

WATERGY: The Nexus of Energy and Water



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Alliance to Save Energy

WHAT IS THE ALLIANCE TO SAVE ENERGY?

✦ Established **1977**

✦ Non-profit 501(c)(3)

✦ Bipartisan Congressional representation on Board:

- Pryor, D-AR
- Wamp, R-TN
- Collins, R-ME
- Bingaman, D-NM
- Dorgan D-ND
- Jeffords, I-VT
- Markey, D-MA
- Hall, R-TX

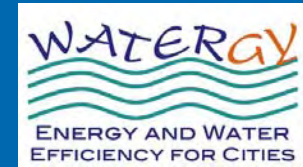
✦ **Mission:** “To promote energy efficiency worldwide to achieve a healthier economy, cleaner environment & greater energy security”

✦ A **leader** in energy efficiency in all relevant sectors:

- buildings
- utilities
- research
- industry
- appliances
- policy
- water
- transportation
- education



What is Watergy?

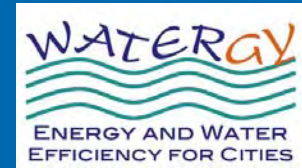


Water efficiency means cost effectively providing the consumer with the desired services associated with water while using the least amount of water and energy possible.





Supplying Water Takes Energy throughout the System

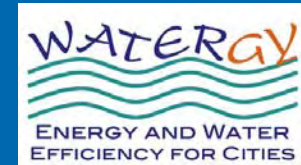


- Groundwater Extraction
- Surface Water Treatment
- Water Conveyance
- Water Distribution and Booster Pumping
- Wastewater Treatment and Disposal
- End-Use Water Heating

Factors like *topography*, distance from *source water*, and *water quality* determine the relative importance of each.



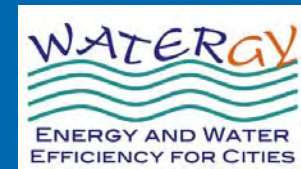
Watergy Goals



- ① Make the best use of two valuable & limited resources:
energy and **water**
- ② Improved water **service** and **access**,
including new household connections
- ③ **Revenue Enhancement**:
 - ✓ more funds available for municipal services
 - ✓ long-term financial viability of water provision
- ④ Improved **policies** promoting energy efficiency



WATERGY PROGRAM



Helping cities and regional entities distribute water and treat wastewater efficiently, saving money and conserving water.

WHY IS THIS IMPORTANT?

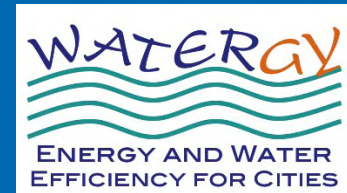
- ✓ **Water scarcity** an urgent issue in much of U.S. West of the Mississippi and especially in the developing world
- ✓ U.S. water utilities spend about **\$2.2 B** every year on electricity to deliver water & treat wastewater
- ✓ **4%** of all energy consumed in the U.S. is used to deliver water and treat wastewater and the figures are even higher overseas

AND IT'S COST EFFECTIVE...

- ✓ **Rapid Payback:** generally ranges from immediate to 2 years
- ✓ **Huge Savings:** 20% of energy budget typical from Watergy
- ✓ Reduces the need for new **infrastructure** from new water sources



WATERGY



🌱 Began in 2000, all in **developing** countries

🌱 Currently in:



India



Mexico



Philippines



Brazil



Sri Lanka



South Africa



Ukraine

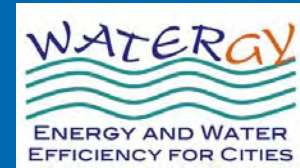


Bosnia

🌱 **Domestic** program being launched



What Can Municipalities or Water Utilities Do?



~ For both *water supply* and *wastewater treatment* ~

Managerial & Technical

- Leadership from the **top** essential
- Acceptance of the **community**
- Water system **assessment**
- Establish **goals** and **benchmark**
- Develop **baselines** and **metrics**
- Strengthen technical **staff**

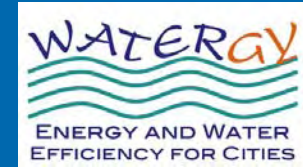
Infrastructure-related

- Pumps
- Leaks
- Metering & Monitoring
- O&M
- System design & layout
- Low-friction pipes

Many opportunities also in demand side management



Watergy Approach

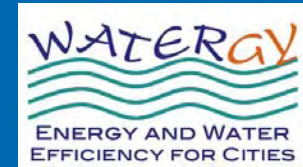


TECHINICAL ASSISTANCE is:

- ☑ ...always designed to best suit **local conditions**
- ☑ ...provided at various levels:
 - ① Municipal **Decision-Makers**: for enthusiasm at the top
 - ② **Technical Staff** – to build local technical capacity
 - ③ National- or state-level **urban development agencies** – build their **capacity** to help cities & leverage their **resources**
 - ④ **National policy** improvements
- ☑ ...of three types:
 - ✓ technical
 - ✓ financing
 - ✓ policy



Optimizing Pumps



Buy pumps based on efficiency not purchase price!

