyday decision-making. OWASA's Energy Management Program involves staff from across the organization, including a committed group of individuals serving on the organization's Energy Team, numerous partners and stakeholders, and a comprehensive, systematic methodology for identifying, evaluating, and prioritizing clean energy strategies that will increase the sustainability of our organization and community for years to come. Our Energy Management Plan is a result of the collective contributions of all those involved in our Program. (Appendix A summarizes the criteria that the OWASA Energy Team uses to prioritize clean energy strategies, as well as how each of the new proposed strategies compare to this framework.)

This document serves as an update to OWASA's 2017 Energy Management Plan (EMP), OWASA's first formal, organization-wide evaluation of ways to better manage energy across all our facilities. It documents our progress towards our energy management goals and objectives and presents updated recommendations and proposed strategies for further improving our use of energy and reducing our carbon footprint.

The remainder of this update is organized around the five goals and objectives for OWASA's Energy Management Program.

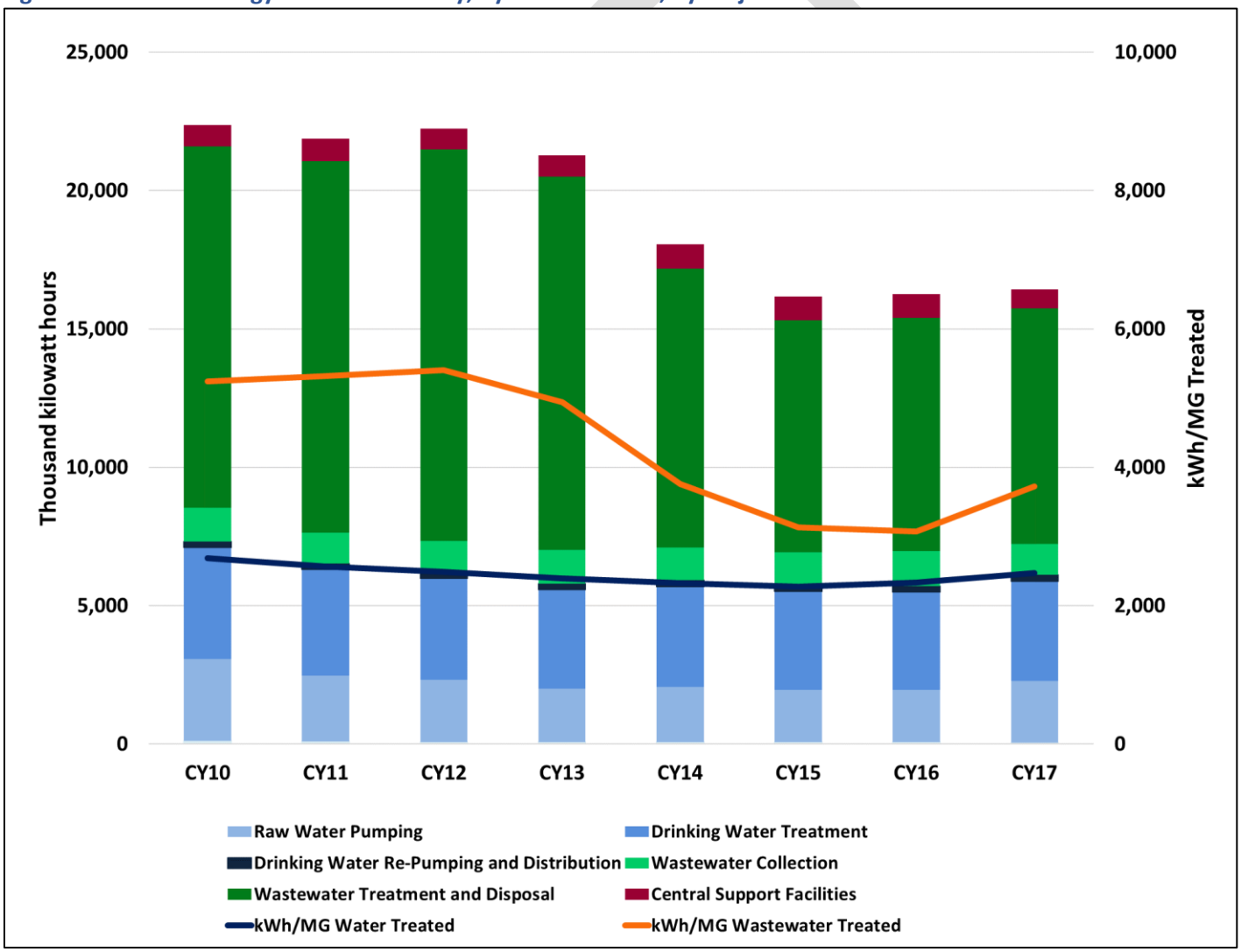
Objective 1

Reduce use of purchased electricity by 35% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Trends in Electrical Energy Use and Costs

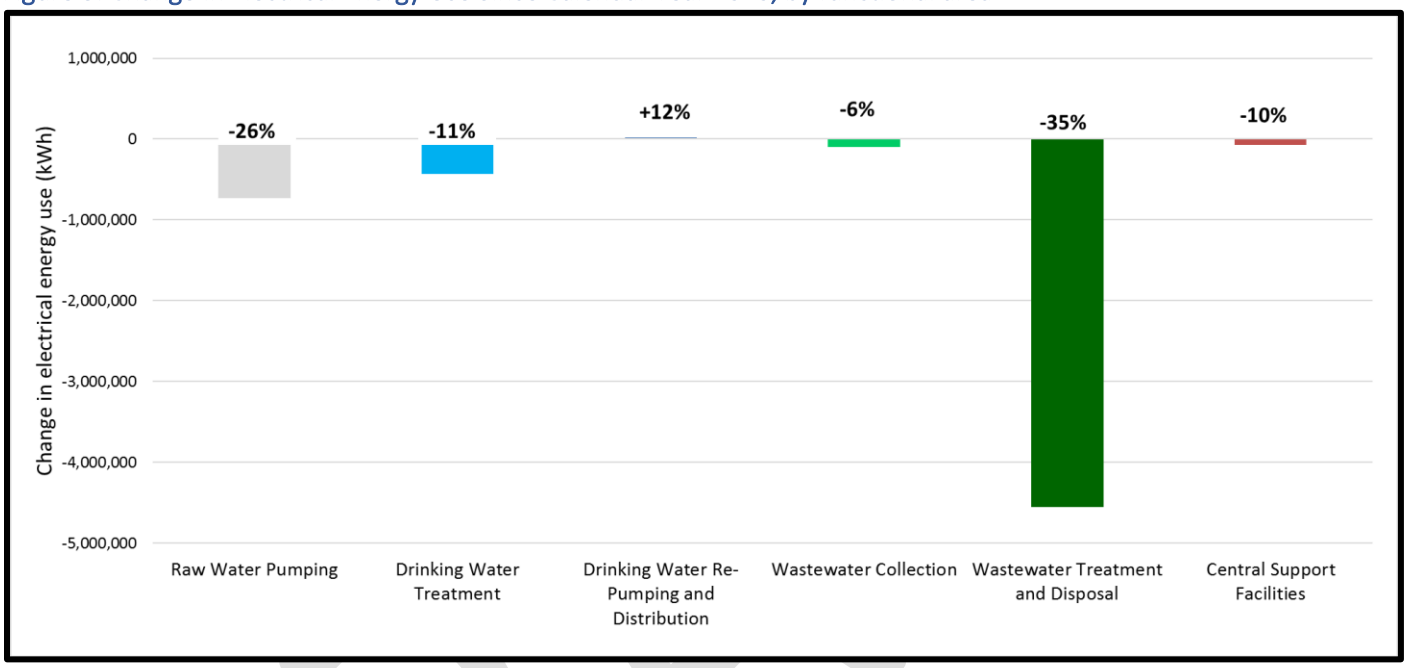
Figure 2 shows eight years of historical electrical energy use across all OWASA facilities, by major functional area. This graph compiles monthly billing data for all of OWASA's electrical service accounts (served by Duke Energy or Piedmont Electric Membership Corporation). Through investments in more energy efficient equipment and processes, as well as changes to our operations, we have reduced (and sustained) our use of purchased electricity by 27% since 2010.

Figure 2: Electrical Energy Use and Intensity, by Calendar Year, by Major Functional Area



Since 2010, we have reduced our annual electrical energy usage by about 6 million kilowatt-hours (kWh). Figure 3 provides a breakdown of the change in electrical energy use by functional area. The size of the bar represents the amount of absolute change in electrical energy use, while the text within the figure shows the percent change for that functional area.

Figure 3: Change in Electrical Energy Use Since Calendar Year 2010, by functional area



To meet our goal by 2020, we need to reduce our annual electrical energy use by an additional 1.8 million kWh, another 8 percentage points of the 2010 baseline. The 2017 EMP defined a series of strategies for implementation and further evaluation to help achieve the goal. We have just begun to implement some of these strategies and expect to see their impact soon. In addition, throughout the last year, we have identified and defined more strategies that are proposed in this EMP Update.

We recognize and appreciate that the energy management objective is set against our overall use of electrical energy, regardless of customer demand, so that our customer's wise use of water is considered an energy management strategy. Nonetheless, we are mindful of the change in our energy use intensity (EUI) to provide our services. Overlaid on Figure 2 are trends in EUI for our water supply and treatment operations, and our wastewater collection, treatment and recycling operations. This EUI analysis only reflects electricity use at our facilities directly associated with water and wastewater pumping, piping, and treatment[1]. It does not take into account the electricity use for the Administration Building, Operations Center, or lake offices and recreation facilities, since energy use at those support facilities is not directly affected by changes in water and wastewater demand.

In 2017, we experienced an increase in the amount of energy used to collect and treat a million gallons of wastewater (energy use intensity). We attribute this increase to two primary factors:

[1] For purposes of this high-level analysis, the energy use of the reclaimed water system is included in the wastewater treatment plant energy use.

1. 2017 was a relatively dry year, which resulted in less influent flow to the Mason Farm Wastewater Treatment Plant (WWTP). While some energy use fluctuates with flow, a portion is fixed and does not decrease with lower flows. Therefore, to a modest degree, there is an inverse relationship between flow and energy use intensity. When flow goes down, energy use intensity goes up and vice versa.

2. In order to meet our goals for biosolids management (liquid land application of 75% of biosolids generated), we have increased our use of two off-site biosolids storage tanks. When in use, these storage tanks require consistent mixing by two 25 horsepower mixers. Our use of energy at the off-site biosolids storage tanks was about ten times higher (420,000 kWh higher) in 2017 than in 2010.

In Fiscal Year 2010, OWASA was billed $1.26 million for electricity at an average of $0.0555 per kwh. In Fiscal Year 2017, we were billed $1.1 million at an average of $0.0655 per kwh. In absolute dollars, we spent about $160,000 less on electricity in 2017 than in 2010. However, if we had used the same amount of electrical energy in 2017, as we did in 2010, but were charged at 2017 levels, we would have paid about $400,000 more. **Through our energy management efforts, we avoided over $400,000 in annual operating and maintenance expenses in FY17.**

These cost savings are a result of increased energy efficiency and conservation, as well as our ongoing evaluation and adjustments of the rates that we pay for energy. Most recently, we adjusted the contract demand for three facilities, which we estimate will avoid about $13,000 each year in energy costs (absent future energy management efforts to reduce energy demand). Additionally, after a cost-benefit analysis, we have opted out of participation (i.e. contribution) to Duke Energy's energy efficiency rider at the Wastewater Treatment Plant and Cane Creek Reservoir complex. We estimate this will save OWASA approximately $50,000 per year. We will continue to participate in the program at the 400 Jones Ferry Road complex while the LED lighting retrofit and HVAC upgrade are underway, for which we are receiving over $80,000 in Duke Energy SmartSaver energy efficiency Incentives in 2018.

Update on Electrical Energy Management Strategies (described in detail in Appendices A and B)

To meet the goal of reducing purchased electricity by 35% by 2020, we need to reduce our annual electrical energy use by an additional 1.8 million kWh per year (8 percentage points of the CY 2010 baseline). The 2017 Energy Management Plan outlined a suite of energy management strategies that were either included in the Capital Improvements Program (CIP), proposed to be implemented, or proposed to be evaluated. A year later, some of the projects are underway and some are still in the planning/design stage. Additionally, the Energy Team has explored, refined, and prioritized more strategies to get us closer to – and perhaps even exceed – our goal.

The following section provides an update of those projects one year later and proposes another suite of projects for consideration. Table 1 below lists each of these strategies, their estimated electrical energy reduction potential (if enough information is available to develop an estimate), a four-year timeline, cost estimates, and assignment of the responsible party for moving forward with each strategy.

Strategies Underway (or very recently completed): We are in the process of implementing a suite of energy management strategies for which it is too early to truly measure their impact on energy use. **We estimate that these projects will ultimately reduce our use of purchased electricity by 525,000 to 918,000 kWh per year (2.3-4.1% of the 2010 baseline).**

Projects currently in CIP: Of the projects in our CIP, there are 11 projects with the potential to improve the energy efficiency of our operations. For these projects, the reduction in energy savings is a secondary rather than primary objective. From the preliminary information that we have on some of these projects, **we estimate that this suite of strategies has the potential to reduce purchased electricity by 158,000 to 291,000 kWh per year (0.7-1.3% of the 2010 baseline)**. Other projects are too early in the engineering and design phase to estimate energy savings. The costs for these projects are already budgeted for in the CIP. (Please note that timing of these projects may change in the FY19-FY23 CIP.)

Strategies to Implement: Based on a favorable evaluation against the six criteria of OWASA's Energy Management Program, the Energy Team recommends the implementation of six additional strategies in the coming years. **This suite of strategies is estimated to reduce our use of purchased electricity by an additional 806,000 to 1,113,000 kWh per year (about 3.6-5.0% of the 2010 baseline).** The largest project in this suite of strategies is a 733kW solar photovoltaic (PV) system at the Cane Creek Reservoir. Without this project, this suite of strategies is estimated to reduce our use of purchased electricity by 56,000 to 113,000 kWh (about 0.3-0.5% of the 2010 baseline).

Strategies to Evaluate: Based on their potential, but given current uncertainty about their specific cost and benefits, the Energy Team recommends further evaluation of eight additional strategies. **Based on preliminary estimates, this suite of strategies could potentially reduce our use of purchased electricity by 228,000 to 457,000 kWh per year (about 1-2% of the baseline).**

Table 1: Project Plan for Electricity Management Strategies and Estimated Energy Savings and Costs

Energy Management Strategy	Estimated Potential Energy Savings (kWh)	Timeline and Cost (in $1,000s) Light shading: Study Dark shading: Implement				Project Management
		FY18	FY19	FY20	FY21	
Underway						
Eastowne, Eubanks, and Meadowmont 1 Wastewater PS Improvements (CIP No. 277-24)	5,000-14,000					Engineering
Admin Building Heating, Ventilation, and Air Conditioning (HVAC) System Upgrade (CIP No. 280-06)	160,000 - 200,000					Engineering
LED Lighting Retrofit (Admin Building, WTP, and Ops Center) (280-12)	154,000-290,000					Sust/Maintenance
Energy Optimization for IT Server Room: low to no cost strategies	3,000-5,000					IT
Backwash WTP Filters in Off-Peak Times	Reduces demand but not kWh					WTP Operations
HVAC: Operational Changes	41,000 -82,000					Maintenance
Energy Monitoring System at WTP	TBD					WTP Operations
HVAC Equipment Replacement	25,000-52,000					Staff
Pump Optimization (Finished Water Pump Station)	137,000-275,000		6	6	6	Sust/Asset Mgmt/ Maintenance

Energy Management Strategy	Estimated Potential Energy Savings (kWh)	Timeline and Cost (in $1,000s) Light shading: Study Dark shading: Implement				Project Management
		FY18	FY19	FY20	FY21	
Currently In CIP						
Cane Creek Raw Water Transmission Main Capacity (271-05)	TBD					Engineering
Cane Creek Pump Station Improvements (270-16)	138,000–227,000					Engineering
University Lake Pump Station Improvements (270-11)	TBD					Engineering
Finished Water Pump Rehabilitation and Replacement (272-42)	TBD					Engineering
Knolls Pump Station Abandonment (277-37)	0-24,000					Engineering
Reduction of Inflow and Infiltration in Wastewater System (276-17 & 18)	TBD					Engineering
Building Envelope Rehabilitation (278-68)	TBD					Engineering
WWTP Secondary Clarifier Pumping Improvements (278-72)	TBD					Engineering
WWTP Non-Potable Water Pump Replacements (278-58)	20,000-40,000					Engineering
High-Performance SCADA System (278-73)	TBD					Engineering
WWTP Digester Complex Rehabilitation and Improvements (278-78)	TBD					Engineering
Implement						
HVAC: Equipment Replacement (As needed and >15 years old)	44,000-88,000		45	10	25	Maintenance
WWTP Non-Potable Water Conservation	12,000-25,000		10			Sust/Maintenance
Online Energy Dashboard	TBD		8	5	5	Sustainability
Motor Management Program	TBD		12			Asset Mgmt/Sust/ Maintenance
Pump Station Operational Assessments	TBD		25	25		Eng/Maintenance
Solar PV at Cane Creek	750,000-1,000,000			25	1600	Sust/Engineering
Evaluate						
Pump Optimization (Other Wastewater Pump Stations)	TBD			Morgan Creek PS	Heritage Hills PS	Asset Mgmt/Sust/ Maintenance
Optimize WWTP Filter Backwash	20,000-40,000					WWTP Operations

Energy Management Strategy	Estimated Potential Energy Savings (kWh)	Timeline and Cost (in $1,000s) Light shading: Study Dark shading: Implement				Project Management
		FY18	FY19	FY20	FY21	
Real-Time Nitrification Control System at WWTP	103,000-207,000					WWTP Ops & Eng.
WWTP UV System Energy Assessment	105,000 – 210,000					WWTP Ops & Maintenance
Recommission WWTP Odor Control System	*TBD*					WWTP Ops & Maintenance
Operational Changes at Morgan Creek Pump Station	*TBD*					WWTP Ops & Sust.
Controls and Sensors on WWTP Headworks Conveyor System	*TBD*					WWTP Ops & Maintenance

Fiscal Year 2019 Budget:

In addition to what is budgeted in the CIP for FY 2018-2022, the following is requested in the FY19 budget to pursue the strategies above:

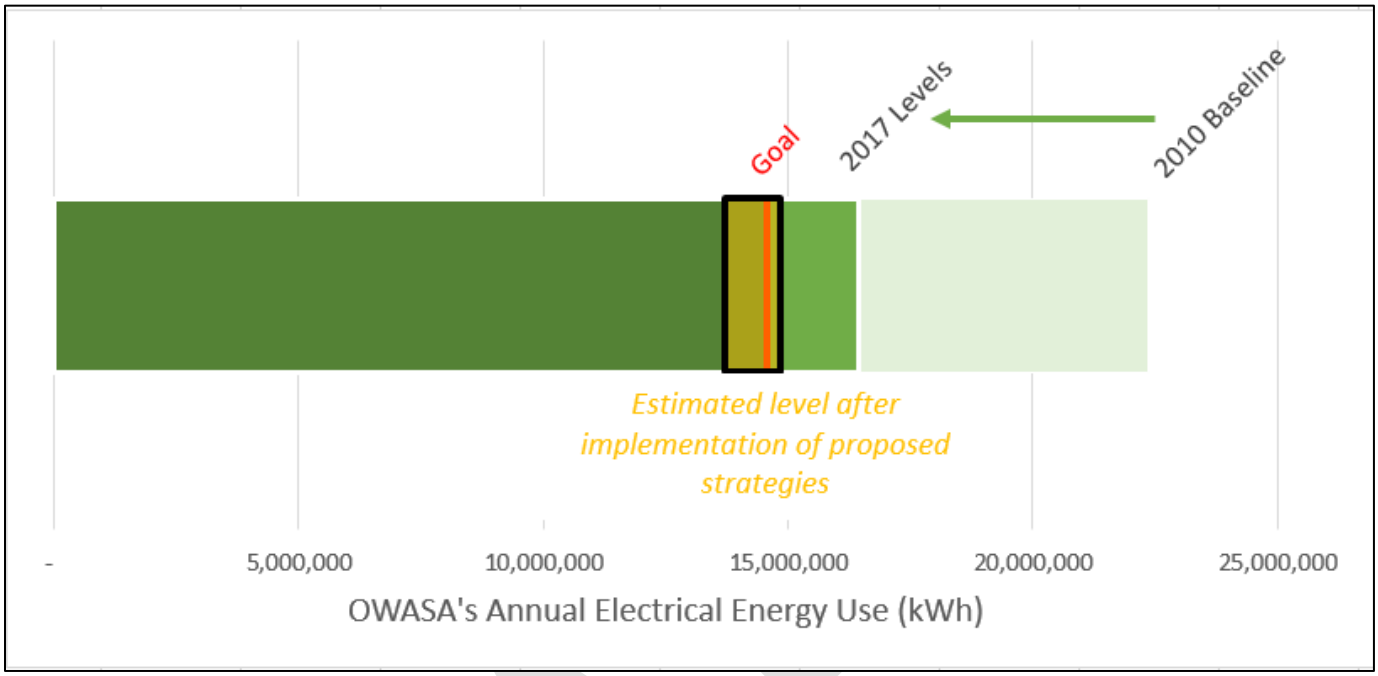
- Capital Improvements Budget: $45,000 (HVAC Equipment Replacement) and $25,000 (Pump Station Operational Assessments)
- Technical Assistance and Consultants: $12,000 (Motor Management Program)
- Operating Budget: $14,000 (Online Energy Dashboard and Pump Optimization Software)
- Capital Equipment: $10,000 (NPW Water Conservation)

Where applicable, we will pursue Duke Energy Smart Saver Incentives (energy efficiency rebates) for these projects, as we have done recently with the HVAC project in the Administration Building, LED lighting replacements, and the aeration and mixing energy efficiency improvements project at the WWTP.

