Energy Self-Assessment Tools and Energy Audits for Water and Wastewater Utilities

James Horne, US EPA Office of Wastewater Management

Jason Turgeon, US EPA Region 1

Eric Byous, US EPA Region 9

Energy Use and Water Utilities

- Water and Wastewater treatment represents about 2% of the nation's energy consumption
  - About $4.7 billion is spent annually for energy costs to run drinking water and wastewater utilities[1]
  - Equivalent to approximately 69 billion kilowatt hours (kWh)[2]
  - Equates to adding approximately 52 million tons of greenhouse gas to the atmosphere[3]
- Energy represents the largest controllable cost of providing water or wastewater services to the public
  - About 15,000 municipal treatment plants and 51,000 community water systems in the US[4]
  - Energy costs often one of the top 3 O&M costs in this sector

1 Based on EIA's average utility electric rate per kWh for industrial customers, 2013 data
2 Electric Power Research Institute, Electricity Use and Management in the Municipal Water Supply and Wastewater Industries, November 2013 (EPRI)
3 Calculated from EPRI figures using EPA GHG emissions calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.htm
4 EPRI

Energy Reduction at Water Utilities

- Water and Energy Efficiency at Utilities =
  - Reduced energy usage
  - Reduced operating costs
  - Reduced climate impacts/carbon footprint
  - Sustainability of water infrastructure
  - Save Water

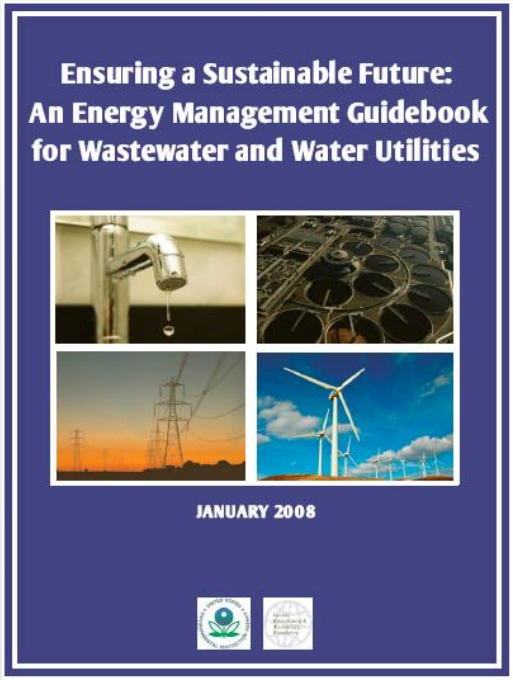
Why Focus on Management?

- Energy issues are here to stay and will only get more serious—no quick fixes!
- Individual projects and technologies are fine, but something is needed to pull it all together (a **system**)
- Systematic management will ensure **continuing** focus on energy efficiency
- The Plan-Do-Check-Act management systems approach has worked in many different sectors

Managing to Maximize Energy Efficiency

Designed to help utilities:

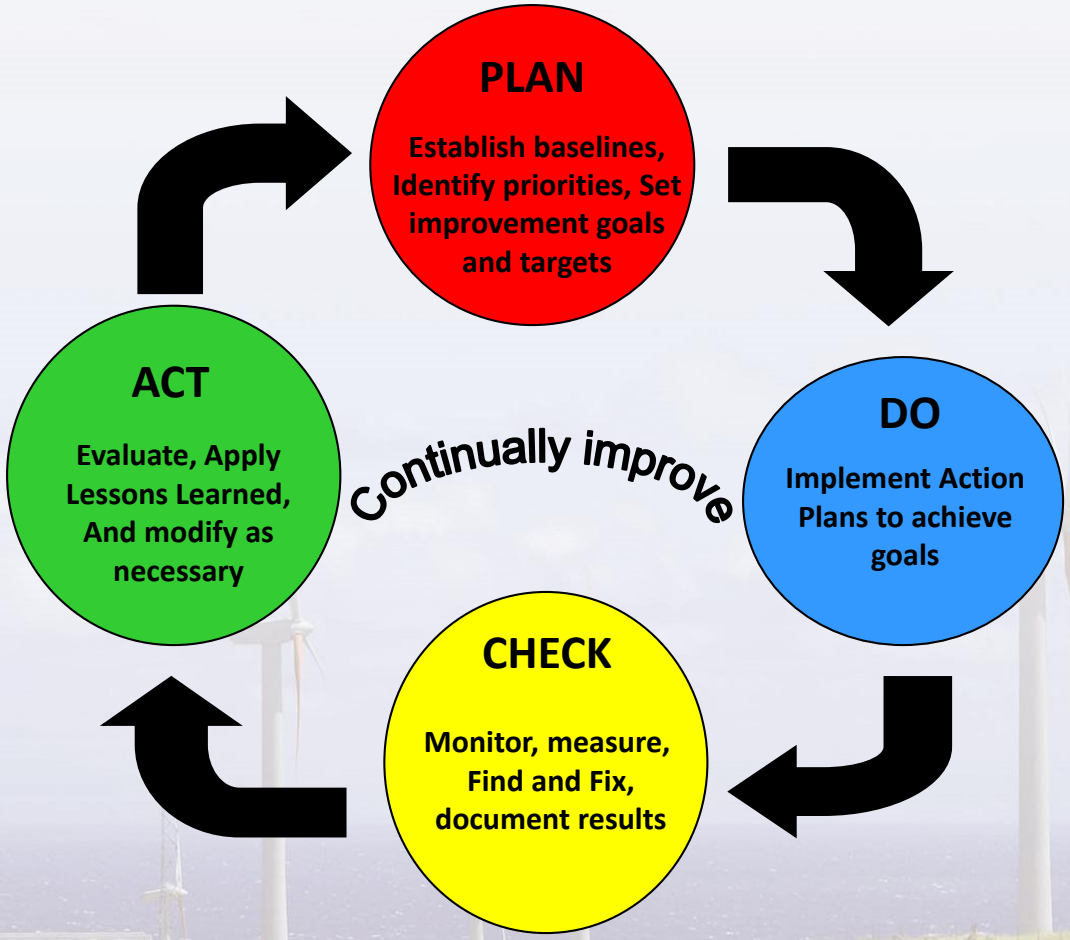
- Systematically assess current energy costs and practices
- Set measurable performance improvement goals
- Monitor and measure progress over time



