Better Buildings®
U.S. DEPARTMENT OF ENERGY

Leveraging Partnerships to Accelerate Energy Efficiency Improvement: Wastewater Treatment

Wednesday
9:30-12:30pm
Sapna Gheewala

U.S. DEPARTMENT OF ENERGY

Panelists

- Moderator
  - Sapna Gheewala, U.S. Department of Energy
  - Charles Satterfield, U.S. Department of Energy

- **Partnerships Discussion**
  - **Megan Levy, State of Wisconsin**
  - **Adam Zoet, State of Minnesota**
  - **Jose Cueto, Miami-Dade County, FL**
  - **Grace Richardson, Alexandria Renew Enterprises**

- Tools Discussion
  - Megan Levy, State of Wisconsin
  - Adam Zoet, State of Minnesota
  - Jose Cueto, Miami-Dade County, FL
  - Grace Richardson, Alexandria Renew Enterprises
  - Jay Wrobel, U.S. Department of Energy
  - Michael Muller, Rutgers University

Megan Levy

State of Wisconsin

U.S. DEPARTMENT OF ENERGY

Tracking Energy Use in Wisconsin's Wastewater Treatment Plants

Justifying investments in critical infrastructure in Wisconsin

Megan Levy

Local Energy Programs Manager

608-266-5054

Megan.levy@Wisconsin.gov

OEI

Wisconsin Office of Energy Innovation

Presentation Contents

- Office of Energy Innovation Introduction
- Partnership with WDNR
- Focus on Energy Overview
- Wastewater Bridge Overview (Partnership between OEI & Focus)
- Tracking Energy Use- WI's tool
- Resources

OEI – the energy office of many names

Office of Energy Innovation f/k/a State Energy Office f/k/a Office of Energy Independence

- Since 2015 Act 55 moved the energy office, OEI is housed at the Public Service Commission of Wisconsin (PSC)
- Since the 1970's every state and 6 territories have had an energy office
- 100% Federally funded, statutory responsibility to prepare for energy emergency and serve WI

WISCONSIN DEPT. OF NATURAL RESOURCES

OEI

www.stateenergyoffice.wi.gov

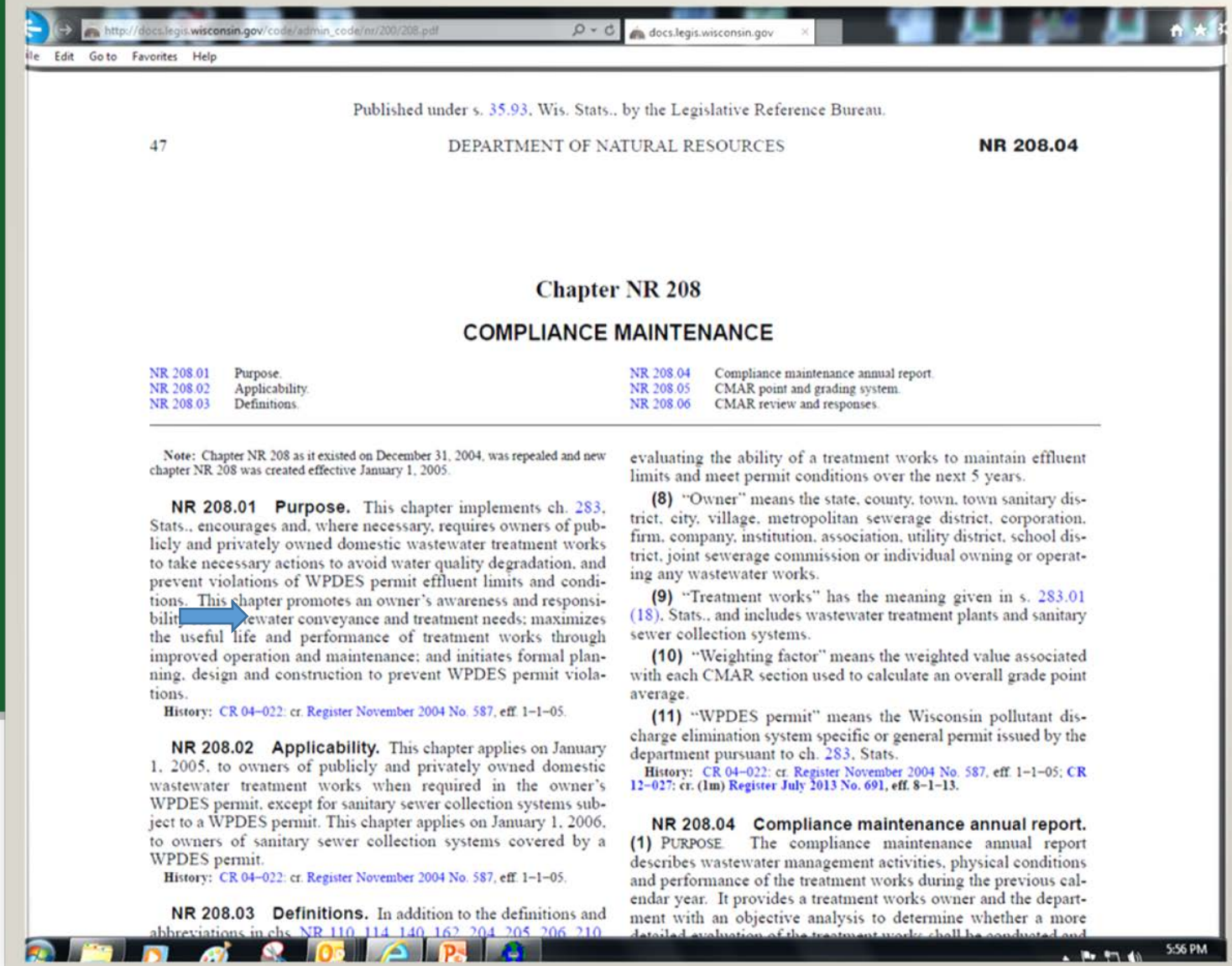
OEI – the energy office of many names

OEI, who are we continued. . .

- Now OEI and Focus on Energy are partners (back to the future)
- OEI MEETAP program (Municipal Energy Efficiency Technical Assistance Program) works with schools and municipal entities to create energy use baseline and identify projects.
- MEETAP compliments Focus Ag, Schools, &Gov. program

OEI Partnered with the WDNR

First Step: Check the code!



http://docs.legis.wisconsin.gov/code/admin_code/nr/200/208.pdf

docs.legis.wisconsin.gov

File Edit Go to Favorites Help

Published under s. 35.93, Wis. Stats., by the Legislative Reference Bureau.

47 DEPARTMENT OF NATURAL RESOURCES **NR 208.04**

Chapter NR 208

COMPLIANCE MAINTENANCE

NR 208.01 Purpose.
NR 208.02 Applicability.
NR 208.03 Definitions.
NR 208.04 Compliance maintenance annual report.
NR 208.05 CMAR point and grading system.
NR 208.06 CMAR review and responses.

Note: Chapter NR 208 as it existed on December 31, 2004, was repealed and new chapter NR 208 was created effective January 1, 2005.

NR 208.01 Purpose. This chapter implements ch. 283, Stats., encourages and, where necessary, requires owners of publicly and privately owned domestic wastewater treatment works to take necessary actions to avoid water quality degradation, and prevent violations of WPDES permit effluent limits and conditions. This chapter promotes an owner's awareness and responsibility [illegible] wastewater conveyance and treatment needs; maximizes the useful life and performance of treatment works through improved operation and maintenance; and initiates formal planning, design and construction to prevent WPDES permit violations.

History: CR 04–022: cr. Register November 2004 No. 587, eff. 1–1–05.

NR 208.02 Applicability. This chapter applies on January 1, 2005, to owners of publicly and privately owned domestic wastewater treatment works when required in the owner's WPDES permit, except for sanitary sewer collection systems subject to a WPDES permit. This chapter applies on January 1, 2006, to owners of sanitary sewer collection systems covered by a WPDES permit.

History: CR 04–022: cr. Register November 2004 No. 587, eff. 1–1–05.

NR 208.03 Definitions. In addition to the definitions and abbreviations in chs. NR 110, 114, 140, 162, 204, 205, 206, 210

evaluating the ability of a treatment works to maintain effluent limits and meet permit conditions over the next 5 years.

(8) "Owner" means the state, county, town, town sanitary district, city, village, metropolitan sewerage district, corporation, firm, company, institution, association, utility district, school district, joint sewerage commission or individual owning or operating any wastewater works.

(9) "Treatment works" has the meaning given in s. 283.01 (18), Stats., and includes wastewater treatment plants and sanitary sewer collection systems.

(10) "Weighting factor" means the weighted value associated with each CMAR section used to calculate an overall grade point average.

(11) "WPDES permit" means the Wisconsin pollutant discharge elimination system specific or general permit issued by the department pursuant to ch. 283, Stats.

History: CR 04–022: cr. Register November 2004 No. 587, eff. 1–1–05; CR 12–027: cr. (1m) Register July 2013 No. 691, eff. 8–1–13.

NR 208.04 Compliance maintenance annual report.
(1) PURPOSE. The compliance maintenance annual report describes wastewater management activities, physical conditions and performance of the treatment works during the previous calendar year. It provides a treatment works owner and the department with an objective analysis to determine whether a more detailed evaluation of the treatment works shall be conducted and

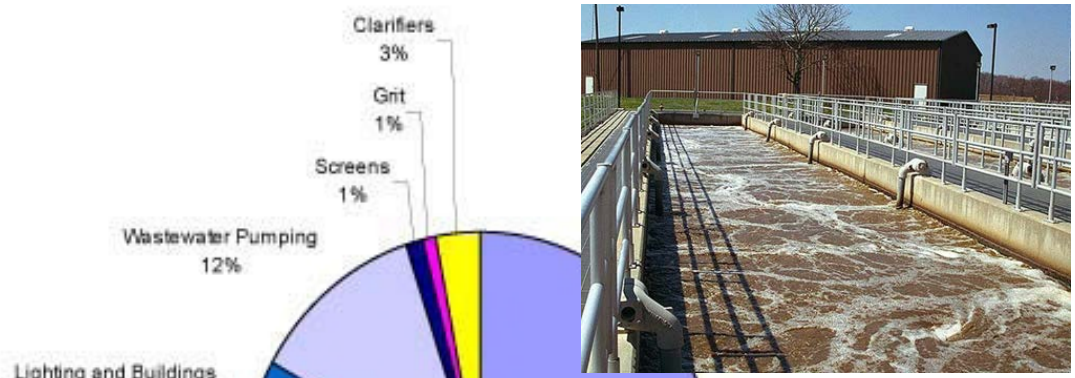
5:56 PM

Why Does Energy Matter?

#1 Expense for smaller municipalities

Courtesy of Joseph Cantwell, Focus on Energy (2009)

Electricity Requirements for Typical Wastewater Treatment Plants



OEI
www.stateenergyoffice.wi.gov

Why CMAR, Why Now?

Compliance Maintenance Annual Report

- One of the primary purposes of the CMAR is to foster communication of wastewater treatment plant needs among wastewater treatment plant operators, governing bodies and the Department of Natural Resources
- Thus making it ideal for educating and **increasing awareness** among governing bodies and operators on **energy use** as well as the **importance of treatment/energy efficiency.**

Why?

And- an energy audit is a new requirement for a Clean Water Fund Loan

Long term goal of increased energy awareness
(integral wastewater management function)

More modern and efficient equipment and processes

Less energy use = cost $aving$

Improved performance and compliance

ENERGY EFFICIENCY AND USE

6. Collection System

6.1 Energy Usage

6.1.1 Enter the monthly energy usage from the different energy sources:

Energy use can be obtained from your monthly utility bills or request from your utility a use summary. Read your energy bill or use summary closely and enter the use in the correct month. Include all collection system energy use in which the municipality is responsible for payment.

COLLECTION SYSTEM: Total Energy Consumed

Number of Municipally Owned Pump/Lift Stations:

	Total Collection System Electricity Consumed (kWh)	Total Collection System Natural Gas Consumed (therms) *Leave blank if not applicable*
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Total		
Average		

6.1.2 Comments:

6.2 Energy Related Processes and Equipment

6.2.1 Indicate equipment and practices utilized at your pump/lift stations (Check all that apply):

- ☐ Comminution or Screening
- ☐ Extended Shaft Pumps
- ☐ Flow Metering and Recording
- ☐ Pneumatic Pumping
- ☐ SCADA System
- ☐ Self-Priming Pumps
- ☐ Submersible Pumps
- ☐ Variable Speed Drives
- ☐ Other:

6.2.2 Comments:

6.3 Has an Energy Study been performed for your pump/lift stations?

- ○ No
- ○ Yes

Year:

By Whom:

Describe and Comment:

6.4 Future Energy Related Equipment

6.4.1 What energy efficient equipment or practices do you have planned for the future for your pump/lift stations?

7. Treatment Facility

7.1 Energy Usage

7.1.1 Enter the monthly energy usage from the different energy sources:

Read your energy bill or use summary closely. Use the period of energy usage on your bill or utility use summary that corresponds to the same month of the flow.

