

Energy Benchmarking for Drinking Water Utilities

PROBLEM STATEMENT:

- Benchmarking practices mainly focuses operational performance
- The performance benchmarking metrics, both physical and functional, have no specific consideration of energy
- No set of standard for energy benchmarking in drinking water supply system

RESEARCH GOAL:

To improve existing benchmarking practices on how to measure energy benchmarking so that the utilities can use those parameters to improve their energy efficiency.

RESULTS

Examples below are parts of in-progress results of energy benchmarking in the drinking water facilities. Only 4 parameters from 105 parameters, total average flow (MGD), Differences between highest and lowest system elevations (ft), total system HP (hp), and total average daily residuals (lb/day) can represent approximate 60 percent of the total energy use of the water utility.

Summary of Fit	
RSquare	0.607933
RSquare Adj	0.594972
Root Mean Square Error	0.935072
Mean of Response	17.76228
Observations (or Sum Wgts)	126

Analysis of Variance				
Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	164.04771	41.0119	46.9051
Error	121	105.79746	0.8744	Prob > F
C. Total	125	269.84517		<.0001*

Parameter Estimates					
Term	Estimate	Std Error	t Ratio	Prob> t	VIF
Intercept	16.979304	0.104852	161.94	<.0001*	
Total Average Daily Residuals (lb/day)	1.3077e-6	4.734e-7	2.76	0.0066*	1.0448576
Number of Distribution Pumps (count)	0.0141014	0.003818	3.69	0.0003*	1.3995389
Total Average Flow (MGD)	0.0061163	0.001722	3.55	0.0005*	1.7819981
Total system hp (hp)	6.612e-5	1.514e-5	4.37	<.0001*	2.2146517

