Current Trends in “Counting What Counts” and Integrated Water-Energy Sustainability Programs

Presented by
Cat Shrier, Ph.D., P.G.
Watercat Consulting LLC

1209 E Street SE
Washington, DC 20003 USA
www.watercatconsulting.com
cat@watercatconsulting.com
(202) 344-7894

Presented to:
2nd Annual Water-Energy Symposium
September 29, 2010
Today’s Objectives

- Originally part of series of presentations and briefings on “Counting What Counts”
  - energy agency support for water industry and larger public goals (energy, GHG)

- Origin of “19% of CA’s energy used for water” statistic and subsequent programs
  - Often quoted (Chu, Sutley)

- New federal approach in “Greening the Federal House” under EO13514: “Federal Leadership in Environmental, Energy and Economics Performance”
  - “Zero Environmental Footprint”
  - Increased need for baseline audits and programs
  - Market, incentives, credibility, game-changer
CA Energy Commission 2005 Study

- **STEP ONE: MEASURE (BASELINE + CHANGES)**
  - CA: 19% electricity and 33% natural gas used for water
  - Also determined GHG Emissions associated with water

![Pie chart showing energy consumption by sector](chart1.png)

Total Natural Gas Demand in 2001 = 13,571 therms

![Pie chart showing energy consumption by sector](chart2.png)

Total Electricity Demand in 2001 = 250,454 GWh
CEC Energy for Water Audit Approach

- CA considered entire cycle: extract, conveyance, treat, distribute, END USE (MUN/IRR/IND), collect, treat, dispose of water

- Allows comparisons of projects, technologies (e.g. desal/reuse locally vs pumping/importing water)

- National estimate from DOE EIA is 3%, projected to double to 6% due to increased treatment (predicting 1.5% increase in energy for treatment)
  - only pumping and treatment
  - Beginning to review this approach

**Typical Urban Water Cycle**
Energy Intensity can Vary Significantly: 2,000 – 20,000 kWh/MG

[Diagram showing the water cycle with energy intensity graph]
1) ENERGY SECURITY

California Relies Heavily on **Imported Energy from Out-of-State, & Out-of-Country:**
- Electricity: 27%
- Oil: 62%
- Gas: 87%

Two Major Threats
- Disruption in Oil Imports / Supply Cuts
- Growing Energy Demand, & Flat or Declining Conventional Energy Sources
- Water-Related Energy Use Growing Faster Than Other Uses

2) GHG EMISSIONS


**TOOK AN INTEGRATED APPROACH TO CLIMATE ENERGY FOR WATER**
Site Baseline Audits Technical Assistance and Demonstration Project Grants for Water System Energy Efficiency Improvements:

- Reducing Process Energy Usage
- Replacing / Retrofitting Aging Equipment with More Efficient Technologies
- Repairing / Replacing Leaking & Damaged Pipes & Equipment
- Improving Electrical Load Management through Scheduling or Control modifications
- Adding System Flexibility with Storage
- Incentive for Water Utilities: Cost Savings
CA Solutions: Renewables/On-site Energy

CA Water Agencies
RE Feed-in-Tariff
( Adopted on Dec. 17, 2009)

- Renewables
  - Photovoltaic Solar
    - First PV System Installed @ WWTP in the U.S./World
    - Sewerage Commission of Oroville Region (N. CA)
  - CPUC’s CA Solar Initiative – Started in 2006 to Provide $3 Billion by 2016; Incentive Levels Reduce Annually

- Biogas / Anaerobic Digester Gas
- Wind – 950 KW by Palmdale Water District for Pumping
Ways to Reduce GHG Emissions from Water Sector:
- Reducing the Amount of Water Used,
- Energy Efficiency in the Water Cycle
- Water Recycling, and
- Using Cleaner / Renewable Energy Sources.

Most Cost Effective
Permanent Savings
Killing Three Birds with One Stone
Anticipated Reductions from Water Sector towards AB32 Target = 4.8 MMTCO2e Annually
Other Integrated W-E Program Approaches

Western CO Basin Roundtable Energy Studies

Green Buildings & Microwatersheds

WWTP Energy Use & Generation (ARPA-E?)