TREATMENT FACILITY: Total Energy Consumed/Month

	Electricity Consumed (kWh)	Total Influent Flow (MG)	Electricity Consumed/ Flow (kWh/MG)	Total Influent BOD (1000 lbs)	Electricity Consumed/ Total Influent BOD (kWh/1000 lbs)	Natural Gas Consumed (therms) *Leave blank if not applicable*
January		311.46		323.80		
February		311.07		316.62		
March		473.20		323.80		
April		454.82		320.22		
May		352.97		459.48		
June		301.08		457.11		
July		310.86		443.33		
August		274.05		439.92		
September		318.00		428.94		
October		318.68		430.44		
November		270.64		378.18		
December		313.21		385.36		
Total		**4,010.04**		**4,707.20**		
Average		**334.17**		**392.27**		

7.1.2 Comments:

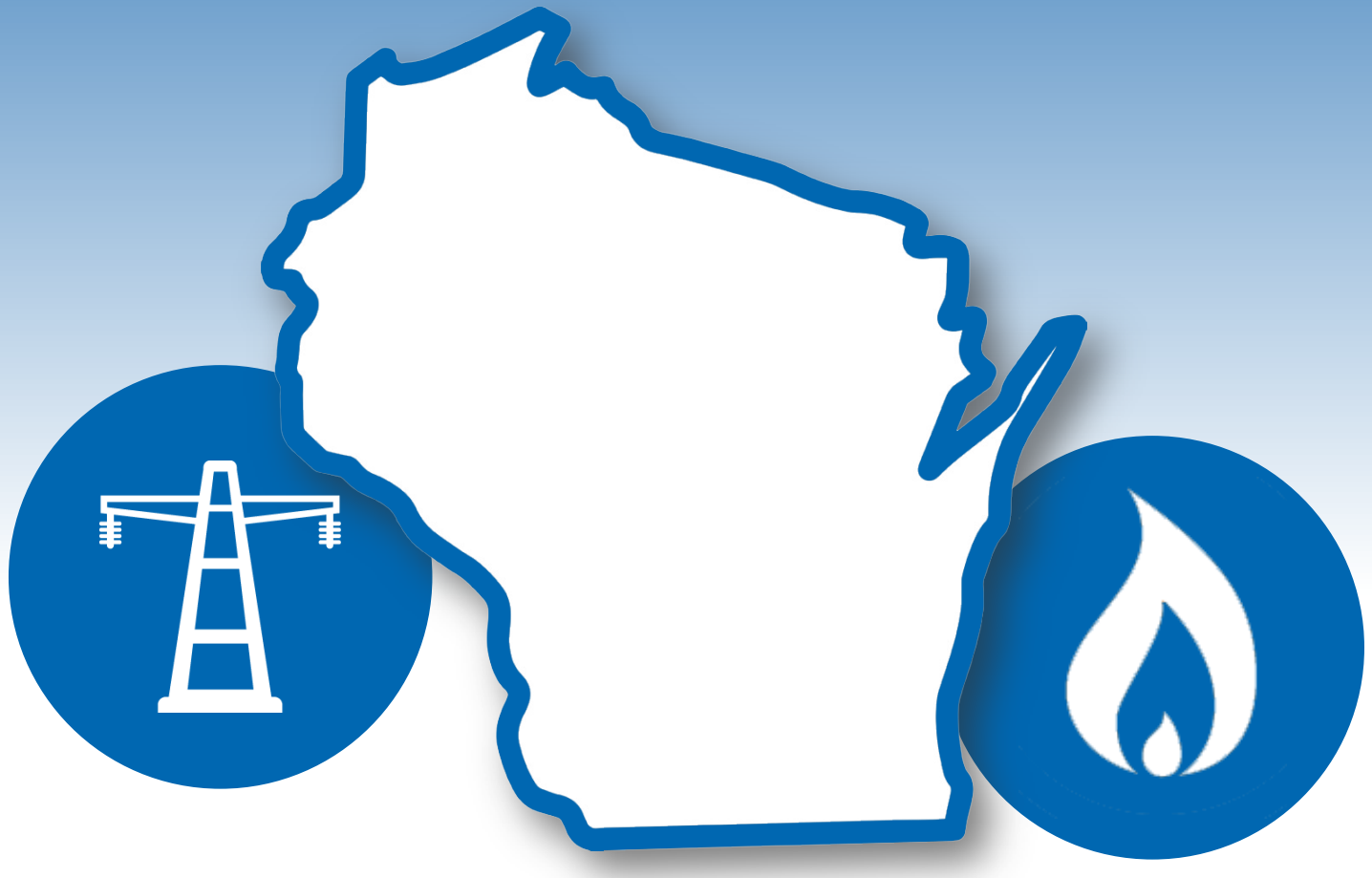
7.2 Energy Related Processes and Equipment

7.2.1 Indicate equipment and practices utilized at your treatment facility (Check all that apply):

- ☐ Aerobic Digestion
- ☐ Anaerobic Digestion
- ☐ Biological Phosphorus Removal
- ☐ Coarse Bubble Diffusers
- ☐ Dissolved O2 Monitoring and Aeration Control
- ☐ Effluent Pumping
- ☐ Fine Bubble Diffusers
- ☐ Mechanical Sludge Processing
- ☐ Nitrification
- ☐ SCADA System
- ☐ UV Disinfection
- ☐ Variable Speed Drives
- ☐ Other:

7.2.2 Comments:

What is Focus on Energy



What does Focus on Energy do?

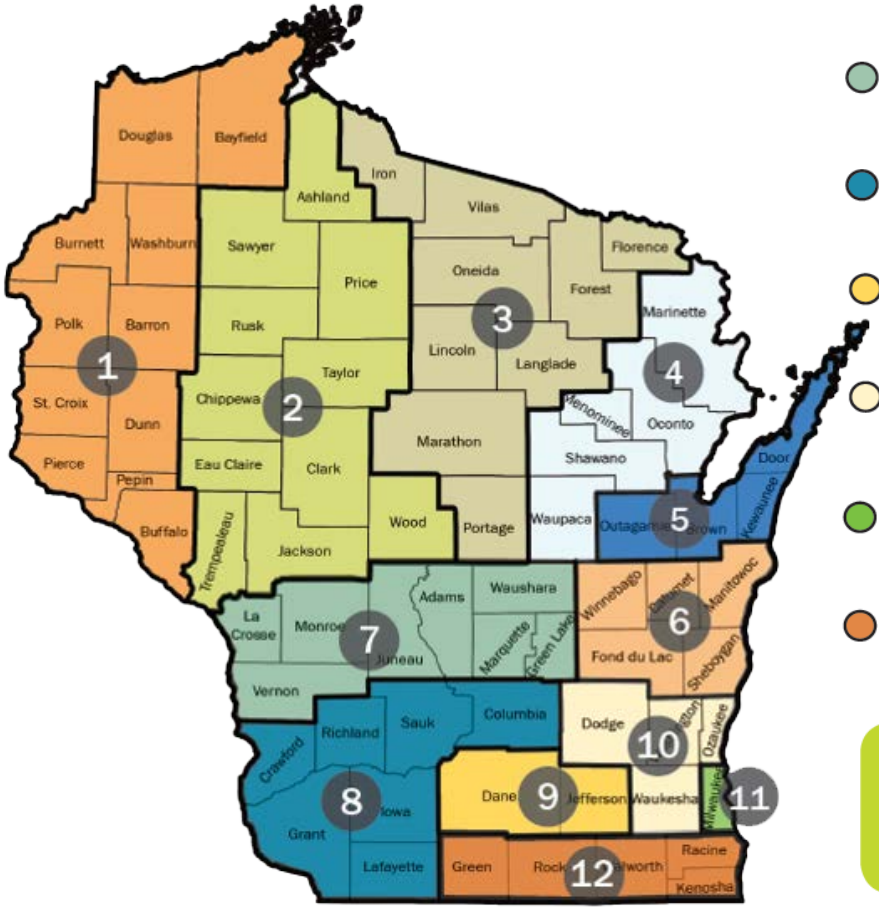
Assists Wisconsin residents and businesses in implementing energy saving projects.

Offers unbiased information and technical assistance to participating utilities' electric and/or natural gas customers.

Provides financial incentives for energy saving projects that would not occur otherwise.

2017 Energy Advisor Territory Map

- **Al Bohl - 1**
  al.bohl@focusonenergy.com
  715.720.2154
- **David Voss - 2**
  david.voss@focusonenergy.com
  715.720.2166
- **Adam Snippen - 3**
  adam.snippen@focusonenergy.com
  715.720.2120
- **Nicole Zaidel - 4**
  nicole.zaidel@focusonenergy.com
  715.720.2142
- **Bill Plamann - 5**
  bill.plamann@focusonenergy.com
  715.720.2135
- **Joe Kottwitz - 6**
  joe.kottwitz@focusonenergy.com
  715.720.2157



- **Jessica Anderson - 7**
  jessica.anderson@focusonenergy.com
  715.720.2146
- **Ryan Sprague - 8**
  ryan.sprague@focusonenergy.com
  715.720.2144
- **David Rheineck - 9**
  david.rheineck@focusonenergy.com
  715.720.2152
- **Chris Seitz - 10**
  chris.seitz@focusonenergy.com
  715.720.2129
- **Tom Dragotta - 11**
  tom.dragotta@focusonenergy.com
  715.720.2151
- **Saurabh Betawadkar - 12**
  saurabh.betawadkar@focusonenergy.com
  715.720.2180

Talk to an AgSG Rep today!
Call 888.947.7828

focus on energy℠
Partnering with Wisconsin utilities

Wastewater Bridge Information

Tracking Energy Use = $$

Know what your bill means and how to adjust your use to optimize savings, operations

OEI
www.stateenergyoffice.wi.gov

Top 25 Low Cost No Cost Measures to Implement

1. Meet with your electric supplier to review and discuss your current rate schedule to best fits your facilities' needs.
2. Demand Management – Contact your electric supplier to review your energy rate schedule and identify on-peak hours.
   - Review your operations during on-peak hours to identify idle operation of non-essential equipment.
   - Determine if a portion of your treatment process(es) can be adjusted to operate during off-peak hours.

   Examples Include:
   - Operate thickening or dewatering equipment during off-peak hours.
   - Shift recycling of supernatant to off-peak hours.
   - Load digesters during off-peak hours.
   - Operate mixers or aerators in aerobic digesters during off-peak hours.
   - Accept or treat hauled-in wastes during off-peak hours. Utilize storage, if applicable.
   - Shift filter backwash cycles to off-peak hours.
   - Bump diffusers to off-peak hours or not at all, if practical.
   - Test repaired equipment during off-peak hours.
   - Change lead-lag equipment operation during off-peak hours.
   - Do not mix solids holding tanks during on-peak hours.
3. Maintain pumps and blowers; inspect, lubricate, and replace seals and bearings; check belt tension and alignment and adjust for optimal operation per manufacturers recommendations.
4. Turn off aerobic digester blower periodically or operate intermittently (i.e. 2 hours on / 4 hours off; repeat).
5. Modify the dissolved oxygen (DO) level in the aeration tank(s).
6. Operate select aeration tanks as needed.
7. Change intake filters for aeration blowers regularly to provide minimum resistance for intake air.
8. Identify and repair aeration system air main leaks.
9. Identify and repair compressed air leaks.
10. Re-sheave blowers.
11. Turn off unnecessary lighting and install occupancy sensors.
12. Idle aeration basins or zones seasonally, if not needed.
13. Adjust system operations when there is a change in wastewater load.
14. Raise wet well levels to reduce static head in the pump system.
15. Lower aeration tank levels to reduce air header static pressure.
16. Shift nightly low flow periods or seasonal low flow periods to smaller HP pumps / blowers, if applicable.
17. Operate minimum number of UV lamps as possible while still meeting disinfection needs if applicable.
18. Regularly clean UV lamp sleeves to improve transfer efficiency.
19. Test and calibrate / replace DO sensors if needed.
20. Identify the best location to install DO probes in the aeration tanks.
21. Install programmable thermostats and utilize night set back / set up settings.
22. Assess the potential for organics removal prior to entering the secondary treatment system. Assess the capability for high organic dischargers to feed loadings directly to a digester.
23. Review your operations to identify if any pumps or blowers are being throttled. If throttled pumps and blowers are identified, review to determine if they can be unthrottled to operate more efficiently.
24. Idle any unnecessary equipment.
25. Review Focus on Energy's Water and Wastewater Energy Efficiency Best Practices Guide. This updated guide outlines the basic steps in building an energy management program, as well as providing detailed information on water, wastewater, building efficiency, and general best practices.

Focus on Energy Incentives

Rebates Available for Projects

- Water & Wastewater Bonus on all Projects in 2017
- 20% incentive bonus for Prescriptive projects (must be submitted by December 31, 2017) up to $1,000 bonus/project (not to exceed $5,000 annually).
- 10% incentive on Custom Projects – eligible up to $5,000 bonus/project (custom projects much be submitted by December 31, 2017 and completed by December 31, **2018** to receive the bonus.

Thank you!

WI Office of Energy Innovation:

Municipal Energy Efficiency Technical Assistance Program

608-266-5054
megan.levy@wisconsin.gov

OEI
Wisconsin Office of Energy Innovation

Adam Zoet

State of Minnesota

U.S. DEPARTMENT OF ENERGY

Better Buildings Summit:

Partnerships to Accelerate Energy Efficiency Improvements at Wastewater Treatment Plants

Adam Zoet, Energy Planner Principal

May 17, 2017

Pool of Partnerships Discussion

Capitalizing on the Strengths of State and Local Resources

Wastewater Treatment Plant (WWTP) Efficiency Opportunities
DOE SEP Project Overview

- **Objective:** Improve WWTP energy efficiency through
  - Benchmarking
  - Site assessments
  - Intern assistance
  - Renewable energy assessments

- **Project Timeline:** Early 2015 – Late 2017.

- **For More Information:** To learn more about this effort and how you can participate, please visit the project webpage: http://www.mntap.umn.edu/POTW/wwtp.html

Wastewater Treatment Plant (WWTP) Efficiency Opportunities

Project Team

Minnesota Department of Commerce

Project Manager

Minnesota Technical Assistance Program

Facility Assessments and Analysis

Minnesota Pollution Control Agency

Outreach and Technical Support

The Weidt Group

the energy practice of EYP Inc.

Wastewater B3 Benchmark Development

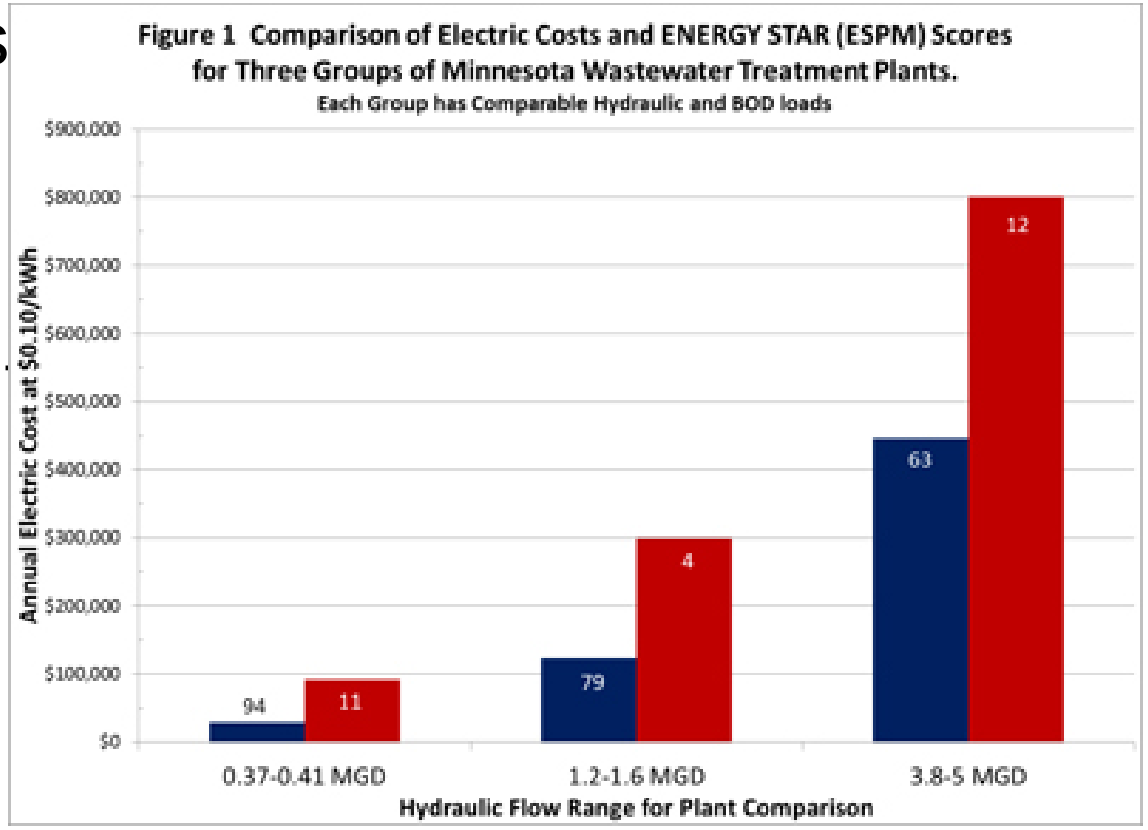
Why Energy Efficiency in WWTPs?

