



National Coordinators Meeting



Water and Energy Audits



El Paso, Texas

September 22, 2015.



Energy Management Program for Water Utilities



Description:

A program to provide a comprehensive and systematic methodology for identifying and implementing cost effective energy conservation and renewable energy projects in water and wastewater utilities .

Participants:

BECC, Federal and State Agencies in Mexico and US, Private Sector, Water Utilities.

Program Objectives:

- Reduce GHG emissions
- Reduce energy consumption
- Promote water conservation
- Displace energy from fossil fuel with renewable energy resources
- Make clean water more affordable by reducing energy costs
- Identify and facilitate access to funding sources
- Build local technical capacity through technology transfer activities and training
- Record and measure results

Energy Management Program for Water Utilities



Main activities:

- ✓ Prioritize and conduct energy audits and renewable energy feasibility studies for water and wastewater collection and treatment systems
- ✓ Consolidate the study results into Energy Management Plans and select projects for implementation
- ✓ Identify financing programs for implementation of the recommended projects
- ✓ Assist public entities with financing and implementation of projects
- ✓ Provide training
- ✓ Monitor and evaluate the effectiveness of the program, including greenhouse gas reduction, capacity building, energy savings and energy cost reductions achieved through the program.

Energy Management Workshops for Water Utilities



- Five Energy Management workshops have been held in coordination with EPA and CONAGUA, as well as with TWDB, NMED, CEAT-Tamaulipas, CEAS-Coahuila and JCAS-Chihuahua
- The workshops covered several topics related to energy management and energy efficiency as described in the invitation below.

ENERGY MANAGEMENT SYSTEM WORKSHOP

September 23 & 24, 2014
9:00 am - 3:30 pm

Check-in and Networking at 8:30 am

Come learn how you can

- Reduce energy use
- Reduce energy cost

Brownsville Event Center
1 Event Center
Brownsville, TX 78526

There is no registration fee.
Lunch provided.

Learn about energy projects by:

- Brownsville Public Utilities Board
- City of Laredo
- City of Weslaco

Agenda Topics:

- ▶ Energy management activities
- ▶ Benchmarking energy use & costs
- ▶ Understanding electric rates
- ▶ Funding of energy management projects....and much more.



Brownsville Event Center

Please register by **September 10** to David Reazin, EPA Region 6
reazin.david@epa.gov
214-665-7501



Energy Audits



Community	State	Technical Assistance Funding Source
Wilcox	Arizona	PDAP
Douglas	Arizona	PDAP
Pomerene	Arizona	PDAP
Anthony	New Mexico	PDAP
La Mesa	New Mexico	BECC
Sunland Park	New Mexico	BECC
Fabens	Texas	BECC
Brownsville	Texas	BECC
Tijuana	Baja California	BECC-USAID
Ensenada	Baja California	BECC-USAID
Rosarito	Baja California	BECC-USAID
Tecate	Baja California	BECC-USAID
Mexicali	Baja California	BECC-USAID
San Luis Rio Colorado	Sonora	BECC
Cd. Juarez	Chihuahua	BECC
Piedras Negras	Coahuila	BECC
Nuevo Laredo	Tamaulipas	BECC
Cd. Victoria	Tamaulipas	BECC
Reynosa	Tamaulipas	Border 2012
Rio Bravo	Tamaulipas	Border 2012
Matamoros	Tamaulipas	Border 2012

- Energy audits have been completed for 21 water utilities in 8 border states.

Water Audits



Community	State	Technical Assistance Funding Source
Douglas	Arizona	PDAP
Pomerene	Arizona	PDAP
Mesilla	New Mexico	PDAP
Tornillo	Texas	PDAP
Presidio	Texas	PDAP
San Luis Rio Colorado	Sonora	BECC

- Water audits have been completed for 6 water utilities in 4 border states.
- One more water audit is currently under development for the Lower Rio Grande Public Water Works Authority (LRG-PWWA). This regional utility provides services to 14 colonias in Doña Ana County, New Mexico, including the communities of La Mesa, Mesquite, Brazitos, Berino, Desert Sands, Organ, Butterfield Park, and East Mesa. This water audit is funded by the BECC/NADB Joint Technical Assistance Program.