Uses a management system approach for energy conservation, based on the successful Plan-Do-Check- Act process [based on Environmental Management Systems (EMS)

http://water.epa.gov/infrastructure/sustain/cut_energy.cfm

The Plan-Do-Check-Act Approach



- Allows utilities to systematically assess and manage energy opportunities and take action
- NOT a project—a system to manage for the long haul

Energy Audit Approaches

- Conduct a Self-Assessment of your utility's energy use
- Conduct a Level II or III energy audit at your facility
- Start an energy management program to implement audit recommendations

Section 1: Self-Assessment Tools

- Free
- Easy to Use for Operators of Any Size Facility
- Available Online
- Do Not Require Outside Assistance

Energy Self-Assessment Tools For Small Utilities

- EPA Office of Groundwater and Drinking Water Energy Use Assessment Tool
- EPA Energy Management Planning Self-Assessment worksheet (aka “radar graph”)
- NYSERDA/CEE Checklists
- Mass Energy Insight (available to local governments in Massachusetts)

EPA's Energy Use Assessment Tool

- What is the Energy Use Assessment Tool?
  - Free of charge, downloadable tool based in Excel that can be used by small and medium water and wastewater systems
  - Allows a utility to conduct a utility bill analysis to assess baseline energy use and costs
  - Use prior to a full-scale energy audit
  - Drills down to equipment level
  - Printable summary report
    - Presentation of energy consumption & costs (broad to detail)
    - Graphs energy use over time
    - Highlights areas of energy efficiency

How the Energy Use Tool can Help Drinking Water And Wastewater Systems

Wet-well and Piping

Credit: Jackson, SC

- The tool:
  - Acts as a repository of up to 5 years of your energy use, cost, equipment and operational data
  - Analyzes your data and displays cost and energy use trends
  - Includes lighting and HVAC
  - Compiles equipment data

EPA's Energy Use Assessment Tool: Information Needed to Enter in the Tool

- **All plant utility data (use and cost information) by month (minimum of 12 months) for up to 5 years of analysis**
  - Collect from utility bills such as electric, natural gas, water/sewer, fuel oil, alternative energy, and other utilities
- **Non-process information (by building)**
  - List of lighting fixtures
  - HVAC equipment
- **Drinking water and/or Wastewater treatment plant information**
  - Monthly treatment/discharge volumes
  - Pump and motor nameplate data (horsepower, efficiency rating, full load amp rating)
  - Average motor operating amperage

EPA Energy Use Assessment Tool for Wastewater Systems

Select/Switch Template | Building Data | Plant Energy Usage | Reset Data | Save

General Information

Specify Other Utility Type (if any)	Propane
Specify Units for Other Energy Consumption (if any)	GAL

2011

Electric ($/kWh)	Natural Gas ($/CCF)	No 2 Fuel Oil ($/CCF)	Water/Sewer ($/GAL)	Alt. Energy: ($/CCF
$0.1018	$1.1504	$1.0618	$0.0056	

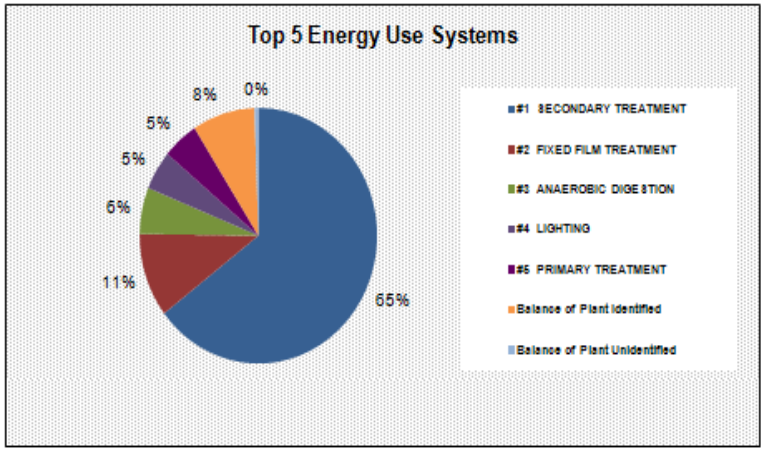
2011	January	February	March	April	May	June	July	August	September	October	November	December
Electricity Cost ($) 2011	$18,184.32	$19,492.46	$19,247.76	$19,704.16	$20,930.40	$19,997.44						
Consumption (kWh) 2011	196,800	189,800	187,600	192,800	204,000	183,800						
Natural Gas Cost ($) 2011	$6,146.54	$5,556.68	$5,015.30	$3,292.82	$1,525.44	$1,428.90						
Consumption (CCF) 2011	5,276	4,782	4,331	2,914	1,362	1,299						
No 2 Fuel Oil Cost ($) 2011	$16,231.03	$11,166.71	$8,587.05	$5,077.59	$534.92	$43.09						
Consumption (CCF) 2011	14,260	10,279	8,478	5,237	562	400						
Water & Sewer Cost ($) 2011	$12,320.06	$12,320.06	$11,741.82	$11,741.82	$11,741.82	$16,794.47						
Consumption (GAL) 2011	2,210,986	2,210,986	2,107,257	2,107,257	2,107,257	3,013,644						
Alternative Energy Cost ($) 2011	$1,914.90	$2,035.80	$2,571.40	$2,394.60	$2,012.40	$25,071.20						
Consumption (CCF) 2011	1,473,000	1,566,000	1,978,000	1,842,000	1,548,000	229,400						
Other - Propane Cost ($) 2011	$1,070.30	$1,535.60	$2,324.30	$3,180.10	$2,017.40	$1,923.90						
Consumption (GAL) 2011	973,000	1,396,000	2,113,000	2,891,000	1,834,000	1,749,000						
Total Utility Cost 2011	$55,867.15	$52,107.31	$49,487.63	$45,391.09	$38,762.38	$65,259.00						
Treatment Volume (MGAL) 2011	112.240	107.500	116.700	118.400	111.200	94.700						
Utility Cost/Treatment Volume ($/MG	$497.75	$484.72	$424.06	$383.37	$348.58	$689.11						
Electric Utilization (kWh/MGAL) 2011	1,753.39	1,765.58	1,607.54	1,628.38	1,834.53	1,940.87						

2010

Electric ($/kWh)	Natural Gas ($/CCF)	No 2 Fuel Oil ($/CCF)	Water/Sewer ($/GAL)	Alt. Energy: ($/CCF
$0.1020	$1.0894	$1.0610	$0.0056	