- **2%** of ALL electric energy use in U.S.
- **25-40%** of WWTP operating budget

Energy Efficiency in Water and Wastewater Facilities , EPA 2013
Statewide Assessment of Energy Use by the Municipal Water and Wastewater Sector, NYSERDA 200

Value of Benchmarking

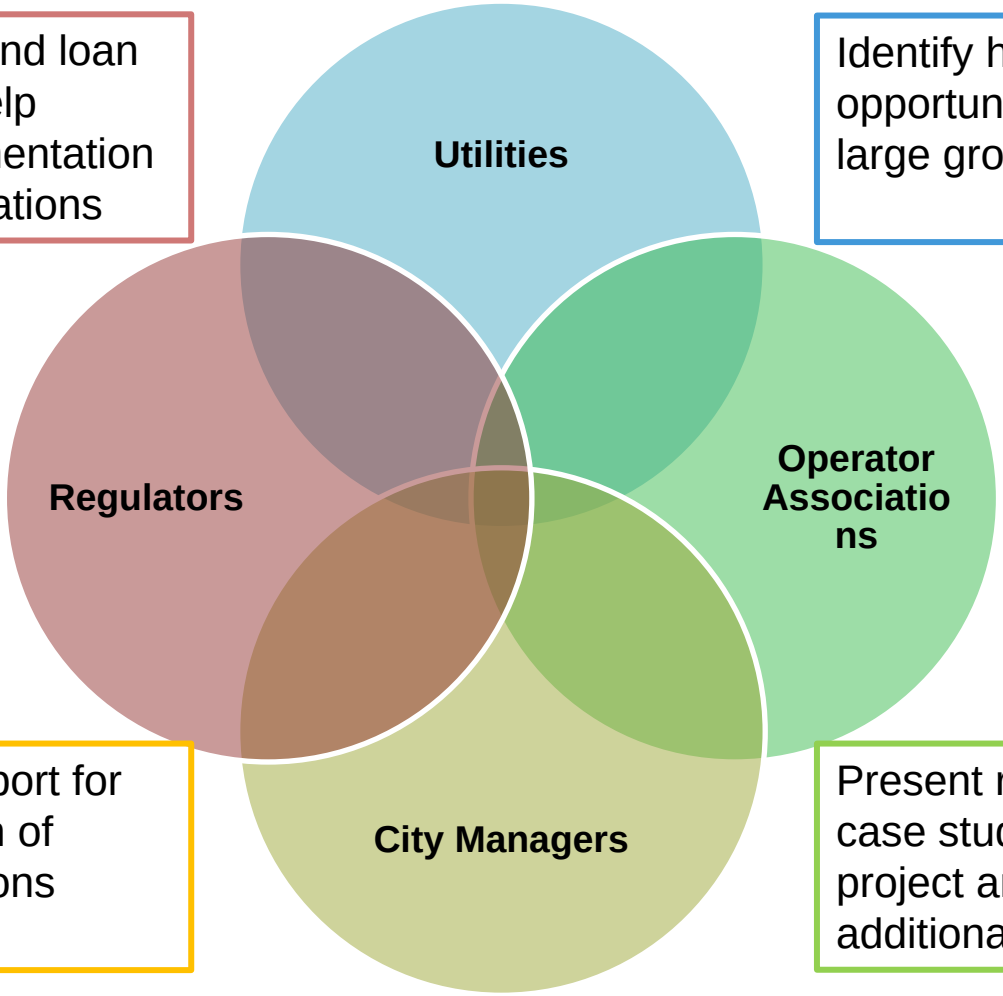
- Compare operations internally and externally
- Identify improvement opportunities
- Monitor change
- Track progress



Benchmarking and Partnerships

Identify grant and loan programs to help finance implementation of recommendations

Identify high potential opportunities across a large group of plants



Help build support for implementation of recommendations

Present results and case studies to promote project and generate additional interest

Benchmarking as Tool to Promote Energy Savings in Minnesota

- State wanted to develop a WWTP benchmarking tool that would:
  - Leverage the strengths of our partnerships and process.
  - Automate data entry as much as possible to allow for easier and quicker benchmarking of a wide swath of plants.
  - Allow cities to track their WWTP energy use and costs alongside their other buildings.

Questions?

Follow up questions, please contact adam.zoet@state.mn.us

Access our project website here:
http://www.mntap.umn.edu/POTW/wwtp.html

Jose Cueto

Miami-Dade County, FL

U.S. DEPARTMENT OF ENERGY

MDWASD

Leveraging Energy Efficiency for a Resilient Utility

OVERVIEW

- Largest water and sewer utility in the Southeastern United States
- Serving more than 2.3 million residents
- FY2015-2016 budget:
  - Projected revenues $732 M
  - $13.5 B multi-year capital plan (15-20 yrs.)
  - 2600+ total budgeted positions
- **Better Plants Program**
  - Sustainable Wastewater Infrastructure of the Future (SWIFt)
  - CHP Accelerator





WATER SYSTEM

- 3 large regional and 5 small water treatment plants, plus new Hialeah Reverse Osmosis WTP
- Supplying an average of 314 million gallons per day (MGD)
- Per capita water use 137 GPCD

- 15 wholesale customers
- 432,000 retail customers
- 100 water supply wells
- 8,206 miles of pipes

QUALITY. VALUE. ECONOMIC GROWTH.
WWW.MIAMIDADE.GOV/WATER

WASTEWATER SYSTEM

- 3 wastewater treatment plants
- 2 ocean outfalls and 21 deep injection wells
- Collecting, treating, and disposing 308 MGD
- 350,000 retail customers
- 13 wholesale customers
- 6,309 miles of mains and laterals
- 1,047 sewer pumps stations

QUALITY. VALUE. ECONOMIC GROWTH.
WWW.MIAMIDADE.GOV/WATER

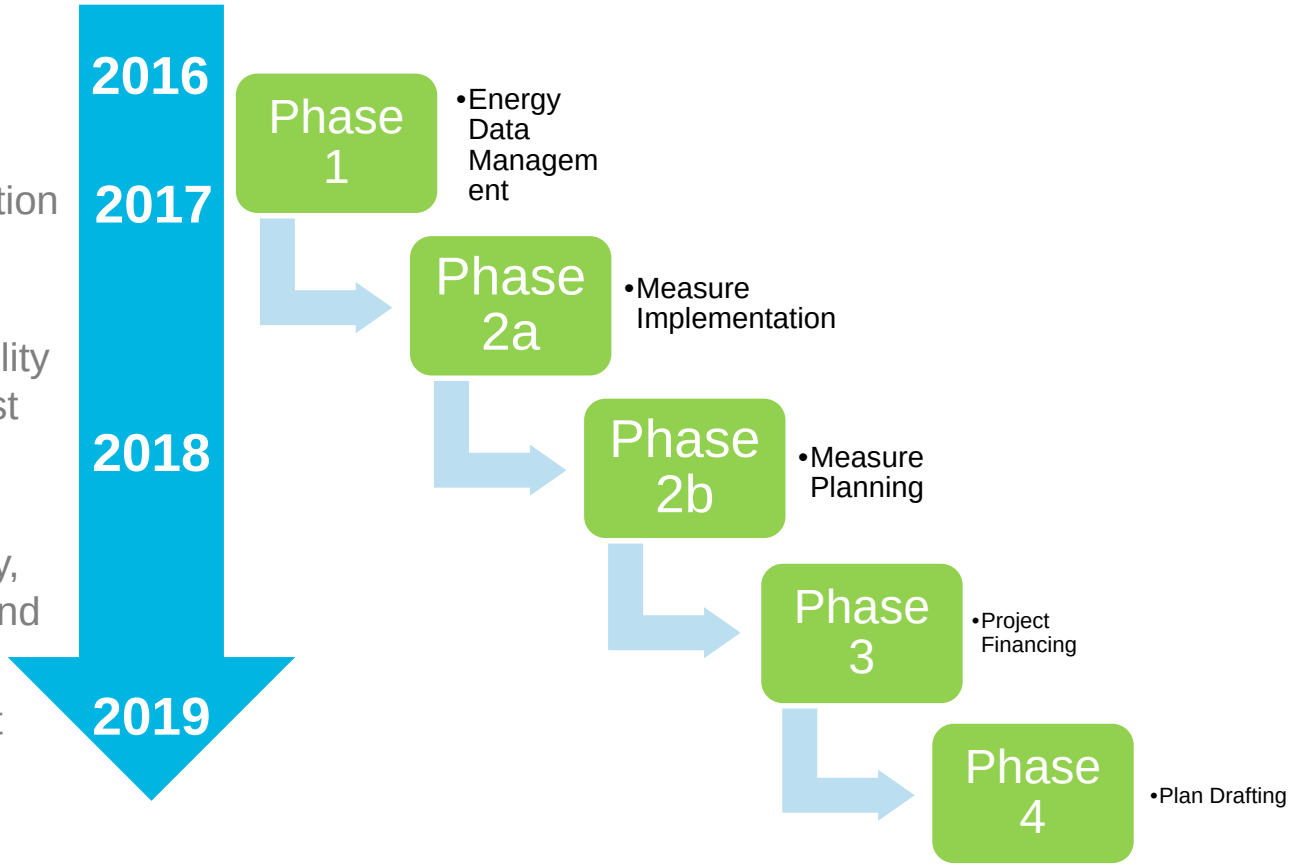
Strategic Partnerships

Sustainable Wastewater Infrastructure of the Future (SWIFt) Accelerator

- Objectives:
  - Catalyze the adoption of innovative and best management practices
  - Reduce Energy Consumption by 30%
  - Integrate resource recovery measures
- Schedule:
  - 3 year implementation
  - Phased approach, currently in Phase 2a

SWIFt

- Energy Baseline and Selection of Data Management Tool
- Selection of Target Wastewater Treatment Facility and implement No/Low-Cost Measures (5% goal)
- Identification of long term improvements in technology, management, processes, and resource recovery.
- Identify Financing and Draft Infrastructure Improvement Plans to achieve 30%



MDWASD and SWIFt

- Initiated Accelerator in Fall of 2016
- Energy Data Management Tool Selected (EnergyCAP) – February 2017
- Embarked on planning tracks to evaluate technology and process improvements – March 2017
- Currently scheduling Measure Hunt at South District WWTP (121 MGD facility)

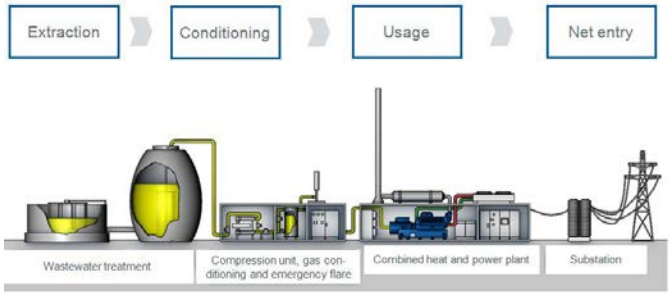
MDWASD Planning Tracks

- Technology
  - Evaluation and implementation of energy efficient technologies
    - Right Sizing Pumps
    - System Automation
    - Premium Efficiency Motors
    - Renewable Energy

- Process Improvements
  - Opportunities for optimization of operations
    - Load Management
    - Instrumentation/Controls
    - Submetering

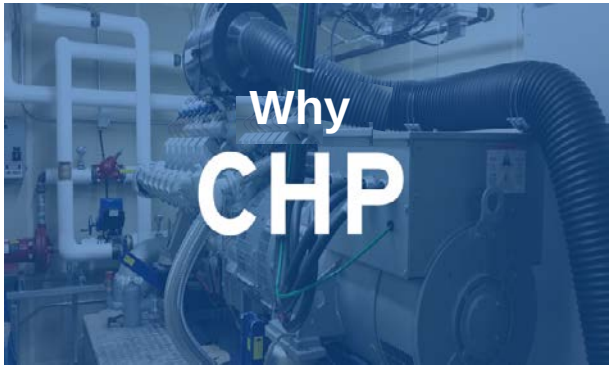
Combined Heat and Power Accelerator

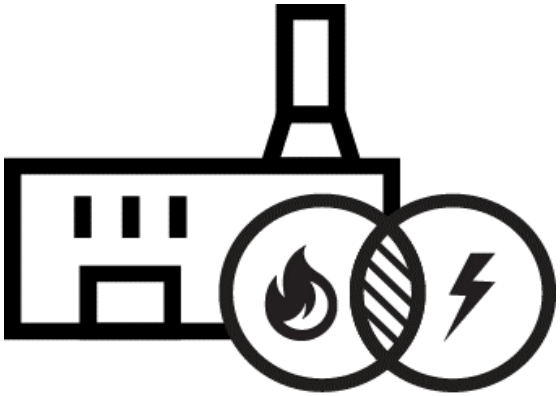
- Objectives:
  - Integrating CHP in resiliency planning for critical infrastructure
  - Identify barriers (technical, policy, economic) to CHP
  - Exchange of information on CHP planning
  - Develop decision support tool for assessing and prioritizing the appropriateness of CHP
  - Toolkit to support communities in utilizing CHP as a resiliency solution in critical infrastructure
- Schedule:
  - 3 year implementation



Why CHP?

- Produces power at a cost below retail electricity
- Enhances power reliability for the plant
- Displaces purchased fuels for thermal needs.
- Reduces emissions of greenhouse gases and other air pollutants, primarily by displacing utility grid power
- 1 MGD of wastewater = biogas to produce 26 kilowatts (kW) of electric capacity





QUALITY. VALUE. ECONOMIC GROWTH.
WWW.MIAMIDADE.GOV/WATER

MDWASD's History with CHP

South District WWTP Cogeneration Facility

- Upgrade of existing cogeneration facility constructed in early 1990's
- Capacity expanded to process methane gas from adjacent municipal landfill
- Four 2,000 kw cogeneration units
- Upgrades to digester and landfill gas conditioning systems

MDWASD and CHP Accelerator

- Resiliency Objectives:
  - Strengthen assets and operations to be come more resilient to climate and disaster events.
  - Develop strategic plans to address operational resiliency
- Initial Steps
  - Inventorying of critical and vulnerable infrastructure
  - Assessing potential of CHP at these facilities
- Accelerator Goals:
  - Bring tools and resources back to the community that will lead to increased resiliency through CHP
  - Integrate CHP in resiliency program and identify facilities where CHP can enhance resiliency and energy efficiency.

Better Buildings® U.S. DEPARTMENT OF ENERGY
COMBINED HEAT AND POWER FOR RESILIENCY ACCELERATOR

QUESTIONS?

