



Using less. Doing more.

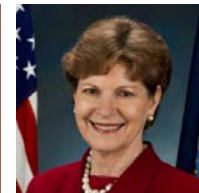
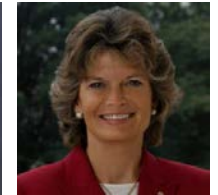
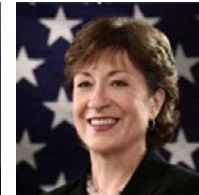
Water and Energy Efficiency: Watergy

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What is the Alliance to Save Energy?

The Alliance to Save Energy promotes energy efficiency worldwide to achieve a healthier economy, a cleaner environment and greater energy security.

- Nonprofit organization headquartered in U.S.; operations worldwide
- Led by **Senator Mark Warner (D–Va.)** and **Tom King, Chairman of the Board and President, National Grid USA**
- Board includes 14 Members of Congress – Bi-Cameral, Bi-Partisan
- Also includes environmental, consumer and trade association heads, state and local policy makers, corporate executives



Working with and Across All Sectors of the Economy

Business ▪ Government ▪ Public Interest

- Coalition membership of more than 160 diverse organizations
- Involvement by businesses in all economic sectors
- Participants active in policy advocacy, research, standards, education and communication



Sempra Energy®

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Gas



United Technologies

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Johnson
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EDISON ELECTRIC
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National Rural Electric
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Honeywell



PG&E Corporation.

SIEMENS



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American
Chemistry
Council



American Gas Association

MASCO



FLEXENERGY

35 YEARS ALLIANCE
TO SAVE ENERGY

Using less. Doing more.

