



Benchmarking Wastewater Systems in Portfolio Manager

U.S. Environmental Protection Agency (EPA)

March 10, 2011



Today's Agenda



2:00 Welcome and Introduction

2:05 Introduction to the ENERGY STAR Challenge

Stephen Couture, The Cadmus Group (EPA Contractor)

2:15 Live Demonstration of Portfolio Manager and Case Studies

Jason Turgeon, U.S. Environmental Protection Agency

2:50 Question & Answer Session and Closing Remarks



What is ENERGY STAR for Buildings and Plants?



- U.S. Environmental Protection Agency energy management program providing proven solutions to help public and private sector building owners and managers reduce their energy consumption.
- Over 83,000 buildings, representing more than 11.5 billion square feet of space, have measured their energy performance with ENERGY STAR using Portfolio Manager.

Increasing Energy Consumption = Increasing Carbon Emissions



- Generating power releases carbon emissions into the atmosphere, contributing to global climate change.
- As the climate changes, scientists predict an increase in physical risks to businesses.
- Greenhouse gas emissions reporting systems will need to draw from energy management tracking and monitoring data.



Take the ENERGY STAR Challenge



- The ENERGY STAR Challenge encourages everyone to improve the energy efficiency of America's buildings by 10% or more.
- If this goal were met, each year we would save \$20 billion and reduce GHG emissions equivalent to those of 30 million vehicles.
- More than 2,100 organizations are participating:
 - More than 45 states
 - More than 65 professional associations
 - **More than 375 local governments, many of which own or influence wastewater utilities**



Sign up at: www.energystar.gov/challenge

The ENERGY STAR Challenge Toolkit



➤ Get Started!

- Quick Lists of ENERGY STAR Resources for Buildings and Homes
- Model for establishing an energy efficiency campaign for your community

➤ Learn More!

- Fact sheets on energy use in different parts of the community (offices, hotels, schools, supermarkets, congregations, etc.)
- Fast facts on energy use and climate change to help you craft your message

➤ Spread the Word!

- Co-brandable information cards, posters, and other materials for distribution to constituents and employees
- Sample news releases
- Tips on working with the media to promote your efforts
- . . . and much more

How Can Water and Wastewater Utilities Get Involved Now?



- Join ENERGY STAR
- Use ENERGY STAR Guidelines for Energy Management
- Measure and Verify energy use
 - Portfolio Manager (Water/Wastewater available since Oct. 1st, 2007)
 - Energy performance score
 - Compare groups/sharing feature
 - Track improvement over a normalized baseline
 - Measure carbon reductions
 - Performance Score provided, but Label not yet being awarded for wastewater treatment plants

How Can Water and Wastewater Utilities Get Involved Now (cont.)?