Josenrique Cueto, P.E., Assistant Director MDWASD

jcueto@miamidade.gov

Grace Richardson

Alexandria Renew Enterprises

U.S. DEPARTMENT OF ENERGY

Pool of Partnerships:
Department of Energy and VCS

May 2017

Superior Energy Performance

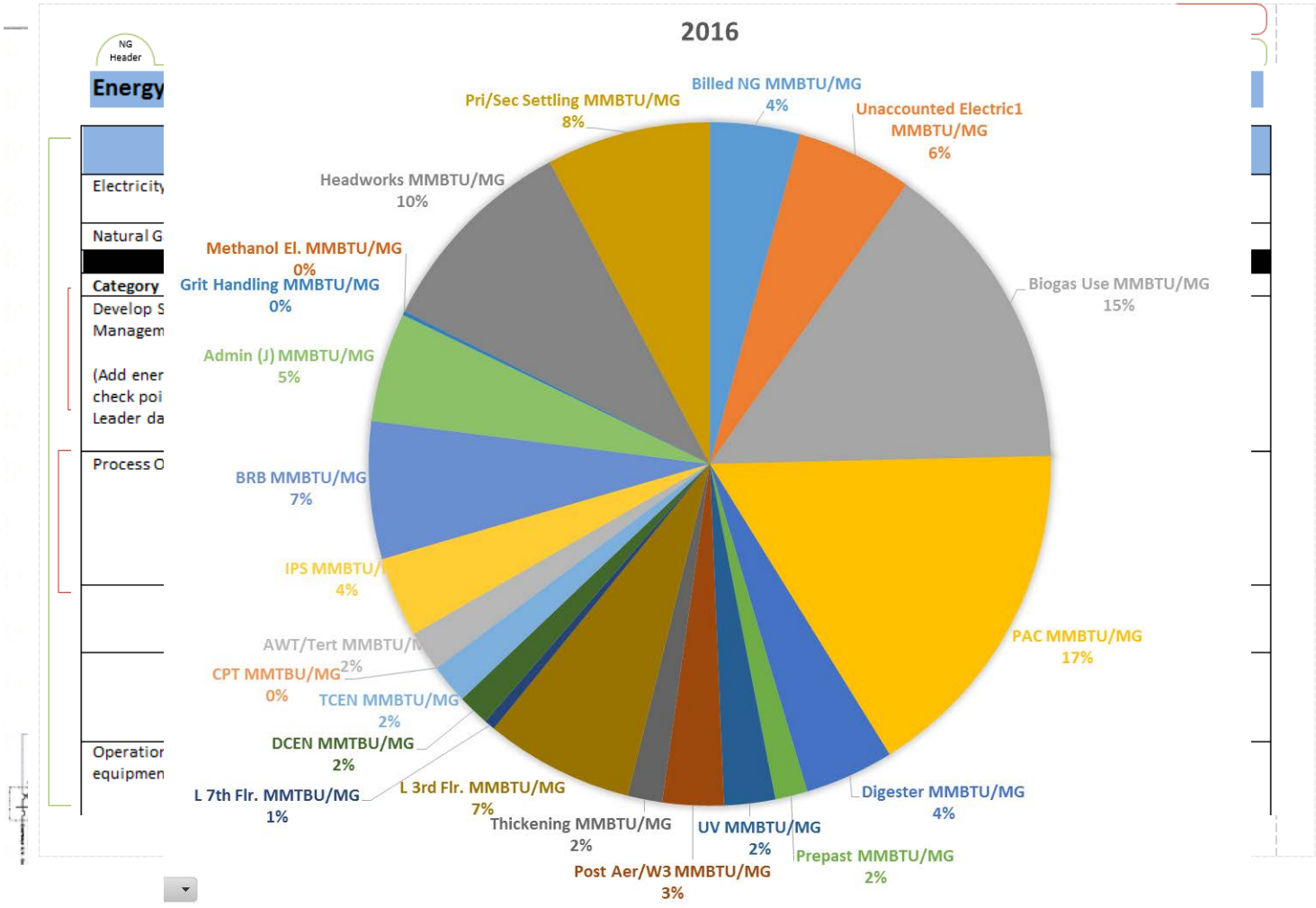
- Starting Fall 2015, a group of 7 w/ww utilities became a co-learning cohort in Superior Energy Performance
  - Kent County DPW
  - North Carolina: Utilities, Inc.
  - Alexandria Renew Enterprises
  - Victor Valley Water Reclamation Authority
  - Des Moines Water Works
  - City of Laredo, TX
  - Delta Diablo Sanitation District

Superior Energy Performance

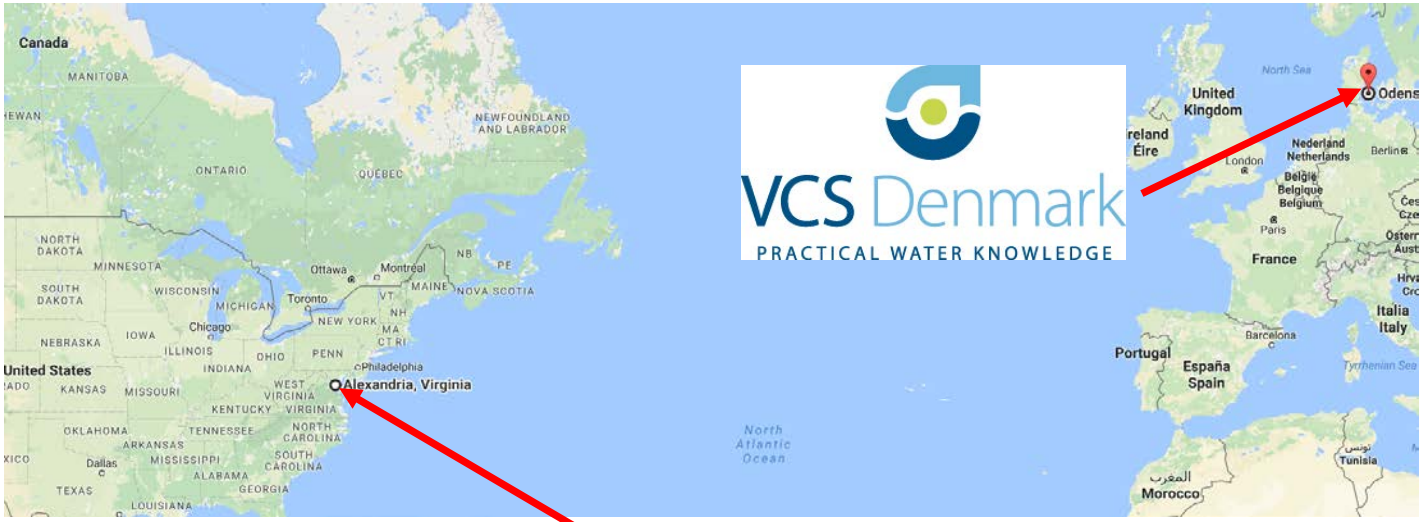
- Three interactive, 3 day workshops building up to implementation of Energy Management Systems

- Phase 1:
  - Energy Planning
- Phase 2:
  - Implementation and Operation
- Phase 3:
  - Checking and Management Review

- Each phase taught by subject matter experts from Georgia Tech


2016
Billed NG MMBTU/MG 4%
Unaccounted Electric1 MMBTU/MG 6%
Biogas Use MMBTU/MG 15%
PAC MMBTU/MG 17%
Digester MMBTU/MG 4%
Prepast MMBTU/MG 2%
UV MMBTU/MG 2%
Post Aer/W3 MMBTU/MG 3%
Thickening MMBTU/MG 2%
L 3rd Flr. MMBTU/MG 7%
L 7th Flr. MMTBU/MG 1%
DCEN MMTBU/MG 2%
TCEN MMBTU/MG 2%
CPT MMTBU/MG 0%
AWT/Tert MMBTU/M 2%
IPS MMBTU/ 4%
BRB MMBTU/MG 7%
Admin (J) MMBTU/MG 5%
Grit Handling MMBTU/MG 0%
Methanol El. MMBTU/MG 0%
Headworks MMBTU/MG 10%
Pri/Sec Settling MMBTU/MG 8%
NG Header
Energy
Electricity
Natural G
Category
Develop S
Managem
(Add ener
check poi
Leader da
Process O
Operatior
equipmen

International Partnerships



ALEXANDRIA renew ENTERPRISES®

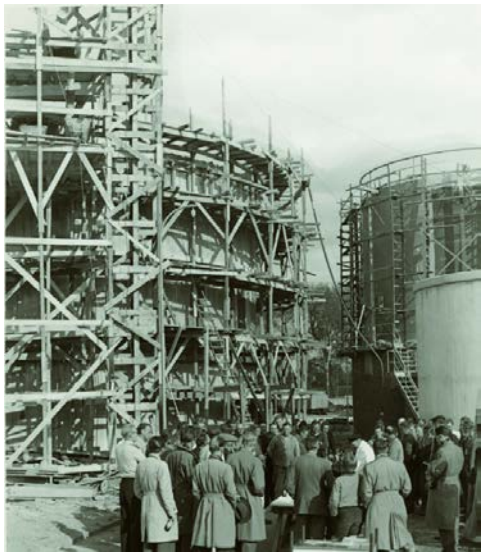
Who are we?

AlexRenew

- Founded 1952
- Treatment plant 1956
- 320,000 people served
- 13 billion gallons treated
- 100 employees

VCS Denmark

- Founded 1853 - drinking water
- Treatment plant 1907
- 230,000 people served
- 7.9 billion gallons
- 200 employees - 100 wastewater



Who are we?

- Progressive utilities
- Strategies for energy neutrality

- Cutting edge technologies
  - Side stream deammonification
  - Mainstream deammonification
  - Ammonia-based aeration control
  - Research on granular sludge
  - Resource recovery
  - Carbon footprint reduction

Why international cooperation?

Purpose and scope

The purpose of this agreement is to exchange information and to share knowledge and know-how within the wastewater area, for the benefit of the companies, their employees and ultimately, their customers.

exchange information

share knowledge

Areas of cooperation

1) Deammonification – side stream and mainstream
2) Maintenance of online sensors
3) Ammonia-based aeration control
4) Nutrient removal optimization
5) Energy production

Personal experiences

- English!
- New perspective on daily work
- What are you doing?
- Why am I doing this the way I do it?
- Self reflection
- Inspiration
- Professional development
- Motivation

Questions?

Grace Richardson
Engineering Project Manager
Alexandria Renew Enterprises
grace.richardson@alexrenew.com

30 MIN SESSION BREAK

Return 10:45am

U.S. DEPARTMENT OF ENERGY

15 MIN Important Takeaways

U.S. DEPARTMENT OF ENERGY

Panelists

- Moderator
  - Sapna Gheewala, U.S. Department of Energy
  - Charles Satterfield, U.S. Department of Energy

- Partnerships Discussion
  - Megan Levy, State of Wisconsin
  - Adam Zoet, State of Minnesota
  - Jose Cueto, Miami-Dade County, FL
  - Grace Richardson, Alexandria Renew Enterprises

- **Tools Discussion**
  - **Megan Levy, State of Wisconsin**
  - **Adam Zoet, State of Minnesota**
  - **Jose Cueto, Miami-Dade County, FL**
  - **Grace Richardson, Alexandria Renew Enterprises**
  - **Jay Wrobel, U.S. Department of Energy**
  - **Michael Muller, Rutgers University**

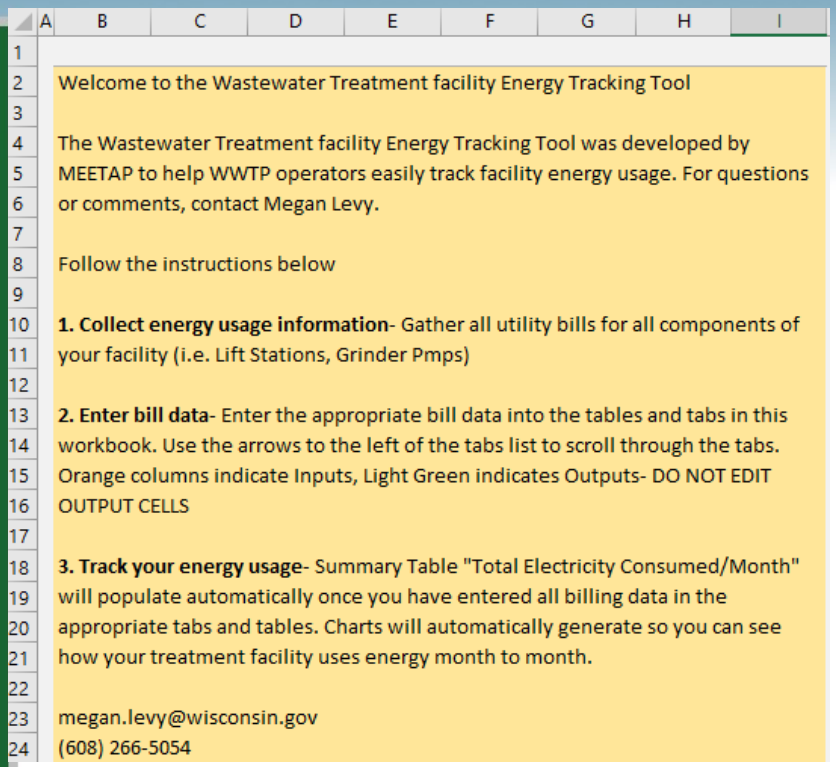
Megan Levy

State of Wisconsin

U.S. DEPARTMENT OF ENERGY

Need help tracking energy use in your facility?

Tool is in beta-testing mode, see me for more information



Welcome to the Wastewater Treatment facility Energy Tracking Tool

The Wastewater Treatment facility Energy Tracking Tool was developed by MEETAP to help WWTP operators easily track facility energy usage. For questions or comments, contact Megan Levy.

Follow the instructions below

1. Collect energy usage information- Gather all utility bills for all components of your facility (i.e. Lift Stations, Grinder Pmps)

2. Enter bill data- Enter the appropriate bill data into the tables and tabs in this workbook. Use the arrows to the left of the tabs list to scroll through the tabs. Orange columns indicate Inputs, Light Green indicates Outputs- DO NOT EDIT OUTPUT CELLS

3. Track your energy usage- Summary Table "Total Electricity Consumed/Month" will populate automatically once you have entered all billing data in the appropriate tabs and tables. Charts will automatically generate so you can see how your treatment facility uses energy month to month.

megan.levy@wisconsin.gov
(608) 266-5054

Sample facility OEI

ENERGY USAGE SUMMARY 2017

Table 1: Total Electricity Consumed/Month

Month	Electricity Consumed (kWh)	Total Energy Charges ($)	On-Peak Demand (kW)	On Peak kWh	Total Demand Charges ($)	Off Peak kWh	Monthly Total Flow to Facility MG	Monthly Total BOD to Facility (lbs)	Total kWh/Total Flow (kWh/MG)	kWh/Total BOD (kWh/BOD lb)	Daily Average Energy Use (kWh)
January	1,277,541.00	$68,571.49	3,908.00	493,089.00							
February	1,242,490.00	$66,592.70	3,912.00	474,600.00							
March	1,343,908.00	$73,169.97	3,925.00	503,713.00							
April	1,500,594.00	$81,683.57	4,508.00	541,564.00							
May	1,573,225.00	$96,098.88	5,189.00	566,436.00							
June	2,012,8			724,166.00							
July	1,634,0			646,084.00							
August	1,617,9			622,481.00							
September	1,240,7			483,592.00							
October	1,168,5			469,330.00							
November	1,039,5			382,317.00							
December	1,115,7			407,958.00							

Electricity Consumed
Sums total power consumed as kWh for each component of your plant that uses electricity (i.e. Lift Stations, Grinder Pumps)

Summary Data Instructions

DO NOT EDIT THE ABOVE SUMMARY TABLE

1. Organize your facility's energy bills according to the tabs below (i.e. all energy bills for Lift Stations, Grinder Pumps, Natural Gas, etc.)