Figure 4 shows our current progress towards Objective 1 and the estimated range of electrical use levels anticipated after implementation of proposed strategies (illustrated by the black outline). Using conservative projections of the projects for which we can estimate an energy savings, we fall just under 200,000 kWh/year of our goal. Under optimistic projections, we surpass our goal by nearly 900,000 kWh/year.

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Figure 4: Summary of Progress Towards Objective 1



A significant contributor to this reduction is the development of a 733 kW ground-mounted solar photovoltaic system at the Cane Creek Reservoir site, which is expected to generate 750,000 – 1,000,000 kWh per year. As currently modeled, this project would be owned and operated by OWASA and is anticipated to cost $1.6 million. It is projected to provide a positive net present value over the life of the asset (25 years) when incorporating the social cost of carbon and/or the ability to finance it with a 0% interest loan. (There are more details on the economic analysis in Appendix B.)

Based on projections for OWASA's overall capital program and recent changes in state law regarding solar development, this project is not proposed to begin construction until Fiscal Year 2021. That should allow time to fully consider such a project within the context of new programs created by state law (see discussion under Objective 5) and fully coordinate and communicate with Duke Energy, Orange County, and our neighbors. Without the solar project, our energy management strategies defined in this update for which we can estimate energy savings at this point will fall short of meeting our goal by 100,000 to 900,000 kWh/year.

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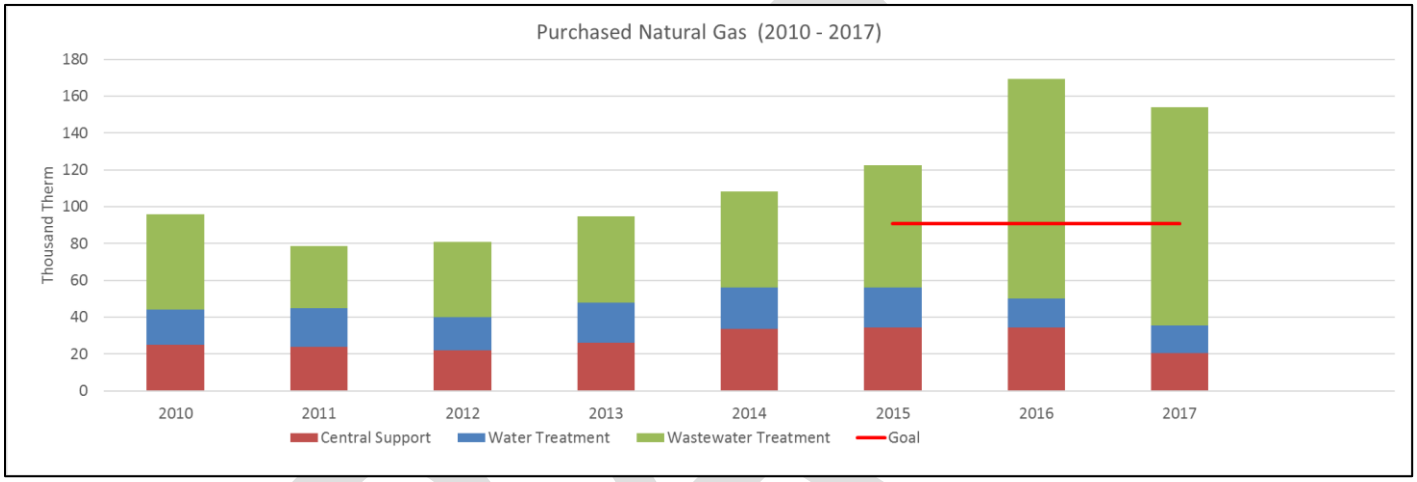
Objective 2

Reduce use of purchased natural gas by 5% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Trends in Natural Gas Use and Costs

Figure 5 shows historical natural gas use across the major functional areas, based on monthly billing data for our nine different natural gas accounts over the past eight-year period. It also shows our goal for reducing purchased natural gas by 5% from 2010 levels.

Figure 5: Purchased Natural Gas, by Functional Area (2010 – 2017)



Overall, we used about 58,000 therms more in 2017 than in 2010, an increase of about 60%. This is primarily due to an increase in natural gas required to heat two boilers that provide heat for the anaerobic digestion (solids treatment) process at the Mason Farm WWTP.

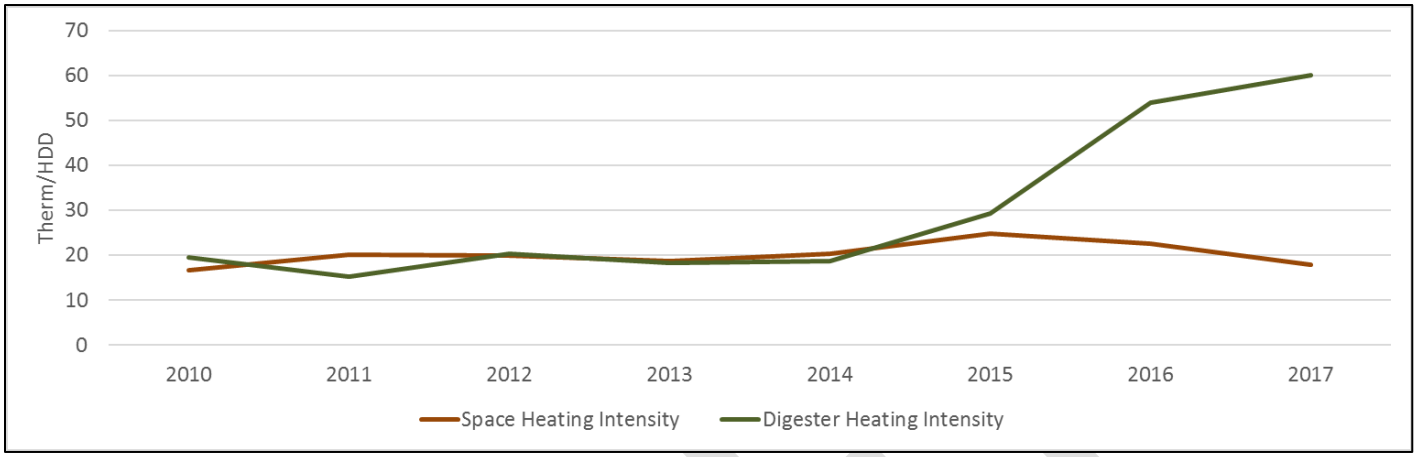
Methane – or biogas – is produced as a by-product of the digestion process, and under normal operations, is used as the primary fuel in our boilers at the plant. However, starting in late 2015 through 2016, we relied almost exclusively on natural gas to heat the boilers while two digesters and our gas storage unit were undergoing major rehabilitation. This project resulted in a significant increase in natural gas use at the WWTP. Once the project was complete, the biogas-to-boiler system was found to be non-functional. Wastewater treatment plant staff have been working with contractors to identify and fix the problem, so that we can once again offset natural gas use with biogas. It is a priority for our staff to get that system up-and-running very soon.

It is important to note that decisions made in pursuit of Objective 3 and 4 (beneficial use of biogas) have the potential to impact our use of natural gas for digester heating. Under some scenarios, it may be more advantageous to treat and condition all of the biogas for another use (i.e. vehicle fuel) and use natural gas to heat boilers. As we move forward with evaluating options for beneficial biogas use, we will consider the implications on our overall energy balance, carbon footprint, and associated costs.

In addition to using natural gas for our digesters, we use natural gas in our main office buildings and at the WTP for domestic water heating and for space heating. In these facilities where natural gas is used for space heating, our use varies with changes in temperature. Adjustments to thermostats,

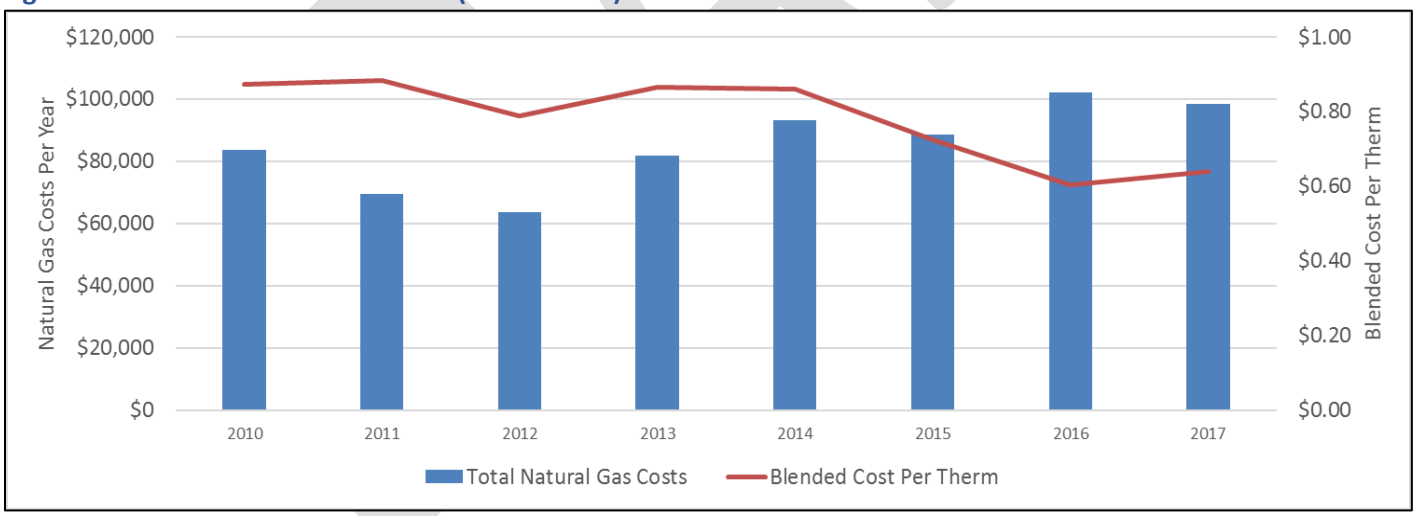
improvements to building insulation, and investment in new high efficiency HVAC equipment can help reduce our use of natural gas. When normalized for temperature, our use of natural gas for space heating has been relatively consistent over the past eight years (as shown in Figure 6).

Figure 6: Natural Gas Use Intensity (2010 – 2017)



Although our use increased by 60%, our annual expenses on natural gas have not increased as dramatically. We only spent 18% more (about $15,000 more) on natural gas in 2017 than in 2010. Natural gas rates were 27% less in 2017 than in 2010. Figure 7 below shows our trends in natural gas costs.

Figure 7: OWASA's Natural Gas Costs (2010 – 2017)



Update on Natural Gas Management Strategies

As with the strategies proposed for Objective 1, the following strategies are grouped into three major categories: projects currently in the CIP, energy management strategies to implement, and energy management strategies worthy of further evaluation. (Although, there are no projects currently proposed for the last category: further evaluation) Table 2 lists each of these strategies, their estimated natural gas reduction potential (if enough information is available to develop an estimate), a four-year timeline, cost estimates, and assignment of the responsible party for moving forward with each strategy.

Projects Currently in CIP: There are two projects currently in the Capital Improvements Program that have the potential to reduce our use of natural gas. From the preliminary information that we have on these projects, **we estimate that they will reduce our current use of natural gas by 7,000 to 12,000 therms (about 8-13% of 2010 baseline).**

Strategies to Implement: The most significant strategy that we will undertake to reduce our use of purchased natural gas will be in restoring the biogas-to-boiler system. We estimate that this will bring natural gas use for boiler heating back by about 60,000 – 70,000 therms.

Table 2: Project Plan for Natural Gas Strategies and Estimated Energy Savings and Costs

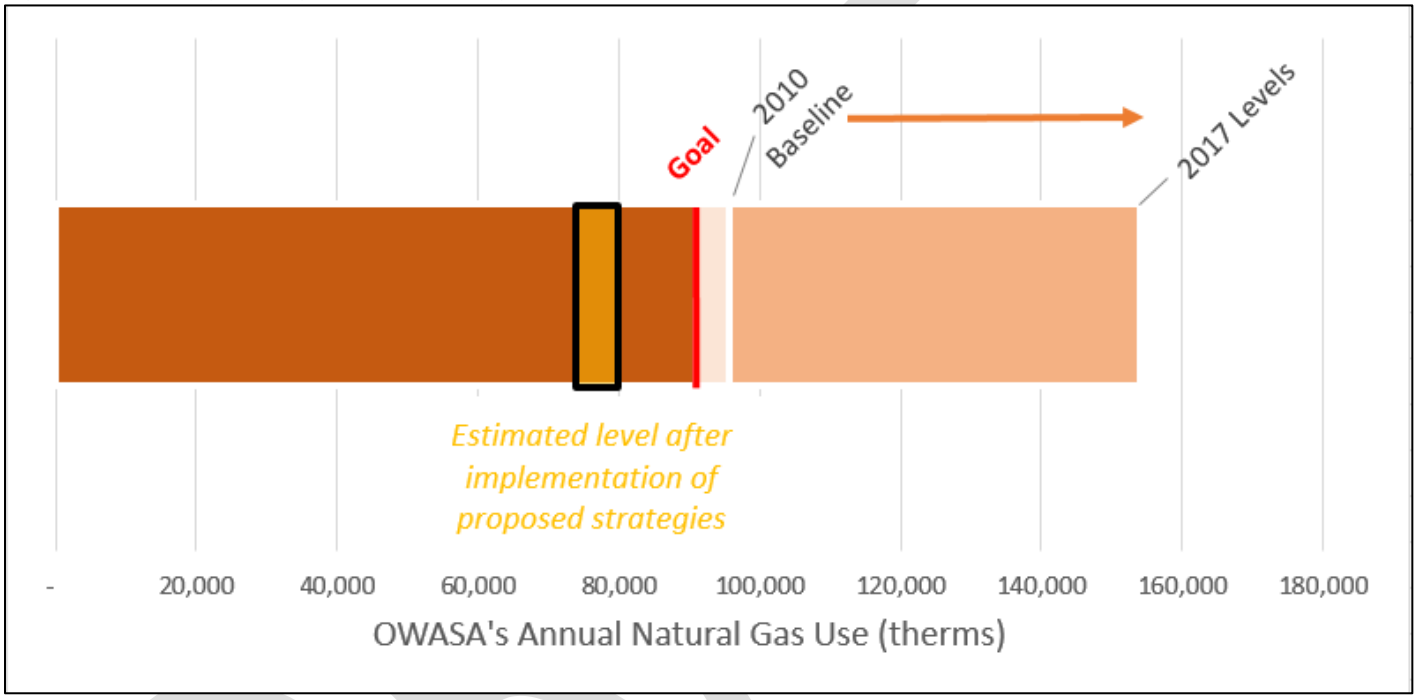
Proposed Natural Gas Management Strategies	**Estimated Natural Gas Savings (therms)**	**Timeline and Cost (in $1,000s)**				**Project Management**
		FY18	FY19	FY20	FY21	
Currently in CIP						
Admin Building Heating, Ventilation, and Air Conditioning (HVAC) System Upgrade (CIP No. 280-06)	7,000-12,000					Engineering
Building Envelope Rehabilitation (CIP No. 278-68)	TBD					Engineering
Implement						
Biogas-to-Boiler Improvements at WWTP	60,000 – 70,000	21				Maintenance
HVAC: Operational Changes	Continued savings					Maintenance

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Fiscal Year 2019 Budget: Beyond what is budgeted in the CIP, there are no additional funds requested to pursue natural gas management strategies.

Figure 8 illustrates the progress that we need to make to meet Objective 2 (difference between 2017 Levels and Goal) and the estimated levels of annual natural gas use after brining the biogas-to-boiler system online and implementing the proposed strategies.

Figure 8: Summary of Progress Towards Objective 2



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Objectives 3 and 4

Beneficially use all WWTP biogas by 2022, provided the preferred strategy is projected to have a positive payback within the expected useful life of the required equipment.

Formally engage local governments and partners in discussion about potential development of biogas-to-energy project at the Mason Farm WWTP.

(The following provides a combined update on Objectives 3 and 4, given their complementary nature.)

The Mason Farm WWTP produces about 110,000 cubic feet of biogas each day as a by-product of the anaerobic digestion process. Once the biogas to boilers system is restored, OWASA can use a portion of that biogas as fuel for two boilers that provide heat for the WWTP digestion process. But even when the biogas-to-boiler system is functional, the WWTP produces more biogas than needed for the boilers. By maximizing the beneficial use of biogas, OWASA can reduce our carbon footprint, lessen the impact of future increases in the cost of grid-supplied electricity and/or natural gas, and meet some or all of our on-site power/fuel requirements with a locally-produced and controlled supply of renewable energy, thereby increasing reliability and redundancy, and resiliency. Unlike renewable wind and solar energy production (excluding systems that have integrated energy storage capacity), digester biogas can provide a reliable baseload power and heat supply, and/or vehicle fuel supply, as it is produced 24 hours a day, 7 days a week, regardless of weather or daytime factors, provided the digestion process and biogas piping system are in full service.

OWASA's 2017 Energy Management Plan described in detail seven options for making beneficial use of the biogas generated at our WWTP as:

1. Continue to use the biogas as fuel for the boilers, and flare off any unused gas (Status Quo)
2. Install a biogas-fueled 330 kWh Combined Heat and Power (CHP) system to offset electrical power use and meet much of the digester heating requirements
3. Install a biogas-fueled 950 kW CHP system and optimize the operation of the system around peak time of day rate periods for electricity
4. Install a biogas-fueled 700 kW CHP system and High Strength Organic Waste (HSOW) receiving and processing facilities to enhance biogas production and renewable energy generation[2]
5. Install a system that enables biogas to be used as renewable compressed natural gas (rCNG) in vehicles and certain equipment
6. ~~Install a system that enables biogas to be converted to rCNG for off-site transport to an end user or biomethane aggregator that upgrades the biogas for wholesale delivery to a natural gas pipeline and/or other end user ("Mobile Pipeline" option)~~[3]
7. Install a system for upgrading the biogas for direct injection into the natural gas pipeline system, where it can be used by natural gas customers

[2] It is important to note that HSOW co-digestion would increase gas production for any biogas-to-energy option. However, for purposes of our early screening analysis, it was only analyzed as a supplement to a CHP System.

[3] There are no existing biomethane aggregator systems in our area; therefore, there is great uncertainty of terms, conditions, and associated costs and benefits that would apply to OWASA under this option. Currently, there is no path forward for OWASA to pursue this option.

The 2017 EMP did not recommend the pursuit of a single strategy. Rather the OWASA Board requested that staff explore partnership opportunities in the region and work with the Natural Resources and Technical Systems (NRTS) Committee to further evaluate our options, in light of this exploration.

On September 21, 2017, the NRTS Committee discussed a detailed report on partnership potential in the area which concluded that although there is interest in long-term collaboration, there are no immediate or near-term opportunities to partner with local governments or UNC-Chapel Hill on actual design and implementation of one or more specific biogas-to-energy options we have considered. On December 5, 2017, the Committee discussed a report that provided an update of considerations and options for moving forward with a biogas.

Following the framework used to evaluate all clean energy projects, key considerations presented in that report are summarized below.

