Sustainable Water Futures—Opportunities at Water and Wastewater Utilities

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Agency Overview

- Regional wastewater service provider and distributor of wholesale water and recycled water
- Serving 800,000 people over 242 square miles of the Chino basin – one of the most rapidly growing regions in the U.S.
- Wastewater treatment is approximately 60 MGD
- Electric demand is approximately 13 MW
- Agency’s 3 products: Renewable energy – Biosolids compost – Recycled water
Wastewater Utility Goals

Three Products:
- Recycled Water
- Biosolids/Composting
- Renewable Energy
Water Utility Goals

- Statewide Drought
- Colorado River
- State Water Project – Delta Issue
- Local Supplies
  - Stormwater
  - Groundwater
  - Recycled Water
Inland Empire Utilities Agency (IEUA)
IEUA Water Recycling Facilities

- Four Water Recycling Facilities
  - Regional Plant No. 1 – Ontario
  - Regional Plant No. 4 – Rancho Cucamonga
  - Regional Plant No. 5 – Chino
  - Carbon Canyon Water Recycling Facility – Chino

- Influent Flow Levels

- Water Quality

- Recycled Water Demand
Design Capacity:
84.4 Million Gallons per Day
Actual Average Daily Flow:
58 Million Gallons per Day

Montclair Diversion Structure → Montclair Lift Station → Influent Diversion Structure
CCWRF (11.4 MGD) → Montclair Lift Station → Influent Diversion Structure
RP-2 (Solids only) → Montclair Lift Station → Influent Diversion Structure

RP-4 (14 MGD) → San Bernardino Lift Station → Diversion Structures
RP-5 (15 MGD) → Primary Effluent Diversion Structures

Wastewater Flows
Lift Station Flows
Primary and WA sludge
Process Flow
Facility (Design Capacity)
IEUA’s Energy Strategy

- Since 2001, goal has been to maximize renewable energy, optimize energy usage
- Significant investments made in biogas generation, energy efficiency, green building (first platinum LEED)
- Go “100% Renewable” by 2020
- Pursue New Renewable Technologies
IEUA Innovations to Address Energy Needs

- Maximize Efficiency

  Constructed the nation’s first platinum LEED-rated headquarters by a public agency (2003).

- Sustainability and Diversification

  Biogas production from anaerobic digesters.
  Installed a total of 16.5 acres of solar panels in 2008 on four Agency’s sites.
Energy Intensity of Water Supplies

Total energy requirements for marginal (e.g. imported) supplies of water in Southern California are 3,519 kWh/acre-foot (0.01 kWh/gallon).
Electricity Use for Water System Components in Southern California

- Local Distribution: 9%
- Waste Treatment: 14%
- Groundwater Supply: 6%
- Imported Water Supply: 71%
State Water Project Pumping Facilities
State Water Project Pumping Energy

All figures: kWh/AF
Top figure = cumulative energy
Lower Figure = facility energy

(Includes Energy Recovery and Transmission Losses)
Energy Intensity of Water Supplies for IEUA

Energy Use by Source

<table>
<thead>
<tr>
<th>Source</th>
<th>kWh/AF</th>
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<tbody>
<tr>
<td>Recycling</td>
<td>400</td>
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<tr>
<td>Groundwater Pumping</td>
<td>950</td>
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<tr>
<td>Ion Exchange</td>
<td>1,050</td>
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<tr>
<td>Chino Desalter</td>
<td>1,700</td>
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<tr>
<td>Colorado River Aqueduct</td>
<td>2,000</td>
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<tr>
<td>West Branch State Project Water</td>
<td>2,500</td>
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<td>East Branch State Project Water</td>
<td>3,200</td>
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<tr>
<td>Ocean Desalter</td>
<td>4,400</td>
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IEUA’s Expanding Energy Project Portfolio

- Renewable Energy Programs
  - Three-Phase Thermophilic Digestion
  - Digester Optimization
  - Combined Heat and Power
  - Food Waste Additions
  - Flared Biogas Recovery (conversion to pipeline quality gas)
  - Solar Power
  - Wind Power
  - Fuel cells
  - Algae
IEUA Recycled Water Production Cycle

**Primary**
- Industrial Pretreatment & Source Control
  - Influent TOC Avg. 165 mg/L

**Secondary**
- 95% TOC Removal to 7.0 mg/L Avg.

**Tertiary**
- Distribution System

**Industrial & Brine Export**

**Groundwater Blend & Hold**
- 50% TOC Removal to ±1 mg/L

**Soil-Aquifer Treatment**
- 75% TOC Removal to ±2 mg/L
Exceptional Recycled Water Quality

- **Pre-Treatment Program**
  - Manages Significant Industrial Users (SIU)
  - No Drugs Down the Drain Program
  - Industrial & Brine Export to NRWS

- **Longstanding Treatment Facility Performance**
  - Outstanding NPDES & T-22 Compliance Record
    - 100% Compliant for 2008
  - Exceptional Nitrogen and TOC Removal
  - No Issues with Emerging Constituents of Concern
Recycled Water Usage
Actual and Planned

<table>
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<tr>
<th>Year</th>
<th>Actual RW Use</th>
<th>Projected RW Use</th>
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<tr>
<td>FY06/07</td>
<td>10,000</td>
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<tr>
<td>FY07/08</td>
<td>20,000</td>
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<tr>
<td>FY08/09*</td>
<td>30,000</td>
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<tr>
<td>FY09/10</td>
<td>40,000</td>
<td>(Goal)</td>
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<tr>
<td>FY10/11</td>
<td>50,000</td>
<td>(Goal)</td>
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<tr>
<td>FY11/12</td>
<td>60,000</td>
<td>(Goal)</td>
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</table>