2. Enter your facility's energy usage into the appropriate tabs.

3. The Summary Table will automatically generate final values based on data entered into each tab.

4. Corresponding graphs can be found on orange tabs.

5. If needed, convert kW to kWh using the table at right. Simply enter kW consumed and hours in use and the table will calculate kWh. Copy and Paste Values into the relevant cells.

Table 1.A Convert to kWh

Month	Electricity	Hours of	kWh
January			0.00
February			0.00
March			0.00
April			0.00
May			0.00
June			0.00
July			0.00
August			0.00
September			0.00
October			0.00
November			0.00
December			0.00

MINNESOTA DEPARTMENT OF COMMERCE

If you have suggestions for improvement of the energy tracking tool, contact Vanessa Durant at vanessa.durant@wi.gov or

Grinder Pump Instructions

1. Gather utility bills for all Grinder Pumps- you will need billing information for all meters

2. Enter data from each meter's bill into the appropriate columns- fill in as many tables as needed, use the table headers to distinguish each meter. If a pump has more than one meter you can rename each Grinder Pump table as necessary.

3. Energy consumed by Grinder Pumps will be aggregated into the summary table below- total energy consumption will be aggregated into the Summary Data tab to give you a clear picture of just how much energy your facility uses.

MEETAP

OEI

Wisconsin Office of Energy Innovation

DO NOT EDIT SUMMARY TABLE

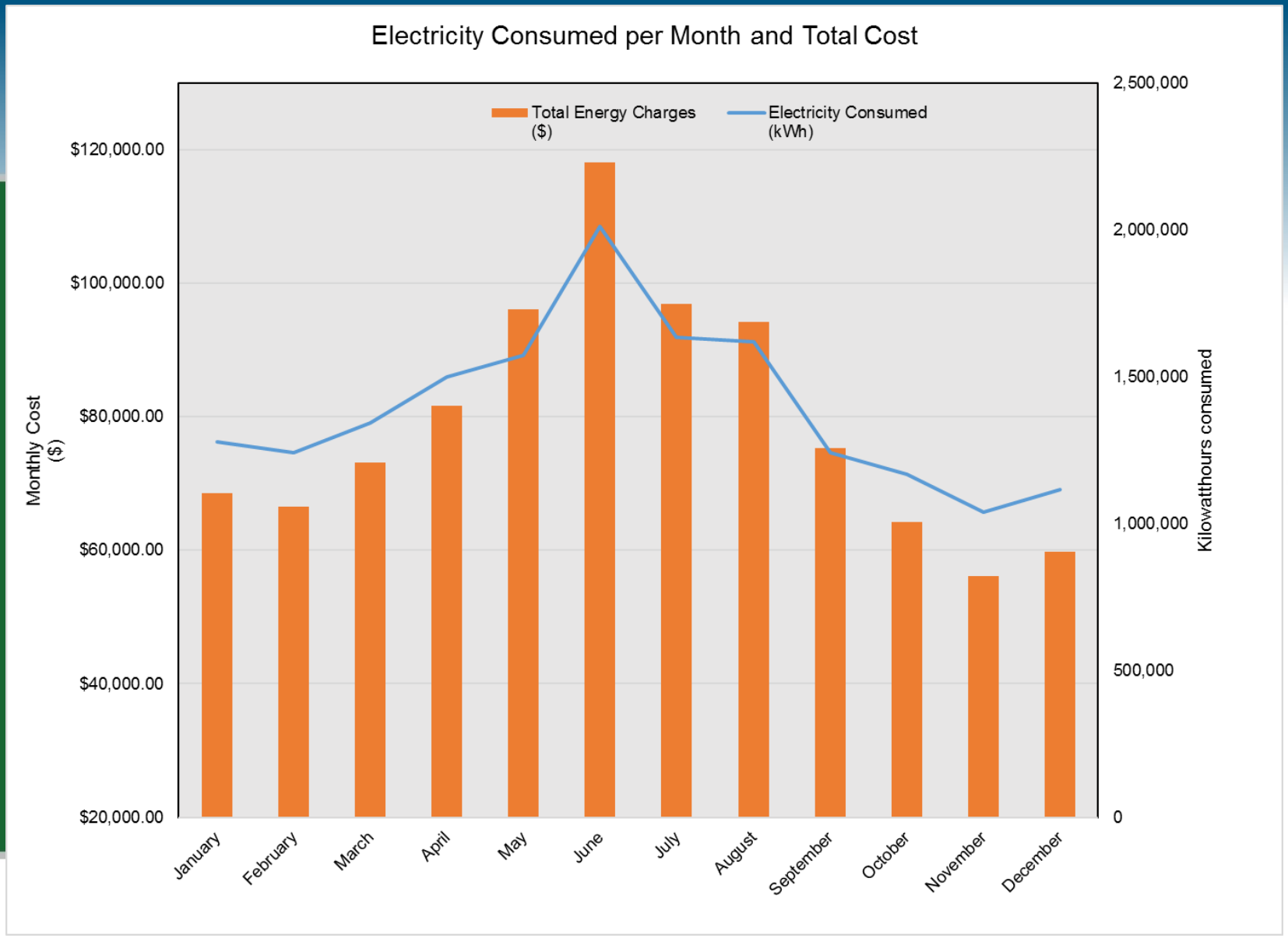
Table Summary Grinder Pumps

Month	Total Energy Consumption (kWh)	Total Consumption Charges ($)	Total Daily Average Energy Use (kWh/day)	Total Metered Charges ($)
January	0.00	$0.00	0.00	$0.00
February	0.00	$0.00	0.00	$0.00
March	0.00	$0.00	0.00	$0.00
April	0.00	$0.00	0.00	$0.00
May	0.00	$0.00	0.00	$0.00
June	0.00	$0.00	0.00	$0.00
July	0.00	$0.00	0.00	$0.00
August	0.00	$0.00	0.00	$0.00
September	0.00	$0.00	0.00	$0.00
October	0.00	$0.00	0.00	$0.00
November	0.00	$0.00	0.00	$0.00
December	0.00	$0.00	0.00	$0.00
TOTAL	0	$0	0	$0

Grinder Pump 1		
Start billing period	End billing period	# Billing Days
		0
		0
		0
		0
		0
		0
		0
		0
		0
		0
		0
TOTAL		0

Grinder Pump 2	*Enter Meter Number Here*					
Start billing period	End billing period	# Billing Days	Total Energy Consumption (kWh)	Total Consumption Charges ($)	Daily Average Energy Use (kWh/day)	Total Metered Charges ($)
		0				
		0				
		0				
		0				
		0				
		0				
		0				

Grinder Pump 3		
Start billing period	End billing period	# Billing Days
		0
		0
		0
		0
		0
		0
		0



Output- All electricity consumed and cost for entire facility

DO NOT EDIT SUMMARY TABLE

Table Electricity Use- all/misc/other

Month	Total Energy Consumption (kWh)	Total Energy Charges ($)	On-Peak Demand (kW)	On Peak kWh	Total Demand Charges	Off Peak kWh	Daily Average Energy Use
January	1,267,197.00	$67,213.15	3,908.00	493,089.00	$29,885.72	$774,108.00	$48,717.17
February	1,231,823.00	$65,192.42	3,912.00	474,600.00	$29,910.08	$757,223.00	$48,496.57
March	1,333,832.00	$71,846.48	3,925.00	503,713.00	$29,989.25	$830,119.00	$47,952.47
April	1,492,668.00	$80,646.46	4,508.00	541,564.00	$33,539.72	$951,104.00	$48,891.89
May	1,566,845.00	$95,264.19	5,189.00	566,436.00	$38,186.35	$1,000,409.00	$59,553.20
June	2,007,227.00	$117,345.12	5,181.00	724,166.00	$44,419.50	$1,283,061.00	$58,289.12
July	1,628,753.00	$96,236.18	4,878.00	646,084.00	$41,859.00	$982,669.00	$56,452.08
August	1,612,480.00	$93,536.40	4,462.00	622,481.00	$38,739.00	$989,999.00	$56,798.80
September	1,234,036.00	$74,428.62	4,215.00	483,592.00	$35,983.56	$750,444.00	$48,169.76
October	1,161,523.00	$63,268.08	3,904.00	469,330.00	$29,049.36	$692,193.00	$39,897.03
November	1,030,759.00	$54,917.85	3,963.00	382,317.00	$29,408.67	$648,442.00	$50,859.12
December	1,105,269.00	$58,363.07	3,881.00	407,958.00	$28,137.63	$697,311.00	$46,281.05

Table Flow

Enter flow data into corresponding columns

Month	Monthly Total Flow to Facility MG	Monthly Total BOD to Facility (lbs)	Total kWh/Total Flow (kWh/MG)	Total kWh/Total BOD (kWh/BOD lb)
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Meter #1	*Enter Meter Number Here*

Start billing period	End billing period	# Billing Days	On Peak (kWh)	Off Peak (kWh)	On Peak ($)	Off Peak ($)	Peak Demand (kW)	Total Energy Consumption (kWh)	Demand Charge ($)	Total Energy Cost ($)	Demand Cost per kW	Daily Average Use (kWh)
2/1/2017	3/3/2017	30	2,771.00	129,226.00	$7,789.46	$5,140.61	976.00	131,997.00	$5,943.84	$12,930.07	$6.09	262.00
1/3/2017	2/2/2017	30	3,382.00	160,441.00	$7,555.67	$6,382.34	889.00	163,823.00	$5,414.01	$13,938.01	$6.09	318.00
12/1/2016	1/4/2017	34	4,666.00	179,566.00	$9,684.97	$7,143.14	980.00	184,232.00	$5,968.20	$16,828.11	$6.09	441.00
11/2/2016	12/2/2016	30	4,027.00	219,041.00	$11,424.76	$8,713.45	1,110.00	223,068.00	$6,759.90	$20,138.21	$6.09	363.00
10/2/2016	11/1/2016	30	3,777.00	276,668.00	$13,848.21	$11,005.86	1,054.00	280,445.00	$6,517.94	$24,854.07	$6.18	354.00
9/2/2016	10/3/2016	31	3,961.00	335,266.00	$17,273.39	$13,336.88	1,035.00	339,227.00	$7,762.50	$30,610.27	$7.50	370.00
8/2/2016	9/1/2016	30	4,088.00	227,865.00	$13,438.52	$9,064.47	1,236.00	231,953.00	$9,270.00	$22,502.99	$7.50	381.00
7/4/2016	8/3/2016	30	4,048.00	206,832.00	$12,051.32	$8,227.78	1,013.00	210,880.00	$7,597.50	$20,279.10	$7.50	377.00
6/2/2016	7/5/2016	33	3,922.00	123,714.00	$9,547.23	$5,874.51	1,049.00	127,636.00	$7,656.20	$15,421.74	$7.30	367.00
5/3/2016	6/3/2016	31	3,838.00	145,994.00	$8,552.56	$5,807.64	974.00	149,832.00	$5,931.66	$14,360.20	$6.09	358.00
4/4/2016	5/4/2016	30	10,343.00	151,204.00	$7,403.27	$6,014.90	921.00	161,547.00	$5,608.89	$13,418.17	$6.09	357.00
3/4/2016	4/5/2016	32	9,737.00	130,522.00	$7,371.91	$5,192.17	982.00	140,259.00	$5,208.72	$12,564.08	$5.30	304.00
TOTAL		371	58,560.00	2,286,339.00	$125,941.27	$91,903.75	12,219.00	2,344,899	$79,639.36	$217,845.02	$77.83	4,252.00

Input- electricity usage in administrative offices (anything not machinery or equipment

Who Are You Going to Call?

- RESOURCES
- Focus on Energy Ag, Schools, and Government Program (888.947.7828 or
- https://www.focusonenergy.com/sites/default/files/2017%20Advisor%20Map_links.pdf
- Office of Energy Innovation
- MEETAP program: http://www.stateenergyoffice.wi.gov/section.asp?linkid=1844&locid=160

Thank you!

WI Office of Energy Innovation:

Municipal Energy Efficiency Technical Assistance Program

608-266-5054
megan.levy@wisconsin.gov

OEI
Wisconsin Office of Energy Innovation

Adam Zoet

State of Minnesota

U.S. DEPARTMENT OF ENERGY

Sea of Tools Discussion

B3 Benchmarking Tool Adopted for Wastewater Sector

Buildings, Benchmarks & Beyond (B3) History

- Established in 2004 for the State of Minnesota as part of Buildings, Benchmarks & Beyond (B3)
- Benchmarking has ability to track and measure public building types
- Benchmarking now used by over 8,500 public buildings across Minnesota
- Benchmarking is continuously improved to enhance the capabilities of tracking, measuring and reporting portfolios

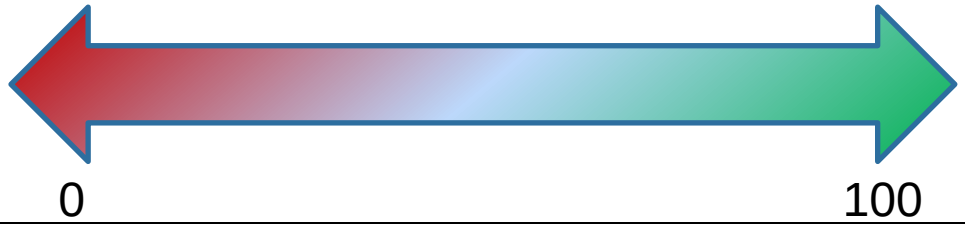
Wastewater Treatment Plant Benchmark Overview

- Allows cities to track energy savings potential of WWTPs alongside their other buildings.
- ENERGY STAR Portfolio Manager (ESPM) provides a 1-100 percentile score for primary, secondary and advanced treatment plants meeting certain conditions (mainly plants > 0.6 MDG).
- Benchmarking functionality was enhanced to track required data for WWTPs and utilize existing ESPM integration that is in place for buildings.