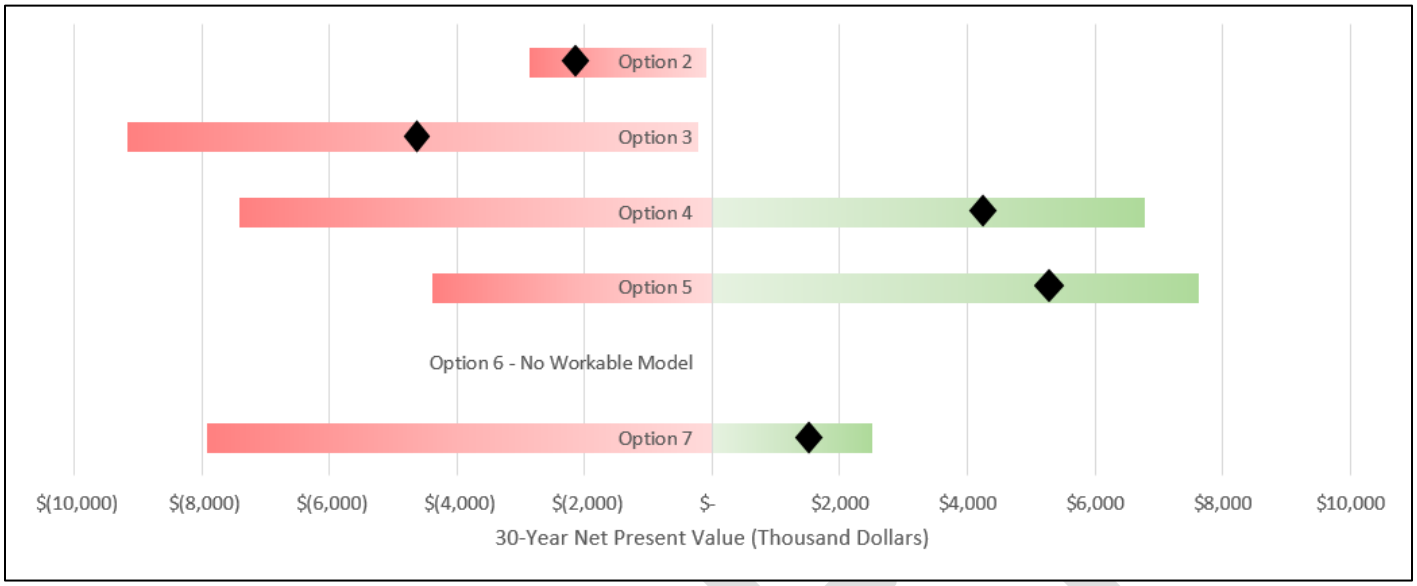
Financially Responsible: The identification of a successful biogas-to-energy option does not lie in the economics alone, but it is a critical threshold to a sustainable project and defined in the goal itself. Energy has a value and the renewable aspect of the energy has a value as well. But it comes at a cost. Biogas treatment, conditioning, and compression systems are costly from both a capital and operating and maintenance standpoint, and the costs will vary depending on quality of the raw biogas and the ultimate use of the biogas. In converting biogas to energy, key parameters of concern are hydrogen sulfide, carbon dioxide, siloxanes, and moisture. If biogas is to be used as vehicle fuel or delivered to the natural gas pipeline grid, additional treatment and high-level compression will be required.

Staff's screening level analysis shows that using the biogas as a renewable compressed natural gas for vehicle fuel (Option 5) and injecting the biogas into the natural gas pipeline (Option 7) have potential to have a positive net present value within the life of the asset even without co-digestion. Co-digestion of high strength organic waste has the potential to increase the economic viability of any of the options (as shown in Option 4), but also introduces financial risk and operational and capacity risks and costs at the Mason Farm WWTP.

As the NRTS Committee and Board have discussed, given the preliminary nature of our evaluation, there are many uncertainties surrounding the economic and technical analysis of our biogas-to-energy options. For example, gas quality and gas treatment and conditioning capital and operating and maintenance costs are more uncertain for options that would require very high levels of treatment and conditioning, and revenue projections for the sale of upgraded biogas to other parties are very uncertain.

Staff prepared a sensitivity analysis of the potential financial benefits and cost of each option, assuming a 30-year useful life of the equipment required for each option. The results are summarized in Figure 9. The diamond indicates the "most likely" outcome; the range was developed by applying a best case and worst case to that outcome for individual line items. At this point in our analysis, the ranges between best and worst-case scenarios are fairly broad. Even those that are projected to be economically viable have worst-case scenarios that fall well "in-the-red". A peer review by a third-party consulting firm with recent experience in similar projects could narrow the ranges. A more thorough design and implementation plan would narrow the range further.

Figure 9: Estimated Range of 30-Year Net Present Value ♦ within the Best and Worst Case Scenarios (not including the Social Cost of Carbon)



Option 2: *Biogas Combined Heat and Power (CHP) system operating continuously (330 kW)*
Option 3: *Biogas CHP system operating during on-peak times (950 kW)*
Option 4: *Biogas CHP with high-strength organic waste receiving (700 kW)*
Option 5: *Biogas used as a Renewable Compressed Natural Gas (rCNG) for vehicle fuel*
~~***Option 6:*** *Biogas delivered to other parties or aggregator via "Mobile Pipeline" strategy*~~
Option 7: *Biogas injected to PSNC Natural Gas Pipeline*

Energy/Carbon Reduction Potential: Implementing any option other than the status quo increases the beneficial use of our biogas and reduces greenhouse gas emissions. The estimated carbon reduction potential of a biogas-to-energy strategy depends on the strategy, the type and amount of renewable energy it provides, and any increases in energy use that would be required if it is implemented. For example, a combined heat and power strategy generates kilowatt-hours of renewable energy that would offset our use of electricity from Duke Energy, as well as reduce our use of natural gas to heat digesters (i.e. heat from engine is recovered and used to heat digesters). A biogas-to-vehicle fuel or pipeline strategy would offset the burning of diesel fuel in vehicles, but increase our use of natural gas required to heat the digesters. The energy required for gas treatment, conditioning, and compression equipment will offset some of the energy production and carbon reduction benefits from the biogas to energy system.

Nonetheless, the strategies are estimated to reduce OWASA's greenhouse gas footprint by anywhere between 4% (Option 3) to 16% (Option 4), as outlined in Table 3. (Important to note that this analysis looks at the direct footprint of the project.)

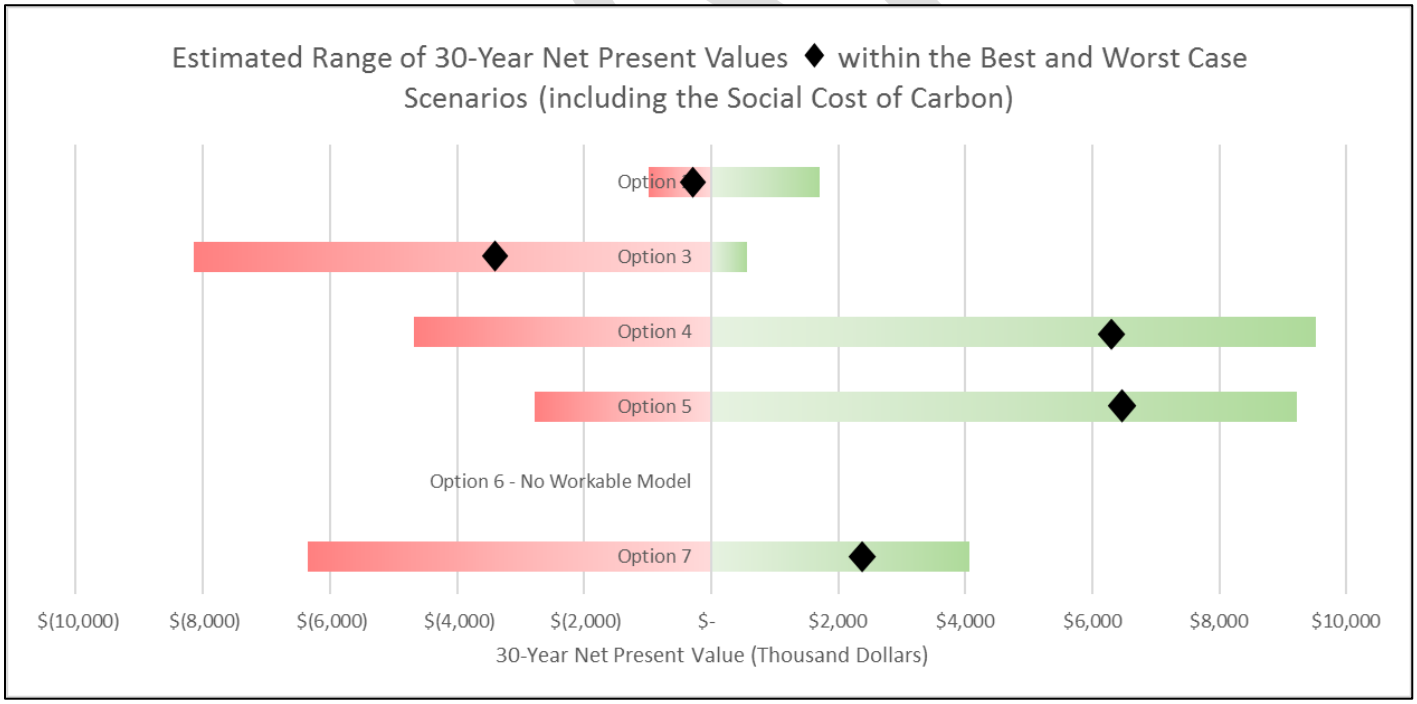
Table 3: Greenhouse Gas Impact of Each Viable Biogas-to-Energy Option

	Metric tons of CO_2 Offset Per Year	% of OWASA's 2010 Emissions (associated with purchase and use of electricity and natural gas)
Option 2	1,130	10%
Option 3	500	4%
Option 4	1,700	16%
Option 5	1,000	9%
Options 6	No workable model	
Option 7	990	9%

The OWASA Board of Directors and staff recognize that conventional financial analyses do not attempt to monetize the value of a project's environmental benefits (or costs) to society, and that such an approach understates the total economic value to society. To address this concern, the Board of Directors agreed that OWASA's clean energy project business case evaluations are to include consideration of the "Social Cost of Carbon" (SCC).

Figure 10 shows the estimated range of 30-year net present values within the best and worst case scenarios INCLUDING the social cost of carbon set at levels projected by a Federal Interagency Working Group. As expected, assigning a societal economic value to the greenhouse gas reductions improves the economics of each option.

Figure 10: Estimated Range of 30-Year Net Present Values ♦ within the Best and Worst Case Scenarios (including the Social Cost of Carbon at levels projected by the Federal Interagency Task Force



Realistic/Implementable: In establishing the energy management goals and objectives, the OWASA Board of Directors set a goal to beneficially use all biogas by 2022, provided that was determined to be financially and technically acceptable. In order to comfortably meet this deadline, we need to identify the preferred option(s) and move forward with a more detailed design and refined financial and

implementation plan in Fiscal Year 2019, due the complexity of the system, its potential impact on our operations, and the contractual requirements to sell the output. However, the target completion date of 2022 is not a regulatory requirement, and the Board has discretionary authority to revise that date as it deems appropriate.

Given that there is no regional partner ready to immediately move forward with us on project design, options that involve lockstep coordination with one or more regional partners are likely on a longer timeline. These options include co-digestion of food waste (a version of Option 4) or selling rCNG as vehicle fuel (Option 5).

Project coordination with our electric and natural gas utilities alone will be significant, but is likely more actionable in the near term. Moving forward with Option 7 will require up-front work with PSNC, our natural gas utility, to define gas quality standards and other essential terms for a contractual agreement. Some of this work has begun, but much more is required.

Other Factors: The decision framework for the Energy Management Program identifies other factors for consideration in prioritizing projects, including operational impacts, coordination with other projects, and the community impacts.

Any option other than the status quo increases staff maintenance responsibility and the complexity of operations, even if operation and maintenance of the system itself is contracted out (the costs of which we have incorporated into each of the options). Furthermore, until a long-term resource recovery facilities plan is developed for the WWTP, it is difficult to forecast how any option will integrate with future plans for the plant.

There are some distinguishing considerations between the options.

The combined heat and power system options (Options 2-3) have the potential to increase the resiliency and reliability of the plant, but they do so at a cost (see financial responsibility).

Options that involve regional collaboration (Options 4-5) could provide a direct benefit to our community, but will require considerably more time to plan, design, finance, and implement than options under the direct control of OWASA.

At this point, Option 7 has potential to be financially responsible, implementable, and makes beneficial use of our biogas, but it will complicate operations and maintenance at the plant without any direct benefit to our plant or the community.

Next Steps

As mentioned, there is no outside regulatory driver to proceed with this project right now. However, embedded in our mission is that we are responsible and creative stewards of the resources we manage. Biogas, a potent greenhouse gas with an inherent energy value, is as much of a resource generated by the wastewater services we provide, as a waste product. If we can find a way to make beneficial use of that renewable energy supply at no additional cost to our customers while also ensuring we meet our mission critical responsibilities, we are acting in-line with our values of environmental responsibility, affordability and value, and sustainability.

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Staff's analysis suggests that there is potential in a few different options and trade-offs among them: actionable versus economically viable, operationally distinct versus operationally integrated, etc. However, the only option that is actionable in the short-term (in the absence of a ready partner) is the biogas-to-pipeline option (#7).

Given uncertainties regarding the options and the potential for regional collaboration on a more economically feasible project in the long-run, the NRTS Committee and other Board members present at the December 5, 2018 NRTS Committee meeting do not recommend investing money to develop a more certain implementation plan for any of the options evaluated to date. Rather, the NRTS Committee and other Board members present unanimously agreed that OWASA should repair our biogas-to-boiler system to continue our current use of biogas (approximately half) and engage and assist with complementary analyses with the Town of Carrboro on a biogas-to-vehicle fuel option and with Orange County Solid Waste, Chapel Hill-Carrboro City Schools, and/or the University of North Carolina on co-digestion of high strength organic waste. The Committee recognized that in taking these steps we will not meet the 2022 goal.

Objective 5

Seek proposals for third-party development of renewable energy projects on OWASA property

In 2017, the OWASA Energy Team reviewed and discussed the potential for various renewable energy projects on OWASA-owned land. As discussed in the section pertaining to Objective 1, one project the Energy Management Team has recommended for consideration is an OWASA-owned 733kW solar PV system near the public entranceway to Cane Creek Reservoir, as that was the only economically-favorable solar project for OWASA to develop on its own. The Team recommended further investigation into potential third-party development of solar photovoltaic (PV) systems on one or more OWASA sites. Solar PV installations present a unique and mutually beneficial opportunity for public-private partnerships in renewable energy installations in the Piedmont of North Carolina. Due to the OWASA's status as a tax-exempt, government entity, we are not able to take advantage of any financial incentives for renewable energy projects, such as the Federal 30% Investment Tax Credit (ITC) or Modified Accelerated Cost Recovery System (MACRS) depreciation (five year), but private parties with tax liability are.

Third-party development of solar farms on public land has been a model for a mutually-beneficial public-private partnership by which private entities with tax liability are able to receive tax credits and public entities create opportunities for local solar power development, generate lease payments (nationally about $350-$1,000/acre/year[4]), and, sometimes, subsequent purchase of the solar system from the private developer once the tax benefits are realized. Under this model, the local government has the opportunity to eventually become the owner of a renewable energy system and the clean energy it generates.

At its May 25, 2017 meeting, the OWASA Board of Directors discussed how private solar development and energy management integrated into the organization's overall land management approach. The Board requested that staff take the following steps:

[4] Based on phone conversation with staff members of the National Renewable Energy Laboratory in January 2018.

1. In the context of current and future land uses, as well as stakeholder feedback, identify one or more potential OWASA sites for a large scale (1-5 megawatt) solar PV development.
2. Seek qualifications from private solar PV developers to evaluate the technical and economic feasibility of solar PV development on the identified site(s).
3. If feasible, engage stakeholders (including neighboring landowners) in a site development plan and potential agreement with the solar developer.

Staff has made progress on Step 1. Meanwhile, state and federal policy have changed the regulatory and economic landscape for solar power development, giving pause to Steps 2 and 3.

Land suitability: A local solar developer worked with OWASA (without commitment) to provide a preliminary evaluation of OWASA-owned land for potential development of solar PV. The first step was to screen OWASA land for viable sites using the following criteria:

- Relative close proximity to electric transmission line and sub-station
- Currently cleared land which would not be affected by current and near-term OWASA operations
- Moderately flat (<10% ground slope)
- Outside of the Cane Creek Critical Watershed Area

Based on these criteria, OWASA staff identified a 21.86-acre field in the biosolids land tract, which if fully developed could host approximately 3 megawatts (MW) of solar generation capacity. On our behalf, the local solar developer submitted a standard pre-request to Duke Energy for information regarding the closest substation to the site. The report from Duke Energy does not say whether a solar system would be approved, but at the time that Duke Energy responded to the request, there was already a significant amount of solar generation capacity loaded and in the queue for the closest sub-station. This could make the property less attractive or perhaps even infeasible to a third-party developer.

State considerations: Additionally, amid this analysis, the North Carolina General Assembly passed House Bill 589 (Session Law 2017-192), which significantly changed the regulatory framework and process for solar power development in the state, including a significant reduction to the size of system that could lock into a long term and assured power purchase agreement with Duke Energy (from 5 MW to 1 MW). This changes the long-term economics of a 3 MW system, likely making our 21.86-acre property less attractive for a private solar power project, as originally envisioned.

On a more positive side, the new legislation calls for a Competitive Procurement for Renewable Energy process that requires 2,660 MW of new renewable capacity over 45 months. The Utilities Commission has approved a plan that slates most this solar development to be in the Duke Energy Carolinas territory, which includes the OWASA service area. The first phase of proposals is due in May 2018. When the contracts are awarded later in 2018, it should be more clear how well the supply matches demand for solar capacity, and if our land would offer a competitive advantage to a solar developer. If so, it may be worthwhile to issue a "Request for Qualifications" to identify a private partner.

Additionally, there are new programs required by House Bill 589 that, once defined, could prove to be a viable option. The Green Source Advantage Program will allow participants to offset some/all of their energy consumption with new renewable energy resources. The law also calls for an authorized solar leasing program, through which OWASA could "lease a solar system" and use the renewable energy. Details of these programs are still under consideration by the North Carolina Utilities Commission.

Federal considerations: In January 2018, the current administration imposed a tariff on imported solar panels. Starting February 7, 2018, tariffs will be levied on nearly all imported crystalline silicone PV cells and modules, starting at 30% in year 1 and declining 5% each year over four years. The solar industry expects that this will result in about a 10% increase in the cost of new solar systems. (This has been incorporated into the economic analysis of the 733 kW system proposed for development at the Cane Creek Reservoir.)

Next steps

Given the state of flux in the industry, staff recommends that we suspend pursuit of this particular strategy and stay abreast of the new programs and options created by the new legislation and provide a summary of those options (such as solar lease agreements and green source rider programs) as they avail themselves.

Near-term milestones include:

- Summer 2018 – Order expected on Green Source Advantage program; Identification of Certified Lessor(s)
- February 2019 – Contracts awarded from first phase of Competitive Procurement of Renewable Energy program

Moving Forward

This Energy Management Plan Update provides an update on proposed strategies and approach for reducing our use of fossil fuel derived electricity and natural gas, and our efforts to incorporate the use of renewable energy sources in our operations. In Fiscal Year 2019, we will implement several projects to further reduce our use of energy and to move closer to our Year 2020 energy use reduction targets. We will also incorporate energy efficiency measures into the planning and design of new capital projects, and pursue cost-effective strategies for the use of renewable energy in our operations.

In future annual updates of this Plan, we will document our progress towards our energy management goals and objectives, and present updated recommendations and proposed strategies for further improving our use of energy and reducing our carbon footprint.

As we move forward, we welcome the questions, comments, and suggestions from our customers, our member governments, and others. We will also continue and expand on our efforts to partner with other agencies on these important efforts, so that we can achieve our energy management goals and objectives in a more cost-effective manner than would otherwise be possible.

Background Resources

OWASA's Strategic Plan that identifies "Implementation of an Energy Management Program" as Strategic Initiative #4 (adopted on June 9, 2016)

Baseline Assessment of Energy Use and Management Efforts and Potential Goals and Objectives for the Energy Management Plan (approved by the OWASA Board on June 25, 2015) provides (a) a baseline assessment of OWASA's energy use; (b) an overview of energy management strategies to date; and (c) the following goals and objectives for Energy Management.