The Water/Energy Link

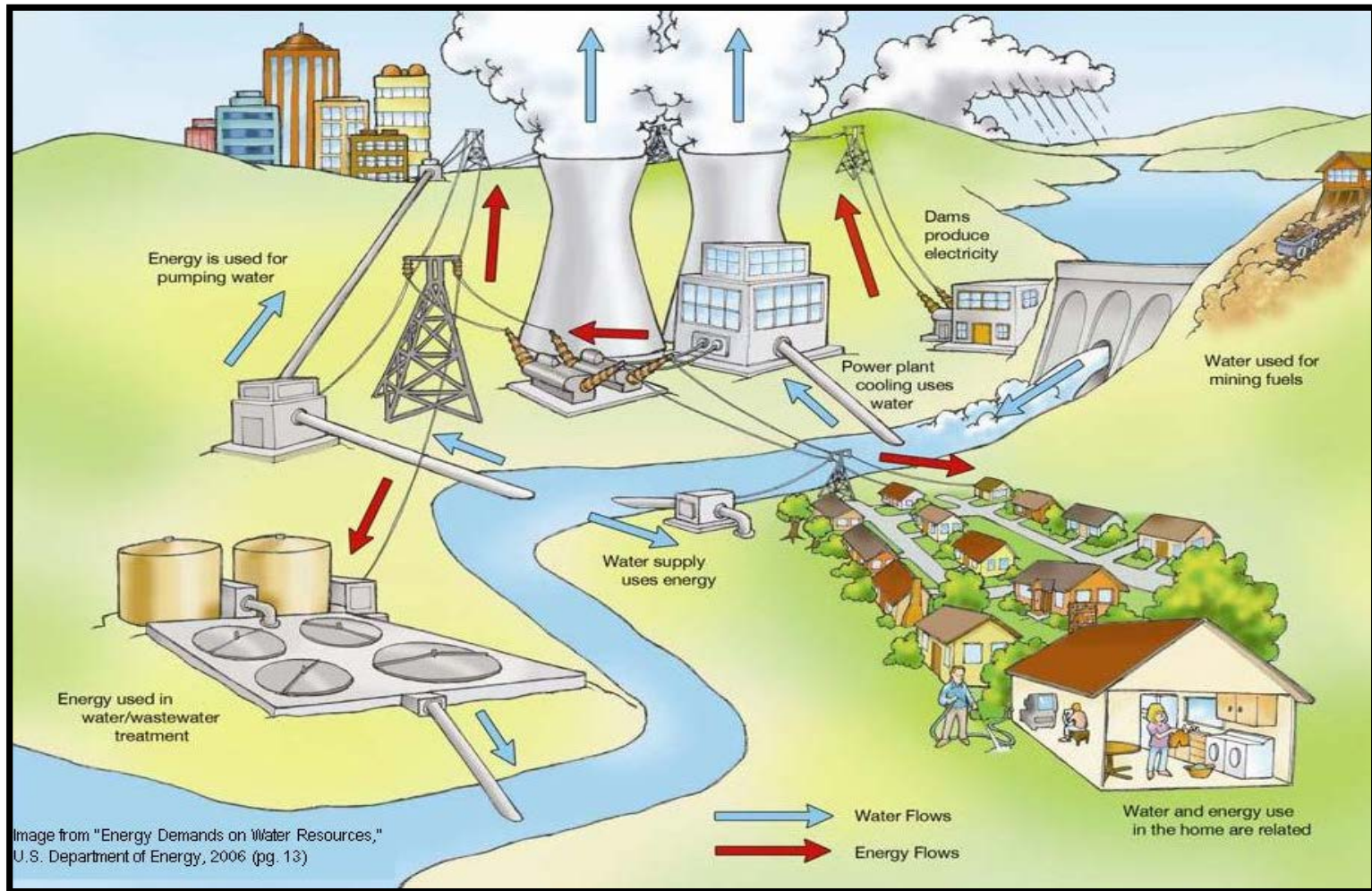


Image from "Energy Demands on Water Resources,"
U.S. Department of Energy, 2006 (pg. 13)

Water/Energy and Energy Efficiency

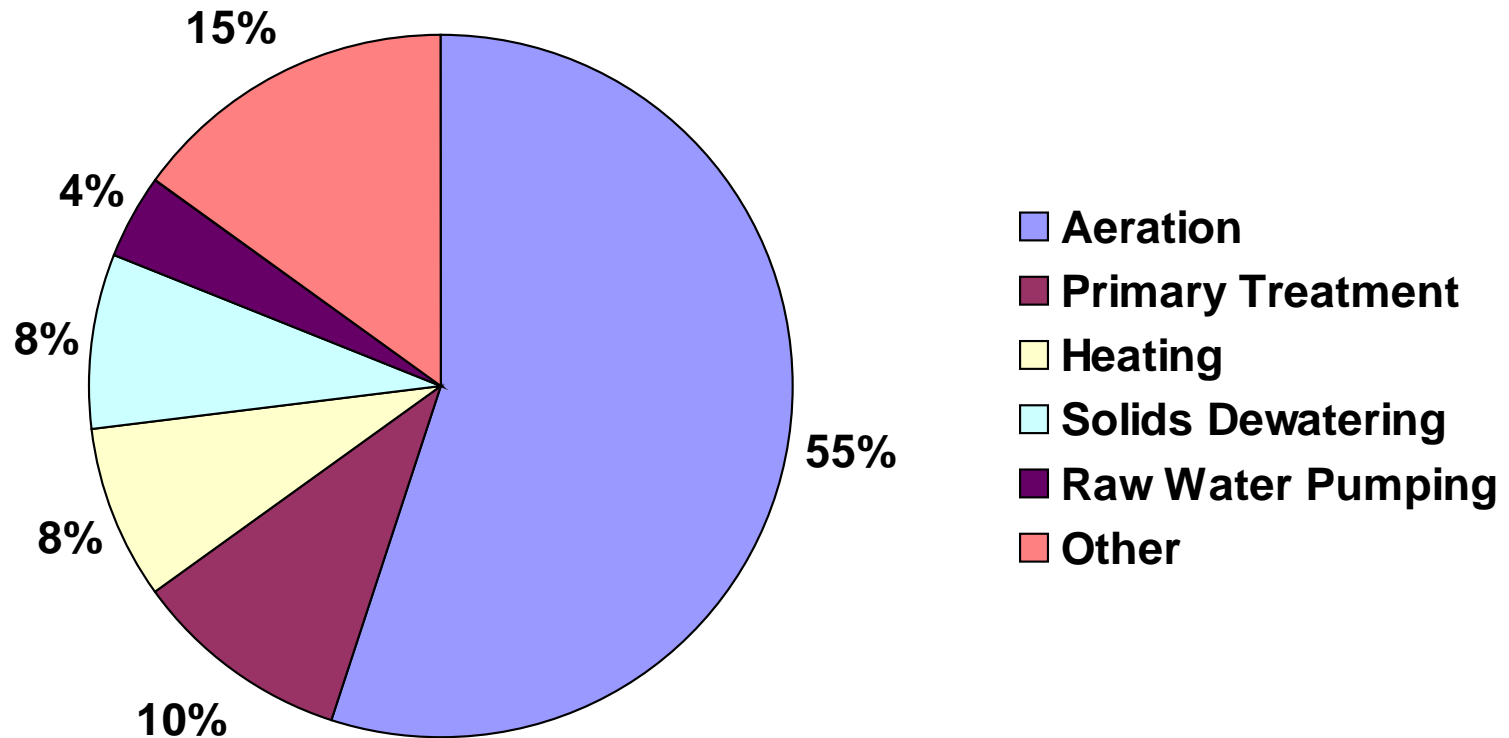
Energy Efficiency can Save Water and Energy