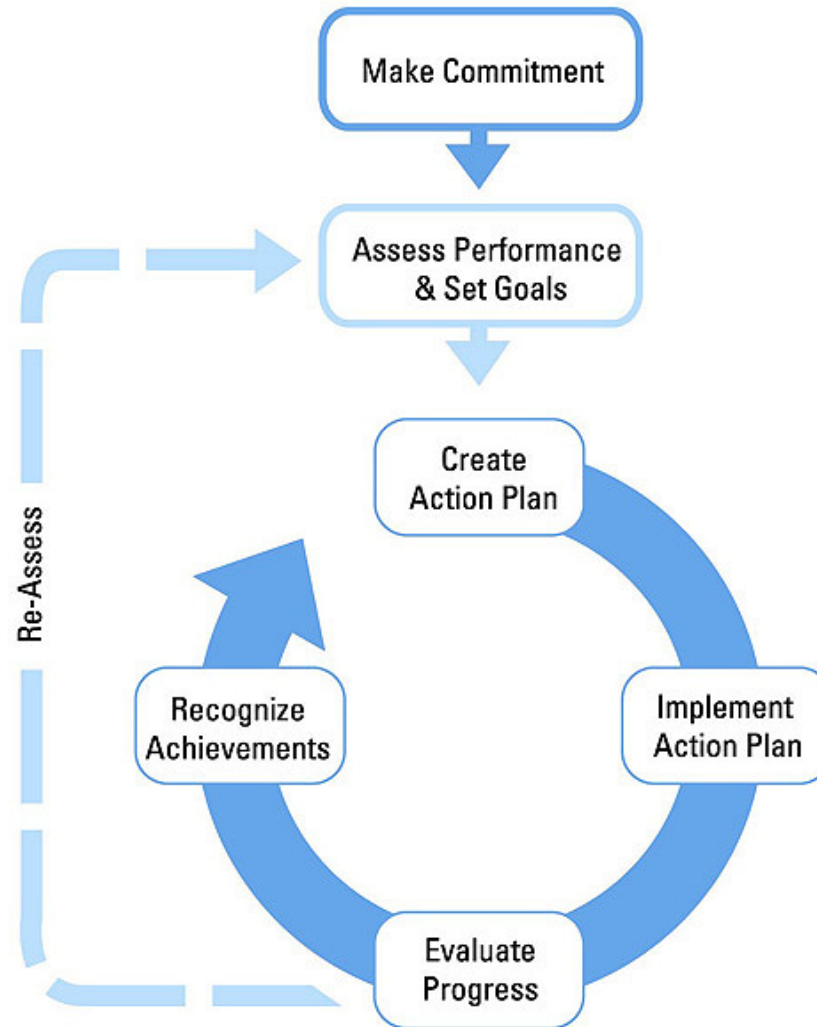


- Use Energy Efficiency Best Practice Guides and Resources
 - EPA Energy Management Guidebook for Wastewater and Water Facilities
http://www.epa.gov/waterinfrastructure/pdfs/guidebook_si_energymanagement.pdf
 - New energy efficiency RFP guidance and sample language
<http://www.cee1.org/ind/mot-sys/ww/rfp/index.php3>
 - New handbook for energy saving technologies:
http://water.epa.gov/scitech/wastetech/upload/ecm_report.pdf
 - Cash Flow Opportunity Calculator and other financial tools:
http://www.energystar.gov/index.cfm?c=assess_value.financial_tools

Strategic Energy Management



Approach based on the successful energy management practices of thousands of commercial and industrial organizations