2010	January	February	March	April	May	June	July	August	September	October	November	December
Electricity Cost ($) 2010	$16,711.68	$17,684.94	$15,451.56	$15,268.68	$16,374.96	$18,996.48	$19,939.92	$18,041.58	$17,689.84	$18,057.60	$17,876.28	$18,335.72
Consumption (kWh) 2010	163,200	172,200	150,600	149,400	159,600	174,600	182,600	177,400	173,600	182,400	186,600	190,600
Natural Gas Cost ($) 2010	$5,571.01	$5,059.70	$6,072.54	$3,619.31	$1,307.83	$1,207.72	$1,188.00	$888.13	$1,018.35	$1,324.23	$2,209.15	$6,538.90
Consumption (CCF) 2010	4,918	4,659	5,769	3,601	1,276	1,108	1,080	875	930	1,193	1,955	5,686

DISTRIBUTION OF ELECTRICAL ENERGY USE & COST BY MAJOR PROCESS FOR 7/2010 - 6/2011



Major Process/Top Energy Use Systems	Electric Energy Use (%)	Electric Energy Use (kWh)	Electric Energy Cost ($)
#1 SECONDARY TREATMENT	64.60%	1,452,103	$146,953
#2 FIXED FILM TREATMENT	10.62%	238,639	$24,150
#3 ANAEROBIC DIGESTION	5.88%	132,289	$13,388
#4 LIGHTING	4.98%	111,865	$11,321
#5 PRIMARY TREATMENT	4.89%	109,930	$11,125
Balance of Plant Identified	8.51%	191,404	$19,370
Balance of Plant Unidentified	0.52%	11,770	$1,191
Total	100.00%	2,248,000	$227,497

EQUIPMENT INVENTORY: BREAKDOWN OF ELECTRICAL ENERGY USE FOR MAJOR/ENERGY INTENSIVE EQUIPMENT

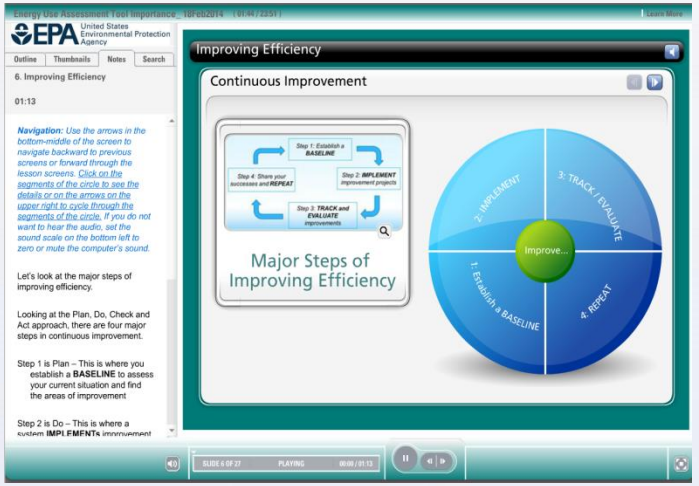
Major Process/Top Energy Use Systems	Motor Efficiency (%)	Efficiency Rating	Electric Energy Use (%)	Electric Energy Use (kWh)	Electric Energy Cost ($)
Anaerobic Digestion					
Mixer - Gas Mixer	88	Medium	2.48%	55,696	$5,636.40
Other kW Load - Mixer Heater	N/A	N/A	0.80%	18,000	$1,821.60
Pump - Ht Wtr Pumps	85	Medium	0.56%	12,581	$1,273.16
Pump - Sludge Ht Wtr Pumps	85	Medium	0.62%	13,979	$1,414.63
Pump - Sludge Recir Pump	85	Medium	1.43%	32,034	$3,241.85
Effluent Pumping/Storage					
Pump - Effluent Pumps	91	High	0.91%	20,363	$2,060.77
Fixed Film Treatment					

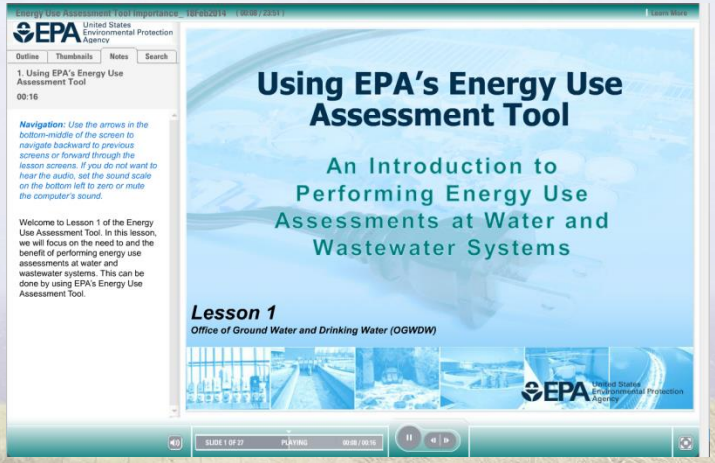
Result is a report format for the utility to share with decision makers

Energy Use Assessment Tool Training

COMING SOON: Online Self-paced training modules

- Introduction to Performing Energy Use Assessments at Water and Wastewater Systems
  - The first module focuses on the need to and the benefit of performing energy use assessments at water and wastewater systems.
  - The second module focuses on performing energy use assessments at water and wastewater systems using EPA's Energy Use Assessment Tool.





http://water.epa.gov/infrastructure/sustain/energy_use.cfm

Energy Use Assessment Tool Guidance

Current Guidance Available at :

http://water.epa.gov/infrastructure/sustain/energy_use.cfm

Click on:

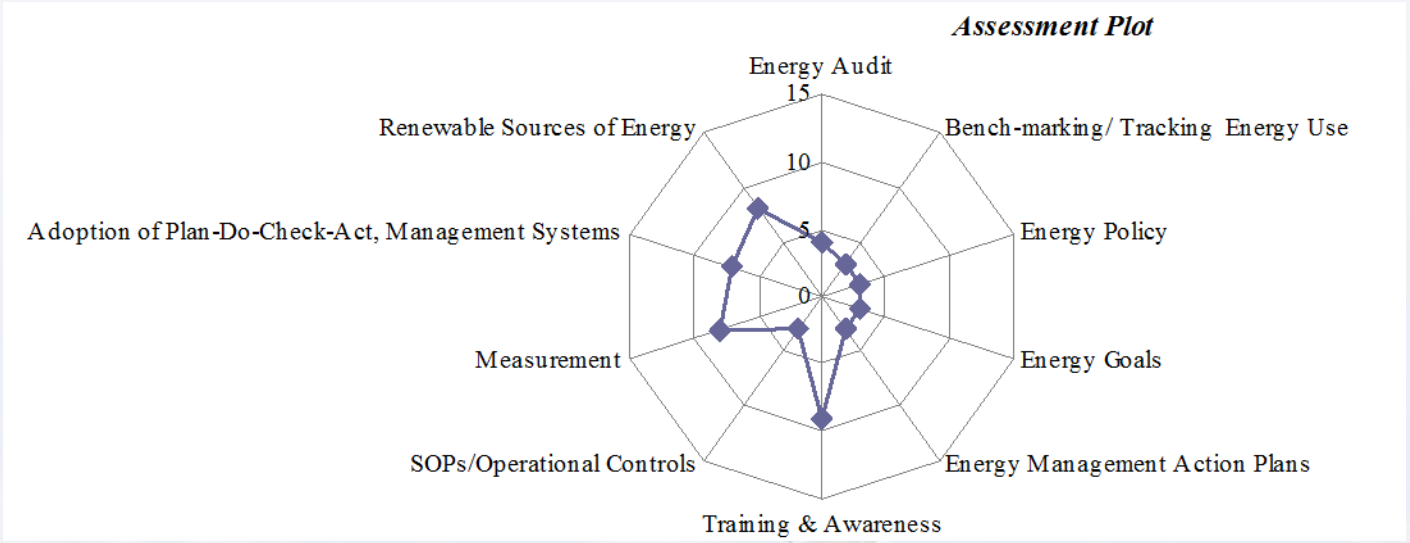
"Energy Use Assessment Tool User's Guide" (full version)

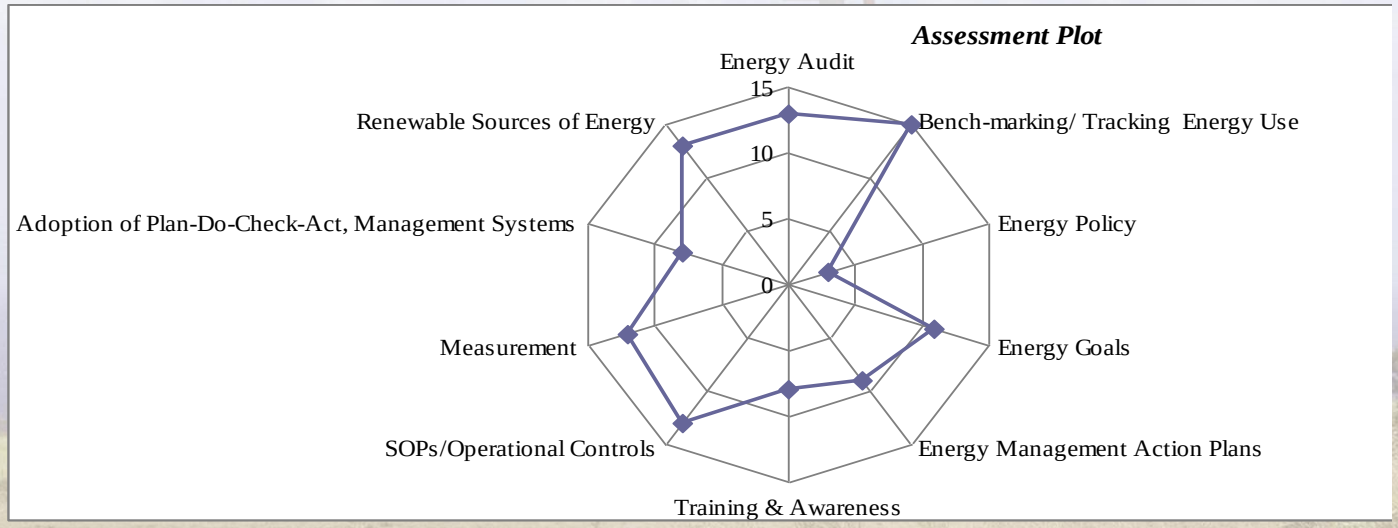
"Energy Use Assessments at Water and Wastewater Utilities" (pocket guide)

EPA Energy Management Planning Self-Assessment Worksheet

- Standalone worksheet included in “Ensuring a Sustainable Future” guidebook.
- 30 questions quickly allow users to evaluate strengths and weaknesses in existing energy management plans across 10 areas
- Intended to be used periodically to check progress on PDCA cycle
- Available on request: turgeon.jason@epa.gov

Before & After Roundtables: Town A





NYSERDA Water Energy Program

- Water and Wastewater Focus Program:
  - Water and Wastewater Best Practices Handbook
  - 10 Steps to Energy Efficiency for Water and Wastewater Treatment Facilities
  - Payback Analysis Tool
  - Wastewater Check List
  - Wastewater Benchmarking Tool
  - Water Treatment Check List
  - Water Treatment Benchmarking Tool
  - http://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Commercial-and-Industrial/Sectors/Municipal-Water-and-Wastewater.aspx

Courtesy Nabeel Mishalani, Hazen and Sawyer

NYSERDA Self-Audit Checklists

- Designed for small water and wastewater facilities
- Simple Yes/No questions designed to point to opportunities for efficiency in operation and equipment
- Download with other NYSERDA tools at http://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Commercial-and-Industrial/Sectors/Municipal-Water-and-Wastewater/MWWT-Tools-and-Materials.aspx

NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY'S

Focus on Municipal Water and Wastewater

SMALL WASTEWATER TREATMENT PLANT CHECKLIST

(If any are not applicable, do not provide a response for that particular question)

	YES	NO	Additional comments and information
1. INFLUENT/EFFLUENT PUMPING			
A. Do you have influent and/or effluent pumps?			
B. If yes, do you have variable speed control on the influent pumps?			
C. If yes, are premium-efficiency motors currently installed on the influent pumps?			
D. If yes, do you have variable speed control on the effluent pumps?			
E. If yes, are premium-efficiency motors currently installed on the effluent pumps?			
Subtotal Grayed			
2. PRE-AERATION/POST-AERATION			
A. Does your plant utilize aeration blowers/compressors for preaeration, post-aeration or other aerated channels?			
B. If yes, are there currently means to throttle the amount of air delivered or otherwise adjust output?			
Subtotal Grayed			
3. INTERMEDIATE PUMPING			
A. Do you have intermediate pumps to convey flow from primary to secondary processes or from secondary to tertiary treatment processes?			
B. If yes, do you have variable speed control on the intermediate pumps?			
C. If yes, are premium-efficiency motors currently installed on the intermediate pumps?			
Subtotal Grayed			
4. BIOLOGICAL PROCESSES - ACTIVATED SLUDGE PROCESSES			