Objective 1: Reduce use of purchased electricity by 35% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Objective 2: Reduce use of purchased natural gas by 5% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Objective 3: Beneficially use all WWTP biogas by 2022, provided the preferred strategy is projected to have a positive payback within the expected useful life of the required equipment.

Objective 4: Formally engage local governments and partners in discussion about potential development of biogas-to-energy project at the Mason Farm WWTP.

Objective 5: Seek proposals for third-party development of renewable energy projects on OWASA property.

Revised Charter for Energy Management Plan (approved to the OWASA Board on May 20, 2016) outlines a timeline and methodology for developing OWASA's Energy Management Plan.

Energy Management Program and Project Evaluation Framework (approved by the OWASA Board on September 8, 2016) summarize an approach to instituting an Energy Management Program at OWASA that objectively and sustainably meets goals and objectives. In addition, staff designed the program to:

- Foster a clean energy culture at OWAS through employee engagement and continuous improvement and innovation,
- Ensure strategic and prompt pursuit of clean energy opportunities, and
- Pursue cost-effective clean energy strategies

Energy Management Program: Stakeholder Engagement Plan (approved by the OWASA Board on September 8, 2016) outlines how to engage defined stakeholders in the implementation of the Energy Management Program, including reference to supplemental Community Engagement Plans for high-profile, community-oriented clean energy projects.

Using a Social Cost of Carbon to Evaluate Clean Energy Projects: A Potential Policy Approach for OWASA
On September 8, 2016, the Board agreed to incorporate the social cost of carbon (SCC) in our business case evaluations of clean energy projects, and to base the economic value of carbon emission reductions on the Federal Interagency Social Cost of Carbon Working Group's central value for the SCC (2018 value of $40 per metric ton of carbon dioxide emissions, at a 3% discount rate). The Board agreed that inclusion of the SCC in business case evaluations would influence, but not on its own propel the pursuit of a clean energy project. This provides a method for quantifying and engaging the community in a discussion about the willingness to pay for carbon emission reductions.

2017 Energy Management Plan was approved by the OWASA Board of Directors on April 13, 2017. This plan summarizes OWASA's Energy Management Program and the strategies proposed to meet the goals and objectives set by the OWASA Board of Directors.

Update on Exploration of Potential Biogas-to-Energy Project Partnership Opportunities (presented to NRTS Committee on September 26, 2017) provides an update on staff's efforts to further explore biogas-to-energy project partnership opportunities with technical staff from our local government partners.

Potential Biogas-to-Energy Project Opportunities (presented to NRTS Committee on December 5, 2017) provides an update of considerations and options for moving forward with a biogas-to-energy project at

the Mason Farm Wastewater Treatment Plant, including case study information, an assessment of partnership potential, and staff commentary.

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Appendix A - Strategy Evaluation Summary

During the Energy Management Plan Update process for FY 2018, the following strategies were identified by OWASA staff and advisors as potential additional opportunities to reduce our use of purchased electricity and/or natural gas. Each strategy is summarized in Appendix B. Each strategy in the table is linked to an energy strategy summary that provides background on it.

After reviewing the energy strategy summaries, the OWASA Energy Team met over the course of two meetings (December 21, 2017 and January 9, 2018) to review, discuss, and prioritize each of the energy strategies. Each Team Member provided a recommendation as how to best move forward with the respective strategies: **implement (Strategies #1-6)**, **study (Strategies #7-10)**, **defer until upgrade (Strategies #11-13)**, or **defer indefinitely**. The Team's final recommendation reflects the average of the Team members' recommendations.

In accordance with guidance approved by the OWASA Board of Directors, the OWASA Energy Team evaluated each strategy qualitatively against the following six criteria (and guiding considerations). Each cell of the table below is color-coded to indicate whether a strategy is considered favorable, neutral, or unfavorable against each criterion.

1. Financially Responsible (High level)
   a. Likely a good use of public funds
   b. Financial viability of similar projects in similar organizations and circumstances
   c. Opportunities for outside funding/financing
2. Realistic/Implementable
   d. Degree to which the strategy has been proven at a scale relevant to our operation
   e. Organizational capacity to undertake and manage the project
   f. Reasonable amount of staff time to implement
3. Operational Impacts
   g. Consistent with how OWASA wants to operate
   h. Degree to which strategy helps to resolve an existing or expected problem
   i. Impact on safety, comfort, and productivity
4. Energy/Carbon Reduction Potential
   j. Potential to reduce OWASA's energy use and/or carbon emissions
5. Coordination with Other Projects
   k. Interdependence with other project(s)
   l. Potential to take advantage of economies of scale to save money and/or staff time
6. Community Impacts
   m. Stakeholder enthusiasm
   n. Coordination with community initiatives

Energy Strategy		Financially Responsible (High level)	Realistic/ Implementable	Operational Impacts	Energy/Carbon Reduction Potential	Coordinates with Other Projects	Community Impacts
1	HVAC: Equipment Replacement (Equipment > 15 years)	Payback on the additional cost of high efficiency equipment from standard is a little over 2 years	Yes	Can help improve the comfort of some spaces By planning ahead, we can choose the most effective and highest energy rating that is sensible	Moderate energy impact	Where applicable	Can help improve the comfort of some spaces

Energy Strategy		Financially Responsible (High level)	Realistic/ Implementable	Operational Impacts	Energy/Carbon Reduction Potential	Coordinates with Other Projects	Community Impacts
2	WWTP Non-Potable Water (NPW) Conservation: Sub-Meter and Audit	Metering costs relatively low and integration not needed with AMI	Yes	Increases knowledge of operations at the plant; helps identify potential sources of NPW system leaks and inefficiencies	To be determined; long-term best practice to manage energy used by NPW system	Meters can be installed and integrated with major upgrades (such as gravity belt thickener replacement)	None
3	Online Energy Dashboard	Value-added data management and dashboard	Program that has been widely used by municipalities and utilities	Dashboard can be made available to all staff to help inform decision making	Not likely directly responsible for energy savings, but empowers a lot of strategies and increases understanding and awareness	We have begun sub-metering individual processes at plants; this tool can incorporate that data	None
4	Motor and Pump Asset Management Program: Motor Management Program	Modest upfront investment	Yes	Will help inform asset management program as well as maintenance	Foundation for sound energy management moving forward	Coordinates with asset management program	None
5	Motor and Pump Asset Management Program/Reconsider Wastewater Pump Station Design, Operations, and Maintenance: Individual Pump Station Evaluations	Modest upfront investment	Yes	Valuable for operations, maintenance, and asset management program	Identification of operational changes to impact large pump stations	In addition to evaluating pump stations that use a lot of energy; Good practice to evaluate the pump station prior to significant upgrade	None
6	"Small-Scale" Solar PV at Cane Creek Reservoir (733 kW)	Significant up-front investment; however, likely to have a positive net present value within the life of the asset	Yes – as an OWASA-implemented project that will be relatively straight-forward to pursue	Maintenance of PV panels by third-party budgeted for in economic evaluation Minor complication of mowing in area	Significant impact on reducing the purchased electricity for the Cane Creek Reservoir Pump Station (Approximately 4.5% of our 2010 baseline)	No	Anticipated mixed results warrant community engagement plan prior to development Represents a significant investment in clean energy Potential concerns of neighbors
7	WWTP UV System Energy Assessment	To be determined	To be determined	Minimal, but would increase complexity and automation of UV system	To be determined; relevant case studies site a 65% reduction in energy used for UV disinfection	Yes; bringing in WEDECO soon to provide training to operators and maintenance staff on UV system	Limited: very important to consider and evaluate the impact on reclaimed water quality
8	Recommission odor control system and seasonally adjust odor control	To be determined	To be determined	Will require on-site, in-depth understanding of odor control system	To be determined	Yes; integrates into odor control system optimization	Important to ensure that any adjustments do not cause objectionable off-site odors

Energy Strategy		Financially Responsible (High level)	Realistic/ Implementable	Operational Impacts	Energy/Carbon Reduction Potential	Coordinates with Other Projects	Community Impacts
9	Increase wet well levels at Morgan Creek Pump Station	Optimization strategy that requires minimal upfront investment beyond monitors and controls	Has potential, but also some challenges, if it complicates operations at the Plant	Need to investigate ways to automate Morgan Creek wet well levels	To be determined – impacts significant energy using process at WWTP (Morgan Creek Pump Station accounts for about 7% of WWTP's daily energy use)	No	Important to ensure that any adjustments do not cause objectionable off-site odors or sanitary sewer overflows
10	Controls and Sensors on WWTP Headworks Conveyor System	To be determined	To be determined	Complicates maintenance requirements on headworks conveyor If the sensor fails, the timer would still be activated	Impacts process that uses relatively small amount of energy at plant	No	None
11	HVAC: Equipment Replacement (< 15 years)	Accelerated up-front costs to achieve near-term energy savings Potential economies-of-scale in large scale project	Yes, but impacts many units (about 17)	Minimal, but would standardize the units across the organization	Only accelerates energy savings; more efficient equipment could be available in the future	Should seek opportunities to upgrade HVAC equipment when appropriate with other capital upgrades	Minimal
12	Above-ground NPW System	Extremely high costs and complicated capital project	Most wastewater treatment plants bury NPW system, but other industries have water system above-ground Retro-actively installing an above-ground system would be very complicated	For distributed plant as Mason Farm, a lot of space would be utilized Heat tracing may be required to prevent pipe freezing Would help staff quickly identify leaks	Heat tracing on cold days could off-set energy savings	No	No
13	"Small-Scale" Solar PV at 400 Jones Ferry Road	Upfront capital costs and on-going maintenance costs exceed avoided costs over assumed 25-year life of system	Yes	Added benefit of providing overhead cover for mobile assets Maintenance of PV panels by third-party minimizes burden on staff; budgeted for in economic evaluation	Would generate approximately 485,000 kWh per year	Would need to coordinate with roof replacement	Concerns about impact on stormwater run-off of parking canopy Potential for community enthusiasm

Appendix B - Energy Management Summaries – 2018 Update

Projects Currently Underway or Recently Completed

Eastowne, Eubanks, and Meadowmont 1 Wastewater Pump Station Improvements (277-24): These improvements were recently completed (late 2017). The improvements were projected to save 5,000-14,000 kWh per year. It is too early to verify the actual amount of savings achieved.

Administration Building Heating, Ventilation, and Air Conditioning (HVAC) System Upgrade (280-06): This project is under construction and anticipated to be completed by Summer 2018. We anticipate the energy savings to be about 200,000 kWH per year (~1% of our 2010 baseline) and 11 kW in electric demand; additionally, we anticipate a savings of about 7,000-12,000 therms of natural gas use per year (7-13% of our 2010 baseline). We applied for a Custom Energy Efficiency Incentive from Duke Energy and have been offered a $14,000 rebate upon completion.

LED Lighting Retrofit (280-12): The 2017 Energy Management Plan recommended an LED lighting retrofit of the Administration Building and Water Treatment Plant campus. Due to lower-than-expected bids and Duke Energy incentives (approximately $65,000 worth of incentives), we were able to also include a lighting retrofit of the Operations Center well within project budget. We anticipate that this project will save 154,000-290,000 kWh per year. With this project, the vast majority of lights have been upgraded to LED; most lights at the Mason Farm Wastewater Treatment Plant and University Lake offices have also been upgraded to LED technology.

Energy Optimization for IT Server Room: At the beginning of the summer, we began incrementally increasing the temperature in the server room while monitoring humidity in the room. We have been able to increase and maintain the temperature from 68 degrees to 74 degrees while still maintaining acceptable humidity levels. We do not have a method for directly measuring the energy impact of this adjustment, but we have seen energy use drop in the Administration Building over the last year. We do not individually meter this process but estimate that the annual impact is a reduction of about 5,000 kWh/year.

Backwash WTP Filters in Off-Peak Times: After analyzing historical and projected energy use at the Water Treatment Plant (WTP), we requested a reduction in Contract Demand for the WTP from 1,000 kW to 700 kW. This change went into effect in November 2017, and we anticipate that this change alone will reduce our annual energy costs by $2,000. Moreover, it will allow us to further reduce our energy costs (which currently make up about 25 percent of our monthly bill at the WTP) by moving more demand to off-peak times, including a concentrated effort to backwash filters in off-peak times. The new energy monitors that are integrated into the plant's SCADA system will help Operators make these shifts.

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HVAC: Operational Changes: In May 2017, we manually adjusted down thermostats across the WTP and WWTP campus. Maintenance staff have been involved in maintaining these adjustments and re-evaluating them at the turn of the season. We will continue this practice.

Energy Monitors at WTP: In July 2017, we brought energy monitors online for the finished water pumps and backwash pumps at WTP. These monitors will be critical to informing operational energy management strategies and to help quantify the potential and realized energy savings from OWASA's energy management investments.

HVAC: Equipment Replacement: Last year, due to unit failure, we replaced a 6 SEER HVAC unit in the Ammonia Building at the Water Treatment Plant with a more efficient unit. This will likely result in a savings of about 25,000 kWh/year. As part of the IPS CIP project at the Wastewater Treatment Plant, we will replace the two HVAC units with high-efficiency units, which will result in a savings of about 26,000 kWh/year.

Pump Optimization (Finished Water Pump Station): Based on connected horsepower, OWASA uses most of its energy to run pumps and motors. Therefore, optimization of pump and motor operations, maintenance, and repair and replacement decisions has a significant potential to reduce energy use at OWASA. OWASA's asset management program includes more than 350 motors and 350 pumps, with the largest being the two 700-horsepower pumps at the Cane Creek Reservoir raw water pump station.

OWASA staff have spent the past year researching different approaches and strategies for monitoring and using energy use information to inform how our pumps and motors are operated in a more energy efficient manner, as well when and how they are maintained and replaced.

OWASA staff have identified an analytical software package that will conduct on-going analytics of pumping systems. The services provided are described below.

The Asset Management Suite software enables routine operator-initiated pump testing for comparison of current pump conditions to ideal factory pump curves. The suite calculates Pump Health Index (PHI), continually recalculates annualized excess energy costs due to worn pumps, and recommends pumps for repair or replacement based on a rigorous financial analysis. This financial analysis can be incorporated into a comprehensive pump asset management program to determine optimal scheduling of pump repairs.

The Optimization Suite works in conjunction with the Asset Management Suite to calculate the combinations of pumps and speeds that will satisfy current flow requirements while maximizing energy efficiency. The suite selects the most efficient combination of pumps and speeds that operate each pump within its Preferred Operating Range. As system conditions change throughout the day, the suite recomputes the solution to ensure the station continues to operate at minimum specific energy intensity (kWh/MG) and makes recommendations for pump operation accordingly.

It remains to be seen how much energy will be saved through the active use of this pump optimization platform. Case studies have shown that the active use of the platform can reduce energy use by 8-11%. If OWASA achieved that range of savings in the energy required for

finished water pumping, we would save about 200,000-275,000 kWh/year. Additionally, this platform will provide an analytical foundation for CIP Project 272-42 (WTP Finished Water Pump Rehabilitation/Replacement), which is proposed to begin design in FY20. The initial cost to set up the system is $21,975 with annual licensing fees of $6,075 (which can be cancelled if and when the system is deemed obsolete).

Projects Currently in the CIP Identified with Potential for Energy Impact

Cane Creek Raw Water Transmission Main Capacity (271-05): Currently, funding is provided in FY 2019 to test the friction coefficient in the existing 24-inch diameter raw water main from the Cane Creek Reservoir to the Quarry Reservoir in order to determine if the main needs to be cleaned to restore its carrying capacity. This study and any related follow-up work are planned to be completed prior to the initiation of design on the Cane Creek Pump Station Improvements (CIP 270-16).

Cane Creek Pump Station Improvements (270-16): Funds are included in FY 2019 and FY 2020 for adding automatic generator transfer switchgear, building a permanent enclosure for the generator, and installing variable frequency drives (VFD). An analysis conducted by the NC State University Industrial Assessment Center estimated that the installation of VFDs at the Cane Creek Pump Station could result in a savings of 138,000 – 227,000 kWh per year.

University Lake Pump Station Improvements (270-11): We are proceeding with the design of a modified pump station for University Lake that will involve the replacement of Pumps #1 (200 hp), #2 (200 hp), and #3 (400 hp) with three 350 hp pumps with VFDs and modifications to the large (42”) water line from the lake to the plant. Currently, there is only a VFD on Pump #4, the smallest of the four pumps. These improvements will enable us to pump larger quantities of water at lower energy intensities than is possible with the three existing, old pumps.

Historically, the energy use intensity (kWh used to pump a million gallons of water) has been lower for the Cane Creek Pump Station than for the University Lake Pump Station, despite being almost 10 miles further from the Jones Ferry Road Water Treatment Plant. Through the improvements made in this project, this should change, which could reduce the overall energy required for raw water pumping.

Finished Water Pump Rehabilitation and Replacement (272-42): The WTP uses four pumps to send drinking water from the plant into the distribution system. Pumps #4, #6, and #7 use VFDs and have pumping capacity ranges from 6 to 10 MGD, from 7 to 12 MGD, and from 3 to 7 MGD, respectively. Pump #5 does not have a VFD and has a capacity of 10 MGD. This project includes funding in FY 2021 to evaluate potential alternative pumping types and configurations along with design of the replacements. Pump Optimization project currently underway will help inform this capital project and the energy efficiency potential in the redesign.

Knolls Pump Station Abandonment (277-37): A FY 2017 evaluation investigated the possibility of eliminating this pump station through conveyance of flow to the City of Durham’s collection system. This option is still under consideration.

Reduction of Inflow and Infiltration (I&I) in Wastewater System (276-57): We have begun a sewer modeling project in which we are installing flow monitors and rain gauges throughout the collection system to better quantify the amount of I&I in our system. This information will help inform and prioritize collection system repair and replacement projects with the goal to reduce I&I. Although it is difficult to quantify the anticipated energy savings from this project, we do know that we will reduce the use of electricity required to pump and treat wastewater if we can reduce the volume of I&I entering our collection system.

Building Envelope Rehabilitation (278-68): This project includes the rehabilitation of building envelope systems (roofs, walls, windows, etc.) at a prioritized set of OWASA's buildings and structures as recommended by a FY 2017 condition assessment. This project has the potential to reduce heating and cooling load on the impacted buildings; however, it is difficult to estimate the energy savings expected from this strategy at this point in time. Impacts on energy use will be incorporated into decision-making for these projects.

WWTP Secondary Clarifier Rehabilitation Project (Specifically RAS Pumping at WWTP) (278-72): We are currently conducting a Preliminary Engineering Review (PER), including a holistic view of the Return Activated Sludge (RAS) pumping system. New pumps and controls, as well as potentially modified RAS pumping processes, are anticipated to be slightly more efficient. Energy will be a consideration of the PER. Ancillary control devices (such as harmonic filters on the VFDs) may offset any energy savings from pump modifications.

WWTP Non-Potable Water (NPW) Pump Replacements (278-58): We have issued a Purchase Order to replace three 25 hp NPW pumps, and anticipate their delivery in early CY 2018. The replacement pumps will be somewhat more efficient and new controls will enable more stable and efficient pumping. A blow-off valve may be required to maintain minimum pressures, and a surge tank is being considered based on the flow requirements of the new Rotary Drum Thickeners that will be installed as part of CIP project 278-51 (WWTP Solids Thickening Improvements). The project requirements will target both 30% energy reductions and increased pump stability. Although it is not individually metered, it is estimated that the NPW system uses about 138,000 kWh/year. A 30% in energy savings would reduce energy use by 40,000 kWh/year.

High Performance SCADA System (278-73): The new system is expected to come online in Spring 2018 at the Mason Farm Wastewater Treatment Plant. Among other things, this project will allow us to generate reports and dashboards for many difference factors, including energy use. It will help us better understand and manage our energy use at the plant. Based on our experience with this new system, we will consider the development of a similar system at the Jones Ferry Road Water Treatment. Currently, CITI, our SCADA systems consultant, is working on system development.

WWTP Digester Complex Rehabilitation and Improvements (278-78): Based on connected horsepower and equipment run time, it is estimated that the digesters use about 140,000 kWh per month and are the 2nd largest energy-using system at the Mason Farm WWTP (next to the aeration basins and blowers). This project has the potential to reduce the thermal needs of the anaerobic digesters and the natural gas used to heat digesters by being able to fine-tune heating

capacity.

New Energy Management Strategies Recommended for Implementation

HVAC Energy Efficient Upgrade of Equipment Greater than 15 Years Old: A 2016 Energy Assessment of OWASA's HVAC equipment conducted by Advanced Energy recommended that OWASA replace cooling units at the end of their rated service life (15 years) with high efficiency units. High efficiency cooling units have features such as advanced controls, larger heat transfer surfaces, and electronically commutated (EC) motors. They also use significantly less energy than their standard efficiency counterparts. High efficiency units (equal to or greater than 15 SEER) cost more than standard efficiency units; however, Advanced Energy estimates the average payback of the additional cost to be 2.35 years without considering the social cost of carbon, and only 1.9 years if the social cost of carbon is included.

