

PG&E Energy Efficiency Program Wastewater Industrial Sector Program & Technology Strategies

*CEE Winter Meeting
Industrial Municipal Water-Wastewater Committee
Berkeley, CA
January 16, 2014*



Stephen Fok
Sr. Program Engineer
Customer Energy Solutions Dept.



WWT Customer Energy Profile

- PG&E offers various customized incentives for process measures to customers in the waste water treatment sector.
- Waste water treatment (WWT) facilities (approx. 750) in PG&E territory consume ~500 GWh per year on waste treatment. Sector analysis on usage, potential and historic EE program adoption indicate:
 - 10% customers consume 82% energy;
 - 80% customers consume <0.5 GWh/year;
 - Widespread adoption of EE in this sector is low; Only 18% of customers have participated in EE programs; 1% of customers did 66% of savings.
 - Current average savings of 5-6 million kWh/year in WWT sector



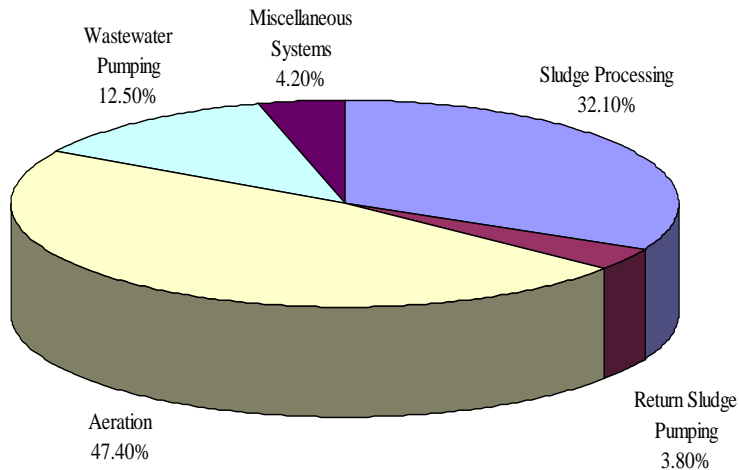
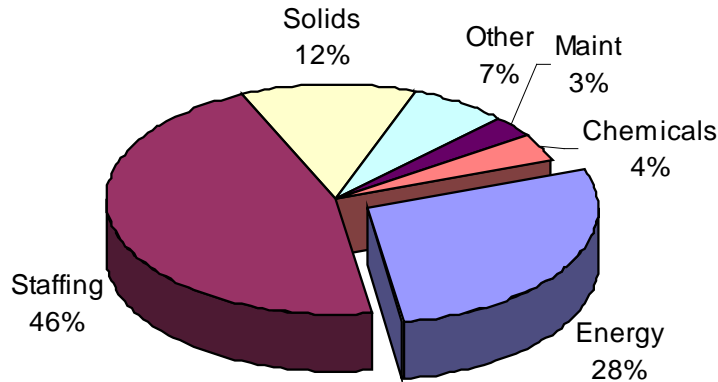
PG&E WWT Channel Engagement Overview





Typical WWT Plant Cost & Energy Profile

O&M Costs in Typical WWTP



- Energy costs represent nearly one third of total operational costs of WWTP plants
- Electricity usage in WWTP expected to increase by 30-40% in next 20 years due to regulations
- Aeration process represents over 50% of total energy required; Energy efficient aeration decreases consumption by 30-50%
- EE Program participation is 1-2% of addressable market size.



WWT EE Program Performance Overview

Energy Efficiency Measure	Municipal WWTTP A	Municipal WWTTP B	Municipal WWTTP C	Municipal WWTTP D	Municipal WWTTP E	Municipal WWTTP F	Municipal WWTTP G	Municipal WWTTP H	Municipal WWTTP I
Premium Efficiency Motors		x	x	x	x	x		x	x
Automated Dissolved Oxygen Control	x		x		x	x	x	x	x
Fine Bubble Diffusers	x								
High Efficiency Air Compressor		x							
Lighting Control	x	x	x				x		
High Efficiency Lighting			x	x			x		
Variable Frequency Drives on Blowers	x						x		x
Variable Frequency Drives on Pumps		x	x	x	x	x	x	x	
Variable Frequency Drives on Mechanical Aerators			x		x	x		x	x
% Energy Savings Identified	33%	8%	5%	5%	18%	8%	19%	16%	21%

	INDUSTRIAL	COMMERCIAL	3P/GP	TOTAL:
KWh	754,000	304,000	4,594,000	5,652,000
kW	120	30	540	690
Incentive	\$70,900	\$28,600	\$501,600	\$601,100



PG&E WWT EE Measure Baselines

Technology	Baseline	Sample Energy Efficiency Measure
Hydraulic-Driven Systems	Water or Hydraulic-Oil Driven System	Electrical-Driven System
Motors	EPAct Standard Efficiency Motors	NEMA Premium Efficiency Motors
Pumps	Throttle, Bypass or No Control	Variable Frequency Drive Control
	Hydraulic Institute (HI) Achievable Efficiency or Average Efficiency from Manufacturers' Data	High Efficiency Pump with Efficiency Better than HI Achievable Efficiency
	Pneumatic	Electrical-Driven
Sludge Dewatering	Centrifuge	Screw Press
Sludge Thickening	Solid-Bowl Centrifuge	Gravity Belt Thickening
UV Radiation Disinfection	Medium-Pressure UV System	Low-Pressure UV System
Wastewater Treatment Process	Aerobic Treatment System	Anaerobic Treatment System



PG&E WWT EE Measure Baselines

Technology	Baseline	Sample Energy Efficiency Measure
Aerators (Blowers)	Coarse-Bubble Diffuser	Fine Pore Diffuser
	Inlet/Discharge Vane or No Control	Variable Frequency Drive (VFD) Control
	Multi-stage centrifugal blowers	Single-stage Centrifugal Blower with VFD Control
	Fan System Assessment Tool (FSAT) Achievable Efficiency or Average Efficiency from Manufacturers' Data	High Efficiency Blower with Efficiency Better than Achievable/Average Efficiency
Aerator (Mechanical)	Constant Speed Motor	VFD Control Based on O ₂ Content
Air Compressor	Rotary Screw Compressor with Load/Unload Control	Air Compressor with VFD Control
Dissolved Oxygen System	Continuous DO Control with Manual Control	Automatic Control of Aeration System



Q & A

Stephen Fok, P.E.

**Sr. Program Engineer
Pacific Gas and Electric Company
Customer Energy Solutions Dept.
San Francisco, CA
Office - (415) 973-4735
Email: skf2@pge.com**