

EPA Programs to Promote Water and Wastewater Energy Efficiency

Jason Turgeon, EPA Region 1



Timeline: Ancient History

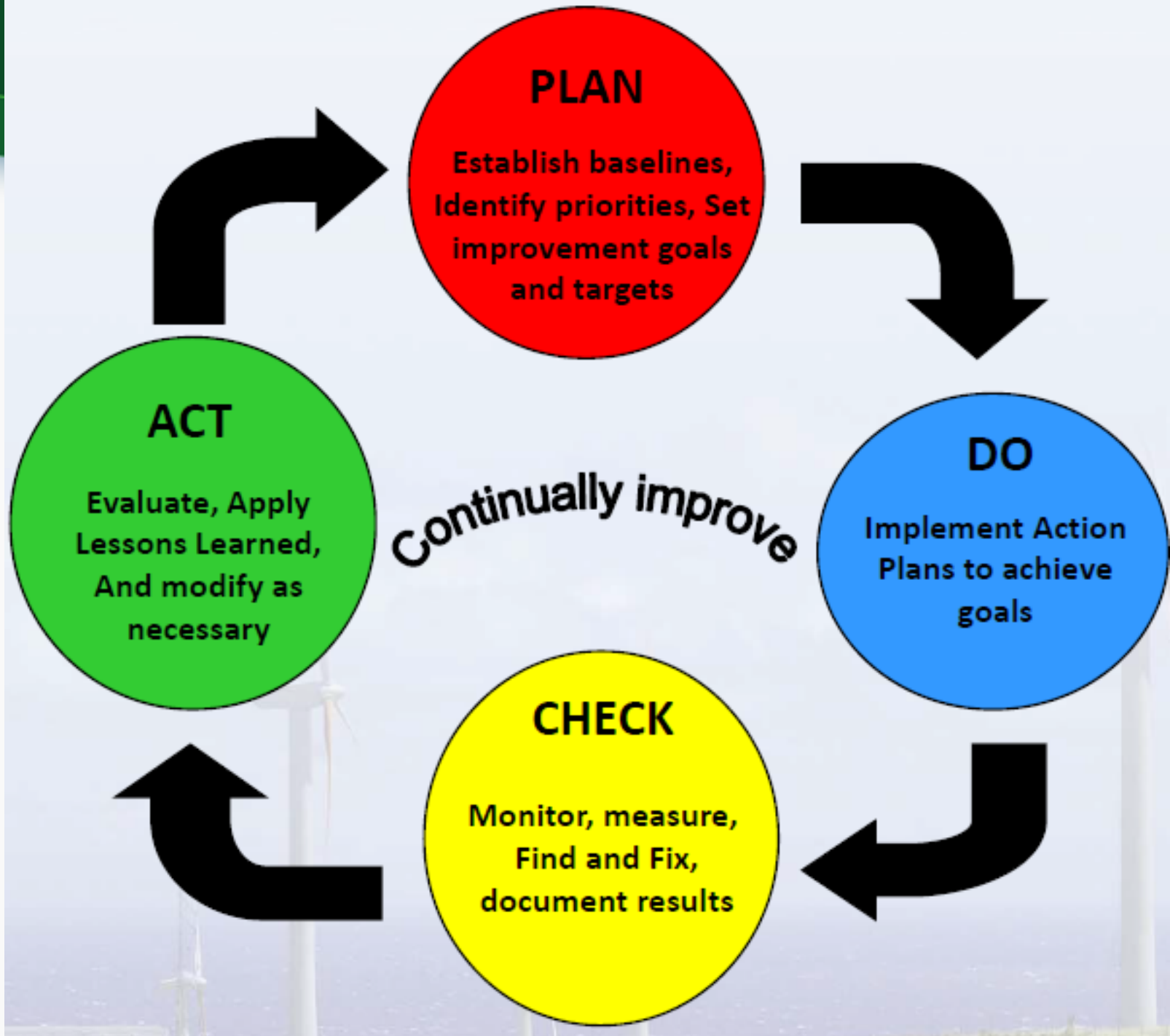
- 1973: EPA-R2-73-281 "Electrical Power Consumption for Municipal Wastewater Treatment"
- 1978: EPA-600/2-78-149 "Total Energy Consumption for Municipal Wastewater Treatment"
- 1980's & 90's: Not much happens except for EPRI report in 1996
- Early 2000's: various activities in the sector begin to refocus attention on energy, especially NYSERDA, Wisconsin Focus on Energy, and Cal Energy Commission
- 2004: EPA contractor investigates energy efficiency financing options
- 2005: ENERGY STAR launches water/wastewater focus, AWWA and partner orgs start energy survey that will become AWWArf 3009 (basis for Portfolio Manager), Congress orders DOE action
- 2006: Sandia Labs produces Energy-Water Nexus report to Congress