In the past, we have operated smaller HVAC units until they were at or near the end of their useful life and could not be cost-effectively repaired (i.e. run to failure). This new strategy would accelerate replacement in order to achieve energy savings. By planning ahead, we can spend the time to research the most effective equipment with the highest sensible energy rating.

Based on the age of systems, the following capital costs and annual energy savings are estimated for the first four years of this strategy

	FY 2019	**FY 2020**	**FY 2021**	**FY 2022**
Number of units	3	1	1	2
Estimated cost of new equipment	$45,000	$10,000	$25,000	$125,000
Estimated energy savings	16,000 kWh/year	1,000 kWh/year	20,000 kWh/year	51,000 kWh/year

Wastewater Treatment Plant Non-Potable Water (NPW) Conservation: Non-potable water (i.e wastewater treatment plant effluent) is re-used throughout the Mason Farm WWTP for various processes that require water and can be met with non-drinking water. The current NPW system provides process water throughout the plant and runs underground. While we have metered total NPW use for a little over a year (we use about 360,000 gallons of NPW each day), we do not meter it on a process level. We anticipate a 30% reduction in NPW energy use from the new pumps and the NPW water use reduction from the new rotary drum presses for solids, taking energy use from the system from about 11,500 kWh per month to 8,000 kWh per month for an annual savings of about 40,000 kWh. Assuming water conservation could reduce pump run time by 25 percent, the energy use of the NPW system could be reduced another 24,000 kWh per year.

Proposed Next Steps:

- Meter NPW use throughout the plant to help quantify the amount of water lost to leaks (cost to meter individual systems throughout the plant)

- Audit NPW water uses for water conservation opportunities (cost to audit the water system and repair)

Online OWASA Energy Dashboard: Each month, a few members of OWASA staff download and review energy use for all or a certain sub-set of OWASA facilities. While this data is technically available for all OWASA staff, it is not readily accessible. We plan to use the Facility Dude energy dashboard software system to provide staff a cloud-based energy management solution that will help them to better track, audit, and analyze utility (electricity and natural gas) consumption and cost for multiple facilities. This platform could be used by any OWASA employee to track and analyze energy use, including exporting the data into Excel. It tracks granular utility information, such as demand, costs, and consumption. It also helps to track and summarize the energy savings associated with individual clean energy strategies. Energy dashboard software will be useful in advancing a culture of energy management across the organization. In future iterations, we could upload interval data for individual accounts and processes. The facility Dude software is used by many public entities across the country, including the Town of Cary and the Chapel Hill-Carrboro City School System. Start-up costs will be about $10,000, including a one-year license. Beyond this, it will cost approximate $5,000 every year to maintain.

Motor Management Program: There are hundreds of motors across OWASA facilities with a wide range of sizes, loads, efficiencies, and ages. Effectively managing the operation, maintenance, repair, and replacement of our motor population is a good source of energy savings. According to a group of industry organization organized under a campaign called Motor Decisions Matter, the motor purchase price of a motor accounts for about five percent of its total lifetime cost. The remaining 95 percent goes towards the electricity to operate the electric motor over its lifetime. Because of this, an effective motor management program (MMP) that maintains high motor efficiency and accounts for the lifetime operating costs of electric motors can lead to significant energy savings.

A sound MMP consists of three main components:

1) Purchasing (new and replacement motors)
    a. Purchase based on the motor efficiency rating
    b. Always consider purchasing NEMA Premium efficient motors
    c. Always consider life cycle costs in purchasing decisions
    d. Do not purchase based on motor price only
2) Operations
    a. Ensure proper installation
    b. Ensure and maintain proper alignment
    c. Ensure motors operate in clean air or install filters, if needed
    d. Ensure motors are properly cooled
    e. Follow all maintenance and greasing schedules
3) Repair
    a. Ensure that the repair center follows industry best practices to maintain motor efficiency and reliability

Implementation of a MMP does not produce an instant savings, but over time, as the program matures, the average efficiency of the motor population will increase. For approximately $12,000, Advanced Energy (a nationally-recognized, non-profit energy consulting firm based in Raleigh, NC) can provide OWASA expert, on-site technical support to help:

1) Implement a formal Motor Management Program
2) Establish a motor nameplate database
3) Establish motor repair/replace rules to guide purchasing decisions
4) Provide Motor Management training to staff, including:
    a. Maintenance Staff
    b. Engineers
    c. Purchasing
    d. Management
    e. Operators

Pump Station Operational Assessments: It is difficult to broadly apply design specifications to pump stations. The design, hydraulics, and operating environment must be considered on an individual basis to determine if and how improvements (i.e. structural, safety, energy, mechanical, electrical, etc.) can be made. Such analyses have been conducted on the Eastowne, Eubanks Road, and Meadowmont 1 Wastewater Pump Stations.

The estimated cost to complete similar analyses on other pump stations would be about $6,000 per station. Such evaluations would inform the need for, scope, and timing of future capital investment decisions to ensure reliable and sustainable operation of our wastewater pump stations. From an energy and operational perspective, recommended candidates for evaluation include:

- Rogerson Drive Pump Station: Large energy user/commissioning of recent capital improvement
    - Annual energy use in FY17: 750,000 kWh
- NSL (within wastewater treatment process): Plant manager recommendation
    - Estimated annual energy use: 400,000 kWh
- *IPS: Pre-cursor to Phase 2 of capital improvement which may involve pump repair/replacement of pumps that are about 40 years old
    - Estimated annual energy use: 400,000 kWh
- *Chapel Hill North Pump Station: Pre-cursor to capital improvement
    - Annual energy use in FY17: 16,000 kWh
- *Rangewood Pump Station: Maintenance Supervisor recommendation
    - Annual energy use in FY17: 11,000 kWh

*Starred evaluations would take place as initial task for CIP upgrade.

Ground-mount solar photovoltaic (PV) system at Cane Creek Reservoir (733 kW system): In the 2017 Energy Management Plan, a small-scale, OWASA-owned solar PV system was prioritized and approved for further evaluation. Over the last year, we sought proposals from four local

solar developers. One worked with us free-of-charge to develop a proposal on which the following is based.

A feasibility study conducted by the US Department of Energy's National Renewable Energy Laboratory in 2016 identified the Cane Creek Reservoir Site as a viable location for a ground-mount solar PV system. Upon review of the land and forest shade, the cleared land adjacent to the visitor entrance on NC Highway 54 was identified as a viable location. The slope of the land is away from the road, which would help alleviate concerns regarding a reflection's impact on traffic.



Based on the available land and demands of the current load on which the system would be net-metered, the solar company specified a 733 kW system. A system of this size is estimated to generate approximately 1 million kWh/year (which represents approximately 4.5% of OWASA's 2010 electricity baseline). The cost of this system is estimated to be approximately $1.6 million, which includes a 10% increase over current costs to account for the recently imposed federal tariff on imported solar panels. The annual operating, maintenance, and insurance costs are estimated to be $8,800 per year.

The following table summarizes the projected net present value (NPV) and payback period for this potential system, assuming a 25-year useful life. The table shows NPV and payback periods for different financing scenarios, and with and without accounting for the social cost of carbon.

25-Year Net Present Value (Year of pay-back)

Financial Scenarios	Without Social Cost of Carbon	With Social Cost of Carbon
0% borrowing; $50,000 Duke Energy incentive	+$247,000 (Year 22)	+$569,000 (Year 12)
0% borrowing; no incentives	+$198,000	+$521,000

	(Year 23)	(Year 15)
3.5% borrowing; no incentives	-$226,000 (>Year 25)	+$67,000 (Year 25)

Above ground biogas-to-boiler piping: Currently, the biogas at the WWTP is not able to be used in the boilers due to recurrent condensation in the existing biogas line, which is mostly underground. To resolve this, we are pursuing a project to replace the old existing line with a new above-ground biogas-to-boiler line. The cost of this project is estimated to be about $21,500. We expect that with these improvements, our use of natural gas will drop to pre-2015 levels.

Energy Management Strategies Under Consideration

Pump Optimization (Other Pump Stations): Depending on the success of the Pump Optimization pilot project with our Finished Water Pump Station, we will evaluate other potential pumping systems on which it could be applied, including:

- Morgan Creek Wastewater Pump Station: Potential energy savings 60,000 kWh/year
- Heritage Hills Wastewater Pump Station: Good candidate because there is a tight range on the VFDs - Potential energy savings 36,000 kWh/year

Optimize WWTP Filter Backwash: We have six denitrification filters at the Mason Farm WWTP that require periodic backwashing to remove solids loading. We use two 50-horsepower pumps (installed in 2005) to backwash the filters, but only one runs at a time. We also use two air blowers (at 100 and 150 hp each).

Currently, we operate all six filter beds and backwash each filter twice per week during off-peak times. It is not practical to reduce the number of filters we have in service at any given time, as we need six filters in service during high-flow events, and each one takes time to put back in operation following a temporary shut down of the filter.

There could be energy savings in reducing the number of backwashes. We currently run the backwash pumps in off-peak times, so there would be minimal demand (kW) savings, but there could be energy (kWh) savings.

In the absence of head loss meters to inform backwash timing, operations staff have begun to incrementally increase the time between backwashes and observe the impact on filter performance and effluent quality.

Real-Time Nitrification Control System at WWTP: Aeration and mixing in the biological treatment process typically accounts for more than half of the energy used in most wastewater treatment plants. By optimizing the biological treatment process and aeration system, wastewater treatment utilities can save energy and chemicals while improving treatment performance.

Most plants with real-time control systems use dissolved oxygen (DO) measurements and fixed DO set-points to control the biological treatment process, reduce aeration requirements and energy use, and reduce chemical use. Another strategy receiving increasing consideration is the implementation of real-time ammonia-nitrogen monitoring and control of the nitrification process.

Under this approach, a control module continuously adapts the DO set-point to reach the required ammonia effluent concentration. Influent flow and ammonia concentration data is gathered in real-time and incorporated in to a model that predicts the aeration rate required to achieve the optimum nitrification level, and then to control that rate. This combination of feed-forward and feed-back control enables: more timely reaction to peak loads than is possible with DO monitoring only; better ensures compliance with effluent requirements; and additional energy savings.

Based on the reported experience of other wastewater treatment plants, real-time nitrification control systems may achieve as much as a 13% to 28% reduction in energy use for the biological treatment process (estimated savings of between 100,000 and 200,000 kWh).

In order to evaluate this strategy, we need to relocate the existing ammonia monitor and incorporate it into the new high performance SCADA system.

WWTP UV System Energy Assessment: The Ultra-violet light (UV) Disinfection System at the Mason Farm WWTP is estimated to use about 5% (350,000 kWh) of the electricity currently used at the plant each year. Currently, our UV banks are flow-paced (banks and lamps turn on and off, depending on the flow), and we use high-efficiency light bulbs. Although we are measuring the transmissivity of the water, it is not directly being used to control the UV system operation. By incorporating real-time transmittance information, we could potentially reduce energy use by turning down the UV system intensity when water quality (transmissivity) is very high. Additional evaluations are needed to confirm whether or not the existing system can be modified to include this capability, and to assess the associated benefits, costs, and operating risks of this strategy.

Next year, staff from WEDECO (the manufacturer of the UV system) will be on-site four days at the Mason Farm WWTP to conduct maintenance and training for our wastewater treatment plant staff. It is recommended that energy management be incorporated into this discussion, and that analysis be conducted on the energy savings potential of a change in operations and maintenance of the UV system. The City of Grand Rapids, Michigan moved from an exclusively flow-paced UV disinfection system to one that incorporated % ultraviolet transmittance (%UVT) and reduce energy use of the system by 65%. A 65% reduction in the amount of energy that we use for UV disinfection would reduce energy use at our WWTP by an estimated 210,000 kWH per year, but we don't yet know if we could achieve this level of savings. In addition, the new SCADA system will incorporate a new controls screen that summarizes UV bulb life and bulb failure. The efficiency of UV bulbs declines as the bulbs age.

Recommission WWTP odor control system and seasonally adjust odor control: This would include closing valves on unused equipment (e.g. out-of-service clarifiers), rebalancing fans, etc. The odor control system is estimated to use about 360,000 kWh per year. Hazen and Sawyer

was recently retained to re-balance the odor control system at headworks and will be doing the same for the solids thickening building once the solids thickening improvements are made. Their focus thus far has been on corrosiveness and safety. It is unknown how much recommissioning the entire system could save. The next step would be an optimization audit of the overall odor control system, building off the work of Hazen and Sawyer.

Operational Changes at Morgan Creek Pump Station (WWTP): We currently keep the Morgan Creek Pump Station Wet Well at about 3.2 feet. Based on horsepower and run-time, we estimate that the Morgan Creek Pump Station uses about 800,000 kWh per year. Running the system with higher wet well levels would decrease the static head in the system, and reduce the amount of energy required to pump influent into the plant (given that we have VFDs on these pumps). Over the next year, we will install energy monitors to measure the actual energy use of the station. This will also enable us to estimate the energy savings potential of keeping the wet well at a higher level to reduce the lift required by the system. We will also install "Smart" manholes to evaluate the impact of increased wet well levels on sanitary sewer overflows upstream of the pump station. Based on this evaluation, we will consider the most efficient range to run the pumps. If Specific Energy's pumping optimization system at the Water Treatment Plant proves useful, that approach will also be considered for optimizing the Morgan Creek Pump Station.

Controls and Sensors on Headworks Conveyor System (WWTP): When wastewater enters the WWTP, large debris and grit are removed from the influent and conveyed into dumpsters. Currently, the conveyor is controlled by a timer. During a walk-through conducted as part of the US Department of Energy's In-Plant Energy Management Training at the WWTP in May 2017, it was observed that the conveyor was running even though no debris or grit was on it. It may be possible to install a sensor that would allow the conveyor to be run only when material needs to be conveyed. Based on the horsepower and run-time of the system, the existing system is only estimated to use about 28,000 kWh/year. A sensor might reduce that by about 25 percent, which represents an annual savings of about 7,000 kWh (about 0.09% of the plant's total use). Conversely, it could add a great deal of maintenance complications. The upfront and on-going costs of such a system is unknown at this point-in-time.

Energy Management Strategies Recommended for Delay Until Upgrade

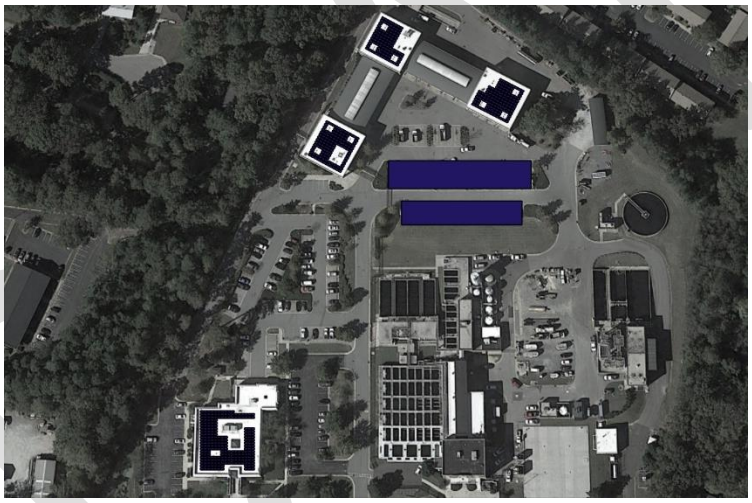
Replace HVAC Units Less Than 15 Years Old with High Efficiency Units: For those units that are less than 15 years old, there are still energy savings to be realized in replacing lesser efficient units with high efficiency units. Advanced Energy estimated that about 125,000 kWh a year could be saved if we upgraded the 17 HVAC units that are less than 15 years old. However, with useful life still remaining in these units, the Energy Team does not recommend moving forward with this strategy for energy purposes alone. These energy savings will ultimately be achieved over a longer period of time as OWASA implements a program for rolling upgrades as HVAC equipment reaches the end of its rated life.

Above-ground NPW System (WWTP): The vast majority of the NPW system is below ground. We do not have the data to assess how much water is lost to leaks by this system. An above-

ground NPW system would help maintenance staff more quickly and efficiently identify and repair leaks in the system. However, it could also require water pipe heating (heat tracing) so that above-ground lines do not freeze. That would off-set some of the savings from reducing leaks. The cost of this strategy would be high and require a substantial level of effort and cost for engineering and construction.

"Small-Scale" Solar PV at 400 Jones Ferry Road (429 kW system): In the 2017 Energy Management Plan, a small-scale, OWASA-owned solar PV system was prioritized and approved for further evaluation. Over the last year, we sought proposals from local solar developers. We contacted four developers; one worked with use free-of-charge to develop a proposal on which the following is based.

A feasibility study conducted by the US Department of Energy's National Renewable Energy Laboratory in 2016 identified the Administration Building as a potential location for roof-top and parking canopy solar PV systems. The system components evaluated for the Jones Ferry Road complex includes rooftop solar PV on the Administration Building and Operations Center and a parking canopy over Operations Center parking lot. There are ancillary benefits of a parking canopy that covers our mobile assets, like the VacTruck and backhoes, protecting them from the elements on a day-to-day basis. It is unknown at this point in time how a solar parking canopy would impact our stormwater permit.



Based on the available space and demands of the current load on which the system would be net-metered, the solar company specified a 429 kW system. A system of this size is estimated to generate approximately 485,000 kWh/year (which represents approximately 2% of OWASA's 2010 electricity baseline). The cost of this system is estimated to be approximately $1.35 million, which includes a 10% increase over current costs to account for the recently imposed federal tariff on imported solar panels. The annual operating, maintenance, and insurance costs are estimated to be $5,200 per year.

The following table summarizes the projected net present value (NPV) and payback period for this potential system, assuming a 25-year useful life. The table shows NPV and payback periods for different financing scenarios, and with and without accounting for the social cost of carbon.

25-Year Net Present Value

	Without Social Cost of Carbon	With Social Cost of Carbon
0% borrowing; $50,000 Duke Energy Incentive; $123,000 ancillary benefit of parking canopy*	-$336,000	-$190,000
0% borrowing; no incentives	-$482,000	-$336,000
3.5% borrowing; no incentives	-$871,000	-$724,000

*Based on one cost estimate for material and labor

DRAFT

Agenda Item 4:

Continue Discussion on Unregulated Compounds in Water Resources, Including Recent Regional Analysis of Per-fluorinated Substances (PFAS)

Purpose:

To continue discussion on unregulated compounds in water resources.

Background:

At the Board of Director's February 22, 2018 meeting, the Board received a presentation from staff on unregulated compounds including a summary of OWASA's recent test results for PFASs. The Board elected to continue this discussion at the March 8, 2018 work session.

The Board also requested information about any on-going monitoring of Jordan Lake for PFASs.

- The State (Department of Water Resources) is conducting monitoring for some PFASs as part of the Jordan Lake Ambient Monitoring. At this time, we are not aware of where PFAS data are available, but we will provide this information once it is available. Past Jordan Lake Ambient Monitoring reports, which did not include PFASs, are available here: https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/intensive-survey-branch/falls-jordan-lakes-monitoring.

- The Town of Cary is conducting some monitoring that includes Jordan Lake (at their raw water intake). These data are available here: http://www.townofcary.org/services-publications/water-sewer-stormwater/water/water-treatment/emerging-contaminants under Lab Reports.

Action Requested:

Review staff's recommended future steps and provide feedback.

Information:

March 1, 2018 Memorandum – Update on Unregulated Compounds in Water Resources, including Recent Regional Analysis of Per- and Polyfluoroalkyl Substances

ORANGE WATER AND SEWER AUTHORITY

A public, non-profit agency providing water, sewer and reclaimed water services to the Carrboro-Chapel Hill community.

MEMORANDUM

TO: Board of Directors

THROUGH: Todd Taylor, P.E.

FROM: Katie Harrold

DATE: March 1, 2018

SUBJECT: **Update on Unregulated Compounds in Water Resources, including Recent Regional Analysis of Per- and Polyfluoroalkyl Substances**

Background

OWASA maintains full compliance with and often surpasses all current Federal and State regulations. According to all current and available science, OWASA's drinking water is safe for drinking and OWASA's treated wastewater is safe for the environment. OWASA supports and participates in science-based research to inform these regulations and protect water quality and human health.