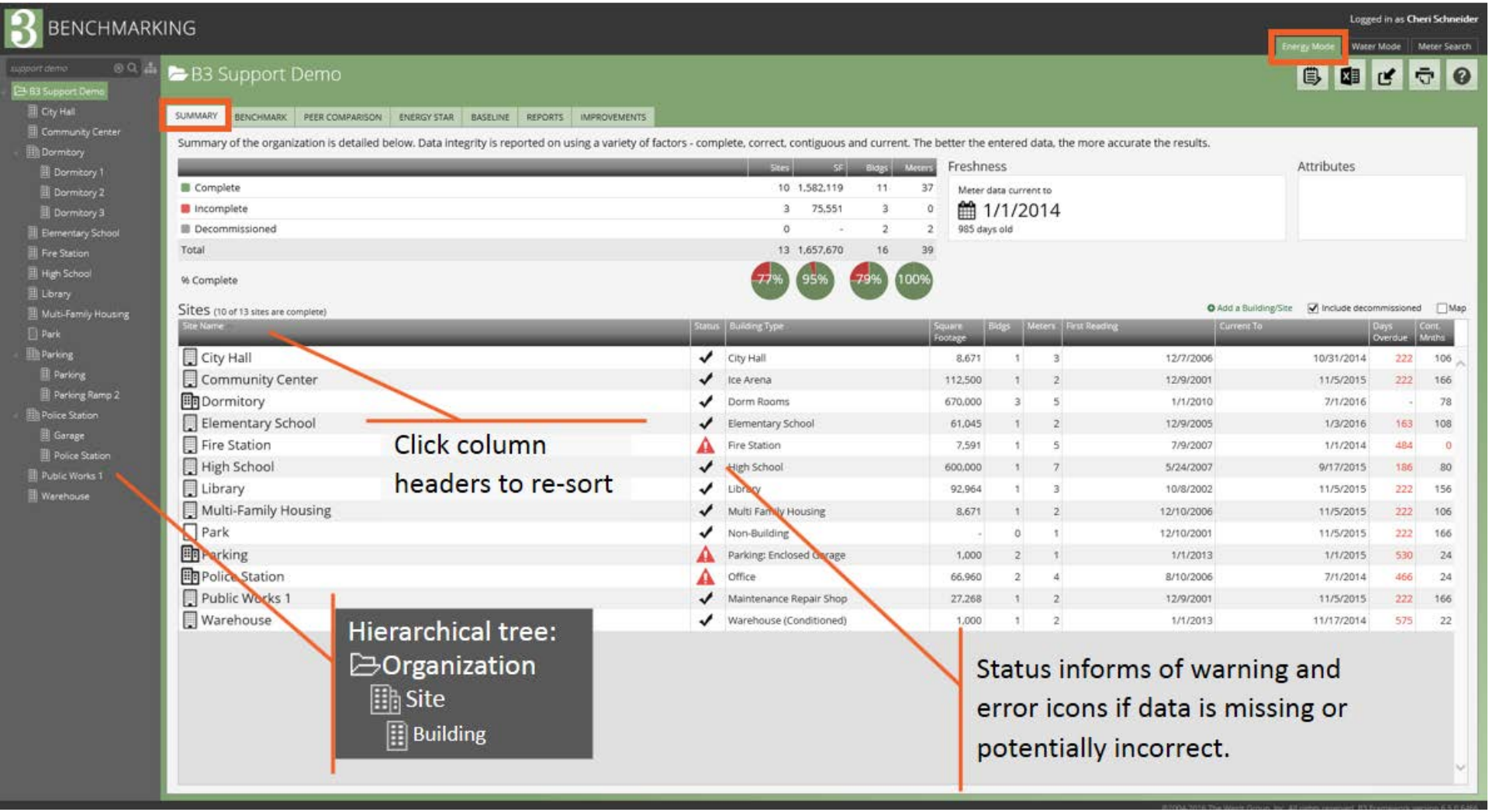
EnergyStar® Portfolio Manager (ESPM)

- Supported by EnergyStar®
- Compares facilities' energy use nationally
- Requires:
  - Utility information
  - Flow and influent/effluent BOD
- Accounts for climate and operations

Effluent Flow (million gal/day)	Electricity Cost ($0.10/kWh)	Energy Star® Score
0.52	$142,000	5
0.57	$45,000	57



B3 Organization Level Energy Summary



	Sites	SF	Bldgs	Meters
Complete	10	1,582,119	11	37
Incomplete	3	75,551	3	0
Decommissioned	0	-	2	2
Total	13	1,657,670	16	39
% Complete	77%	95%	79%	100%

Site Name	Status	Building Type	Square Footage	Bldgs	Meters	First Reading	Current To	Days Overdue	Cont. Mnths
City Hall	✓	City Hall	8,671	1	3	12/7/2006	10/31/2014	222	106
Community Center	✓	Ice Arena	112,500	1	2	12/9/2001	11/5/2015	222	166
Dormitory	✓	Dorm Rooms	670,000	3	5	1/1/2010	7/1/2016	-	78
Elementary School	✓	Elementary School	61,045	1	2	12/9/2005	1/3/2016	163	108
Fire Station	⚠	Fire Station	7,591	1	5	7/9/2007	1/1/2014	484	0
High School	✓	High School	600,000	1	7	5/24/2007	9/17/2015	186	80
Library	✓	Library	92,964	1	3	10/8/2002	11/5/2015	222	156
Multi-Family Housing	✓	Multi Family Housing	8,671	1	2	12/10/2006	11/5/2015	222	106
Park	✓	Non-Building	-	0	1	12/10/2001	11/5/2015	222	166
Parking	⚠	Parking: Enclosed Garage	1,000	2	1	1/1/2013	1/1/2015	530	24
Police Station	⚠	Office	66,960	2	4	8/10/2006	7/1/2014	466	24
Public Works 1	✓	Maintenance Repair Shop	27,268	1	2	12/9/2001	11/5/2015	222	166
Warehouse	✓	Warehouse (Conditioned)	1,000	1	2	1/1/2013	11/17/2014	575	22

B3 Site Level Summary – New WWTP

Clean up errors to obtain a WWTP score

Note: Each WWTP site was created with a default electric meter. If plant does not contain any electric meters (e.g. non-aerated pond), please contact Support to have site updated.

B3 Site Level Summary – Complete WWTP

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

Waste Water Treatment Plant

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

B3 Benchmark
A B3 Benchmark is not available for wastewater treatment plants.

B3 Peer Rating
94
This site is ranked in the 94th percentile amongst 16 similar sites.

Percentile Score
92
This site has received a score of 92.

Baseline
-6.61%
This site is operating below the baseline period.

Wastewater Treatment Plant Type... Activated Sludge Other Than Oxidation Ditch

Buildings (This site contains one building)

Add a Site/Building

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

Waste Water Treatment Plant
Plant Design Flow Rate: 17.9 MGD

Meters (7 meters)

Current To 1/1/2017 | Add a Meter

Meter Name	Status	Type	Utility	Meter #	Acct #	First Reading	Last Reading	Conn
Flow Meter	✓	Flow Meter	(Unknown)			12/1/2009	1/1/2017	1
WWTF Biofuel Generator	✓	Electric Meter	Xcel Energy	17955524	51-0011607957-6	1/12/2017	2/27/2017	1
WWTF Boilers/Bio Solids Firm	✓	Natural Gas Meter	Xcel Energy	628482	51-5187789-1	12/29/2007	2/27/2017	1
WWTF Boilers/Bio Solids Interruptible	✓	Natural Gas Meter	Xcel Energy	594392	51-5187789-1	12/4/2007	2/28/2017	1
WWTF Electric	✓	Electric Meter	Xcel Energy	17955943	51-5187789-1	12/29/2007	2/27/2017	1
WWTF Pilots/Lab	✓	Natural Gas Meter	Xcel Energy	20339497	51-5187789-1	12/29/2007	2/27/2017	1
WWTF SOLAR PV20KW	✓	PV Renewable Meter	(Unknown)	18980348	51-5187789-1	1/26/2016	2/27/2017	1

Energy Assessment - City of St. Peter

Low Energy Star® benchmark score (< 10)

- Two Opportunities
  - Aeration Control and VFD
  - Biosolids Blower VFD
- Savings Potential
  - 436,000 kWh electricity per year
  - $43,000 annual operation cost
- Utility partnership

Questions?

Follow up questions, please contact adam.zoet@state.mn.us

Access our project website here:
http://www.mntap.umn.edu/POTW/wwtp.html

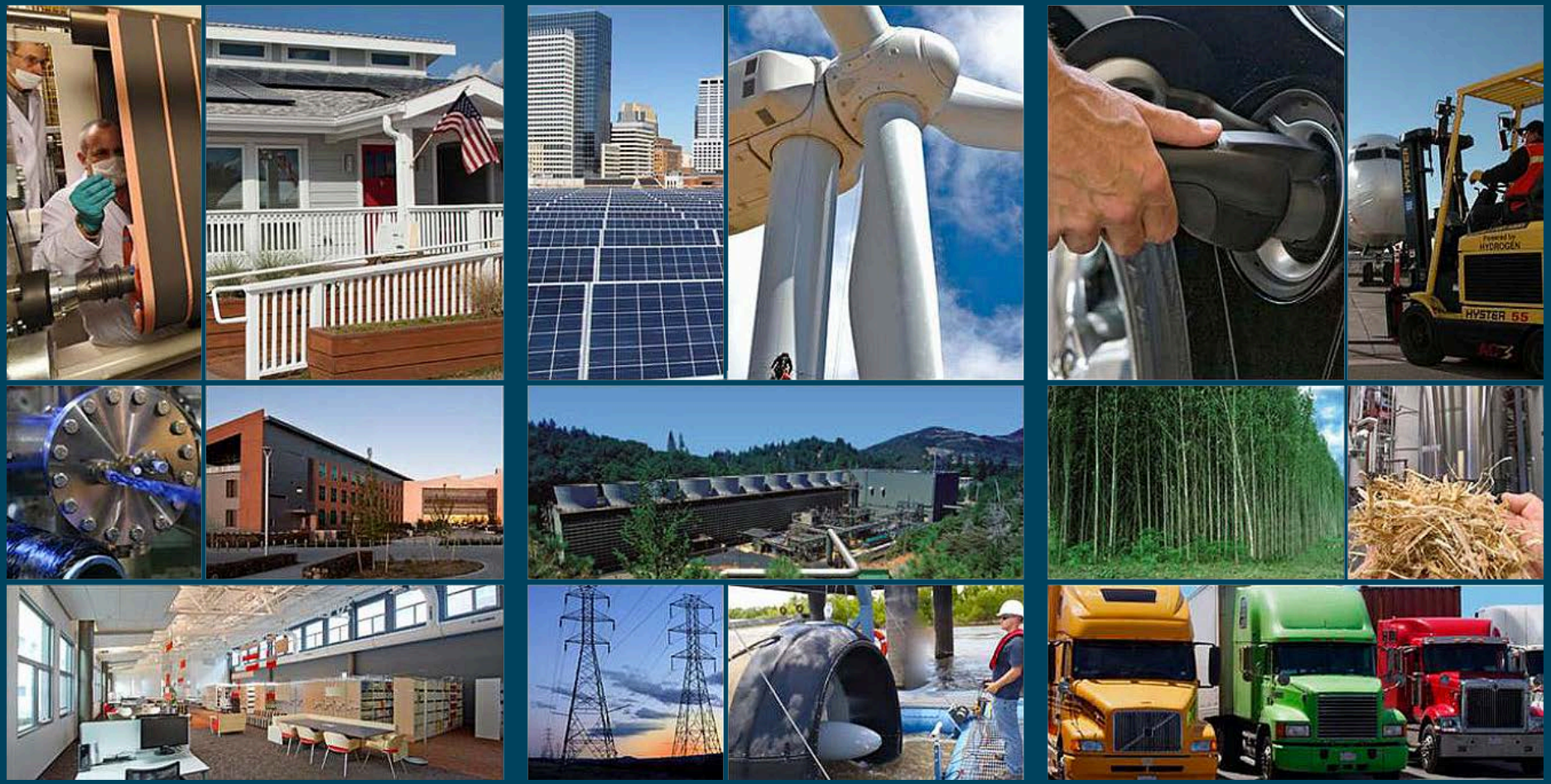
Michael Muller

Analytical Energy Solutions

U.S. DEPARTMENT OF ENERGY

50001 Ready Tools

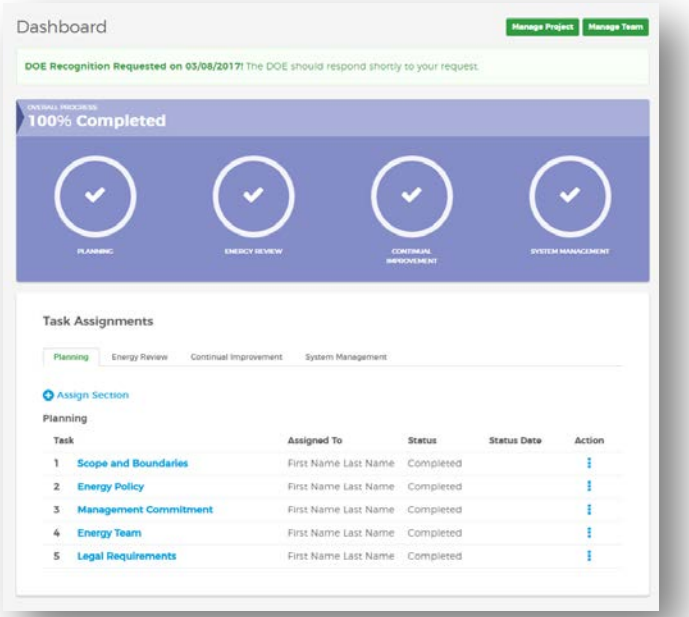
Overview



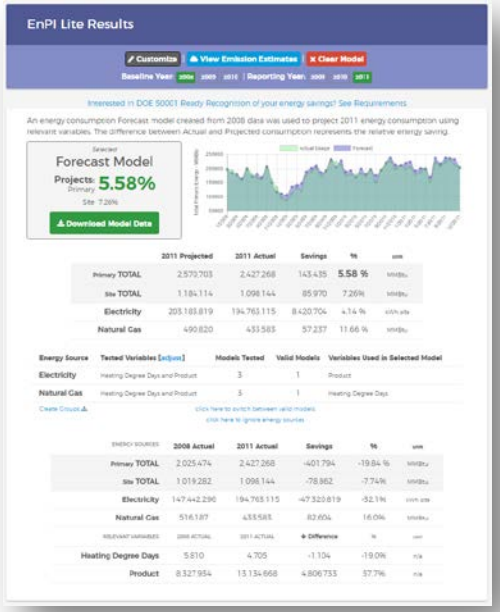
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

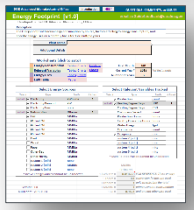
50001 Ready Tools - Overview

50001 Ready Navigator



EnPI Lite





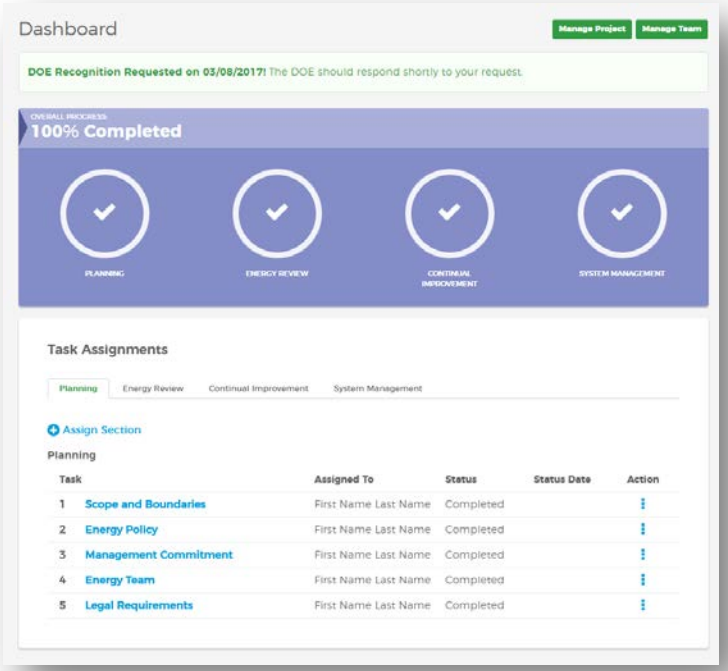
DOE Energy Footprint Tool

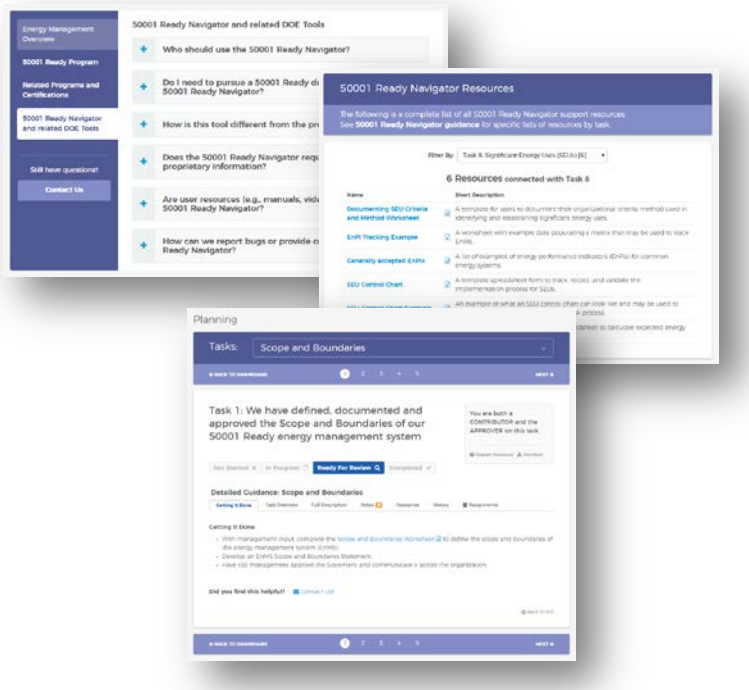
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

50001 Ready Navigator

Provides Step-by-Step Energy Management System Guidance

The 50001 Ready Navigator is an online application that provides step-by-step guidance for implementing and maintaining an energy management system in conformance with the ISO 50001 Energy Management System Standard.