Energy Audit– Anthony WWTP, New Mexico



Summary of Findings

PROJECT	Potential Annual Cost Savings (US\$)	Implementation Cost (US\$)	Potential Annual Energy Savings (kWh)	% Cost Savings current consumption
ECM 3) Lighting and Automatic controls	\$860.00	\$15,000.00	10,000	1.0%
ECM 4) Energy Management Software integration	\$3,096.00	\$35,000.00	36,000	3.4%
ECM 5) Hot water tanks and HVAC units	\$475.00	\$6,000.00	5,520	0.5%
ECM 6) Power factor correction	\$3,576.00	\$15,000.00	41,580	4.0%
ECM 7) Exterior lighting system upgrade	\$765.00	\$2,700.00	19,900	0.9%
PMM 1) Aeration system optimization	\$19,264.00	\$300,000.00	224,000	21.4%
Total	\$28,036.00	\$373,700.00	337,000	31.2%

- The water utility learned that there was a voltage variation in the energy supply that exceeded the 5% ± established in the contract with El Paso Electric (ELP). ELP took the necessary measures to address this issue at no additional cost to the sponsor.

Energy Audit– Piedras Negras, Coahuila



Summary of Findings

PROJECT	Annual Cost Savings (MX\$)	Implementation Cost (MX\$)	Annual Energy Savings (kWh)	% Cost Savings current consumption
Improvements in the electrical installation in the WTP (wiring, grounding, etc.)	\$962,016.50	\$1,066,957.00	119,144	0.82%
Electric tariff change and demand control in the Headworks	\$928,080.34	\$478,240.18	165,539	1.13%
Older Pumps replacement, operational adjustments, electric tariff change	\$1,978,024.88	\$2,123,294.60	672,285	4.60%
Pumps replacement, operational adjustments, electric tariff change, variable frequency drives	\$2,958,004.48	\$4,364,627.10	1,342,574	9.19%
Electric tariff change and demand control in the WTPs	\$2,373,934.44	\$694,429.00	390	0.0%
Pumps replacement and variable frequency drives installation in selected pumps in the WTPs	\$4,914,473.59	\$5,212,079.00	1,773,870	12.15%
Pumps replacement and variable frequency drives installation in selected distribution pumps	\$1,697,243.85	\$2,481,980.00	960,596	6.58%
Total	\$15,811,778.08	\$16,421,606.88	5,034,398	34.5%

Energy Audit– Nuevo Laredo, Tamaulipas



Summary of Findings

Project	Description	Potential Savings (MX\$/year)	Implementation Cost (MX\$)	Energy Savings (kWh/year)	Cost Savings %
Pumping Station "Planta Centro"	Equipment replacement, electric tariff changes, demand control, automation	\$8,368,832.09	\$8,523,225.53	5,104,166	33.50%
WWTP Nor-Poniente		\$556,574.48	\$230,634.50	134,018	15.88%
WWTP Internacional		\$1,506,119.78	\$1,514,155.65	851,949	11.43%
WTP Sur Oriente		\$5,588,490.00	\$5,097,777	3,043,007	51.53%
Total		\$16,020,016.35	\$15,365,792.68	9,133,140	30.51%

Technical Assistance for Recommendations



- Rio Colorado – Tijuana Aqueduct
 - Energy savings potential: 41 M kWh (\$3M)

- Energy Efficiency in 5 utilities in Tamaulipas and Piedras Negras, Coahuila
 - Energy savings potential: 35.5 M kWh (\$5M)

- Energy Efficiency at the WWTP in Anthony, NM
 - Energy savings potential: 244,000 kWh (\$35,000)

Immediate modifications by Utilities



- Tijuana – Pump upgrades PB-1- (MX\$10 M)
- Mexicali – Rehabilitation PB3- (MX\$6M)
- Tecate – Lighting replacement (MX\$3M)
- Anthony – Improvements lift stations
- Piedras Negras – improvements electric system WTP

Water Audit - Douglas, Arizona



Summary of Findings

SUMMARY OF NON REVENUE WATER IN DOUGLAS				
Source From:	Category	MGY	As % of Production	\$ Valuation
Chapter 2	Total Un-Adjusted Water Production	1,084.507	98.6%	
Chapter 2	Adjustment to Production (meter error)	15.829	1.4%	
Chapter 2	Total Adjusted Water Production	1,100.336	100.0%	\$397,502
Chapter 2	Total Consumption Billed	856.571	79.0%	
	Total Base NRW	243.765	22.5%	
	<i>Summary of NRW Components:</i>			
Chapter 3	Apparent Losses*	105.705	9.7%	\$105,705
Chapter 5.8	Authorized Unbilled & Un-Metered Use**	3.726	0.3%	\$3,726
Chapter 5.8	Authorized Unbilled Metered Use	7.822	0.7%	\$7,822
Chapter 5.5	Real Losses from Repaired Leaks	2.488	0.2%	\$899
Chapter 5.6	Real Losses from Unavoidable Leaks (UARL)	34.998	3.2%	\$12,643
Chapter 5.7	Real Losses from Other Sources of Loss	0.006	0.0%	\$2
Chapter 5.10	Real Losses from Undetermined Leaks	89.019	8.2%	\$32,159
	Total Estimated NRW	243.765	22.5%	\$162,956