Timeline: Recent Activity

- 2007: AWWA releases survey data, EPA develops ENERGY STAR Portfolio Manager rating tool for POTWs 0.6 MGD and greater, EPA R1 hires 1 FTE to work on energy-water issues, EPA R1 and MA DEP begin a joint program in MA
- 2008: EPA OW releases “Ensuring a Sustainable Future” guidebook for energy management planning, EPA starts nationwide trainings to go with guidebook, EPA R1 and MA DEP/DOER start first roundtable series, EPA R1 awards State Innovations Grant to Narragansett Bay Commission for energy work
- 2009: ARRA (stimulus), first inclusion of energy in SRF, other regions begin to offer roundtables
- 2010: EPA OW releases Evaluation of Energy Conservation Measures for Wastewater Treatment Facilities
- 2011: First WEF Energy conference, EPA co-chairs
- 2012: EPA OW and ORD release Energy-Water Principles, EPA OW releases Energy Self Assessment Tool, WEF begins Zero Net Energy Roadmap with EPA as a stakeholder
- 2013: EPA and DOE have first formal water-energy nexus meeting

Three Types of Assistance from EPA

- Trainings
- Tools
- Technical Assistance



Training

EPA offers training to assist with Energy Management:

- Guidebook
- Roundtables with state partners
- Webinars
- Conference presentations
- One-time site visits

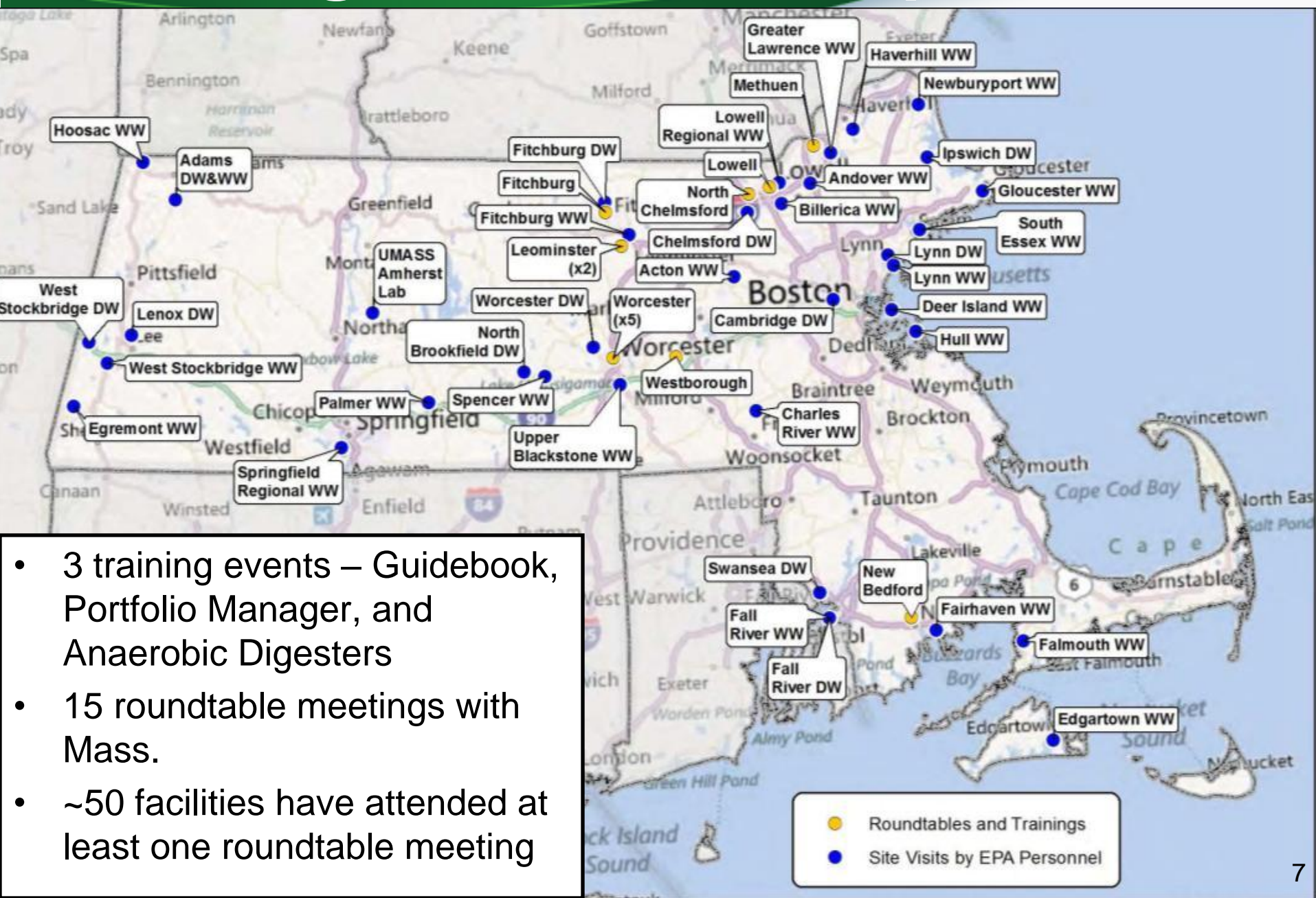
Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities



JANUARY 2008



Training activities example

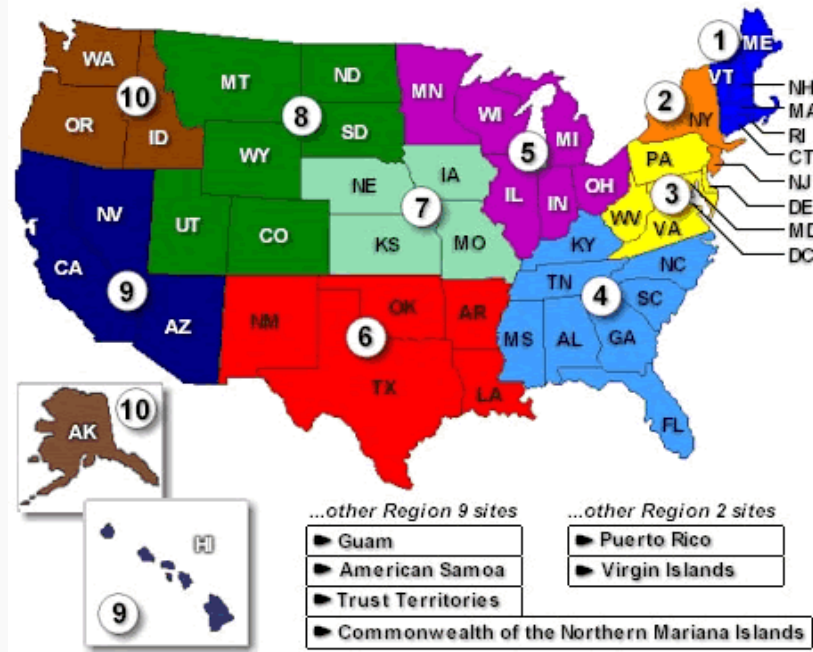


- 3 training events – Guidebook, Portfolio Manager, and Anaerobic Digesters
- 15 roundtable meetings with Mass.
- ~50 facilities have attended at least one roundtable meeting

Other States

- Energy management planning roundtables conducted in every EPA Region since 2008

- New Hampshire
- Maine
- Rhode Island
- Vermont (starting May 2013)
- Oregon
- Washington
- Tennessee
- Indiana
- Texas
- Missouri
- New Jersey
- Pennsylvania
- Kansas
- Colorado
- Plus additional trainings held in EPA R9 (CA, AZ, HI, NV)



Tools

EPA also offers tools to assist with Energy Management:

- Portfolio Manager
- Self-Assessment Tool
- Priority Ranking Tool
- Energy Use Assessment Tool
- Evaluation of Energy Conservation Measures for Wastewater Treatment Facilities
- Sample Contract Language
- Model RFP for energy audits (offered through Maine DEP)
- RFP guidance for major upgrades/new construction (offered through CEE)



Evaluation of Energy Conservation Measures

for Wastewater Treatment Facilities



Benchmarking

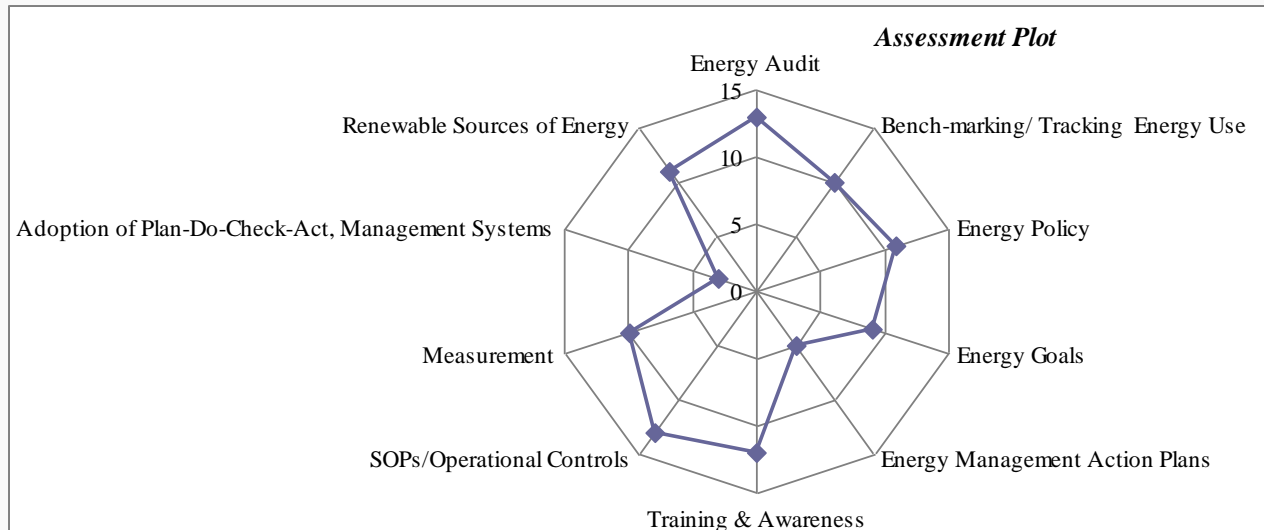


- Portfolio Manager helps to determine baseline energy use and track use over time and generate performance, cost, and emissions reports
- WW facilities > 0.6 MGD average flow rated 1 to 100 relative to similar facilities nationwide
 - Smaller facilities and DW facilities can use tool but do not get 1-100 score
- Quarterly training webinars
- No national statistics, but 180+ facilities in R1