USDA Rural Economic Development For Food, Ecosystems, Energy

AWWA Survey of DW Energy Demands
Excellent studies underway (e.g. WRF) to look at energy for wastewater and water supply → moving towards integration and sustainability?

Remaining questions

- Much better understanding of what to count, how to count, how to keep track.
- What are the goals? What are the benchmarks? What reporting structures to move towards improvement from baseline
- Where are the incentives? Who pays? What is driving these activities?
“Greening the Federal House”

Signed October 5, 2009 by President Obama

Federal Leadership in Environmental, Energy and Economic Performance (Executive Order 13514)

Tasks Federal Agencies to develop, implement and annually update a plan that prioritizes sustainability actions based on a positive return on investment for the American taxpayer and to meet energy, water, and waste reduction targets.

First SSPPs for 50+ agencies released 9/9/10

Available at www.greengov.gov

GreenGov Symposium October 5-7, 2010 in DC (next week)
EO13514 Water Efficiency Targets

- Note: Efficiency, not just conservation

- EO 13514 builds upon EO 13423 (potable water use intensity reduction 2% annual through FY2015 based on FY2007 baseline) as well as EISA 2007 (facility evaluations of 25% of covered facilities annually to identify water efficiency measures)

- EO 13514 requires
  - 2% annual potable water use intensity through FY20 (FY07 baseline)
  - 2% annual volumetric water use reduction for industrial, landscaping, and agricultural use (ILA) through FY2020 (FY10 baseline)
  - Improvement EPA stormwater management guidelines
  - Implement water reuse strategies (compl. w/state laws)
  - Use WaterSmart
Federal government as a whole “is a **fulcrum** that can leverage its “massive buying power to impact the government’s environmental footprint.”

- Buying power, creating markets
- Demonstration projects, establishing credibility
- Behavioral changes
- Contracting mechanisms (Schedules, RFPs)

GSA moonshot goal is “eliminating the impact of the federal government on our natural environment.”

- **“ZERO ENVIRONMENTAL FOOTPRINT**
- **SHIFT FROM ZERO ENERGY FOOTPRINT**
- Energy, water, transportation, materials ...
Federal Integrated W-E/Sustainability Approach

- CEQ/White House leadership
  - guidance, fed employee input, GreenGov Symposium

- DOE FEMP
  - DOE getting into the water business???
    - PNNL Sunday workshop at GovEnergy last month (specialty buildings have interesting challenges)
  - To meet aggressive energy AND overall sustainability goals, must review water systems
  - For economic efficiency, must take approaches that meet water AND energy AND GHG targets

- DOD – the great social experiment, ahead of the game

- All 50+ other agencies
  - Example – during lunch, briefing with Mike Gabaldon on how Interior and USBR
  - 5000+ buildings (note: many landed agencies on GW)
SSPP Goals (Chapters in Report)

- GHG Reductions (Scope 1, 2, 3, Comprehensive Inventory)
- High-Performance Sustainable Design
- REGIONAL AND LOCAL PLANNING
  - how will communities, local utilities support federal goals
- Water Use Efficiency and Management
- Pollution Prevention and Waste Elimination
- Sustainable Acquisition
- Electronic Stewardship and Data Centers
- Department Innovation
SAVING WATER IS:
- NOT JUST ABOUT ENERGY SECURITY
- NOT JUST ABOUT SAVING MONEY
- NOT JUST ABOUT REDUCING GHG EMISSIONS/CLIMATE CHANGE
- NOT JUST ABOUT REDUCING WATER QUALITY IMPACTS

Federal government taking leadership on operating more sustainably

Feds to consider water supply and use at federal facilities as part of energy savings and GHG reduction -- Aggressive targets

Impacting communities around fed facilities (w/ww/power utilities)

Critical to continue progress towards identifying energy use from water/wastewater systems and end use as BASELINE for future programs towards greater efficiency – and determine what to count

One component: understanding water and energy use of products we use at home and work → WaterSense and EnergySTAR