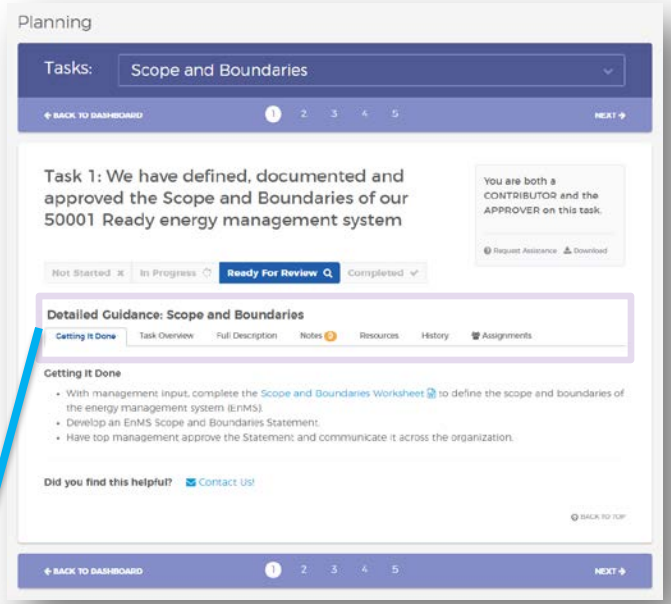


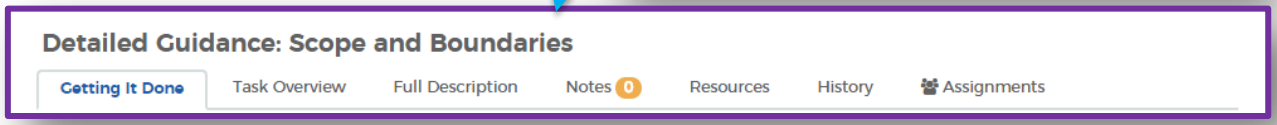
25 Tasks with Detailed Guidance

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

50001 Ready Navigator - highlights

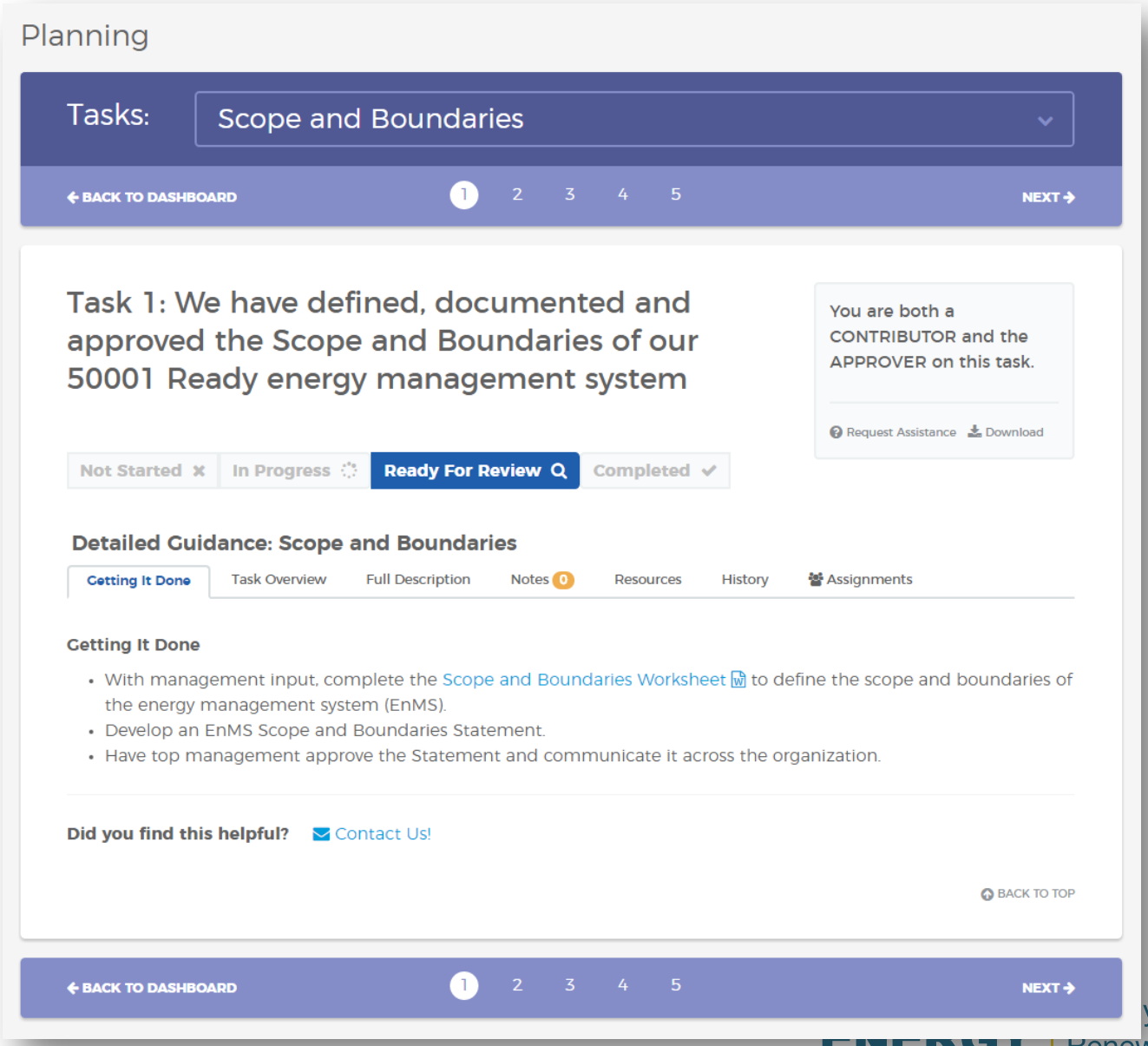
- Straight forward guidance, each task includes the following sections:
  - Getting It Done – what specifically needs to be accomplished
  - Task Overview – how does this task connect with ISO50001
  - Full Guidance – comprehensive guidance about the task
  - *Optional* Transition Tips – from other ISO management systems or ENERGY STAR
- Track and update task progress
- Form teams and assign tasks
- Add task specific notes
- Download guidance
- Create multiple projects
- Access over 100 related resources
- **DOE 50001 Ready Recognition!**





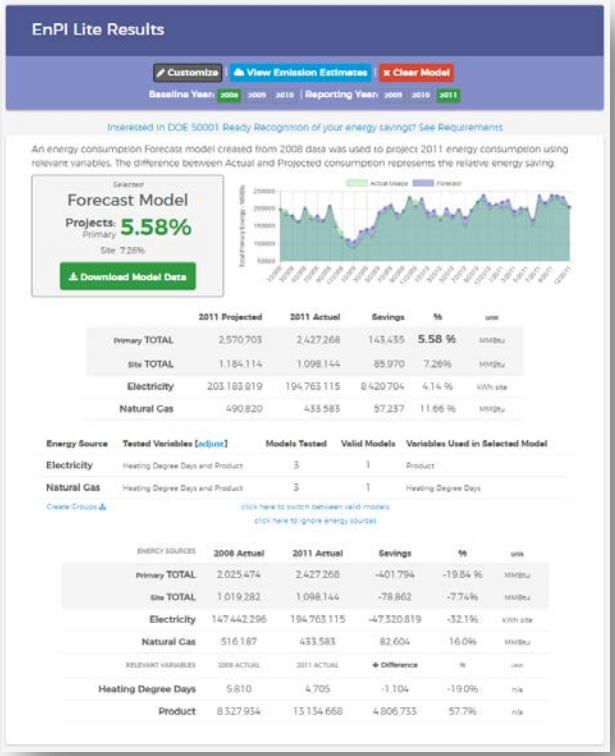
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

50001 Ready Navigator – task guidance



EnPI Lite

EnPI Lite is a web based calculator that estimates **energy savings** relative to relevant variables, like production levels and weather, using linear regression.



EnPI Lite Steps:

1. Input Energy Consumption and Relevant Variable Data

   Input Options:

   - Energy Footprint Tool
   - ENERGY STAR Portfolio Manager

2. Regression Analysis (*automatic*)
3. Adjust Data / Models as needed
4. Download Results

Note: Provides the same fundamental analysis as the other DOE EnPI tools with similar options

Energy Footprint Tool

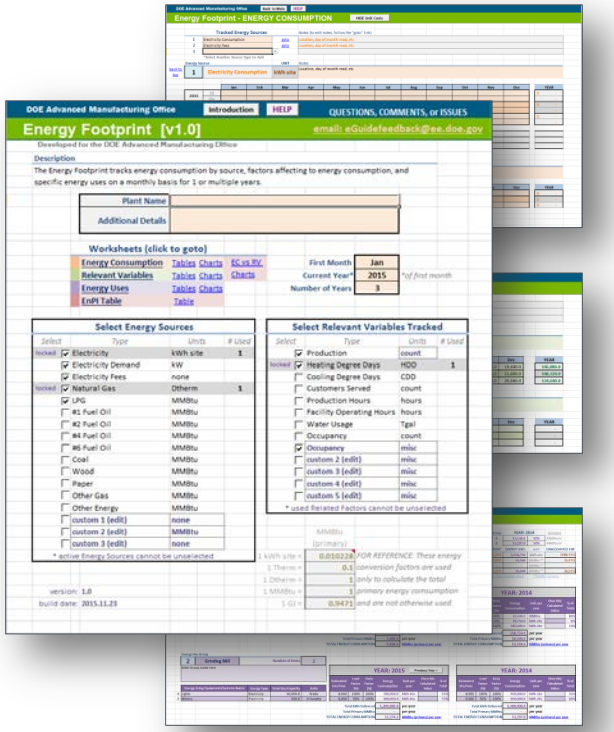
The **Energy Footprint Tool** is an Excel-based energy consumption and relevant variable tracking tool designed to be easy to use with significant built-in documentation. Detailed labels and pop-up help windows on all sheets allow users quickly begin using all features.

What data needs to be gathered?

Monthly Energy Bills should provide all of the required ***Energy Consumption*** data.

Depending on the ***Relevant Variables***, these may or may not be tracked at the plant (ex. production, operating hours) and might need to be looked up (ex. degree days)

Energy Uses may or may not be individually tracked by the plant and could potentially be estimated based on energy consumption or possibly directly measured



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

Related Links

- 50001 Ready Navigator
  - https://energy.gov/50001ready/navigator
- EnPI Lite
  - https://energy.gov/50001ready/enpilite
- DOE Energy Footprint Tool
  - https://energy.gov/eere/amo/downloads/energy-footprint-tool
  - Guide: https://ecenter.ee.doe.gov/EM/tools/Documents/downloads/EnergyFootprintGuide.pdf
  - Tutorial Video: https://www.youtube.com/watch?v=JxJJobiVBRs&feature=youtu.be

Jose Cueto

Miami-Dade County, FL

U.S. DEPARTMENT OF ENERGY

MDWASD

Leveraging Energy Efficiency for a Resilient Utility

Energy Tools

MDWASD's Energy Tools

- Miami-Dade County utilizes EnergyCAP county-wide for tracking of utility bills.
- EnergyCAP is a family of energy management
  - Leveraged for tracking, managing, processing, reporting, benchmarking, and analyzing utility bills
- Interfaces with EPA Energy Star Portfolio Manager.

EnergyCAP

- EnergyCAP has been configured to group and catalog water and wastewater facility energy assets for tracking.
- Hourly tracking of energy data from billing meters (Florida Power and Light)
- Integration with Portfolio Manager allows for normalization of energy metrics (footprint, flow, loading, etc.)

MDWASD Energy Baselines

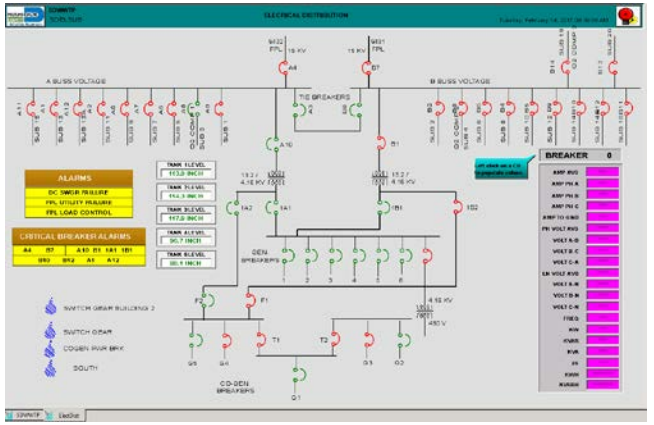
- Wastewater Treatment Facilities: 140 million kw-hr/year
- Water Facilities: 150 million kw-hr/year
- Pumping Stations: 73 million kw-hr/year
- Energy Bill: ~US$ 30 million per year

FY		FPL	EMDs	City Gas	Bio-Gas	Total	Flow		Elect., FPL		Elect., Total	
		kwh/yr					MG/yr		kwh/MG		kwh/MG	
2016	Orr WTP	57,783,660	6,132,000	8,557,090		408,637,663	65,968	117,615	876	1,270	1,099	1,395
	Hlh + Preston	76,611,800					46,812		1,637		1,637	
	Hialeah RO	12,620,837					2,251		5,607		5,607	
	Rex System	2,371,236					2,585		917		917	
	NDWWTP	45,139,200					30,734	115,280	2,132	1,851	1,469	2,121
	SDWWTP	62,249,600	15,314	9,627,911	7,182,180		38,114		2,168		2,075	
	CDWWTP	33,034,400	93,258		14,294,000		46,432		1,151		1,021	
	Pump Station	72,925,177									633	

MDWASD's Energy Tools (cont.)