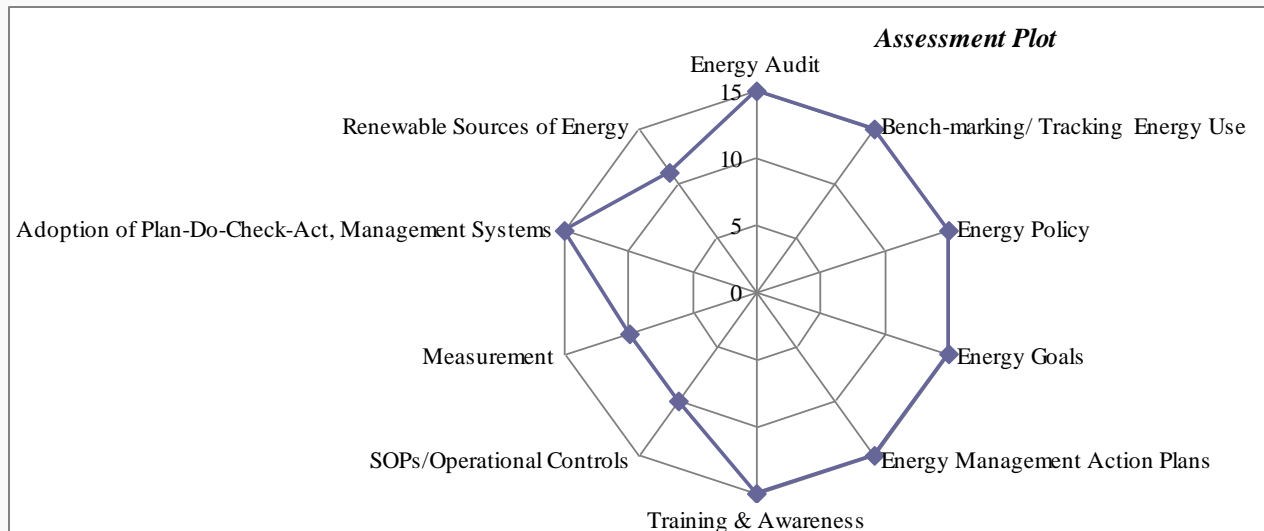
Self Assessment

This tool measures improvements made to a utility's energy management system

Before



After



Courtesy Madeline Snow, UMass Lowell

Priority Ranking

This tool helps utilities determine the best order to address projects

Example of Energy Priority Ranking Table

AUDIT RECOMMEND- ATION OR POTENTIAL ENERGY IMPROVEMENT	OPERATION OR LOCATION	TYPE OF ENERGY USED	RANKING CRITERIA TO SET PRIORITIES (EXAMPLES ONLY—USE THESE AND/OR CREATE YOUR OWN CRITERIA)							
			Current Associated Energy Use 1 = L 3 = M 5 = H	Feasibility of Implementation 1=Not feasible 3 = feasible 5 = Very feasible	Potential to get Incentives/ Rebate 1 =Low 3 =Medium 5 =High	Rate of Return on Investment 1 = More than 5 years 3 = 5 years 5 = Less than 3 years	Regulated? 1 = Yes and compliance issues exist 3 =Yes 5=No	Effect on Operations 1 = Negative 3 = Neutral 5 = Beneficial	Other	Total Score

Adapted by Madeline Snow, UMass Lowell, from *Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities*, EPA, January 2008, p.40.

Energy Use Assessment

Water: Sustainable Infrastructure

Water Home

You are here: Water » Water Infrastructure » Sustainable Infrastructure

Determining Energy Usage

Designed for small to medium sized water/wastewater treatment facilities to self-assess

A57 2011

EPA Energy Use Assessment Tool for Drinking Water Systems

Select/Switch Template

General Information Building Data Plant Energy Usage Reset Data Save

Electrical Energy Utilization (kWh/MGAL) 2008	1,487.68
Electrical Energy Utilization (kWh/MGAL) 2007	1,506.90
Estimated Annual Electrical Energy Use (kWh)	2,248,000
Estimated Annual Electrical Energy Cost (\$)	\$227,497
Average Electrical Energy Rate (\$/kWh)	\$0.1012

Specify Units for Treatment Volume: M GAL

Specify Units for Alternative Energy Consumption: CCF

Specify Other Utility Type (if any): Propane

Specify Units for Other Energy Consumption (if any): GAL

2011

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

Instructions General Information Building 1 Data Building 2 Data Building 3 Data Building 4 Data Building 5 Data Building 6 Data Building 7 Data Building 8 Data