- Improving motor system energy efficiency (pumping systems, aeration blowers, grinders, mixers)
- Implementing energy management/efficient design
 - Pumping stations (reducing head)
 - Process cooling applications (proper flow)
- Installing appropriate system automation
- Metering and energy monitoring
- Leak management
 - Energy savings by lowering pressure in water distribution system
 - Energy savings from less infiltration of sewers

The Challenge: Infiltration Results in Greater Energy Use in Wastewater Systems

- Whenever water comes into the wastewater system due to leaks, energy use increases
- Older sewer systems can be leaky
 - In the U.S. 500,000 miles of publicly owned sewer lines (similar amount in privately-owned sewer systems)
 - Designed to carry wastewater, not storm water
 - Some storm water enters sewer lines through cracks and roof and basement drains
 - This storm water has to be treated – energy consequence of cracks
 - In 2005, City of New Orleans was still treating 20 M gallons/day after evacuation due to water from leaks
- Energy efficiency can mitigate increased loads from growth and infiltration

Wastewater Treatment and Energy Use



- Energy can make-up 25 to 40% of the total operating cost of a Wastewater treatment plant

Wastewater Treatment and Energy Use

- Aeration blowers account for majority of wastewater plant energy use
- Manual control of fixed speed aeration blowers can cause up to 50-60% excess energy use
- Significant energy savings can be realized by using variable speed control rather than fixed speed operation
- System controls of aeration blowers can improve energy efficiency further

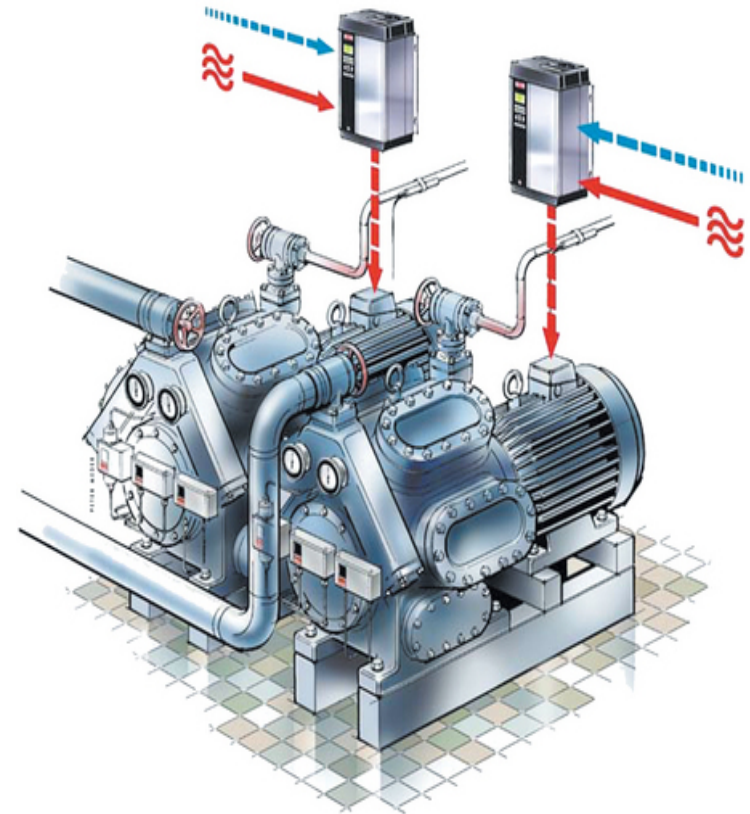


Photo courtesy of Danfoss, Inc.