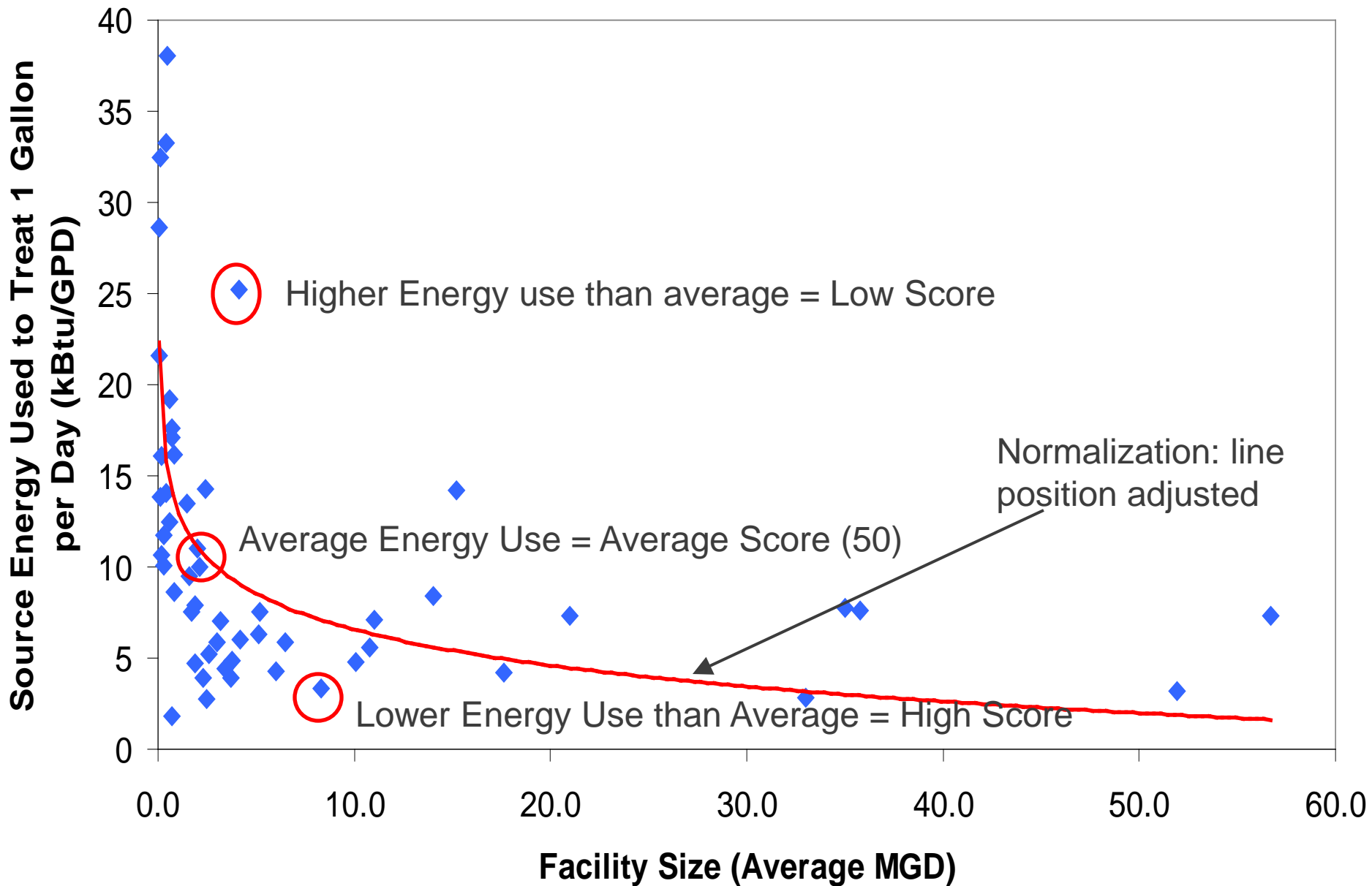
Benchmarking



- Expanding EPA's Energy Performance Scoring System for use by water and wastewater utilities to rate energy performance
 - Accessed on-line through Portfolio Manager
 - Performance score for wastewater treatment plants
 - based on energy use per unit of flow, influent and effluent quality, treatment type
 - Normalized for external factors
 - Wastewater - Resulting model shows statistical significance at 90% confidence level

- Engine behind the energy performance scale
 - Water Research Foundation (WRF – previously AwwaRF) Project - National Survey Data: covers water and wastewater
 - Initial models developed - report published by WRF in 2007 (project no. 2009), available free to subscribers online at <http://www.waterresearchfoundation.org/>

Energy Use per Flow vs. Facility Size





Portfolio Manager for Wastewater

Data Needed:

- Energy use for all fuels - monthly
- Average Daily Influent Flow
- Average Influent Biological Oxygen Demand (BOD) - average over 12 months (mg/l)
- Average Effluent BOD - average over 12 months (mg/l)
- Plant Design Capacity - treatment design (mgd)
- Fixed Film Trickle Filtration Process (yes/no)
- Nutrient Removal y/n