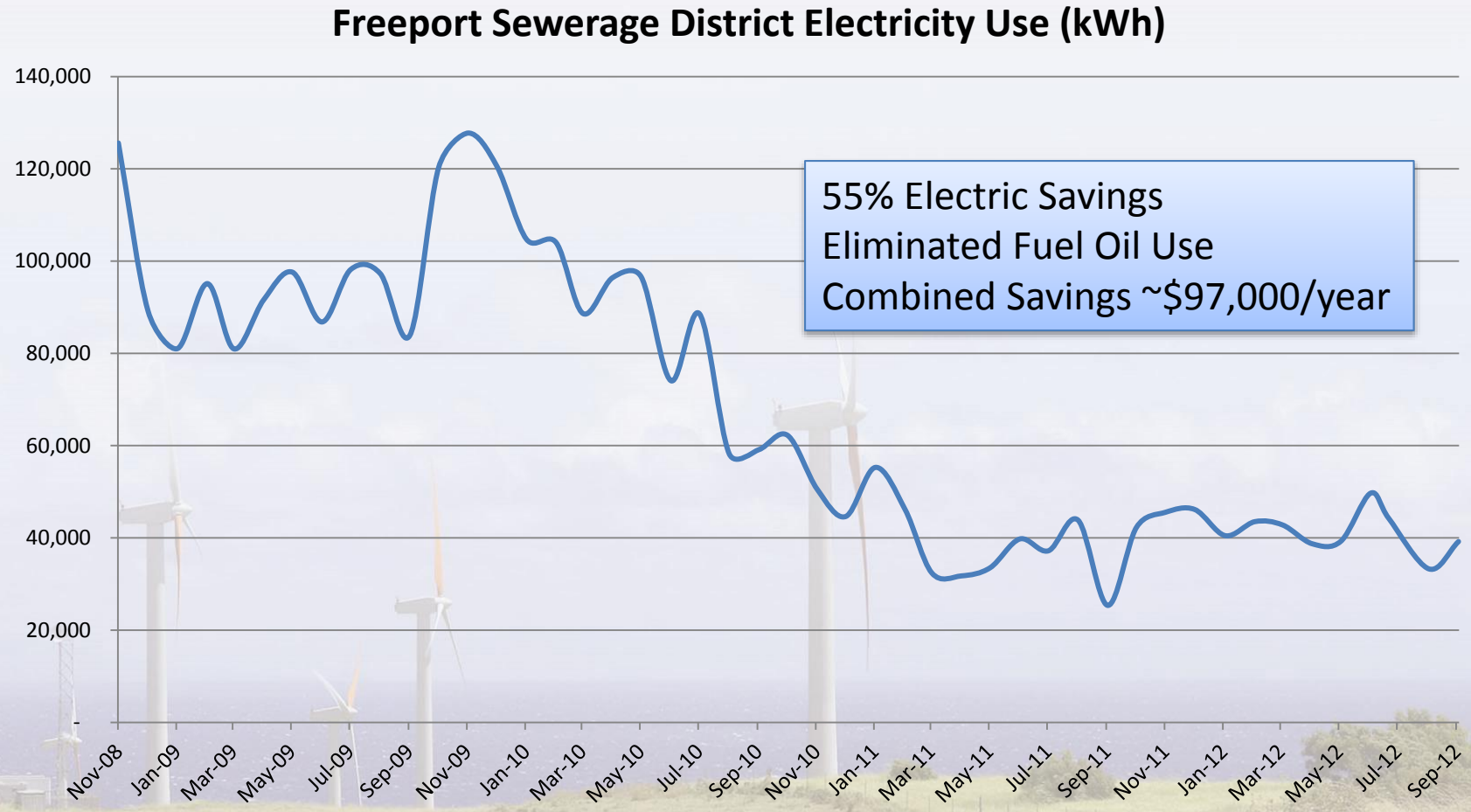
CEE Self-Audit Checklists

- Adapted from NYSERDA Checklists
- Designed for small water and wastewater facilities
- Simple Yes/No questions designed to point to opportunities for efficiency in operation and equipment
- Available from Efficiency Vermont: https://www.efficiencyvermont.com/For-My-Business/Solutions-For/Water-Wastewater-Facilities

Mass Energy Insight

- Available to any Massachusetts government entity including water/wastewater districts
- Data automatically uploaded from electric/gas utilities
- Provides a variety of built-in reports for water/wastewater industries
- Ability to interface automatically with ENERGY STAR Portfolio Manager
- www.massenergyinsight.net/

CASE STUDY 1: Freeport, ME



Section 2: Energy Audits

- Conducted by outside experts
- Available in a variety of costs from free to high 5 figures
- Available in a variety of levels from walk-through to “investment-grade”

Image: CC-licensed by kqedquest http://flic.kr/p/KyS8o

Energy Audits

- Types of Audits
- Costs & Providers
- Results
- Examples

Energy Audits

- Typically identify capital improvements (motors, blowers, variable frequency drives, etc) and operational improvements
- Operational improvements can result in substantial savings with little to no cost
  - Time of operation, load demand contracts, unnecessary equipment, energy management systems, etc.
- Audits can be conducted on plant designs – very cost effective
- Can identify renewable energy opportunities

Types of Energy Audits
DEMAND vs SUPPLY

- ASHRAE Tiered Energy Audits
  - Level I (Walk-Through Analysis)
  - Level II (Energy Survey & Analysis)
  - Level III (Detailed Analysis of Capital – Intensive Modifications, aka Process Audit)
- Renewable Energy Assessments
  - Simple Discussion of Alternatives
  - Desktop Analysis
  - Feasibility Study

EPA Goals: Address Both Demand & Supply

- All facilities will benefit from Level II or Level III audit
  - Uncover operational and equipment changes for efficiency
  - These audits are NOT free, but have very fast paybacks
- All facilities should discuss renewable energy options and have a desktop analysis of promising alternatives
  - Feasibility studies performed where potential exists for significant energy production
- All facilities should use BOTH to develop a prioritized action list to guide their next steps!

