

Greening Water and Wastewater Infrastructure

The Path Toward Continuous
Energy Savings

Focus on Energy Management vs. Projects/Low Hanging Fruit

- § Energy issues are here to stay – new opportunities will occur — it is an ongoing process!
- § Individual projects are great, 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 approach has worked in many different sectors
- § Enables consistent, organized, and integrated management of utility operations



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

Based on management system approach for energy conservation,

Based on the successful Plan-Do-Check-Act process (Environmental Management Systems (EMS))

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

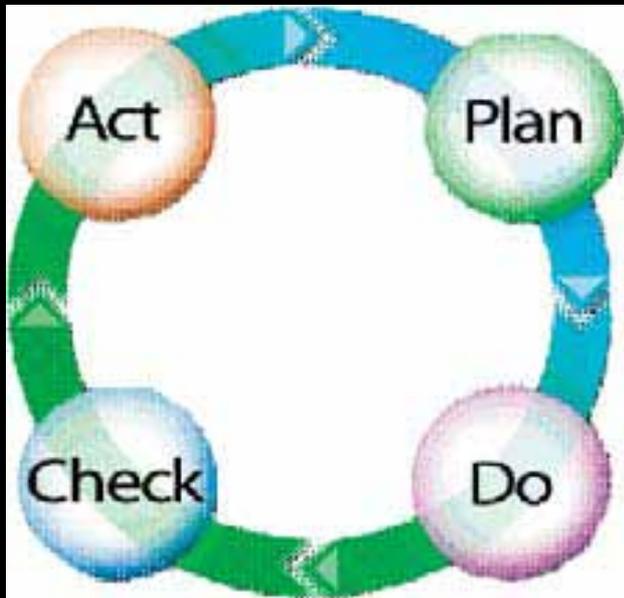


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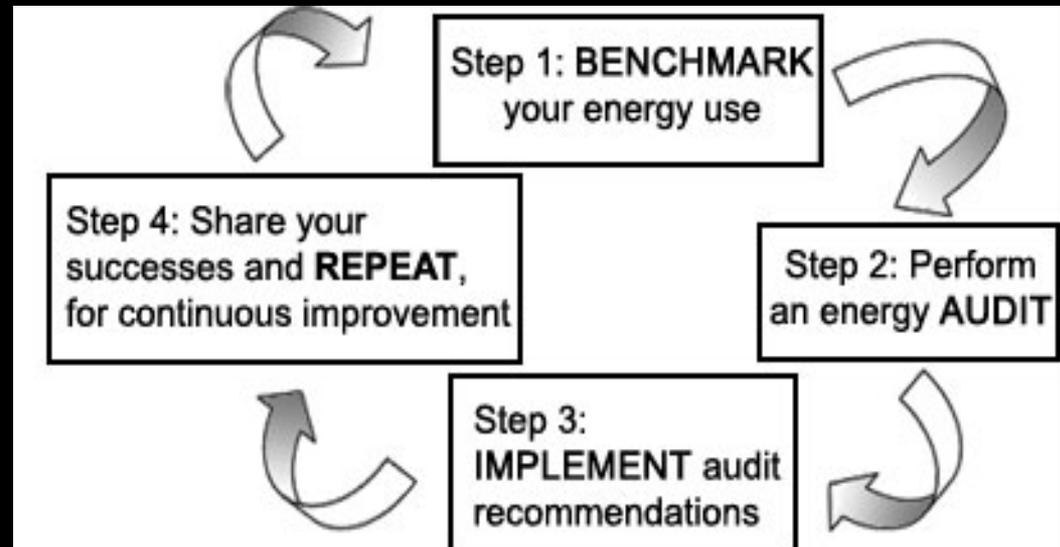


The PLAN-DO-CHECK-ACT Framework

7 Steps



CONTINUOUS IMPROVEMENT



Plan

1: Get Ready

2: Assess Current Energy Baseline

3: Establish Energy Vision & Priorities

4: Identify Objectives and Targets

Do, Check & Act

- 5: Implement Energy Improvement Programs (and a Management System to Support Them)
- 6: Monitor & Measure Energy Improvement Management Programs
- 7: Maintain, Improve & Communicate

CELEBRATE!!!

1. Get Ready - Keys to Success

- Management Commitment and Support
- Active and Meaningful Engagement of Staff
- Ability to build on existing processes and projects
- Effective leader and team have authority to act
- Balancing the need for quick hits and longer term changes
- Communication of meaningful results



65% OF THE EFFORT GOES TO PLANNING!

GETTING READY

- **Secure Management Commitment, Involvement, Visibility**

Do managers need to know to provide support?

What are you asking of them?

Accountable Results, Staff Resources, Budget?

What are your managers priorities – what is most important?

Define Management Role: Ensure Accountability, Acknowledge and Reward Success, Advocate More Resources, Time Commitment, Empower Authority, Communication

- **Determine Your Scope, Boundary, Mission, Goals**

- How much can be accomplished with your resources?

- What is most important if you can't do it all now? Phases.....

Do you want to reduce your energy costs or support community sustainability activities?

What equipment and process do you have that use energy?

What has already been done to reduce energy-has it been documented?