Unregulated Compounds

The Federal law that regulates public drinking water utilities like OWASA is called the Safe Drinking Water Act (SDWA). The US Environmental Protection Agency (EPA) sets these health-based regulations, which are then enforced by state agencies such as the NC Department of Environmental Quality in partnership with the EPA.

To ensure high-quality, safe drinking water the EPA reviews unregulated compounds which may warrant regulation under the SDWA and has added regulated compounds to the SDWA, as a result. Periodically, specific unregulated compounds will gain local or national attention. For example, recently hexavalent chromium (or chromium 6) and 1,4-dioxane were topics of concern in the public. Often, such compounds are already under review by the EPA.

Two factors are important to the EPA when considering regulation of unregulated compounds: occurrence and health risks. Is this compound prevalent in drinking water systems across the country? And at what levels are chronic and acute exposures hazardous to human health? The fact that a compound is detectable does not necessarily mean that it is harmful to human health; this remains true even as technology improves and compounds can be measured at increasingly lower levels.

The EPA collects information on the occurrence of compounds that are suspected to be present in drinking water, but are not currently regulated, through the Unregulated Contaminant Monitoring Rule (UCMR). OWASA has participated in the previous monitoring under the UCMR and will continue to participate in the future.

Risk-based health levels are based on the most current research regarding the health effects of compounds and established at concentrations under which no health impact should be realized by even the most vulnerable populations.

If and when a compound is regulated, the EPA sets the Maximum Contaminant Level (MCL) which takes into account health effects, detection limits, treatment effectiveness, and cost. The MCL is set as close as feasible to the Maximum Contaminant Level Goal (MCLG), for which the EPA only considers health effects in its establishment. The MCLG is not regulatory. These are set to protect even the most sensitive populations (including infants, children, the elderly, and people with compromised immune systems and chronic diseases).

If a compound is not regulated, the EPA may set a non-regulatory Health Advisory Level (HAL) based on health effects information to provide technical guidance to assist Federal, State, and local officials.

Per- and Polyfluoroalkyl Substances

Recently, the occurrence and levels of GenX, a compound that belongs to a class of man-made chemicals, known as per- and polyfluoroalkyl substances (together, PFASs) has impacted drinking water in nearby communities[1].

PFASs are used in a variety of everyday products to increase resistance to water, grease, or stains such as carpet, clothing, fabric for furniture, paper packaging for food, and other materials (e.g., cookware). Thus, they are commonly found in household dust as well as household discharges to wastewater. They are also used in aqueous firefighting foams (AFFF) that are used at airfields and in industrial processes.

Detectable concentrations of PFASs can enter lakes, rivers, or groundwater through industrial releases, discharges from wastewater treatment plants, and the use of AFFF. Often, PFASs in water are localized and associated with a specific facility, such as fire training facilities, military bases, domestic airports, and manufacturing sites. Treated effluent from wastewater treatment plants and biosolids land application sites have also been identified as PFASs contributors as they are conveyors of PFASs that enter the wastewater stream from concentrated sources and household products.

In 2016, the EPA established a lifetime Health Advisory Level (HAL) of 70 parts per trillion (ppt) for the combined amount of two PFASs - PFOA and PFOS - in drinking water.

[1] These compounds have been sometimes referred to as perfluorinated compounds or PFCs, but the EPA and other organizations are switching to PFASs rather than PFCs to consistently collectively describe this class of compounds.

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are the two PFASs which have been the most extensively produced and studied.

Recent PFASs Monitoring Results

In October 2017, Duke University professors analyzed a sample of OWASA drinking water. When analyzed, the sample was found to have a sum total of 14 ppt of PFOA and PFOS. This is well below the aforementioned EPA Health Advisory Level of 70 ppt combined of the two compounds. The Duke professors also analyzed the sample for seven other perfluorinated compounds, they detected a sum total of about 50 ppt for all nine compounds (PFOA, PFOS, and 7 additional compounds). While we saw no reason for alarm in these results, we followed-up with additional analysis.

In January 2018, OWASA collected samples for PFASs analysis. These analyses measured the level of 39 PFASs in OWASA's raw source waters, treated drinking water, and treated wastewater effluent as well as the raw well water source for the Cane Creek Reservoir Recreation Facilities water system, process water within the water treatment plant, and Morgan Creek upstream of the wastewater effluent discharge. Full results are attached. Below are some key findings:

	Treated Drinking Water	Raw Source Water			Morgan Creek Upstream	Wastewater
		University Lake	Cane Creek Reservoir	Quarry Reservoir		Treated Wastewater Effluent
Count of PFASs Detected from 39 analyzed	7	2	11	2	8	9
Sum of all PFASs (ppt) [No HAL]	37.8 – 45.9	4.7	206.1	4.9	49.6	101.9
Sum of PFOS & PFOA (ppt) [HAL* is 70 ppt]	13.7 – 18.0	4.7	120.0	4.9	13.4	23.1

*Drinking water Health advisories are specifically for PFOA and PFOS and do not apply to other perfluoroalkyl substances (PFASs). The EPA is continuing to gather information about other PFASs.

GenX was not detected in any sample.

Finished Drinking Water: Two treated drinking water samples were collected, one as water left the Jones Ferry Water Treatment Plant and one from the distribution system. The same seven PFASs were detected in each sample at very similar levels. The sum of PFOS and PFOA in these samples was well below the 70 ppt health advisory level (13.7 in one sample and 18.0 ppt in the other). Studies indicate that the use powder activated carbon (PAC) is successful in the removal of some PFASs but not all. Our test results showed that OWASA's treatment process was also successful in removing some PFASs but not all.

Raw Reservoir Water: In the University Lake and Quarry Reservoir samples only two PFASs were detected. In the sample from Cane Creek Reservoir, 11 PFASs were detected. The sum of

PFOS and PFOA in University Lake, Quarry Reservoir, and Cane Creek Reservoir were 4.7, 4.9, and 120 ppt, respectively.

The definite sources of PFOS and PFOA in the Cane Creek Reservoir are unknown. There are no facilities typically associated with elevated levels of PFAS in the watershed, although we do not have specifics on past land use. We do know that other utilities apply biosolids in the watershed; OWASA does not.

Wastewater: In the Mason Farm Wastewater Treatment Plant effluent sample, nine PFASs were detected. The list of nine compounds detected in the effluent includes all seven PFASs detected in the drinking water samples and two additional compounds. Five of these compounds were present at similar levels to that in the drinking water samples.

Upstream Morgan Creek: Eight PFASs were detected in the sample collected from Morgan Creek upstream of where the Mason Farm Wastewater Treatment Plant effluent is discharged. These were the same eight compounds detected in the effluent sample; one additional compound was detected in the effluent and not in the creek sample. Four of the compounds were present at similar levels in the creek and effluent samples.

On February 22, 2018, the Board requested information about any on-going monitoring of Jordan Lake for PFASs.

- The State (Department of Water Resources) is conducting monitoring for some PFASs as part of the Jordan Lake Ambient Monitoring. At this time, we are not aware of where PFAS data are available, but we will provide this information once it is available. Past Jordan Lake Ambient Monitoring reports, which did not include PFASs, are available here: https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/intensive-survey-branch/falls-jordan-lakes-monitoring.

- The Town of Cary is conducting some monitoring that includes Jordan Lake (at their raw water intake). These data are available here: http://www.townofcary.org/services-publications/water-sewer-stormwater/water/water-treatment/emerging-contaminants under Lab Reports.

Future Steps

Recent test results help to assure that OWASA's water is safe to drink, with levels of PFOS and PFOA well-below Health Advisory Levels. They do, however, raise questions about the potential that biosolids are a contributor to levels in the Cane Creek Reservoir that exceed the drinking water HAL for PFOA and PFOS, as well as the potential that our own biosolids and wastewater effluent are contributing to elevated levels in other watersheds. Our analysis suggests that the use of powder activated carbon at the Jones Ferry Water Treatment Plant is effective at removing some, but not all PFAS from drinking water.

As it is for the entire water and wastewater industry of many unregulated compounds, this issue is of continued interest and importance to OWASA. As an individual utility, OWASA continues

to proactively address it through regional cooperation and communication, the support of local and national research, and open and honest communication with our customers.

We support research into the occurrence, primary sources, health impacts, and effective treatment options for PFASs and other unregulated compounds on the forefront of the industry's research agenda. As we do for all other compounds, we look to the federal and state government to turn this research into science-based laws that protect our community.

We will continue to coordinate with nearby communities on analysis and treatment options, recognizing the connectivity of our actions. We have and will continue to reach out to other utilities known to land apply biosolids in the Cane Creek watershed to try and gain a better understanding of the potential sources of PFASs.

And we continue to communicate openly and transparently about our water quality and serve as a resource for our community on state of the science. Within the week, the results of this test will be posted on OWASA's website with information about how to interpret the results.

At this time, OWASA staff does not see justification to pursue aggressive mitigation and treatment of PFAS. As a product of our current source water protection efforts and water treatment processes, OWASA's water is safe to drink. And while biosolids are potentially associated with elevated levels of some PFASs, they are not causing OWASA's drinking water quality to exceed HALs for PFOA and PFOS, nor are they the ultimate source of PFASs. The ultimate sources are potentially indiscrete, individually minor, and beyond the regulatory authority of OWASA.

We remain vigilant in our support of scientific research regarding the occurrence and health effects of PFASs and other unregulated compounds to help us continue in our commitment to providing high-quality and reliable water, wastewater, and reclaimed water services.



Katie Harrold
Laboratory Supervisor

Attachment: Full results from January 11, 2018 sample taken by OWASA staff and analyzed by Eurofins Eaton Analytical.

Results from January 11, 2018 sample taken by OWASA staff and analyzed by Eurofins Eaton Analytical

Analyte	*Acronym*	*Cane Creek Reservoir and Recreation*	*University Lake*	*Cane Creek Reservoir*	*Quarry Reservoir*	*WTP Process Recycle*	*Treated Drinking Water Leaving Jones Ferry Water Treatment Plant*	*Distribution System Treated Drinking Water*	*Morgan Creek Upstream of Wastewater Discharge*	*Mason Farm Treated Wastewater Effluent*
10:2 Fluorotelomer sulfonic acid	10:2 FTS	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
4:2 Fluorotelomer sulfonic acid	4:2 FTS	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
6:2 Fluorotelomer sulfonic acid	6:2 FTS	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**2.2**
8:2 Fluorotelomer sulfonic acid	8:2 FTS	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ADONA		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F-53B Major		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F-53B Minor		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
GenX		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
N-ethylperfluorooctane sulfonamide	NEtFOSA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
N-ethylperfluorooctane sulfonamidoethanol		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
N-methylperfluorooctane sulfonamide	NMeFOSA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
N-methylperfluorooctane sulfonamidoethanol		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorobutanesulfonic acid	PFBS	<2.0	<2.0	**7.8**	<2.0	**5.1**	**4.2**	**3.6**	**5.6**	**5.1**
Perfluorobutanoic acid	PFBA	<5.0	<5.0	**6.1**	<5.0	<5.0	<5.0	<5.0	**6.2**	**11**
Perfluorodecanoic acid	PFDA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluoroheptanoic acid	PFHpA	<2.0	<2.0	**16**	<2.0	**7.5**	**7.4**	**6.1**	**4.2**	**7.4**
Perfluorohexanesulfonic acid	PFHxS	<2.0	<2.0	**20**	<2.0	**2.6**	**3.5**	**2.7**	**4.9**	**4.1**
Perfluorohexanoic acid	PFHxA	<2.0	<2.0	**12**	<2.0	**11**	**7.7**	**7.0**	**7.5**	**26**
Perfluorolauric acid	PFDoA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorononanoic acid	PFNA	<2.0	<2.0	**2.6**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorooctane sulfonate	PFOS	<2.0	**2.3**	**63**	**2.6**	**2.5**	**3.0**	**2.7**	**5.4**	**5.1**
N-ethyl Perfluorooctanesulfonamidoacetic acid	NEtFOSAA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
N-methyl Perfluorooctanesulfonamidoacetic acid	NMeFOSAA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorooctanoic acid	PFOA	**2.2**	**2.4**	**57**	**2.3**	**12**	**15**	**11**	**8.0**	**18**
Perfluorotridecanoic acid	PFTrDA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Analyte	*Acronym*	*Cane Creek Reservoir and Recreation*	*University Lake*	*Cane Creek Reservoir*	*Quarry Reservoir*	*WTP Process Recycle*	*Treated Drinking Water Leaving Jones Ferry Water Treatment Plant*	*Distribution System Treated Drinking Water*	*Morgan Creek Upstream of Wastewater Discharge*	*Mason Farm Treated Wastewater Effluent*
Perfluoroundecanoic acid	PFUnA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorododecanesulfonic acid	PFDoS	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorodecanesulfonic acid	PFDS	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluoroheptanesulfonic acid	PFHpS	<2.0	<2.0	**3.9**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorohexadecanoic acid	PFHxDA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluoro-2-(2-methyl)ethoxyacetic acid		<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0
Perfluoro-4-(1-methyl)ethoxybutanoic acid		<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0
Perfluoro-4-methoxybutanoic acid	PFMOBA	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0
Perfluoro-3-methoxypropanoic acid	PFMOPrA	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0
Perfluorononanesulfonic acid	PFNS	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorooctane sulfonamide	PFOSA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluoropentanoic acid	PFPeA	<2.0	<2.0	**8.7**	<2.0	**6.8**	**5.1**	**4.7**	**7.8**	**23**
Perfluoropentanesulfonic acid	PFPeS	<2.0	<2.0	**9**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorotetradecanoic acid	PFTeDA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Agenda Item 5:

Review Preliminary Fiscal Year 2019 Budget Information

Purpose:

The purpose of this discussion is to provide the Board of Directors with:

- Information about the draft operating budget for Fiscal Year (FY) 2019.
- A summary of the next steps in the budget development process.

The Board of Directors will continue to discuss these topics, as necessary, in order to be prepared to hold public hearings, tentatively scheduled for May 24, 2018, and make final budget and rates decisions at the June 14, 2018 Board meeting.

Budget and rate adjustment status:

Staff has developed a draft of the FY 2019 operating budget. A draft of the 5-year Capital Improvements Program (CIP) and capital equipment budgets will be provided at the March 22, 2018 Board meeting. Staff will also provide the Board with rate adjustment alternatives for consideration at the March 22 meeting.

Budget preparation efforts to date:

Our draft operating budget is based on the needs of the organization and our continued commitment to provide high value to our customers. We began the process of developing the FY 2019 budget in December 2017. We completed budget request worksheets for each department, compiled the information, performed various analyses, and held budget request review meetings.

Summary of the draft budget:

Expenditures in the draft FY 2019 budget include:

Category	Amount (in thousands)
Operating Expenses	$22,817
Capital Equipment Expenditures	To be determined
CIP	To be determined
Debt Service on Outstanding Bonds	$6,968

Approach to developing the draft FY 2019 budget:

We have drafted the FY 2019 operating budget based on "normal operating conditions" without contingencies. This increases our risk of exceeding the budget if we incur higher than normal costs from, for example, chemical price increases, more instances of equipment failures, etc. However, OWASA's financial condition, including reserve funds, allows us to manage the finances of the organization with a leaner budget.

One of the intended outcomes of establishing reserves is to be better prepared for contingencies that can adversely affect the organization and the customers we serve. Without adequate reserves, we may not be

able to react timely and effectively to situations such as a critical asset failure, significant and sudden decrease in water demand, or the effects of a natural disaster. Having adequate reserves also helps us reduce the risk of needing to suddenly increase rates to address unbudgeted expenditures.

Assumptions and highlights:

- The budget is being developed so that all of our Financial Management Policy objectives may be met.
- 2.5% vacancy allowance – the personnel compensation budget has been reduced by about $200,000, to account for position vacancies.
- 10% increase in health insurance. This will be adjusted once we receive information from our health insurance provider.
- A 5% increase in the rate we are charged for electricity.
- Price increases for certain chemicals based on information provided by vendors.
- A placeholder for a 4% merit and cost of labor (combined) increase is included. The Board is scheduled to discuss employee wage increases on May 10, 2018.
- Application of the new approach to measuring and compensating employee performance that the Board approved on December 14, 2017.
- 140 Board authorized positions with 135 funded for FY 2019.
- Use of the proposed new calculation method for System Development Fees (previously referred to as Service Availability Fees) which was approved by the Board on January 25, 2018. The new calculation method results in lower rates for System Development Fees.
- Drinking water and reclaimed water sales are not expected to increase or decrease significantly.
- The draft operating budget includes funds for consulting assistance to continue our work to implement our diversity and inclusion program.
- Wastewater treatment nutrient removal requirements in the Jordan Lake Rules have been delayed by the NC General Assembly until 2024.
- Costs related to the planned OSHA Consultation Services Audit and Crisis Management projects to be managed by the new Safety and Risk Manager will be included in the FY 2019 Budget.
- Equipment that would allow us to analyze water for taste and odor compounds will likely be proposed in the capital equipment budget. Additionally, the operating budget would include a new Lab Analyst position to operate the equipment.
- A vehicle for use in controlling sediment during water main break events will also likely be included in the capital equipment budget.
- The draft operating budget includes funding for a new Lab Analyst position to help meet increased demands on the Water Treatment Plant's lab operation.

Budget and rate setting process next steps:

Public hearings on the budget and rates are tentatively scheduled for May 24, 2018. A final budget and proposed rate schedule are tentatively scheduled to be presented for approval at the Board work session on June 14, 2018.

1. Staff will present a revised (if necessary) detailed draft of the operating budget, a draft of the 5-year CIP budget, and rate adjustment alternatives at the Board's March 22 meeting.
2. Staff will incorporate feedback from the March 8 and March 22 Board meetings into the budget and financial plan.
3. Staff anticipates presenting an updated draft of the FY 2019 budget to the Board of Directors on April 12 in advance of the public hearings.
4. Staff will prepare a revised (if necessary) draft of the FY 2019 budget and rate adjustment recommendation for presentation at public hearings tentatively scheduled for May 24.
5. At the public hearings, the Board will receive and consider comments from customers and other stakeholders.
6. After considering public input, the Board of Directors will discuss and provide guidance to staff on the final draft of the FY 2019 budget and rate adjustment recommendation.
7. Staff will finalize the FY 2019 budget and rate adjustment recommendation and is scheduled to present it for adoption by the Board of Directors at its meeting on June 14, 2018.

Action requested:

Review the draft FY 2019 budget information and provide guidance.

Information:

Attachment 1 – Table 1 shows a summary of how the draft FY 2019 operating budget compares to FY 2016 and 2017 actual results, FY 2018 budget and forecast, and the FY 2019 budget projection included in last year's financial plan.

Attachment 1 – Table 2 shows details of the draft operating budget with comparative information.

Attachment 1 – Table 3 shows details of the draft professional services budget.

Attachment 2 – Graphs of long-term trends of select financial data.