Other names/types of audits

- Evaluate existing power consumption and metrics
  - Utility bill analysis
  - Benchmarking
- HVAC/Mechanical system audit
  - Evaluate gas requirements (process & heating systems)
  - Evaluate ventilation (efficiency & effectiveness)
  - Controls (programmable thermostats, etc.)
- Electrical system audit
  - Motor efficiency / type
  - Variable frequency drives
  - Lighting (systems, bulb type, controls)
- Process system audit
  - Process improvement
  - Operations optimization
  - Efficiency planning

Important Terms in Utility-Funded Audits

- Utility = Not you! The energy (electric or gas) provider.
- PA = Program Administrator = Utility Energy Efficiency personnel. Your new best friend - can help pay for audits and provide incentives ($$$) for projects!
- Identification of Energy Efficiency Opportunities = ~ Level I audits

Audit Costs and Providers

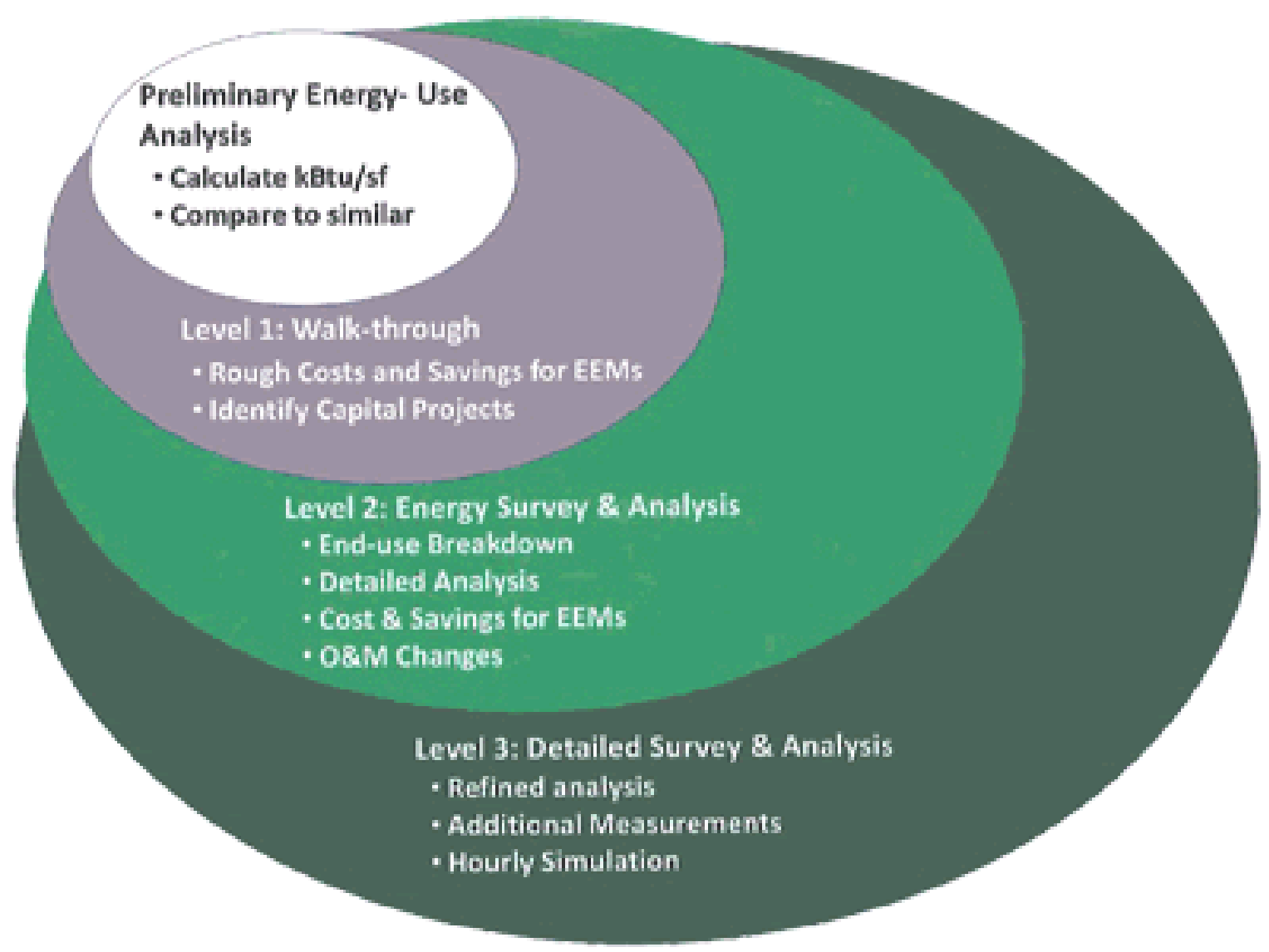
- PAs can and will fund audits in many service territories across the country
  - Audit costs usually split 50/50
  - You may be able to negotiate with PAs to develop something that works for you
  - PAs will often do a free walk-through with a simple checklist (aka Identification of EE Opportunities)

Audit Costs and Providers (cont'd)

- Find your PA by contacting your utility or visiting www.dsireusa.org and selecting your state.
- Some states have state-run efficiency programs instead of utility contacts (VT, WI, OR, ME, NY, NJ) but your utility can always tell you who to contact
- Some utilities, especially when owned by a municipality, may not offer assistance
- US DOE funds a network of Industrial Assessment Centers (IACs). Some IACs will work with water/wastewater clients at no cost.

  www1.eere.energy.gov/industry/bestpractices/about_iac.html

ASHRAE Audit Levels



Renewable Energy Assessments

- Start small (discussion) and end large ($100k+ feasibility studies)
- Some energy auditors will do some level of renewable energy assessment, usually discussion and desktop analysis with recommendations for further study
- Renewable energy projects usually only cost-effective AFTER all energy efficiency projects are completed.
- Some states have programs to fund assessments for certain types of projects

Audit Results:
One Size Does Not Fit All

FACILITY NAME	**AUDIT TYPE, LENGTH**	**AUDIT COST** (free audits no longer standard)	**ANNUAL ENERGY COST**	**ANNUAL SAVINGS**
Barnestable	Level I-II, 8 pgs	Free via utility	Not calculated	$32,422
Edgartown (audit 1)	Level II, 56 pgs	Free via utility	$209,328	$17,728
Edgartown (audit 2)	Level II, 170 pgs w/specs	Free via utility	Not calculated	$42,082
GLSD	Level III, 117 pgs	~$50,000 (split with utility)	$3,286,000	$1,028,000
Name Withheld (CT Water Facility)	Level III plus Desktop Renewables	~$25,000	$319,000	$55,000 efficiency, additional potential from up to 530 KW renewables

