City of Santa Cruz
Water Supply and Conservation

Santa Cruz County
Water Advisory Commission
Commission on the Environment
October 28, 2009

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Toby Goddard
Water Conservation Manager
Presentation Overview

- Overview of City’s Water Supply System and water Supply Problem
- Water Conservation Office: Roles and Responsibilities
- Water Energy Connection in Santa Cruz
Service Area Characteristics

Area served:
- Santa Cruz
- County
- Capitola

Population:
~ 95,000

Employment:
~ 45,000

Governing body:
City Council
Monthly Water Production
(million gallons per day)

Loch Lomond Reservoir
Live Oak Wells
San Lorenzo River
North Coast
Water Uses

- Park and Large Landscape Irrigation: 26%
- Single Residential: 40%
- Business, Industry, UCSC: 23%
- Multiple Residential: 9%
Primary Problem: Lack of Adequate Water Supply During Drought

U.S. Drought Monitor
February 3, 2009
Valid 8 a.m. EST

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:
- Delineates dominant impacts
  - A = Agricultural (crops, pastures, grasslands)
  - H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

Released Thursday, February 5, 2009
Author: Eric Luebhusen, U.S. Department of Agriculture
Water Supply Conditions Vary Widely Year to Year
City’s Approach to Meet These Challenges

1. Reduce average demand through water conservation in all years
2. Curtail water use through temporary water restrictions in drought years
3. Develop new sources of supply
Integrated Water Plan:

Long-term water conservation

Desalination

Short-term demand reduction - "use curtailment"
Long-Term Water Conservation

• Emphasis on permanent measures that reduce average daily water use.

• Goals:
  1. Savings of 300 million gallons per year in 2010.
  2. Reduce residential per capita use from 76 to 65 gpcd

• Actual per capita use in 2008 = 68 gpcd

• In 2001, City became a signatory to California Urban Water Conservation MOU
California Urban Water Conservation Council

BMP 1: Residential Survey Programs
BMP 2: Residential Plumbing Retrofit
BMP 3: System Water Audits
BMP 4: Metering with Commodity Rates
BMP 5: Large Landscape Conservation
BMP 6: High Efficiency Clothes Washers
BMP 7: Public Information Programs
BMP 8: School Education Programs
BMP 9: Commercial Industrial Institutional
BMP 10: Wholesale Agency Assistance
BMP 11: Conservation Pricing
BMP 12: Conservation Coordinator
BMP 13: Water Waste Prohibition
BMP 14: Residential Toilet Replacement
Long-Term Water Conservation Programs

Residential indoor water use (gallons/person/day):

- Toilets: 18.5
- Clothes washers: 15.0
- Showers: 11.6
- Faucets: 10.9
- Leaks: 9.5
- Baths: 4.0
- Dishwashers: 0.7
- Other: 1.6
- Total without conservation: 69.3 gal per day
- Total with conservation: 45.3 gal per day
Plumbing Fixture Retrofit Regulations

- All buildings must be retrofitted with low consumption plumbing fixtures when real estate is sold.
- Regulations apply to all types of buildings served by the City: Residential, Commercial & Industrial.
Commercial, Industrial, and Landscape Programs

- Plumbing Fixture Rebates
- Facility audits
- Retrofit regulations
- Smart Rinse, Light Wash, Smart Rebate Programs
- Regulations for New Development
Public Awareness and Education
## Conservation Oriented Water Rate Structure

<table>
<thead>
<tr>
<th>Block</th>
<th>Category</th>
<th>Inside City monthly</th>
<th>Outside City bimonthly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>Units</td>
<td>Rate</td>
</tr>
<tr>
<td>5</td>
<td>Inefficient or excessive use</td>
<td>$8.37</td>
<td>over 18</td>
</tr>
<tr>
<td>4</td>
<td>High use</td>
<td>$6.71</td>
<td>15-18</td>
</tr>
<tr>
<td>3</td>
<td>Average outdoor needs</td>
<td>$4.89</td>
<td>10-14</td>
</tr>
<tr>
<td>2</td>
<td>Average indoor needs</td>
<td>$3.81</td>
<td>5-9</td>
</tr>
<tr>
<td>1</td>
<td>Essential needs</td>
<td>$1.49</td>
<td>1-4</td>
</tr>
</tbody>
</table>
Next Priority: Large Landscapes