1. Monitor monthly zero consumption and low use accounts.
2. Establish meter benchmarking and replacement.
3. Implement an annual leak detection program.
4. The City of Douglas would benefit greatly from the implementation of a computer based work order entry and reporting system.
5. The utility's rate structure was identified as an important problem during the course of the water audit. BECC will provide PDAP/EPA technical assistance to develop a Rate Study.

Water Audit-Town of Mesilla, New Mexico



Summary of Findings

Category	MGY	% of Production	Value/1000 Gal	Total Value (\$M)
Un-Adjusted Water Production	113.818	100%	\$0.15	17.073
Billed consumption	100.535	88.3%		
Total Non-revenue Water	13.283	11.7%		
Apparent Losses (i.e. meter under reads)	5.544	4.9%	\$2.66	14.747
Authorized unbilled & unmetered usage	0.163	0.1%	\$2.66	0.434
Authorized unbilled metered usage	0	0.0%	\$2.66	0.000
Real Losses --Repaired Leaks	1.022	0.9%	\$0.15	0.153
Real Losses --Unavoidable Leakage	2.013	1.8%	\$0.15	0.302
Real Losses --Other identified sources	0	0.0%	\$0.15	0.000
Real Losses -- Unidentified Leakage	4.539	4.0%	\$0.15	0.681

- As a result of the water audit the Mesilla Utilities Department has made a commitment to upgrade the water metering system. Based upon similar metering projects the utility will probably invest \$250,000 to completely upgrade their metering and billing system.
- The utility's rate structure was identified as a significant problem during the course of the water audit. The water system was not self-sustaining due its low rates, making investments in capital improvements very difficult. The utility has implemented a new rate structure.

Water Audit-Tornillo, Texas



Summary of Findings

Category	MGY	% of Production	Value/1000 Gal	Total Value (\$M)
Un-Adjusted Water Production	111.3	100%	\$0.31	34.503
Billed consumption	104.29	93.7%		
Total Non-Revenue Water	7.01	6.4%		
Apparent Losses (i.e. underregistering Meters)	-4.31	-3.9%	\$8.08	-34.825
Authorized unbilled & unmetered usage	1.39	1.3%	\$8.08	11.231
Authorized unbilled metered usage	1.19	1.1%	\$8.08	9.615
Real Losses --Repaired Leaks	0	0.0%	\$0.31	0.000
Real Losses --Unavoidable Leakage	0	0.0%	\$0.31	0.000
Real Losses --Other identified sources	0	0.0%	\$0.31	0.000
Real Losses -- Unidentified Leakage	8.74	7.9%	\$0.31	2.709

- The primary issue in the water system is related to the unreliability of the meter data and the billing system. Replacing meters should be priority for the utility in the future, to provide more reliable data for tracking production and sales.
- Currently meter reading and billing consumes four days a month for the system operators and office staff. With an automated system less than a day will be required for one staff member for both readings and billing.

Water Audit-Presidio, Texas



Summary of Findings

Category	MGY	% of Production	Cost/1000 Gal	Total Value (\$)
Un-Adjusted Water Production	291.2	100%	3.18	876,520
Billed consumption	176.8			
	5	60.7%		820,037
Total Non-Revenue Water	114.3			
	5	39.3%	3.18	363,633
Apparent Losses (i.e. under registering meters)	9.67	3.3%	11.5	111,205
Authorized unbilled & unmetered usage	3.64	1.3%	11.5	41,860
Authorized unbilled metered usage	10.58	3.6%	11.5	121,670
Real Losses --Repaired Leaks	0	0.0%		
Real Losses --Unavoidable Leakage	0	0.0%		
Real Losses --Other identified sources	0	0.0%		
Real Losses -- Unidentified Leakage	90.46	31.1%	3.18	287,663

- The Water Audit revealed deficiencies with system meters and very critical issues with water losses. This water audit was particularly useful since it has been used to redefine the needs of an ongoing water system improvements project.
- The system pressure at the lower elevations exceed 90 psi. It is probably that the excessive pressures are contributing to line breaks, leakage from joints. The City must reduce these pressures in order to maintain the integrity of the system, reduce operational costs in repairing line breaks, and reduce the total amount of water lost due to major leaks.

The end



Thank you

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