- Although MDWASD utilizes EnergyCAP, process specific data not available
- Partial submetering in place utilizing Siemens WinnPM.Net
- System installed to monitor power quality and consumption
- Integration of WinnPM.Net data with utility SCADA system
- MDWASD working to expand submetering efforts and integrate data with EnergyCap

SIEMENS



QUESTIONS?

Josenrique Cueto, P.E., Assistant Director MDWASD

jcueto@miamidade.gov

Jay Wrobel

Advanced Manufacturing Office, U.S. Department of Energy

U.S. DEPARTMENT OF ENERGY

CHP for Resiliency Accelerator overview

Goal: To develop a guided experience to assess the built environment for CHP opportunities incorporating differing criteria for defining critical infrastructure and political, planning or utility priorities.

1. **How Does CHP Support CI Resiliency**
   - ✓ Policymaker and utility resources
   - ✓ Output is knowledge, terms and facts, case studies, etc
2. **ID the Potential for CHP**
   - ✓ Look at and Prioritize CI buildings
   - ✓ Rank order political priorities to consider (safety, energy independence, location, costs, availability)
   - ✓ High level ranking of buildings to consider
3. **Evaluate Priority Applications**
   - ✓ Portfolio analysis of most critical buildings
   - ✓ Screening tool with VG/G/Not CHP candidate
   - ✓ CHP TAPs to support with more in depth Qualification Screening
4. **CHP Implementation Support**
   - ✓ Steps to get DOE TAP support
   - ✓ Resources and tools for further decision making
   - ✓ Best practices and project profiles (see it in action)

Grace Richardson

Alexandria Renew Enterprises

U.S. DEPARTMENT OF ENERGY

Sea of Tools:
EnPI and 50001 Navigator

Transform water today, inspire for tomorrow

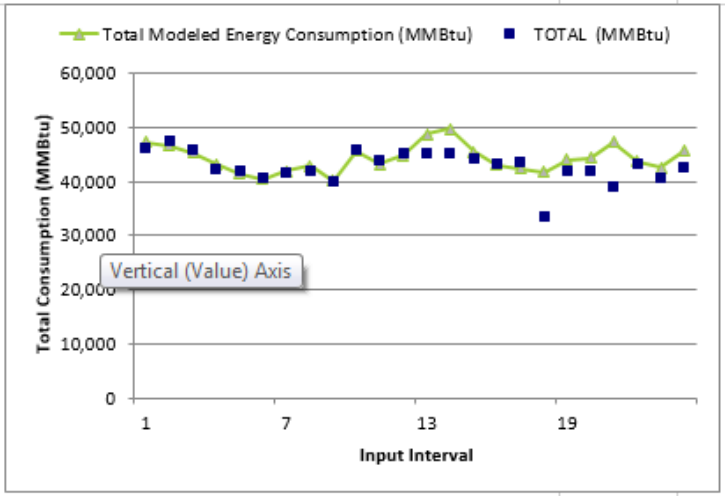
May 2017

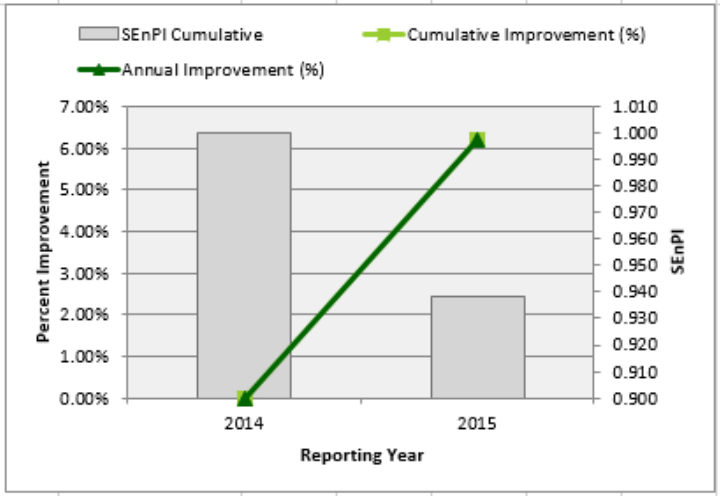
Energy Performance Indicator Tool

- EnPI Tool developed by Department of Energy
- Regression analysis-based tool
- Excel Add-In
- Helps to:
  - Establish normalized energy baseline
  - Identify key variables affecting energy performance
  - Track annual progress

EnPI Tool

	2014	2015
Actual Total Electricity (MMBTU)(MMBTU)	424,879	405,178
Actual Natural Gas (MMBTU)	8,735	9,065
Actual Digester Gas (MMBTU)	90,230	91,699
TOTAL (MMBtu)	523,844	505,942
Adjustment Method	Model Year	Forecast
Modeled Total Electricity (MMBTU)(MMBTU)	424,879	445,580
Total Electricity (MMBTU)(MMBTU) Annual Savings	0	40,401
Modeled Natural Gas (MMBTU)	8,735	8,638
Natural Gas (MMBTU) Annual Savings	0	-427
Modeled Digester Gas (MMBTU)	90,230	85,127
Digester Gas (MMBTU) Annual Savings	0	-6,572
Total Modeled Energy Consumption (MMBtu)	523,844	539,344
SEnPI Cumulative	1.000	0.938
Cumulative Improvement (%)	0.00%	6.19%
Annual Improvement (%)	0.00%	6.19%
Annual Savings (MMBtu/year)	0	33,402
Cumulative Savings (MMBtu)	0	33,402



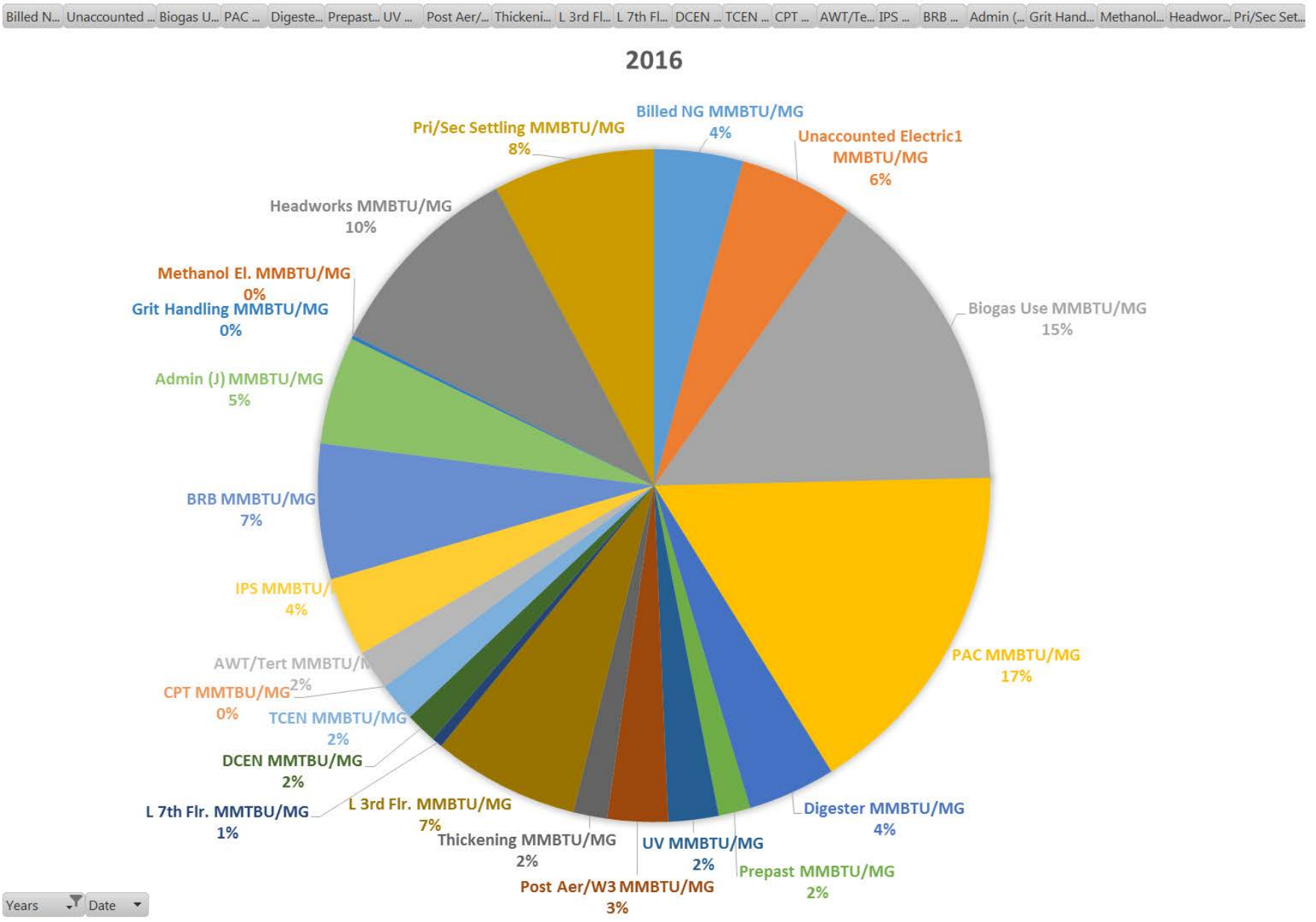


EnPI Tool

- Used in conjunction with “Bottom-Up” energy savings calculations to assess achievement level.
- Useful tool
  - When it works.
- Has some limitations
  - Low resolution (only monthly data)
  - Will use best-fit model, which may or may not be valid in reality

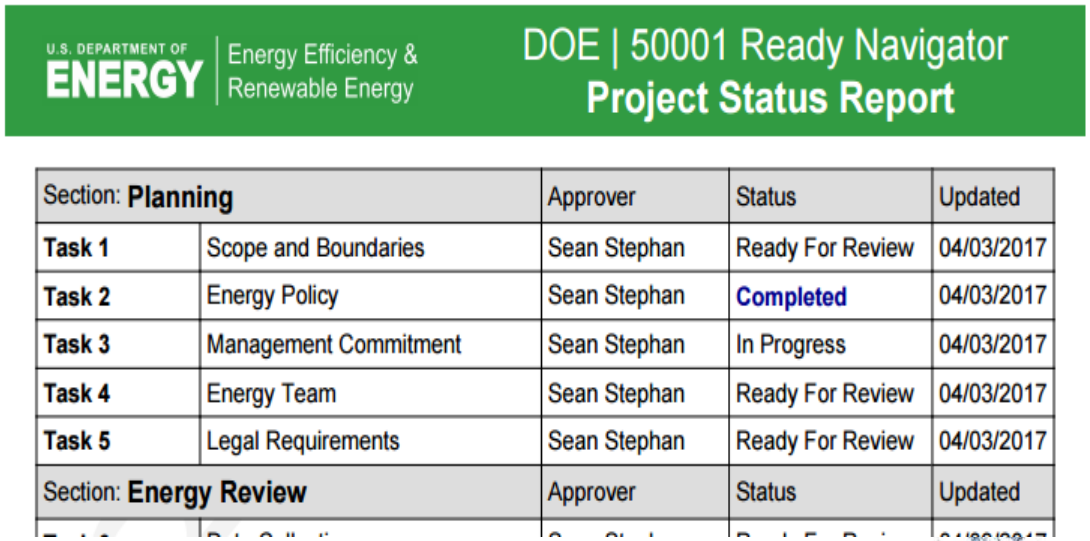
Excel

- Can store fairly large amount of data
- Flexibility in visualization options
- Easy import from AlexRenew data gathering software


Billed N...
Unaccounted ...
Biogas U...
PAC ...
Digeste...
Prepast...
UV ...
Post Aer/...
Thickeni...
L 3rd Fl...
L 7th Fl...
DCEN ...
TCEN ...
CPT ...
AWT/Te...
IPS ...
BRB ...
Admin (...
Grit Hand...
Methanol...
Headwor...
Pri/Sec Set...
2016
Billed NG MMBTU/MG
4%
Unaccounted Electric1
MMBTU/MG
6%
Biogas Use MMBTU/MG
15%
PAC MMBTU/MG
17%
Digester MMBTU/MG
4%
Prepast MMBTU/MG
2%
UV MMBTU/MG
2%
Post Aer/W3 MMBTU/MG
3%
Thickening MMBTU/MG
2%
L 3rd Flr. MMBTU/MG
7%
L 7th Flr. MMTBU/MG
1%
DCEN MMTBU/MG
2%
TCEN MMBTU/MG
2%
CPT MMTBU/MG
0%
AWT/Tert MMBTU/M
2%
IPS MMBTU/
4%
BRB MMBTU/MG
7%
Admin (J) MMBTU/MG
5%
Grit Handling MMBTU/MG
0%
Methanol El. MMBTU/MG
0%
Headworks MMBTU/MG
10%
Pri/Sec Settling MMBTU/MG
8%
Years
Date

50001 Navigator

- Useful online tool to track progress in establishing Energy Management System
- Divides EnMS development into simple steps
- Allows users to establish a team of multiple users
- User-friendly interface
- Automatic Reports



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

DOE | 50001 Ready Navigator
Project Status Report

Section: **Planning**		Approver	Status	Updated
Task 1	Scope and Boundaries	Sean Stephan	Ready For Review	04/03/2017
Task 2	Energy Policy	Sean Stephan	**Completed**	04/03/2017
Task 3	Management Commitment	Sean Stephan	In Progress	04/03/2017
Task 4	Energy Team	Sean Stephan	Ready For Review	04/03/2017
Task 5	Legal Requirements	Sean Stephan	Ready For Review	04/03/2017
Section: **Energy Review**		Approver	Status	Updated

Questions?

Grace Richardson
Engineering Project Manager
Alexandria Renew Enterprises
grace.richardson@alexrenew.com

30 MIN SESSION BREAK

Return 12:05 pm

U.S. DEPARTMENT OF ENERGY

15 MIN Important Takeaways

U.S. DEPARTMENT OF ENERGY

Kudos to all our speakers for having such great initiatives in the EE space in WW

Megan Levy, State of Wisconsin
Adam Zoet, State of Minnesota
Jose Cueto, Miami-Dade County, FL
Grace Richardson, Alexandria Renew Enterprises
Jay Wrobel, U.S. Department of Energy
Michael Muller, Analytical Energy Solutions

Special thanks to Andre Defontaine, Charles Satterfield, Brittany Ryan for helping organize this workshop

If you need anything or would like to follow up please contact Sapna Gheewala

Sapna.Gheewala@ee.doe.gov
202-287-1649

U.S. DEPARTMENT OF ENERGY

Thank You

Provide feedback on this session in the new Summit App!

Download the app to your mobile device or go to **bbsummit.pathable.com**