- Water budgets
- Pricing
- Water efficient landscape regulations
- Weather-based controllers
- Separate, real-time metering
- Audits
Short-Term Water Conservation

“Use Curtailment”

Recently updated City’s Water Shortage Contingency Plan

Document that describes how the City will respond to future water shortages ranging from 5 to 50%
Demand Reduction Program: 5 Stage Structure

<table>
<thead>
<tr>
<th>Stage</th>
<th>Magnitude of Water Shortage</th>
<th>Stage Title</th>
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<tbody>
<tr>
<td>1</td>
<td>0-5%</td>
<td>Water Shortage Alert</td>
</tr>
<tr>
<td>2</td>
<td>5-15%</td>
<td>Water Shortage Warning</td>
</tr>
<tr>
<td>3</td>
<td>15-25%</td>
<td>Water Shortage Emergency</td>
</tr>
<tr>
<td>4</td>
<td>25-35%</td>
<td>Severe Water Shortage Emergency</td>
</tr>
<tr>
<td>5</td>
<td>35-50%</td>
<td>Critical Water Shortage Emergency</td>
</tr>
</tbody>
</table>

Difference between percentage figures used to describe the system-wide shortfall and how individual customers are affected.
Priority-Based Allocation System

Classified demands into 3 usage priorities:

- Health and safety
- Business
- Irrigation/other outdoor usage

Scaled back water delivery by priority:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Overall System Shortfall:</th>
<th>Health/Safety</th>
<th>Business</th>
<th>Irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>15%</td>
<td>95</td>
<td>95</td>
<td>64</td>
</tr>
<tr>
<td>3</td>
<td>25%</td>
<td>95</td>
<td>90</td>
<td>34</td>
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<tr>
<td>4</td>
<td>35%</td>
<td>90</td>
<td>85</td>
<td>12</td>
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<tr>
<td>5</td>
<td>50%</td>
<td>75</td>
<td>67</td>
<td>0</td>
</tr>
</tbody>
</table>
Water Restrictions 2009

3 Dry Years

2007
Rainfall 56%
Runoff 31%

2008
Rainfall 82%
Runoff 57%

2009
Rainfall 71%
Runoff 41%
Water Restrictions 2009

Gross Daily Water Consumption
through October 19, 2009

Million gallons per day

- 2008
- 2009
- Poly. (2009)
- Poly. (2008)
Water-Energy Connection

- Hidden cost of water supply
- Water utilities use large amounts of energy to treat and deliver water
- Electricity used to pump water generates carbon dioxide, contributes to greenhouse gas
- Additional water pumping during peak season for landscape irrigation strains power grid.
Embedded Energy of Water Use Cycle

Source

Water Supply & Conveyance → Water Treatment → Distribution

Recycling → Distribution

Wastewater Treatment → Wastewater Collection

Discharge

End-use
- Agricultural
- Residential
- Commercial
- Industrial

Cold-Water Boundary
Embedded Energy of Water Use Cycle

Energy Intensity per Stage of Water Use Cycle

End Users Within a Service Territory

California American Water, Monterey
Sonoma Valley Area
City of Santa Rosa
Sonoma County Water Agency
Santa Clara Valley Water District
Northern California (CEC Report)
San Jose Water Company
City of Watsonville
Pacific Institute's Water to Air Urban model
City of Santa Cruz
City of Fresno
EBMUD
North Marin Water District

kWh/Acre-Foot

Total Energy Consumed by End Users within a Service Territory.

Each Agency is not responsible for the full energy use. Includes energy for water imported from other agencies and wastewater treatment services provided by other agencies.
2005 Greenhouse Gas Emissions Inventory

Figure 2. 2005 Municipal Emissions by Sector

Figure 3. Community-wide Emission by Sector
Questions?

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