Energy Use Assessment

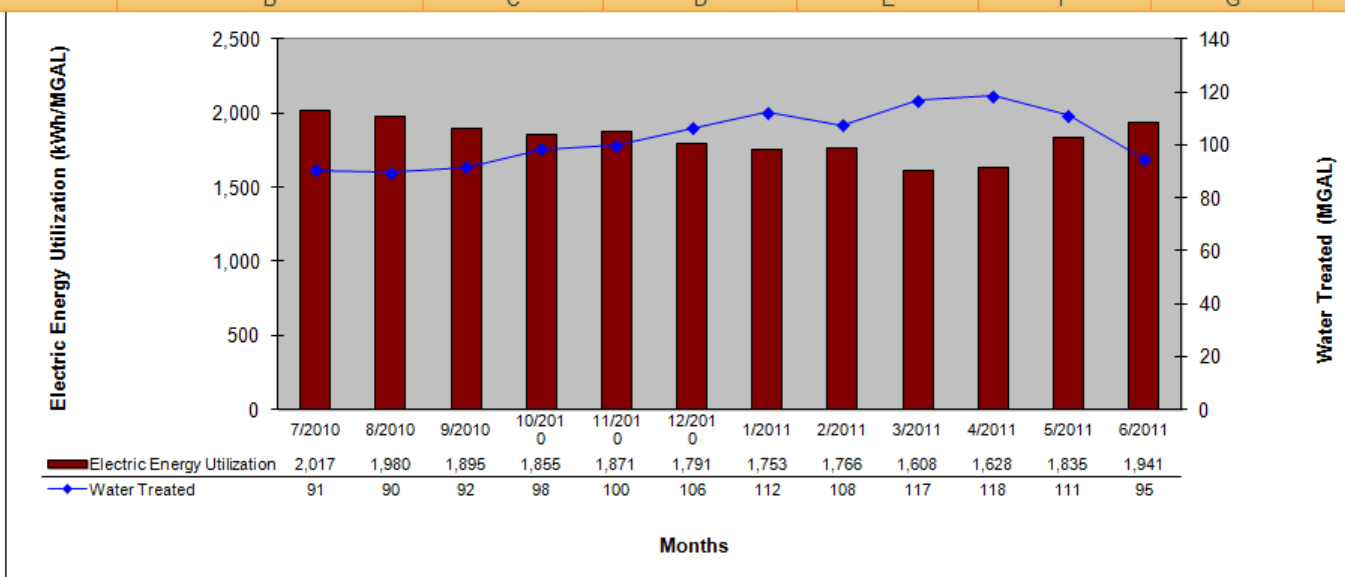
Water: Sustainable Infrastructure

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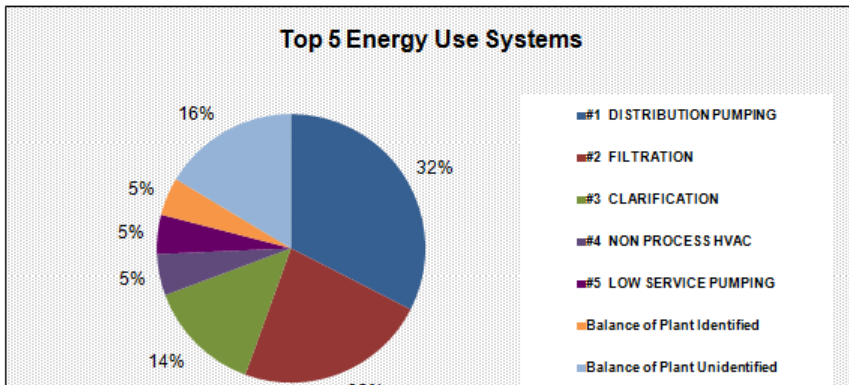
Determining Energy Usage

[Water Home](#)

A1	STATEMENT OF ENERGY PERFORMANCE									
A	B	C	D	E	F	G	H	I	J	K



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 DISTRIBUTION PUMPING	32.53%	731,363	\$74,014
#2 FILTRATION	23.01%	517,160	\$52,337
#3 CLARIFICATION	13.80%	310,273	\$31,400
#4 NON PROCESS HVAC	4.98%	111,865	\$11,321
#5 LOW SERVICE PUMPING	4.72%	106,140	\$10,741
Balance of Plant Identified	4.57%	102,692	\$10,392
Balance of Plant Unidentified	16.39%	368,507	\$37,293
Total	100.00%	2,248,000	\$227,497

Technical Assistance

- Site visits
- Guidance to companies and industries
- Participation in workgroups like A4WE
- Author/reviewer roles in technical publications
 - NEIWPC TR-16
 - WEF Roadmap to Zero Net Energy
- Collaboration with policy groups like the Johnson Foundation
- Advisory roles to groups like US Conference of Mayors

Strategic Focus

Three Ways to Think About Energy for Water

1. Use Less: continue to push for basic efficiency measures that we have known about since 1970s
2. Get to Zero Net Energy: large investments in new efficiency measures and on-site renewables, major operational changes. Work well underway in sector.
3. Integrated Resource Management: combine municipal water/waste/energy services into integrated utilities with major societal benefits. All inputs are resources, nothing is wasted. Massive paradigm shift, work is just beginning.

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<http://water.epa.gov/infrastructure/sustain/energyefficiency.cfm>