Of a pump's total cost over its lifetime:

- ✓ 3% is for purchase
- ✓ 74% is for energy

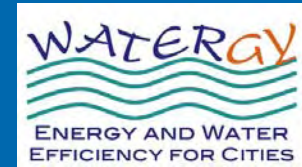
A more efficient pump also has lower maintenance & downtime costs.

Typical ENERGY SAVINGS in a total pumping system:

- ① **SIZE** – proper matching of pump size to load: **10% – 30%**
- ② **SPEED** – variable speed drives adjust as needed: **5% – 50%**
- ③ Know your **SYSTEM REQUIREMENTS** – don't pump more flow and pressure than needed: **5% – 20%**



Leak Detection & Reduction



Unaccounted for Water in Developing Countries:

- Average 34%
- 50% not uncommon

Leak Detection:

- Measure **night flows** between 1 & 4 a.m.
 - *Night flow is close to day flow in a leaky system*
- Isolate their location by measuring different sections
- **Metering**: essential for ongoing leak reduction

Leak Reduction:

- I.D. largest 20% of leaks → usually accounts for 80% of losses
- “Pressure Management”: decreasing pressure decreases leaks



Energy Efficiency through Automation: Example from BRAZIL



WHERE: CAGECE, state water utility in Brazil's arid Northeast

PROBLEMS:

- ❶ 2001 drought (power mainly via HP)
- ❷ Huge water losses & waste from system
- ❸ Utilities couldn't afford energy costs

PROJECT: automated pressure controls, centralized pumping controls, improved data collection & analysis

RESULTS:

- ✓ new access for poor → 88,000 new connections
- ✓ CAGECE saved \$580,000 in 2 years
- ✓ Payback: 7 months



Energy Efficiency through LEAK DETECTION: Cetinje, Montenegro



PROBLEMS:

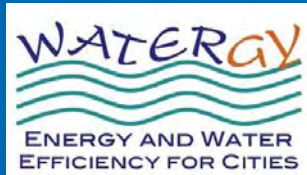
- ① huge water losses (only 1/3 reached end users)
- ② sporadic service (only a few hours per day)
- ③ poor system management & metering; inadequate skills
- ④ insufficient billing & collection; utility owed millions

PROJECT:

- Detection and repair of water leaks
- Hydraulic model developed to analyze network's problems

RESULTS:

- ✓ Utility's water losses and electricity costs reduced by >30%
- ✓ Service is 24/7 for the first time in 10 years!
- ✓ Payment collection now 46% from 22%



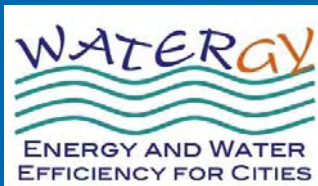
Recovering Water Revenue: Soweto Township Johannesburg, South Africa



Water Pre-Payment

- **Approach:** *all at once...*
 - ❶ Fix residents' plumbing for free
 - ❷ Install water meters
 - ❸ Sell them their pre-payment card
- **Results:**
 - ✓ Acceptance of pre-payment at 98%!
 - ✓ Water pumped went from 70,000 L/mo to 11,000 L/mo per household





Performance Contract Financing: Sebokeng Township Emfuleni, South Africa



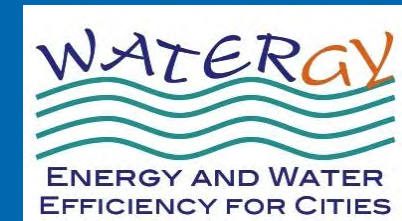
ESCO Model of Shared Savings & Risk Reward Applied to Water

PROJECT

- ✓ Water pressure management firm acting as ESCO
- ✓ **Build-Own-Operate-Transfer** to municipality after 5 years
- ✓ Fees: firm gets 20% of savings
- ✓ Payback period: **3 months!**

ALLIANCE ROLE

- ✓ Our idea; convinced municipality
- ✓ Wrote RFP, putting onus on bidders to find funding
- ✓ **Trusted third party** to help negotiate contract



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