CASE STUDY 2

- Rural New Hampshire wastewater facility
  - 0.15 MGD average daily flow
  - Designed for 0.29 MGD average flow and 1.1 peak flow
  - Average annual electric use 462,000 kWh at a total cost of $63,000

Energy Balance example

Figure 1.1: 2011 WWTP Energy Use Breakdown

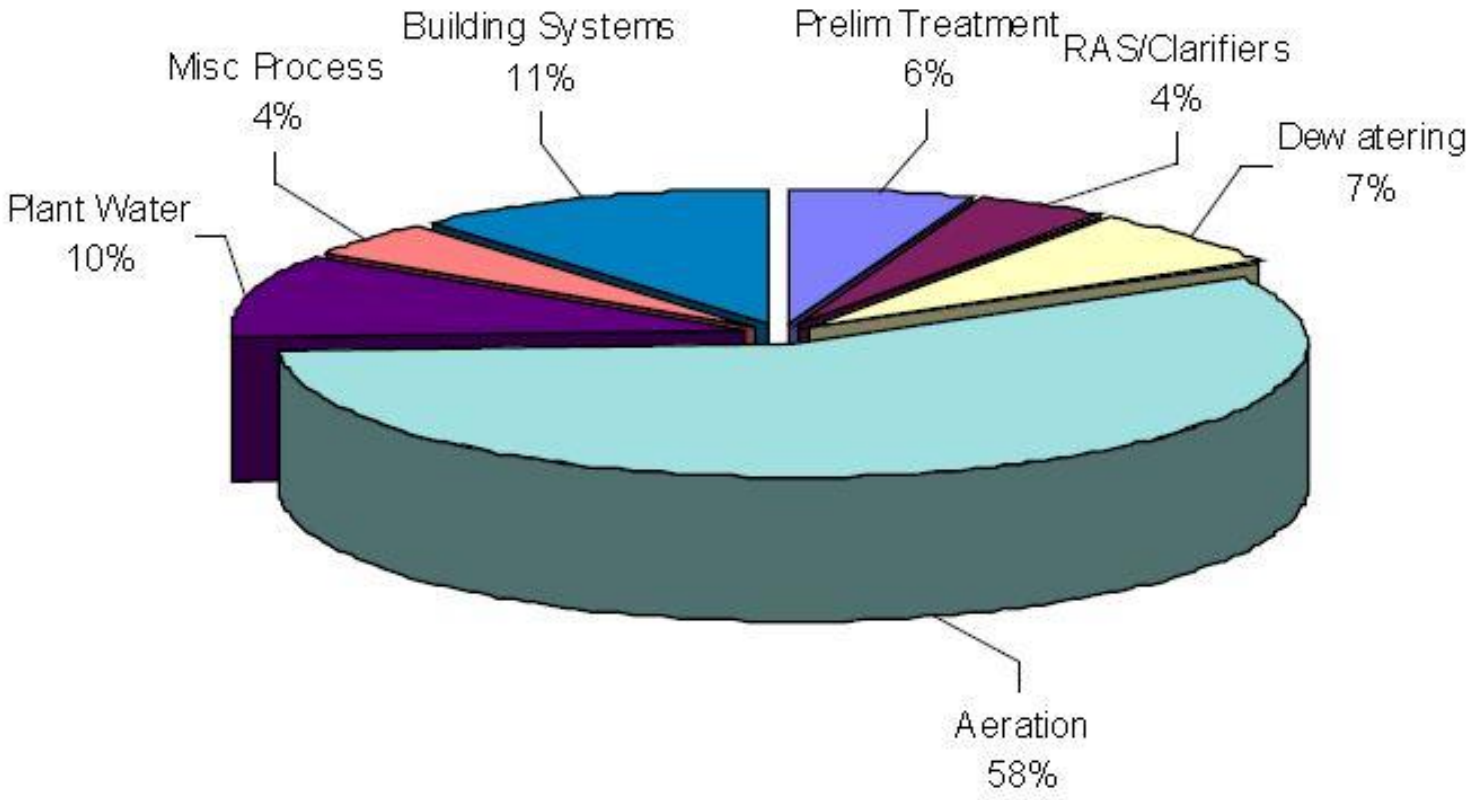


Table 1.2
RECOMMENDED COST SAVING PROJECTS

No	Cost Saving Measures	Fuel Savings (therms)	Annual Energy Savings (kWh)	First Year Annual Savings ($)	Initial Cost ($)	PSNH Incentive	Adjusted Simple Payback (yrs)
	ENERGY MANAGEMENT PRACTICES						
EMP 1	Formalize Energy Management Program	--	--	--	--	--	--
EMP 2	Benchmark System Performance	--	--	--	--	--	--
	Total for EMPs	--	--	--	--	--	--
	OPERATIONAL MEASURES						
OM 1	Temperature & Boiler Controls	2,286	11,000	$4,867	$1,650	--	< 1
OM 2	Cycle Grinder & Grit Blower	--	3,504	$480	$600	--	1.1
OM 3	Discontinue Use of RAS Grinder	--	5,256	$720	--	--	--
OM 4	Cycle Odor Control Blower	--	4,380	$600	$400	--	1.1
	Total for OMs		**24,140**	**$6,667**	**$2,650**		**< 1**
	ENERGY CONSERVATION MEASURES						
ECM 1	Install Fine Bubble Diffusers/Reduce DO/ Reduce Blower Sheave	--	156,987	$21,057	$74,100	TBD	3.5
ECM 2	Install New Plant Water Pump	--	34,952	$4,788	$5,750	TBD	1.2
	Total for ECMs		**191,139**	**$25,845**	**$79,850**	**TBD**	**3.1**
	ENERGY SUPPLY MEASURES						
ESM 1	Operate Sludge Blower Off Peak	--	--	$2,173	--	--	--
	Total for ESMs			**$2,173**			
	Electric Energy Savings & Cost	--	215,279	$31,325	$81,250	TBD	2.6
	Natural Gas Energy Savings & Cost	2,286	--	$3,360	$1,250	--	< 1
	Total	**2,286**	**215,279**	**$34,685**	**$82,500**	**TBD**	**2.4**

Review

- All facilities will benefit from an audit
- Audits vary in size, scope, complexity, and cost
- PAs will help you fund audits and projects
- Renewable energy assessments are important but should come after efficiency projects
- Audits that don’t lead to completed projects don’t save any energy!