The Solution: Watergy

Watergy is an Alliance to Save Energy program that maximizes efficiency of both energy and water

- "Watergy" addresses the link between water and energy
- Watergy teaches end users to make the best use of two valuable resources that are in limited supply
- The approach helps water and wastewater utilities realize significant energy, water and monetary savings
- Watergy has been implemented in municipal water & wastewater systems, but can be applicable to industrial & commercial facilities

Watergy in Action



EE in Caribbean Water Utilities



Lake Victoria Watergy project



Watergy in South African schools

Since 1997: More than 100 cities in 16 countries

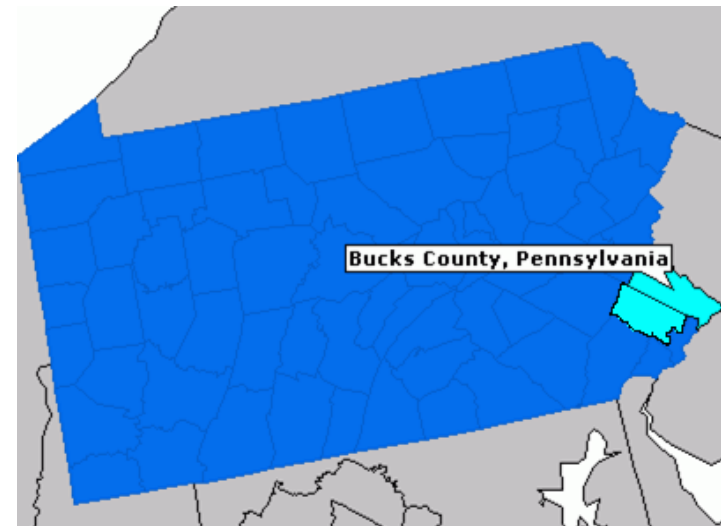
- Mexico, South Africa, Brazil, India, Philippines, Sri Lanka, Guyana, Kenya, Jamaica, Bahamas, Suriname, Panama, Costa Rica, Honduras, Bosnia, Ukraine
- In many developing countries up to 60% of potable water is lost in leaks & illicit connections
- Payback are rapid: usually from a few months to up to 3 years
- Launched in the U.S. in 2010 (Bucks County, PA)
 - Added focus on energy management and financing solutions

Watergy in the U.S.



Bucks County Water and Sewer Authority

- Created in 1962, grew by 300% through acquisitions in last 15 years
- \$65 million in Annual Revenue
- 78,000 Retail Water and Sewer Customers
- Energy consumption of assessed facilities = ~20 million kWh in 2009
- Energy costs of assessed facilities = \$1.7 million in 2009
- Distribution & infrastructure based on growth, not energy efficient design



Watergy Approach in Bucks County

- Cross-functional assessment team:
 - Included management, operations & energy experts
- Applied a systems approach instead of focusing on discrete components
- Technology neutral, product agnostic
- Strong knowledge of energy management:
 - Principles of ISO 50001
 - ASME System Assessment Standard for pumping systems



Watergy Assessment in Bucks County

- Watergy assessment identified:
 - Many energy efficient products (premium efficiency motors, VFDs, SCADA systems)
 - 20% technical energy savings potential
 - Need for energy management training & implementation
 - Incentive packages to reduce payback period



Bucks County: Proposed Solutions

- Energy management training and policies
- Pump control replacements
- Blower improvements
- Metering improvements
- Financing packages from government, utility, and private parties



Assessment Estimated Energy Savings

- | | |
|---------------------------|-----------------------|
| ➤ Electric Energy Savings | 4.1 million kWh |
| ➤ Energy Cost Savings | \$361,000/year |
| ➤ Simple Payback | 2.2 years (~ 45% ROI) |



Bucks County: Results to Date



- Formed energy management team
- Identified new energy savings opportunities
- Lowered thermostats, shut off lighting in unused buildings
- Improved metering & documentation
- Installing VFDs on 2 wastewater pumps
- Evaluating low-impact hydro in capital expansion
- Qualified for utility rebates worth \$330K

Estimated Annual Energy Savings

- | | |
|---------------------------|---------------|
| ➤ Electric Energy Savings | 379,000 kWh |
| ➤ Energy Cost Savings | \$34,000/year |



Water/Energy Efficiency Conclusions

- Water/Wastewater Agencies
 - Culture of focusing on primary mission (water quality, service)
 - Many facilities & much infrastructure is aging
- Financing
 - Many energy efficiency incentives do not apply to wastewater agencies
 - Wastewater agencies not always aware of funding sources
- Opportunities
 - Greater penetration of energy efficiency technologies (VFDs, CHP)
 - Foster culture of continual improvement – utilize ISO 50001
- Programs & Policies
 - More incentives, voluntary programs & workforce training
 - Better coordination with electric utilities
 - More funding for infrastructure upgrades – energy