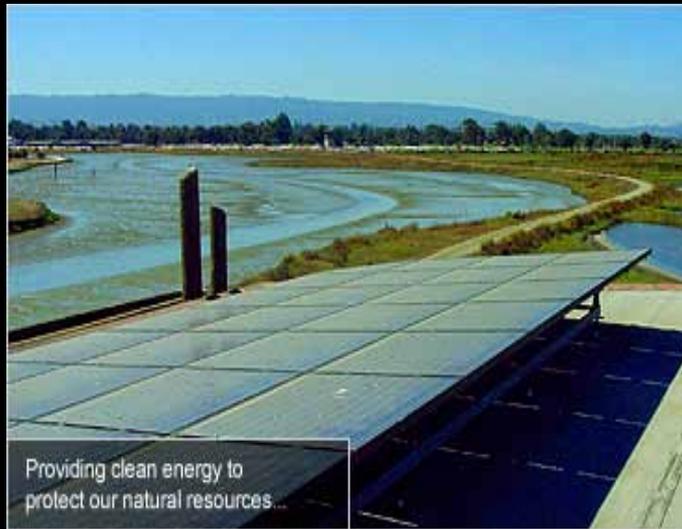
Do you want to solve a known problem, assess for potential problems, reduce energy by ___%

Are there time sensitive opportunities – What is the timeframe?



2. Assess Current Energy Baseline Status

- Benchmark
- Set Baseline time period
- Conduct an Energy Audit
- Review Legal and Other Requirements



3. Establish Energy Vision Priorities for Improvements

- Develop an Energy Policy
- Identify activities and operations that consume energy
- Prioritize activities, operations, potential for energy savings



Establish Energy Vision Priorities

Keys to Success

- Align your energy policy with your utility goals
- Involve employees in the energy review process
- Remember the Keep It Super Simple Rule (KISS)
- Communicate status frequently and regularly
- Document recurrent processes and how decisions are made



High Energy Use Operations (from Guidebook, page 36)

High Energy Using Operations	Energy Saving Measures
Pumping	<ul style="list-style-type: none">• Reduce load• Manage load• Water to wire efficiency• Pump selection• Motor and drive selection• Automated control
Aeration	<ul style="list-style-type: none">• Fine bubble• Improved surface aerators• Premium motors• High efficiency motor drive• Blower Variable Frequency Drives (VFDs)• Automatic DO control
Dewatering	<ul style="list-style-type: none">• Replace vacuum systems• Premium motors• VFDs for plant water pump
Lighting	<ul style="list-style-type: none">• Motion sensors• T5 low and high bay fixtures• Pulse start metal halide• Indirect fluorescent• Super efficient T8s• Comprehensive control for large buildings
Heating, Ventilation, Air Conditioning (HVAC)	<ul style="list-style-type: none">• Water source heat pumps• Prescriptive incentives for RTUs• Custom incentives for larger units• Low volume fume hood• Occupancy controls• Heat pump for generator oil sump

From a PG&E energy audit

TABLE ES-1 SUMMARY OF ENERGY EFFICIENCY OPPORTUNITIES SAVINGS AND COSTS						
EEO No.	Description	Potential Energy Conserved	Demand Savings (kW)	Potential Savings (\$/yr)	Implem. Cost (\$)	Simple Payback (years)
No-Cost Measures						
1.	Repair Domestic Aeration Blower Air Leaks	9,933* kWh/yr	1.1	848	0	0.0
Low-Cost Measures						
2.	Install Premium Efficiency Motors When the Existing Motors Wear Out or Require Rewinding*	11,038 kWh/yr	1.0	1,209	1,866	1.5
Investment Grade Measures						
3.	Install a Dissolved Oxygen (DO) Control System and Adjustable Speed Drives on the Domestic Aeration System Blowers	512,008 kWh/yr	58.4	54,566	126,000	2.3
4.	Install a Dissolved Oxygen (DO) Control System and Adjustable Speed Drives on the Industrial Aeration System Mechanical Aerators	269,460 kWh/yr	30.8	28,729	143,500	5.0
Total Electrical Energy Savings		802,439 kWh/yr				
Total Demand Savings			91.3 kW			
Total Cost Savings				\$85,352		
Total Implementation Cost					\$271,366	
Simple Payback Period						3.2 years

* Two year incremental savings

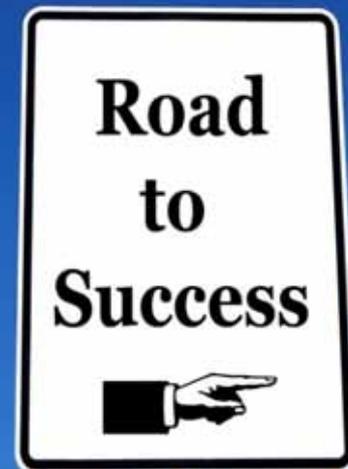
4. Identify Energy Objectives and Targets

- Objective: Internal goal to achieve to improve energy performance, i.e. reduce facility energy use
- Target: Derived from objective, i.e., reduce energy 25% from 2006 levels by 2011
- Performance Indicator: Defines how it will be measured, i.e., \$ or kWh/per unit of treated water
- Consider what you can track, monitor

5. Move to Action with Energy Improvement Management Programs

- What to do to reach the target
- Who will do it
- When to do it by
- What Resources or level of effort are needed

Good Project Management!
(Page 53)



6. Are We There Yet?

Monitor and Measure
Energy Improvement
Management Program
Progress



7. Maintaining and Continuing Energy Improvements

- Guidebook
 - **Session 6:** Monitoring and Measuring Your EIMP
 - **Session 7:** Maintaining Your EIMP



What does it take to implement and maintain energy improvements?



- Roles and responsibilities
- Operating controls
- Managing and controlling documents and records
- Communication
- Monitoring and measuring
- Apply lessons learned



CELEBRATE!!!

