Energy Management Program at Metropolitan Water District of Southern California

First Western Forum on Energy & Water Sustainability
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Metropolitan Water District of Southern California

- 6 counties; 5,200 Sq. Miles
- 18+ million people
- Regional economy: $600+ Billion
- Projected growth: ~220,000 people / year
- Metropolitan provides about half of Southern California’s supply
Where Southern California Gets its Water

- Lake Shasta
- Lake Oroville
- Bay-Delta
- Los Angeles Aqueducts
- Colorado River Aqueduct
- State Water Project
- Metropolitan Water District Service Area
- Local

STATE WATER PROJECT

Los Angeles Aqueducts

Colorado River Aqueduct

METROPOLITAN WATER DISTRICT SERVICE AREA

LOCAL
Background

- Climate change & global warming
- Greenhouse gas emissions
- Legislation
  - Governor’s Executive Order S-3-05
  - AB32: Reduction of GHG Emissions
Energy Facts

- Water-related energy = 19% of Calif. elect. usage
- 2005 Calif. Elect. usage = 272,385 GWh
- 2005 Metropolitan elect. usage = 1,940 GWh (0.7% of Calif.)
  - Enough electricity for 280,000 homes
- Metropolitan’s 16 hydro plants’ capacity = 140 MW
California Electricity Production (2005)

- Nuclear: 14.5%
- Natural Gas: 37.7%
- Large Hydroelectric: 17%
- Coal: 20.1%
- Renewable: 10.7%

California Total = 272,385 GWh
Metropolitan Electricity Use (2005)

- Colorado River Aqueduct: 94.6%
- Diamond Valley Lake: 1.8%
- OC-88 Pump Station: 0.4%
- Treatment Plants: 2.3%
- Other: 0.9%

MWD Total = 1,940 GWh

SWP energy use not included
State Water Project Electricity Use (2005)

SWP Total = 8,283 GWh

- Metropolitan: 52.3%
- Other SWP Contractors: 47.7%
**Metropolitan’s Energy Mgmt Program**

- Initiated in Fall 2006

- **Goal:** Design & Operate in Energy Efficient & Cost-Effective Manner

1. Inventory existing energy mgmt efforts & benefits
2. Determine Metropolitan’s Carbon Footprint & set CO$_2$ emission reduction goals
3. Identify Projects, Activities & Initiatives to reduce emissions & increase energy efficiency
Energy Mgmt Efforts to Date

- Incorporated energy efficient design criteria
  - Motors, pumps, variable frequency drives, lighting
- OC-88 Pump Station reconfiguration
  - 50% reduction in energy use
  - $1+ million annual energy savings, $500,000 rebate (SCE)
- 45% of Metropolitan workforce rideshares
- Installation of LCD monitors (50% reduction)
- Modified Union Station headquarters HVAC operations
- Headquarters bldg.– Energy Star Certified 11/06
- Purchased 27 hybrid sedans
Energy Mgmt Efforts Underway

Define energy efficient design standards for all new construction & rehabilitations

Examples

- Premium efficiency motors & high efficiency lighting
- Adjustable speed / variable frequency drives (i.e. pumps & compressors)
- Bldg. construction (i.e. materials, energy star ratings)

Define criteria for economic feasibility (i.e. payback period)

Installation of power monitoring systems at all treatment plants
Carbon Footprint Analysis

- Determine CO₂ emissions
- All facilities & eqpt. that Metropolitan owns & operates
- Direct vs. indirect emissions
- Examples
  - Electrical usage
  - Eqpt. (i.e. standby generators, construction)
  - Vehicle emissions
Initial Carbon Footprint Analysis (2005)  
Metropolitan’s Preliminary Results

- Fleet/Fuel: 1.9%
- Other: 3.7%
- Treatment Plants: 8.2%
- Colorado River Aqueduct: 86.2%

Metropolitan’s GHG Emissions = 256,040 Metric Tons CO₂
SWP-related emissions not included
Carbon Footprint Analysis

Next Steps

- Submit 2005 analysis & data to California Climate Action Registry
- Certification by 3rd party
- Determine CO$_2$ reduction goals
- Identify projects, activities, initiatives to achieve reduction
- Perform 2006 analysis
Energy use assessments of 2 water treatment plants conducted late 2006

Preliminary reports issued 1/06

- Potential identified savings of approx. 7%
- Examples of energy reduction activities
  - Install VFD’s on flocculator motors
  - Install high efficiency lighting & motion sensors
  - Install programmable thermostats on HVAC units

Assessments of other sites to follow
Solar Power

- Skinner WTP study completed in 2006
- Proposed 1 MW facility
  - Estimated project cost = $8-10 Million
  - Potential rebate = $4-5 Million
  - April initiation
- Solar studies underway at other facilities
Wind Power

- **Hinds Pumping Plant**
  - Data collection for 2 years
  - 20 foot & 50 foot towers
  - Data currently being analyzed to determine feasibility

- Recently obtained additional towers
  - Studies at Iron & Gene Pumping Plants

- Wind turbine design & economics continue to improve
Hydroelectric Generation

- Original closed-conduit program completed in 1970’s
- Reassessment of potential sites initiated in 2/07
  - Exist. pressure control structures
  - Add 3rd turbine at Foothill Power Plant
  - Replace Pelton Wheel with Francis Turbine on Yorba Linda Feeder
  - Assess sites previously considered uneconomical
- Complete study mid-2007
Energy Mgmt Program
Next Steps for Metropolitan

- Build upon & benefit from water-energy relationship
- Complete determination of Metropolitan’s Carbon Footprint
- Continue partnerships with utility companies
- Identify & invest in projects that reduce Metropolitan’s energy demand
- Identify all options for Metropolitan that consider our role as a provider of water in an environmentally responsible manner