Two Tools to Help with Audits

- Maine DEP Sample Audit RFP Language
  - MS Word based to allow for easy cut-and-paste
  - Designed to incorporate most important elements of Level III audits at lowest cost
  - Available at http://www.epa.gov/region1/eco/energy/designing-rfps-contracts.html
- EPRI Energy Audit Manual for Water/WW Facilities
  - Older (1994) but still relevant
  - www.cee1.org/ind/mot-sys/ww/epri-audit.pdf

Questions

Section 3:
Evaluation of Energy Audit Pilot Program Results in AZ, CA, HI, and NV

EPA Region 9's Auditing Pilot Program

- Water and wastewater utilities that received ARRA funding were eligible to receive Level II/III energy audits…15 were selected
- Results show recommendations with a maximum 7.5 yr payback have potential:
  - $1.4 million/yr cost savings with a 4.5 yr payback (16% ROI)
  - 6,900 megawatt hours/yr reductions

EPA Region 9's Auditing Pilot Program

- 15 recommendations with <1 yr payback period, with total annual savings of $190K/yr (**>100% ROI**)
- Non-capital improvements such as rate modifications, time-of-use, depowering equipment, and shutting down unnecessary processes
- These could likely be identified with low cost self-assessments or walk-through audits

EPA Region 9's Auditing Pilot Program

- Recommendations identified an average:

  17% savings in energy **use**

  26% savings in energy **costs**

- Critical to note these audits were not prioritized to "ideal" candidates due to limited duration of funding
- Interestingly, no statistical differences between small and large utility results

Lessons Learned – Audit Process

- Target proper level of audit
- Discuss your payback period thresholds with auditor
- Request an initial simple draft report with brief summary of recommendations
- Discuss draft report with contractor to determine where further detail is required
- Leads to an effective final report…expensive contractor time not wasted on unwanted info

Energy Conservation Opportunities (total # identified during Pilot Project)	Payback Period (yrs.)	Costs (Implementation)	Annual Savings ($)	Annual Energy Cost Savings	MWh/ Year Savings
Electric Rate Modifications (2): modifying rate schedules to be most efficient during peak and non-peak hours	avg = 0.12 0.1 to 0.14	$500	$3,600 - $10,000	13 - 48%	N/A
Electrical Demand Management (5) : monitoring total energy use/demand with installation of electrical metering, maximizing off-peak operations	avg = 0.2 0 to 1	$0 - $75,000	$1,000 - $115,800	0.7 - 7.3%	N/A
Operational Improvements (11): Noncapital improvements to optimize treatment	avg = 1.7 0.7 to 5	$0 - $220,000	$100 - $35,700	0.1 - 26.5%	1 - 284
Pump Modification (6): adjusting effluent pumping, inline flow meters in collection/distribution systems, and pump controls	avg = 4.1 0 to 10.7	$0 - $35,600	$250 - $7,000	0.5 - 7.2%	2 - 26
Motor Efficiency Upgrades (4): replacing inefficient motors with high efficiency motors	avg = 4.9 0.7 to 8.2	$3,100 - $175,000	$2,800 - $44,300	1.3 - 7.6%	9.6 - 136.4
Component System Upgrades (5): Capital and operational improvements on UV, process water, scrubber, and compressed air systems	avg = 5.1 4 to 6.3	$130,000 - $500,000	$20,500 - $98,000	2.2 - 28.3%	105.7 - 441.5
Efficient Lighting Fixtures (5): implementation of more efficient lighting; includes reduced use and sensors	avg = 6.6 2.6 to 11.2	$7,000 - $154,000	$2,650 - $24,700	0.5 - 2.9%	9.1 - 122.1
Variable Frequency Drive Installation (3)	avg = 7.2 2.4 to 12	$15,700 - 126,500	$1,620 - $51,600	0.4 - 4.2%	15.4 - 482
Aeration Control/Improvements (4): smaller blower installation, operation changes, better control with meter installation	avg = 8.3 4.7 to 13.3	$5,000 - $244,000	$760 - $24,400	1.6 - 26.9%	6 - 200

CASE STUDY 3

- Selma-Kingsburg-Fowler County Sanitation District (Fresno County, CA)
  - Serves a population of 40,000
  - Aeration improvements (blower and fine bubble diffuser replacement)
  - SCADA installation improved controls, including dissolved oxygen in aeration basins
  - Verified savings of **$500,000** (6.1 year payback) and 4,544,688 kWh per year

Renewable Energy Highlight

Utility	Treatment Capacity (MGD)	Solar Generating Capacity	Annual Savings
Moorpark WWTP (Moorpark, CA)	3	0.958 MW	$250,000
Santa Rosa WRF (Murrieta, CA)	5	1.1 MW	$152,000
Kihei WWTF (Kihei, HI)	7.5	1.9 MW	$500,000

Section 4: Suggested Next Steps

- Conduct a Self-Assessment of your utility's energy use
  - EPA's EUAT and self-assessment checklists available at

    http://water.epa.gov/infrastructure/sustain/energy_use.cfm

    http://www.epa.gov/region9/waterinfrastructure/audit.html
- Conduct a Level II or III energy audit at your facility
- Initiate an energy management program to implement audit recommendations

Resources for Funding Audits

- Add energy audit to your next capital improvement project grant/loan/bond (or amend scope of existing project)
- Your utility operations budget
- State Revolving Fund Programs (Clean Water and Drinking Water)
- USDA Rural Development
- US Bureau of Reclamation's WaterSMART Program
- Your energy provider
- Additional opportunities can be found at - http://www.epa.gov/region9/waterinfrastructure (Funding tab)

  http://water.epa.gov/infrastructure/sustain/energy_use.cfm

Water Efficiency for Energy Savings

- Water Utilities - Keep in mind substantial energy benefits can be realized by reducing the real losses in your water system
- AWWA's Free Water Audit Software is a widely-used and effective tool to help you identify cost-effective water savings opportunities

Questions

Contact Information

- Jim Horne, EPA Office of Wastewater Management
  - horne.james@epa.gov (202) 564-0571
- Jason Turgeon, EPA Region 1
  - turgeon.jason@epa.gov (617) 918-1637
- Eric Byous, EPA Region 9
  - byous.eric@epa.gov (415) 972-3531