	FY16 Actual	FY17 Actual	FY18 Budget	FY18 Forecast	FY19 Budget	FY19 Amounts in last year's model	FY19 Budget Compared to FY18 Forecast	FY19 Budget Compared to FY18 Budget	FY19 Budget compared to amount in last year's model
Operating Expenses	19,793,818	20,998,593	21,916,977	21,625,941	22,817,224	22,703,460	5.5%	4.1%	0.5%
Capital Equipment	332,252	1,724,456	1,231,100	1,231,100	TBD	900,000			
CIP	7,538,017	9,692,697	15,085,000	18,900,000	TBD	23,189,000			
Total	27,664,087	32,415,746	38,233,077	41,757,041	22,817,224	46,792,460			

Assumptions include:

1	4% combined merit and COLA wage increase
2	10% health and dental insurance increase
3	New Safety and Risk Manager position in HR - budget increase for difference in wages between Accounting Tech II position which was reclassified to HR Safety Manager
4	New Communications and Community Relations Officer (CCRO) position in Admin - budget increase for difference in wages between Public Affairs Administrator position which was reclassified to CCRO
5	Two senior Maintenance Mechanic positions moved from the Water Treatment Plant to the Distribution Dept.
6	One new Lab Analyst
7	2.5% vacancy allowance
8	135 funded positions
9	140 authorized positions

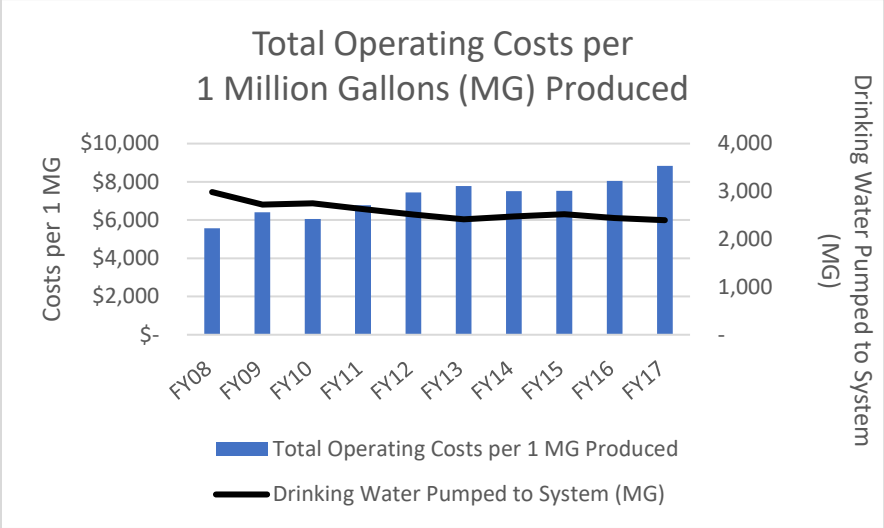
EXPENDITURE CLASSIFICATION	FY 2016 Actual	FY 2017 Actual	FY 2018 Budget	FY 2018 Forecast (as of Nov. 2017)	FY 2019 Budget Request	Dollar variance FY19 v FY18 Budgets	Percent variance FY19 v FY18 Budgets	Dollar variance FY19 Budget v FY18 Forecast	Percent variance FY19 Budget v FY18 Forecast
SALARIES									
SALARIES AND WAGES, REGULAR	7,343,784	7,564,689	7,773,625	7,672,635	8,161,052	387,427	5.0%	488,417	6.4%
SALARIES AND WAGES, OVERTIME	267,684	339,115	276,200	257,283	295,620	19,420	7.0%	38,337	14.9%
STANDBY PAY	44,116	48,427	43,780	45,043	44,627	847	1.9%	(416)	-0.9%
PART-TIME	80,194	158,427	144,912	107,941	93,606	(51,306)	-35.4%	(14,335)	-13.3%
PER DIEM	12,750	11,550	15,000	15,200	-	(15,000)	-100.0%	(15,200)	-100.0%
Total	7,748,528	8,122,208	8,253,517	8,098,103	8,594,906	341,389	4.1%	496,803	6.1%
PAYROLL TAXES AND EMPLOYEE BENEFITS									
FICA	569,007	619,190	606,091	610,101	635,162	29,071	4.8%	25,061	4.1%
RETIREMENT CONTRIBUTION	510,261	598,985	597,971	590,154	627,773	29,802	5.0%	37,619	6.4%
DEFERRED COMPENSATION	180,045	187,565	181,480	176,227	170,560	(10,920)	-6.0%	(5,667)	-3.2%
WORKERS COMPENSATION	158,241	173,042	121,680	152,532	123,735	2,054	1.7%	(28,797)	-18.9%
HEALTH INSURANCE	1,631,609	1,654,664	2,059,404	2,034,552	2,211,429	152,025	7.4%	176,877	8.7%
DENTAL INSURANCE	53,429	46,651	55,630	55,639	55,563	(67)	-0.1%	(76)	-0.1%
VISION INSURANCE	31,120	34,411	40,000	32,631	35,000	(5,000)	-12.5%	2,369	7.3%
WELLNESS PROFRA REIMBURSEMENT	2,421	2,074	2,300	2,339	2,400	100	4.3%	61	2.6%
RETIREES & COBRA INSURANCE	209,881	198,402	213,773	208,085	211,406	(2,367)	-1.1%	3,320	1.6%
DISABILITY INSURANCE	33,045	33,833	36,732	36,155	36,843	111	0.3%	688	1.9%
AUTOMOBILE ALLOWANCE	6,500	6,750	6,000	6,000	6,000	-	0.0%	-	0.0%
UNEMPLOYMENT TAX	1,486	1,968	15,000	15,000	10,000	(5,000)	-33.3%	(5,000)	-33.3%
UNIFORMS	59,251	61,126	57,183	58,238	55,343	(1,840)	-3.2%	(2,895)	-5.0%
GROUP LIFE & A.D. & D.	39,488	41,128	7,336	18,962	42,859	35,522	484.2%	23,896	126.0%
VACATION ACCRUED	-	10,975	-	-	-	-		-	
Total	3,485,784	3,670,764	4,000,581	3,996,615	4,224,073	223,492	5.6%	227,457	5.7%
UTILITIES									
ELECTRICITY	1,075,156	1,148,288	1,146,420	1,135,171	1,150,645	4,224	0.4%	15,474	1.4%
TELEPHONE - LOCAL	110,729	106,991	110,400	124,636	125,440	15,040	13.6%	804	0.6%
CELL PHONES	50,733	53,441	58,100	58,100	61,300	3,200	5.5%	3,200	5.5%
FUEL	92,311	108,750	68,525	80,539	69,976	1,451	2.1%	(10,563)	-13.1%
WASTE DISPOSAL	534,314	253,596	305,030	299,202	289,430	(15,600)	-5.1%	(9,772)	-3.3%
Total	1,863,243	1,671,066	1,688,475	1,697,648	1,696,791	8,316	0.5%	(858)	-0.1%
MATERIALS AND SUPPLIES									
CHEMICALS	1,888,609	2,190,143	2,104,897	2,115,738	2,235,122	130,225	6.2%	119,383	5.6%
LAND APPLICATION	25,265	54,340	50,000	34,451	50,000	-	0.0%	15,549	45.1%
SMALL TOOLS	31,586	16,269	25,155	27,622	22,371	(2,784)	-11.1%	(5,251)	-19.0%
SUBSCRIPTIONS	1,160	1,510	2,425	2,190	1,765	(660)	-27.2%	(425)	-19.4%
LAKE SUPPLIES	25,485	21,340	59,328	61,480	35,060	(24,268)	-40.9%	(26,420)	-43.0%
FUEL - VEHICLES	95,950	118,980	151,118	162,957	165,555	14,437	9.6%	2,598	1.6%
OFFICE SUPPLIES	37,323	34,923	43,375	37,596	46,660	3,285	7.6%	9,064	24.1%
COMPUTER EQUIPMENT & PARTS	73,146	90,410	87,700	97,448	87,300	(400)	-0.5%	(10,148)	-10.4%

EXPENDITURE CLASSIFICATION	FY 2016 Actual	FY 2017 Actual	FY 2018 Budget	FY 2018 Forecast (as of Nov. 2017)	FY 2019 Budget Request		Dollar variance FY19 v FY18 Budgets	Percent variance FY19 v FY18 Budgets		Dollar variance FY19 Budget v FY18 Forecast	Percent variance FY19 Budget v FY18 Forecast
LABORATORY EXPENSES	229,663	233,071	215,343	224,460	240,214		24,871	11.5%		15,754	7.0%
SAFETY SUPPLIES	48,336	59,565	61,685	64,282	87,933		26,248	42.6%		23,651	36.8%
OTHER	26,168	24,967	24,650	24,303	21,400		(3,250)	-13.2%		(2,903)	-11.9%
Total	2,482,691	2,845,518	2,825,676	2,852,528	2,993,380		167,704	5.9%		140,852	4.9%
MAINTENANCE											
MAINTENANCE - EQUIPMENT	890,594	1,235,063	1,002,625	967,917	1,002,665		40	0.0%		34,748	3.6%
MAINTENANCE - PUMPING EQUIPMENT	189,510	336,492	369,450	340,717	384,225		14,775	4.0%		43,508	12.8%
MAINTENANCE - RESERVOIR & TANK	148,619	153,520	170,900	168,663	194,500		23,600	13.8%		25,837	15.3%
FACILITIES	41,135	8,435	32,300	51,338	32,300		-	0.0%		(19,038)	-37.1%
BUILDINGS	311,601	263,700	302,725	307,178	293,225		(9,500)	-3.1%		(13,953)	-4.5%
MAINTENANCE - MAINS	331,460	465,747	434,400	493,223	437,800		3,400	0.8%		(55,423)	-11.2%
MAINTENANCE - METERS	295,046	162,006	439,790	309,495	341,900		(97,890)	-22.3%		32,405	10.5%
MAINTENANCE - HYDRANTS	18,733	37,695	23,925	23,845	24,625		700	2.9%		780	3.3%
MAINTENANCE - SERVICE LINES	61,035	83,280	67,584	89,947	76,195		8,611	12.7%		(13,752)	-15.3%
GROUNDS	81,547	75,289	82,000	93,398	87,000		5,000	6.1%		(6,398)	-6.8%
MOTOR VEHICLES	177,781	201,735	185,500	174,169	186,000		500	0.3%		11,831	6.8%
Total	2,547,061	3,022,962	3,111,199	3,019,889	3,060,435		(50,763)	-1.6%		40,546	1.3%
PROFESSIONAL SERVICES											
LEGAL	258,420	280,300	240,000	240,800	240,000		-	0.0%		(800)	-0.3%
ACCOUNTING	23,688	38,263	32,000	32,000	32,000		-	0.0%		-	0.0%
ENGINEERING	1,550	970	12,500	8,984	7,500		(5,000)	-40.0%		(1,484)	-16.5%
INSURANCE	232,405	230,788	225,798	223,422	228,800		3,002	1.3%		5,378	2.4%
COLLECTION SERVICES	35,468	34,624	40,000	36,833	40,000		-	0.0%		3,167	8.6%
CONSULTANTS	514,344	583,364	602,700	557,386	733,500		130,800	21.7%		176,114	31.6%
FINANCIAL SERVICES	251,042	233,949	267,100	259,159	253,877		(13,223)	-5.0%		(5,282)	-2.0%
TRUSTEE SERVICES	17,050	11,561	29,350	14,628	20,000		(9,350)	-31.9%		5,372	36.7%
OTHER	61,025	61,859	85,000	85,015	86,000		1,000	1.2%		985	1.2%
Total	1,394,992	1,475,678	1,534,448	1,458,227	1,641,677		107,228	7.0%		183,450	12.6%
COMMUNICATIONS											
POSTAGE AND FREIGHT	105,815	79,590	112,800	111,649	113,200		400	0.4%		1,551	1.4%
CUSTOMER INFORMATION	29,162	41,575	24,387	22,396	25,387		1,000	4.1%		2,991	13.4%
ADVERTISING	30,952	36,924	28,950	30,030	35,950		7,000	24.2%		5,920	19.7%
OTHER	4,160	5,000	4,950	4,870	8,950		4,000	80.8%		4,080	83.8%
Total	170,089	163,089	171,087	168,945	183,487		12,400	7.2%		14,542	8.6%
PRINTING AND REPRODUCTION											
PRINTING AND REPRODUCTION	7,293	7,980	14,000	13,878	10,850		(3,150)	-22.5%		(3,028)	-21.8%
Total	7,293	7,980	14,000	13,878	10,850		(3,150)	-22.5%		(3,028)	-21.8%
EDUCATION AND DEVELOPMENT											

EXPENDITURE CLASSIFICATION	FY 2016 Actual	FY 2017 Actual	FY 2018 Budget	FY 2018 Forecast (as of Nov. 2017)	FY 2019 Budget Request	Dollar variance FY19 v FY18 Budgets	Percent variance FY19 v FY18 Budgets	Dollar variance FY19 Budget v FY18 Forecast	Percent variance FY19 Budget v FY18 Forecast
EDUCATION AND DEVELOPMENT	105,541	103,681	154,475	153,509	173,830	19,355	12.5%	20,321	13.2%
BOARD TRAVEL	-	-	-	300	-	-		(300)	-100.0%
Total	105,541	103,681	154,475	153,809	173,830	19,355	12.5%	20,021	13.0%
MISCELLANEOUS									
DUES AND MEMBERSHIPS	43,110	37,770	141,531	141,290	147,383	5,852	4.1%	6,093	4.3%
CONSERVATION	1,459	3,703	6,000	6,000	6,000	-	0.0%	-	0.0%
EASEMENTS			-	1,000	6,000	6,000		5,000	500.0%
OVERAGES AND SHORTAGES	167	(486)	-	-	-	-		-	
UNCOLLECTABLE ACCOUNTS	23,197	27,717	30,000	30,098	30,000	-	0.0%	(98)	-0.3%
RENT AND LEASES	59,351	66,171	62,838	64,718	113,163	50,325	80.1%	48,445	74.9%
FOREST MANAGEMENT	43,960	(560)	8,200	14,169	12,000	3,800	46.3%	(2,169)	-15.3%
BOARD EXPENSES	2,743	3,378	4,500	4,558	7,000	2,500	55.6%	2,442	53.6%
RECRUITMENT	1,787	-	4,000	3,299	4,000	-	0.0%	701	21.3%
OTHER	45,443	60,227	69,950	81,769	72,250	2,300	3.3%	(9,519)	-11.6%
Total	221,217	197,920	327,019	346,900	397,796	70,777	21.6%	50,896	14.7%
Total Personnel Services	11,234,312	11,792,972	12,254,098	12,094,718	12,818,979	564,880	4.6%	724,261	6.0%
Total Operating Services	8,792,127	9,487,894	9,826,379	9,711,826	10,158,246	331,867	3.4%	446,420	4.6%
Total Operating and Maintenance	20,026,439	21,280,866	22,080,477	21,806,543	22,977,224	896,747	4.1%	1,170,681	5.4%
CONSTRUCTION CREDIT	(232,621)	(282,273)	(163,500)	(180,603)	(160,000)	3,500	-2.1%	20,603	-11.4%
Net	19,793,818	20,998,593	21,916,977	21,625,941	22,817,224	900,247	4.1%	1,191,283	5.5%

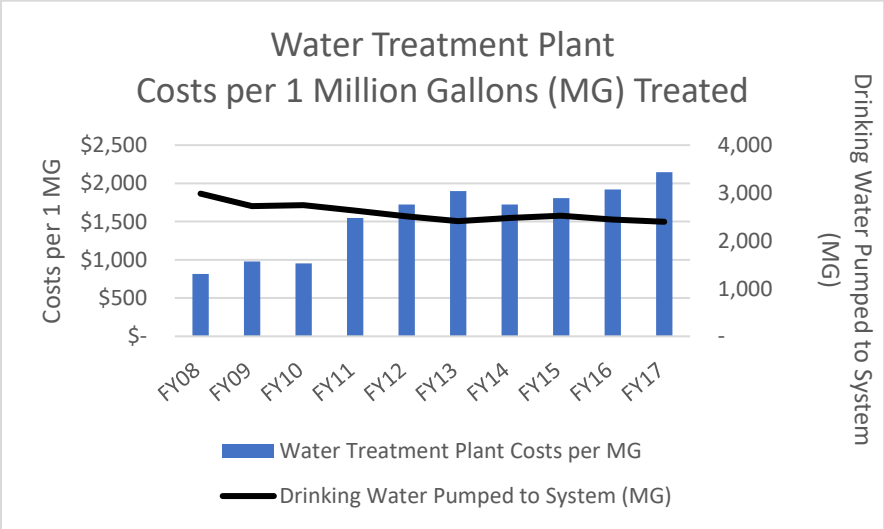
Item No.	Description	Dept	FY19 Draft Budget	FY18 Budget	Notes
1	Legal	Executive Director	240,000	240,000	
2	Insurance-Public Officials	Executive Director	26,000	25,319	
3	Energy Management Plan	Executive Director	30,000	15,000	
4	Diversity and Inclusion Program	Executive Director	-	150,000	Funding program through HR Department in FY 2019
5	Interpreter service for hearing impaired	Executive Director	1,000	1,000	
6	Miscellaneous	Executive Director	2,000		
7	Insurance-Property & Casualty	Executive Director, WTP, WWTP, Distribution, Collection	202,800	200,479	
8	Credit checks, collection fees	Customer Service	40,000	40,000	
9	Miscellaneous survey work - easement surveys, boundary surveys, manholes, etc.	Engineering and Planning	7,500	7,500	
10	Miscellaneous easement acquisition	Engineering and Planning		5,000	Moved to a new account so it can be tracked separately
11	Recurring annual membership payment to the Jordan Lake Partnership	Engineering and Planning	22,000	17,500	
12	Long-Range Water Supply Plan (LRWSP) - update	Engineering and Planning	133,000	60,000	
13	LRWSP - climate change (ongoing USC/Hazen work)	Engineering and Planning		5,000	
14	LRWSP and conservation plan - graphics support, videos, public education materials, meeting facilitation	Engineering and Planning	15,000		
15	Water and sewer capacity evaluations for new developments	Engineering and Planning	10,000	10,000	
16	Hill, Chesson and Woody	Human Resources	60,000	57,200	
17	Frank Horton and Associates (Employee Assistance Program)	Human Resources	4,500	4,000	
18	Envirosafe (safety consulting (audits of facilities, programs) and safety training services)	Human Resources	52,500	52,500	
19	HR department - administrative support	Human Resources	15,000	15,000	
20	South Orange Technical Rescue	Human Resources	6,500	6,500	
21	Diversity/employee development training programs	Human Resources	100,000	-	
22	Other (fit for drug screens, fitness for duty testing, background investigations, etc.)	Human Resources	64,000	64,000	
23	Compliance Training (Sexual Harassment)	Human Resources	20,000		
24	Core Training (per Diversity and Inclusion Program plan)	Human Resources	20,000		
25	Annual financial audit	Finance	32,000	32,000	
26	Annual rate revenue sufficiency study (Burton & Associates)	Finance	50,000	50,000	
27	Trustee services, Rating agency fees, variable rate bond arrangements, credit card processing, bank fees	Finance	273,877	296,450	
28	Payroll processing (ADP)	Finance	24,000	24,000	
29	Cabling	IT	15,000	15,000	
30	Network vulnerability assessment	IT	60,000	60,000	Project was planned for FY 2018 but has been delayed until FY 2019
31	Cloud-hosted VoIP Planning and Design	IT	30,000	30,000	Project was planned for FY 2018 but has been delayed until FY 2019
32	Dynamics/Cogsdale	IT	10,000	10,000	
33	Update operations and maintenance manual	Water Treatment and Supply	50,000	30,000	
34	Taste and Odor panel training	Water Treatment and Supply	13,000		
35	Orange Grove Fire Department	Water Treatment and Supply	12,000	11,000	
	Total		1,641,677	1,534,448	

The following graphs are provided to assist in analyzing the draft budget for FY 2019. Graphs 1 through 3 show select operating costs on a cost per one million gallons of water or wastewater treated basis.



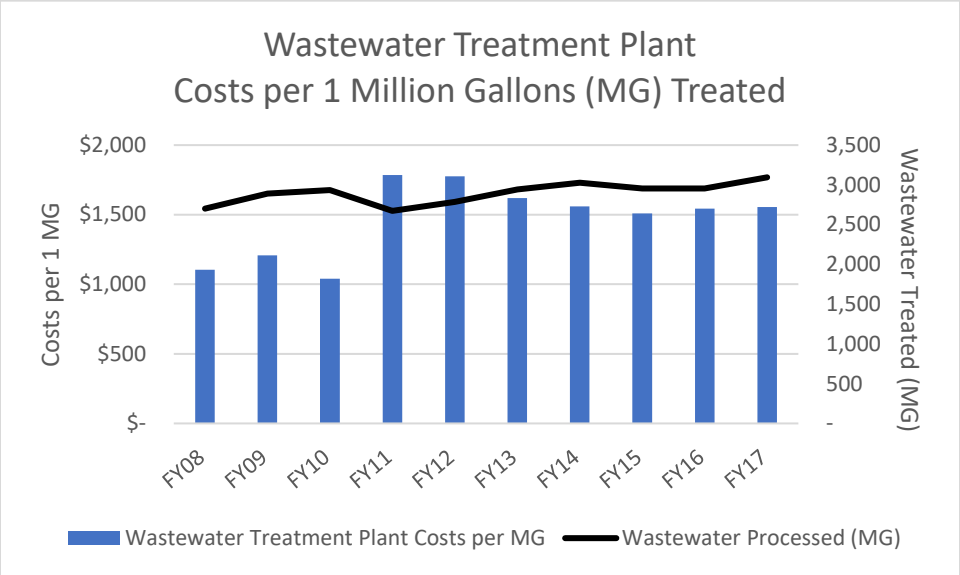
Graph 1

Graph 1 shows a fairly steady decline in the amount of drinking water pumped to the system over the last 10 years. Total operating costs increased from about $16.6 million in FY08 to about $21.2 million in FY17. Therefore, *Costs per One Million Gallons* (MG) of drinking water pumped to the system have increased. All operating costs, including general and administrative, are included in *Costs per 1 MG*. The draft FY19 Budget includes total operating costs of approximately $22.7 million.