Live Demonstration of Portfolio Manager

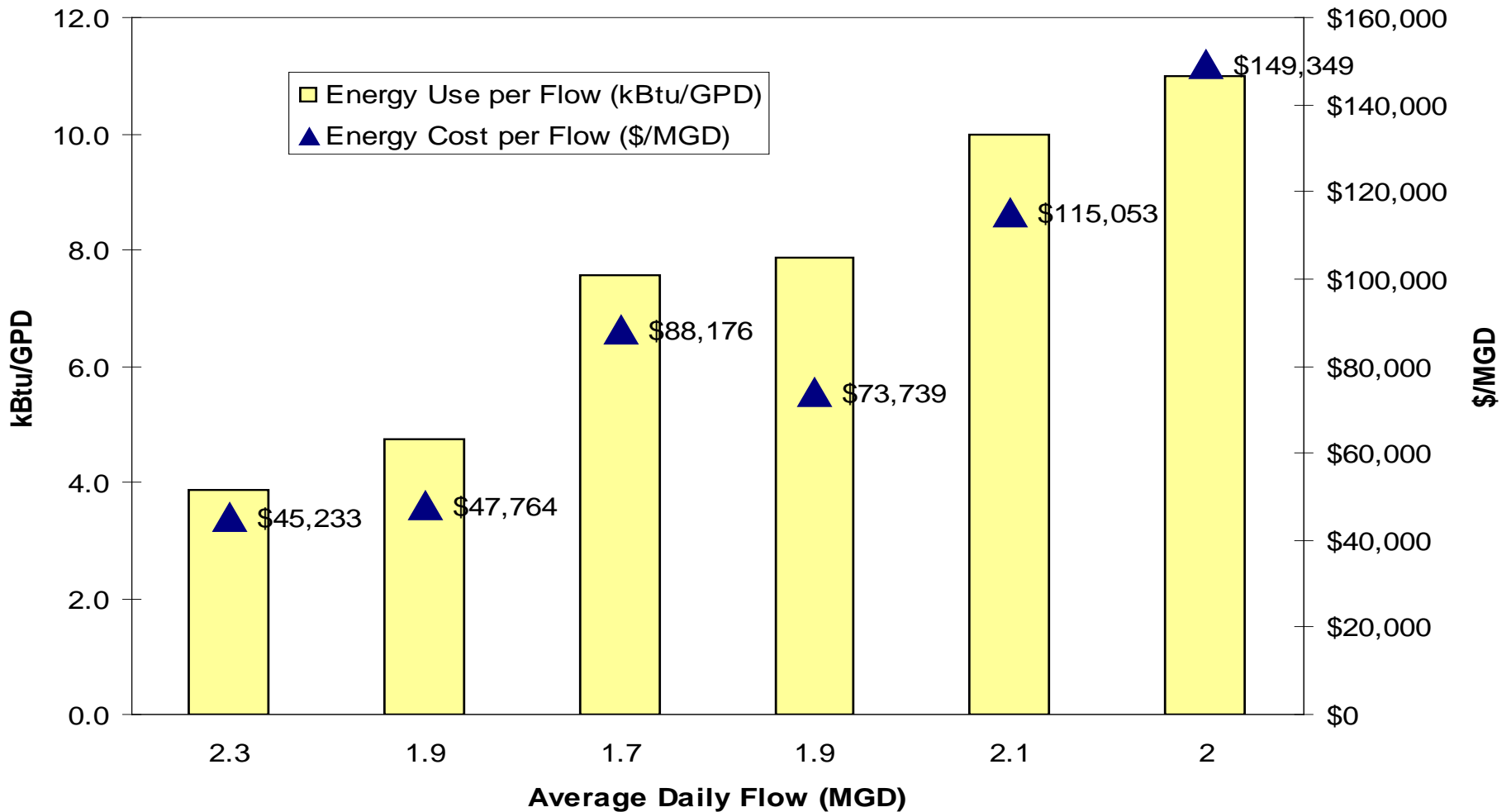


www.energystar.gov/benchmark

Comparing Plants



Energy Use and Cost vs Flow at similar sized plants



What can I do to reduce energy use?



In planning and implementation phase of energy management program...