* FY08/09 Projected Actuals
Recycled Water Use

FY08/09:
- WWTP: 36%
- Recharge: 11%
- Landscape: 22%
- Agricultural: 23%
- Industrial: 7%
- Const Water: 1%

Projected FY11/12:
- WWTP: 14%
- Recharge: 26%
- Landscape: 32%
- Agricultural: 27%
- Industrial: 1%
- Const Water: 1%

3-Year RW Business Plan

Groundwater Recharge

- Recharge Sites
  - 19 Sites throughout Chino Basin

- Sources of Water
  - Stormwater & Local Runoff
  - Imported Water (MWD)
  - Recycled Water

- Natural Soil Aquifer Treatment (SAT)

- Confidence of Regulators

- Recharge Basin Operations & Maintenance (O&M)
Different Systems for Separate IEUA Sites

Tracker T-0
- Area rqmts: 5 acres for 1MW
- Energy production 23% greater than fixed-tilt

Fixed T-10
- High density coverage: 10.5Watts/SqFt. Good for constrained areas

Tracker T-20
- All modular system – no in-ground foundations
- Tilted single-axis provides energy production 30% greater than fixed-tilt
- Lowest cost per kWh technology
Zero to 1 MW Solar in 4 Months!
Solar System at IEUA Water Recycling Plant (Went live 11/28/08 at 1300 hours)
## Solar Project Numbers

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Type</th>
<th>Capacity [KW-AC]</th>
<th>Projected Annual Production [MWH]</th>
<th>Area [Acres]</th>
<th>Completion Date</th>
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<tr>
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<td>T-0</td>
<td>694</td>
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<tr>
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**Total**  
3.5 MW  
7.2  
16.5
Solar Summary

- 3.5 MW of Solar installed at 4 sites in just 4 months
- Financing – Power Purchase Agreements (PPA) used – No capital burden on Agency
- No maintenance responsibilities for IEUA
- Great Environmental Benefits
RP-5 Load Profile

3/28/2009
IEUA Biosolids Management

- Existing IEUA Composting Facility
  - Decommissioned in 2006

- IERCF – Constructed to Meet Rule 1133.2
  - Commissioned in 2007
Facility Description

INLAND EMPIRE REGIONAL COMPOSTING FACILITY (IERCF) SCHEMATIC

FULLY ENCLOSED
Wind Power

- Minimum cut-in wind speed 8 mph for turbine power generation
- Local area wind speed averages 13 mph

IEUA in Class 3 Area (Avg. speed 13 mph)
Wind Speed to Energy

-Relative Turbine Power Output vs. Wind Speed-

18% Turbine Output @ avg. 13 mph

Cut-out Wind Speed
Potential Sites

IEUA Headquarters
RP–5 Complex

RP–4/IERCF Complex

RP–1 Facility

Considerations

- Suitability of site
- Environmental Esthetics
- Permitting
Wind Power – Next Steps

- Options
  - Pursue demonstration project at RP5 site to gain first hand experience with wind power permitting, procurement, operation and maintenance
  - Evaluate actual performance and output
  - Evaluate other sites
Fuel Cells

- Is an electrochemical process that generates electricity, water and heat.
- Can utilize hydrogen from any hydrocarbon fuel
  - Digester Gas, Natural gas, methanol, gasoline
- Relies on chemistry and not combustion
  - Low emissions
Fuel Cells Benefits

- Low air emissions
- High Efficiency
- High Reliability/High Quality Power
- Fuel Flexibility (Digester Gas and/or Natural Gas)
- Quiet Operation
Water Assets of the Chino Basin

- **Groundwater**
  - 5–7 Million Acre-feet of Storage – one of the largest groundwater basins in southern California
  - 1 million acre-feet of unused storage capacity currently
  - Safe Yield of 140,000+ Acre-feet per year with capacity to increase
  - Over 800 Active Wells

- **High quality Recycled Water**
  - Over 90,000 Acre-feet of water available for reuse

- **Storm Water Capture**
  - Region now loses over 40,000 acre-feet per year on average of water that historically recharged the Chino Groundwater Basin

- **Opportunities for Water Efficiency**
  - Over 60% of water use within region is for outdoor irrigation

- **Regional Partnerships**
  - Outstanding collaboration and cooperation among local governments and agencies providing water services
Water Resources Capital Improvement Program
$350 Million in Capital Projects

- **Chino I/II Desalters**
  - 25,000 AF/Yr yield
  - $68 Million

- **Recharge Master Plan**
  - 23,000 AF/Yr Storm water
  - 20 – 40 AF/Yr Recycled Water
  - 80 – 120,000 AF/Yr Imported Water
  - $40 – $50 million

- **MWD Conjunctive Use**
  - 100,000 AF, 33,000 AF/yr yield
  - $28.5 million

- **Recycled Water**
  - 90,000 AF/Yr
  - $200 million

- **Conservation**
  - 25,000 AF/Yr
  - $10 million
Without the Integrated Water Management Strategy, the need for expensive imported water is expected to increase from 60,000 acre-feet to over 150,000 acre-feet.

With the implemented planned water initiatives, the region will significantly reduce its need for imported water and during dry years almost completely roll off imported water supplies.