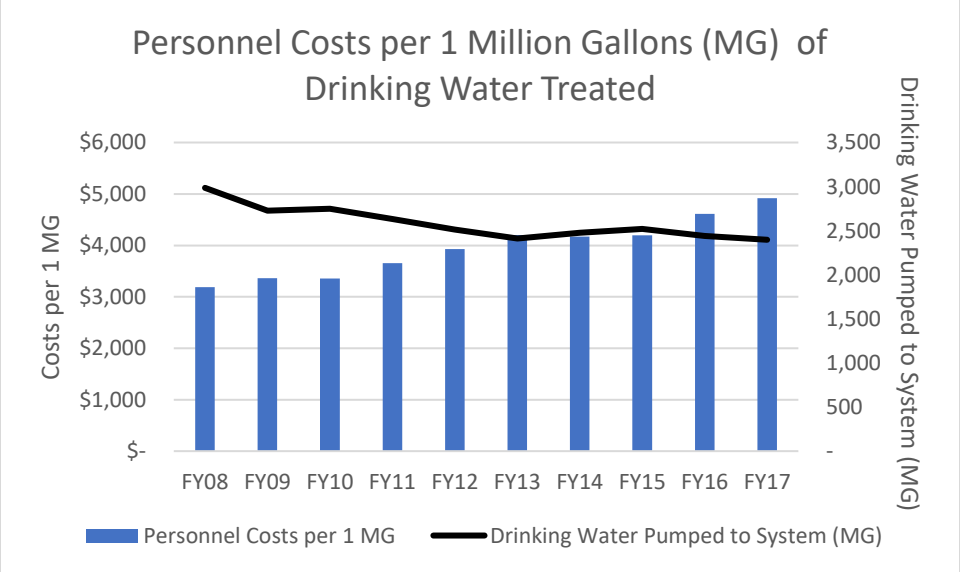
Graph 2

Graph 2 shows the same trend in drinking water pumped to the system. However, only Water Treatment Plant costs are included in *Costs per 1 MG*. Total Water Treatment Plant costs roughly doubled from about $2.4 million in FY08 to $5.1 million in FY17.



Graph 3

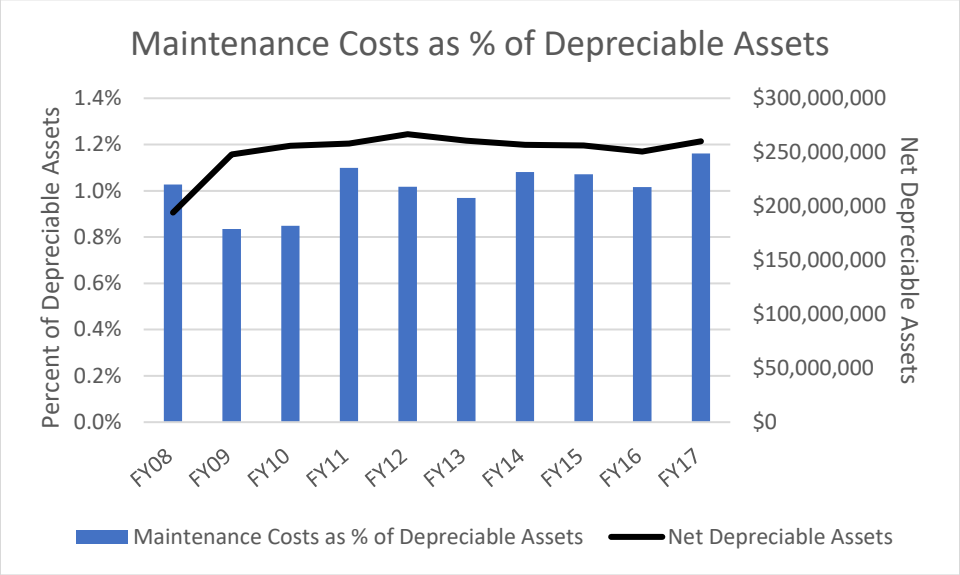
Graph 3 shows the operating costs trend for wastewater processed. Only Wastewater Treatment Plant costs are included in *Costs per 1 MG*. Total Wastewater Treatment Plant costs increased from about $3 million in FY08 to about $4.8 million in FY17.



Graph 4

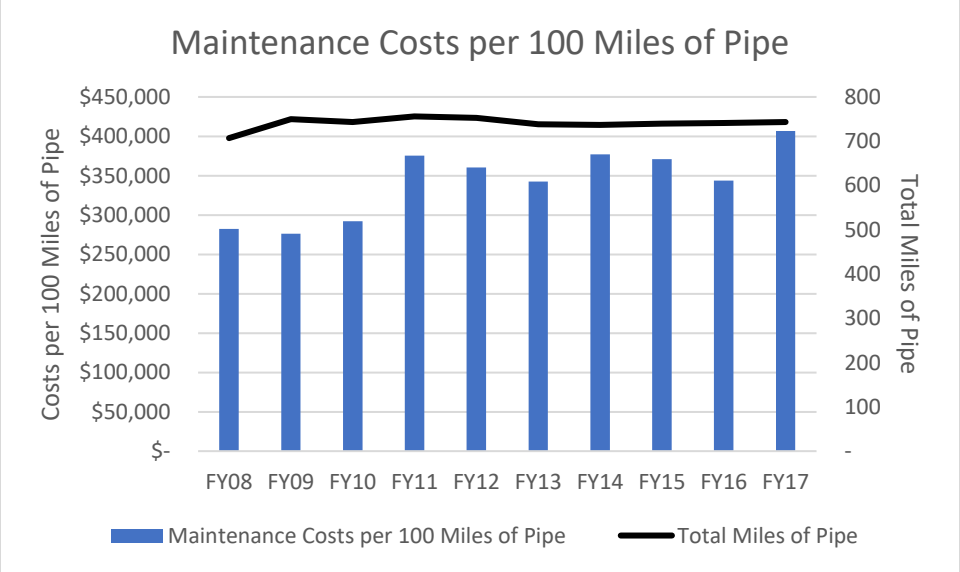
Graph 4 shows the trend in overall personnel costs per 1 MG of drinking water pumped to the system. Personnel costs increased from about $9.5 million in FY08 to about $11.8 million in FY17.

Graphs 5 and 6 show overall maintenance costs trends.



Graph 5

Graph 5 shows total maintenance costs as a percentage of depreciable assets (essentially assets other than land). Total maintenance costs were almost $2 million in FY08 and $3 million in FY17.



Graph 6

Graph 6 again shows total maintenance costs but on a *Cost per 100 Miles of Pipe* basis.

Agenda Item 6:

Review Board Work Schedule

Purpose:

a) Request(s) by Board Committees, Board Members and Staff
b) March 22, 2018 Board Meeting
c) April 12, 2018 Work Session
d) Review and update the 12 Month Board Meeting Schedule
e) Review Pending Key Staff Action Items

Information:

- Draft agenda for the March 22, 2018 meeting
- Draft agenda for the April 12, 2018 meeting
- 12 Month Board Meeting Schedule
- Pending Key Staff Action Items from Board Meetings

March 8, 2018

Agenda
Meeting of the OWASA Board of Directors
Thursday, March 22, 2018, 7:00 P.M.
Chapel Hill Town Hall

In compliance with the "Americans with Disabilities Act," interpreter services are available with five days prior notice. If you need this assistance, please contact the Clerk to the Board at 919-537-4217 or aorbich@owasa.org.

The Board of Directors appreciates and invites the public to attend and observe its meetings. Public comment is invited either by petition upon topics not on the Board's agenda, or by comments upon items appearing on the Board's agenda. Speakers are invited to submit more detailed comments via written materials, ideally submitted at least three days in advance of the meeting to the Clerk to the Board via email or US Postal Service (aorbich@owasa.org/400 Jones Ferry Road, Carrboro, NC 27510).

Public speakers are encouraged to organize their remarks for delivery within a four-minute time frame allowed each speaker, unless otherwise determined by the Board of Directors.

Announcements

1. Announcements by the Chair
   A. Any Board Member who knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight is asked to disclose the same at this time.
2. Announcements by Board Members
   A. Update on the March 19, 2018 Human Resources Committee Meeting (Barbara Foushee)
3. Announcements by Staff

Petitions and Requests

1. Public
2. Board
3. Staff

Consent Agenda

Information and Reports

1. 12 Month Board Meeting Schedule (Robert Morgan/Ed Kerwin)

Action

2. Minutes of the February 22, 2018 Meeting of the Board of Directors (Andrea Orbich)
3. Minutes of the March 8, 2018 Closed Session of the Board of Directors for the Purpose of Discussing a Personnel Matter (Barbara Foushee)

Regular Agenda

Discussion

4. Review Fiscal Year 2019 Draft Budget Information and Proposed Staff Rate Adjustment Recommendation (Stephen Winters)

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Discussion and Action

5. Resolution Setting the Date of May 24, 2018 for a Public Hearing on Proposed Fiscal Year 2019 Budget (Stephen Winters)
6. Resolution Setting the Date of May 24, 2018 for a Public Hearing on Proposed Revisions to OWASA's Schedule of Rates, Fees and Charges (Stephen Winters)
7. (Tentative) Adopt Series Resolutions for Bond Refunding (Stephen Winters)
8. Resolution to Approve Selection and Procurement of Wastewater Treatment Plant Solids Thickening Equipment (Simon Lobdell)

Summary of Board Meeting Action Items

9. Executive Director will summarize the key action items from the Board meeting and note significant items for discussion and/or action expected at the next meeting

Closed Session

10. The Board of Directors will convene in a Closed Session for the Purpose of Discussing a Personnel Matter (Barbara Foushee)

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Agenda
Work Session of the OWASA Board of Directors
Thursday, April 12, 2018, 6:00 P.M.
OWASA Community Room

The Board of Directors appreciates and invites the public to attend and observe its meetings. For the Board's Work Session, public comments are invited on only items appearing on this agenda. Speakers are invited to submit more detailed comments via written materials, ideally submitted at least three days in advance of the meeting to the Clerk to the Board via email or US Postal Service (aorbich@owasa.org/400 Jones Ferry Road, Carrboro, NC 27510).

For items on the agenda, public speakers are encouraged to organize their remarks for delivery within a four-minute time frame allowed each speaker, unless otherwise determined by the Board of Directors.

The Board may take action on any item on the agenda.

Announcements

a. Announcements by the Chair
   - Any Board Member who knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight is asked to disclose the same at this time.

b. Announcements by Board Members

c. Announcements by Staff

Consent Agenda

Action

1. Minutes of the March 22, 2018 Meeting of the Board of Directors (Andrea Orbich)
2. Minutes of the March 22, 2018 Closed Session of the Board of Directors for the Purpose of Discussing a Personnel Matter (Barbara Foushee)

Regular Agenda

Discussion and Action

3. Resolution Awarding a Construction Contract for the Rogerson Drive Pump Station Phase 2 Project (Simon Lobdell)

Discussion

4. Review Employee Health and Dental Insurance Renewal (Stephanie Glasgow)
5. (Tentative) Discuss Revisions to Retiree Health Insurance for New Hires and 457 Deferred Compensation (Stephanie Glasgow)
6. Status of Action Items on Communications During Emergencies (Ed Kerwin)
7. Review Fiscal Year 2019 Draft Budget Information (Stephen Winters)
8. Review Action Plan for Improvements Identified by Organizational Assessment (Ed Kerwin/Stephanie Glasgow)
9. Appointment of the Nominating Committee (Robert Morgan)
10. Review Board Work Schedule (Robert Morgan/Ed Kerwin)
    a. Request(s) by Board Committees, Board Members and Staff
    b. April 26, 2018 Board Meeting
    c. May 10, 2018 Work Session

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d. 12 Month Board Meeting Schedule
e. Pending Key Staff Action Items

Summary of Work Session Items

11. Executive Director will summarize the key staff action items from the Work Session

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OWASA Board of Directors – 12 Month Board Meeting Schedule (March 2, 2018)

Month	Board Meetings		Committee & Other Meetings and Reports
	Work Session	**Business Meeting**	
March 2018	Discuss and Approve Energy Management Plan Update Continue Discussion on Perfluorinated Compounds FY 19 Draft Budget & Rates ( ) CS - ED Interim Review ( ) 3/8/2018	Selection and Procurement of WWTP Solids Thickening Equipment FY 19 Draft Budget & Rates and authorize staff to publish proposed rates ( ) Set date for Public Hearings – FY 19 Budget & Rates ( ) (Tentative) Adopt Series Resolution for bond refunding CS – ED Interim Review ( ) 3/22/2018	*Human Resources Committee (3/19/2018)*
April 2018	Award the Rogerson Drive Pump Station Phase 2 Contract (Tentative) Discuss Revisions to Retiree Health Insurance for New Hires and 457 Deferred Compensation Review Employee Health and Dental Insurance Renewal ( ) Status of Action Items on Communications During Emergencies FY 19 Draft Budget and Rates ( ) Review Action Plan for Improvements Identified by Organizational Assessment Appointment of the Nominating Committee ( ) 4/12/2018	Q3 Financial Report ( ) Award the WWTP Intermediate Pump Station Rehabilitation Contract Agua Vista Update Discuss Draft Banking RFP 4/26/2018	
May 2018	***(Tentative) Discuss LRWSP – Demands & Yield*** Award the Galvanized Water Main Replacement Contract Approve Employee Health and Dental Insurance Renewal ( ) Discuss Employee Merit Pay for FY 19 ( ) ***Discuss Draft Community Engagement Plan for Forestry Management*** 5/10/2018	Public Hearings – FY 19 Budget and Rates ( ) (Tentative) Budget Amendment for FY 2018 CIP 5/24/2018	*NRTS Committee Meeting to continue discussion of Drought Response Operating Protocol (TBD)*
June 2018	Approve FY 19 Budget and Rates ( ) Election of Officers ( ) (Tentative) Review Draft WTP & WWTP Reliability and Risk Assessment Report 6/14/2018	TBD 6/28/2018	
July 2018	Award the Pritchard Avenue Water Main Construction Contract 7/12/2018	TBD 7/26/2018	
August 2018	TBD 8/9/2018	Award the WWTP Solids Thickening Construction Contract Preliminary 12 Month Financial Report ( ) CIP Semiannual Report ( ) (Tentative) Discuss AMI Policies (other than manual read) CS – General Counsel Review ( ) 8/23/2018	
September 2018	EEO/Affirmative Action Report ( ) Annual Report on Disposal of Surplus Personal Property ( ) Review Updated Implementation Plan for D&I Program	Annual Report and Financial Audit ( ) Approve General Counsel Engagement ( ) CS – ED Review ( )	

Current and Pending Key Projects and Stages – in ***bold italics***

OWASA Board of Directors – 12 Month Board Meeting Schedule (March 2, 2018)

	Discuss Action Plan from WTP/WWTP Reliability and Risk Assessment Project Discuss KPI Deep Dive on Water Loss and Non-Revenue Water CS – General Counsel Review ↻ 9/13/2018	9/27/2018	
October 2018	CS – ED Review ↻ 10/11/2018	Q1 Financial Report ↻ Strategic Trends Report and Strategic Plan Update ↻ 10/25/2018	
November 2018	TBD 11/8/2018	*Holiday - no meeting*	
December 2018	TBD 12/13/2018	*Holiday - no meeting*	
January 2019	Employee Health and Dental Insurance Update ↻ Appoint Audit Firm ↻ Affordability Outreach Program Plan Update 1/10/2019	Annual Lakes Recreation Report ↻ CIP Semiannual Report ↻ Q2 Financial Report ↻ FY 20 Budget Calendar and Assumptions ↻ 1/24/2019	
February 2019	CS - General Counsel Interim Review ↻ 2/14/2019	CS - General Counsel Interim Review ↻ 2/28/2019	

The 12 Month Board Meeting Schedule shows Strategic Plan initiatives and other priority efforts that the Board and staff plan to give greatest consideration to during the next twelve months. The schedule also shows major recurring agenda items that require Board action, or items that have been scheduled in response to the Board's prior standing request. This schedule does not show all the items the Board may consider in a work session or business meeting. It also does not reflect meetings at which the Board will discuss and act on the update of the Strategic Plan.

The 12 Month Board Meeting Schedule will be reviewed and updated at each monthly work session and may also be discussed and updated at the Board's business meetings.

In addition to the initiatives shown in this schedule, staff will be working on other Strategic Plan and organizational priorities that are not expected to require major additional discussion with the Board except as part of budget deliberations.

The schedule implies that the following Strategic Plan initiatives would be addressed beyond the 12-month period. The Board may conclude that one or more of the following initiatives are higher priority. The schedule will be revised as needed to reflect the Board's priorities, and any additional initiatives that the Board may decide to address.

- Development of a plan and policy framework for OWASA lands is considered a longer-term priority. The NRTS Committee discussed this issue in September 2017 and determined it was lower priority than Forestry Management. Staff will develop a Community Engagement Plan for Forestry Management by June 2018, and currently plan to present a draft in May 2018.
- Improve effectiveness as a learning organization is considered a longer-term priority.
- Water Conservation Plan will be prepared concurrent with update of the Long-Range Water Supply Plan.

The OWASA Board determines which topics it wants to explore as a full Board (potentially in a work session format) and which topics it wants to assign to Board committees or committee chairs for further analysis and development of recommendations. Board also determines priorities and desired timeframes for addressing topics. Committee meetings will be updated on the schedule routinely.

OWASA Board of Directors – 12 Month Board Meeting Schedule (March 2, 2018)

Abbreviations Used in Draft Schedule:

( )	Recurring agenda item (generally these are "required" items)
AMI	Advanced Metering Infrastructure
CE	Community Engagement
CEP	Community Engagement Plan
CIP	Capital Improvements Program
COLA	Cost of Labor Adjustment
CS	Closed Session of the Board
CY	Calendar Year
D&I	Diversity and Inclusion
ED	Executive Director
FY	Fiscal Year
JLP	Jordan Lake Partnership
LRWSP	Long-Range Water Supply Plan
MST	Mountains-to-Sea Trail
MFMM	Multi-Family Master Meter
NRTS	Natural Resources and Technical Services
Q	Quarter
SOW	Scope of Work
TBD	To Be Determined
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Current and Pending Key Projects and Stages

Project	Strategic Initiative	Project Lead	Mar-18	Apr-18	May-18	June-18	July-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19
AMI	6	Taylor												
LRWSP	1	Rouse			Demand & Yield									
Energy Plan	5	Tiger												

Stages	Committee Discussion	Feasibility Study	Board Review	Community Engagement	Action	Procurement	Implementation

Pending Key Staff Action Items from Board Meetings

No.	Date	Action Item	Target Board Meeting Date	Person(s) Responsible	Status
1.	2-22-2018	Clarify debt service comparison information as it relates to low-interest loan offers from the State of North Carolina.	NA	Winters	Complete – email to the BOD on 2-28-2018
2.	2-22-2018	Provide information regarding any on-going monitoring of Jordan Lake for perfluorinated compounds.	NA	Harrold	Complete – email to the BOD on 2-23-2018
3.	2-22-2018	Provide information on if the EPA considers synergistic effects of multiple compounds when evaluating health risks.	NA	Harrold	Complete – email to the BOD on 2-28-2018
4.	2-8-2018 and 2-22-2018	Provide Board and public an update on Agua Vista (AMI) including financial performance data.	4-26-2018	Taylor	
5.	2-8-2018	Provide Board an outline and overview of staff's work to prepare a Community Engagement Plan (CEP) for forestry management in advance of the draft CEP the Board will discuss on May 10, 2018.	5-10-2018	Rouse	
6.	2-8-2018	Address various Board member suggestions on affordability outreach program to include Care-To-Share	NA	Tiger	
7.	1-25-2018	Incorporate Board Members suggestions in the next CIP report.	8-23-2018	Gangadharan	
8.	1-25-2018	Consider an Open House and other opportunities to attract greater MWBE participation in bidding construction projects.	NA	Gangadharan	
9.	1-11-2018	Provide Board a brief on state of art methods to determine water main condition.	NA	Gangadharan	
10.	11-9-2017	Address Board member feedback on Strategic Trends Report for next year.	10-25-2018	Rouse	
11.	10-12-2017	Schedule future Board discussion about low-flow benchmarks to be used once AMI is implemented.	TBD	Winters Taylor	To be scheduled in summer or fall of 2018
12.	9-14-2017	Issue request for qualifications in the spring of 2018 for banking services and seek the Board's input on the criteria to be considered in selecting the best-qualified bank.	4-26-2018	Winters	To occur in Spring 2018.

Pending Key Staff Action Items from Board Meetings

No.	Date	Action Item	Target Board Meeting Date	Person(s) Responsible	Status
13.	5-25-2017	Prepare a Community Engagement Plan for Forestry Management.	5-10-2018	Rouse	