- Energy audit (detailed or walk-through)
- Identify energy conservation measures
 - Advanced monitoring and control
 - Lighting/HVAC
 - Pumping
 - Aeration (wastewater only)
 - Solids Processing (wastewater only)

Resources



- ENERGY STAR
http://www.energystar.gov/index.cfm?c=water.wastewater_drinking_water
- EPA energy management guidebook and energy conservation technology fact sheet available through www.epa.gov/owm/
- Associations
 - WEF MOP 32 Energy Conservation in Water and Wastewater Facilities (2009)
 - WERF Operations Optimization Challenge, access through www.werf.org
 - WRF, Energy Management Research
 - EPRI energy audit guidance (1994)
- State programs – for example New York, Wisconsin, Massachusetts, Maine, Rhode Island, Oregon
- For more resources <http://www.cee1.org/ind/mot-sys/ww/ww.php3>

Case Study 1



Bath, ME, Water District

Replaced throttling valves with variable frequency drives on two 75 HP raw water pumps and three 150 HP treated water distribution pumps



Total Project Cost	Annual Energy Savings	Estimated Operating Cost Savings	Simple Payback	Efficiency Maine Incentive	Payback After Incentive	Estimated Cumulative Savings since 2004
\$59,870	375,940 kWh	\$30,074*	2 years	\$14,968	1.5 years	\$300,000

Case Study 2



Vernon, CT, Water Pollution Control District

Replaced coarse bubble diffusers with fine bubble diffusers in secondary treatment process



Total Project Cost	Annual Energy Savings	Estimated Operating Cost Savings	Simple Payback	Northeast Utilities Incentive	Payback After Incentive
\$730,231	1,900,000 kWh	\$250,000	3 years	\$365,115	1.5 years

Case Study 3



Narragansett Bay Commission (RI)

4.6 MGD, 4-train Modified Ludzack-Ettinger (MLE) Process for Biological Nitrogen Removal.

Replaced the MLE plant's original pressure based aeration/blower control system with a proprietary air flow based control system.



Total Project Cost	Annual Energy Savings	Estimated Operating Cost Savings	Simple Payback
\$200,000	1.25 million kWh*	\$135,788*	1.5 years

* Average annual savings for first 3 years of operation.

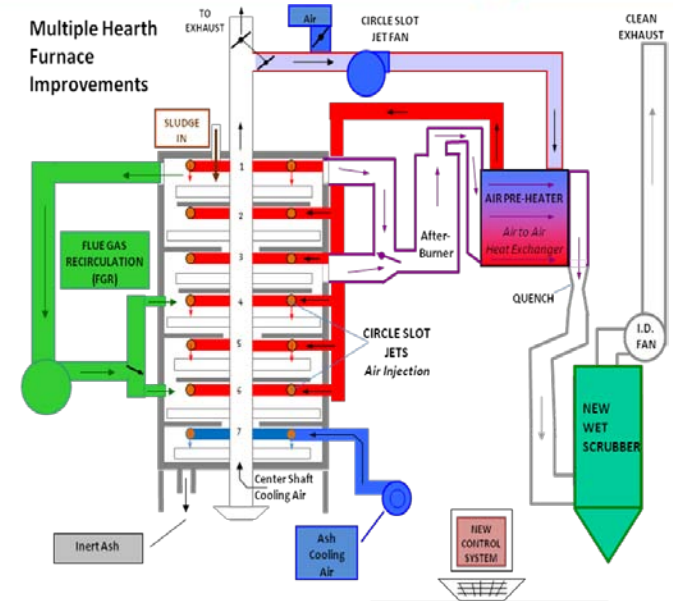
Case Study 4



Washington Suburban Sanitary Commission – Western Branch WWTP (MD)

30 MGD, denitrification activated sludge process with sludge incineration.

Implemented modifications to the sludge incineration multiple hearth furnaces to reduce natural gas consumption (waste heat recovery, flue gas recirculation and combustion air injection system).



Total Project Cost	Annual Energy Savings	Estimated Operating Cost Savings	Simple Payback
\$4,500,000	320,000 therms	\$400,000	11.3 years



Contact Information



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