Eastern Municipal Water District
Integrated Demand Side Management Case Study

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IDSM Theory – Purpose & Objectives

Integrated

- Integrated Demand Side Management
- Seamless integration of measures and technology
- Pursue all cost-effective DSM opportunities

Synchronized

- Sector specific engagement & approach
- Bundled solutions for comprehensiveness
- Customer Loading Order preference

Coordinated

- EELT Strategic Plan based
- IDSM SW Task Force
- SCE 2013-2014 core policy
Why Water Districts for IDSM?

- Large aggregate demand
  - Multiple sites
  - Typically 100-500 kW per site

- Opportunities for diverse efficiency measures

- Good DR performers

- DG and Storage

- Key: SCADA systems

Conclusion: water districts are “naturals” for integrated DSM solutions
Water Facilities 101

- Wells
- Booster pumps
- Treatment plants
- Reservoirs
- Interconnections
- Distribution & customers.

[Diagram showing water facility components]
Technology—SCADA Systems

- Monitor and control remote facilities
- Nearly universal
- Like an EMS, but richer controls

District headquarters

Operator → Central terminal - HMI

Network

Remote terminal

Booster pumps or well (one of many)
Background – EMWD

EMWD – formed in 1950
~ 550 Square Miles
~ Population @ 750,000
~ $220 Million Operating Budget
~ Water, Wastewater, & Recycled
EMWD’s Energy Picture

~ 256 SCE Electrical Accounts
~ 46 So. Cal. Gas Accounts
~ $14.6 Million Budget
~ Focus on Efficiency & Savings
What is Demand Response:

- Temporarily Reducing Electrical Usage During Periods of Peak Demand and/or High Supply Cost:
  - Lowers Cost of Wholesale Electricity (consumer surplus)
  - Reduces Chances of Local Forced Outages
  - Immediate and Low Cost Alternative to Marginal Generation

![Graph showing available generation and excess demand](Image)
Demand Response is a “call to action” to customers to reduce load based on pre-assigned requirements.

“Temporary conservation” to replace generation.

Value is based on speed, duration, availability, location, and timing of the load drop.
### Types of Demand Response

<table>
<thead>
<tr>
<th>Utility Type</th>
<th>Utility Type</th>
<th>3rd Party Type</th>
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</thead>
<tbody>
<tr>
<td><strong>Interruptible</strong></td>
<td>Base Interruptible Program</td>
<td>Flexible Solutions</td>
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<tr>
<td><em>(short notice)</em></td>
<td>AP-I <em>(pumping controls)</em></td>
<td>Several Choices</td>
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<td></td>
<td><em>(incentives)</em></td>
<td>Participation Based Payments</td>
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<tr>
<td><strong>Price Based</strong></td>
<td>SAI <em>(Critical Peak Pricing)</em></td>
<td>Technology Solutions</td>
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<tr>
<td><em>(day ahead)</em></td>
<td>Demand Bidding</td>
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<td>Real Time Pricing</td>
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<td></td>
<td><em>(variable rates or credits)</em></td>
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**Aggregation**
Illustrative Example

- **EBMUD - Total Water Distribution Pumping**
- **Time and kW Data**
- **Graph showing kW levels from 12:10 AM to 10:10 PM on various days**
- **Legend:**
  - 7.17.06
  - 7.24.06
  - 7.10.06
- **Note:** Pumping load delayed
## EMWD’s Demand Response Portfolio

Combined Annual Savings @ $555,000

### Enrolled Demand

<table>
<thead>
<tr>
<th>Utility Type</th>
<th>Demand Amount</th>
<th>3rd Party Type</th>
<th>Demand Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIP</td>
<td>6 MWs</td>
<td>Aggregator</td>
<td>3.1 MWs</td>
</tr>
<tr>
<td>-3 Accounts</td>
<td></td>
<td>-7 Accounts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(anticipate moving to 16 accounts and 3.7 MWs with Auto DR Project Completion)</td>
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</tr>
<tr>
<td>AP-I</td>
<td>2.5 MWs</td>
<td></td>
<td></td>
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<tr>
<td>-20 Accounts</td>
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11.6 MWs @ 33% of EMWD’s Peak Demand
Increasing DR participation

- How did EMWD expand the DR program?
  - Long Term DR Participant
  - SCE Technical Assistance (TA/TI)
  - Consulting Assistance
  - Team Effort
    - SCE representative
    - Consultant
    - 3rd Party Aggregator
    - EMWD Operations
Industry: Water Agency
Location: Perris, CA
Application: DemandSMART™
Program: EnerNOC Demand Response at SCE
DR Strategy: Curtailment only, 3.1MW (moving to 3.7MW)
Primary Curtailment Strategy: Temporary pump shutdown
Annual Payments: Approximately $100,000
No risk approach, variable level of participation based on system operational needs, no penalties, no backup generation needed, comprehensive strategy.
Automated Demand Response:
Participants: SCE, Honeywell; Derceto; EnerNOC; EMWD
Automate the evaluation & implementation of DR Events to enhance performance and minimize burdens

Enable greater enrollment in DR programs

Enhance EMWD’s ability to Participate in:
  - Critical Peak Pricing (dynamic rates)
  - Demand Bidding Program (voluntary reductions)
  - Other DR price based offerings

Coordinate the IDSM options (energy efficiency, demand response, distributed generation, and storage/load shift/rate response) for cost reductions
EMWD Best in Class

Eastern Municipal Water District: A Case Study of Best-In-Class Water-Energy Programs and Practices

A Study Conducted by:
California Sustainability Alliance
A Navigant Consulting Program, Funded by California utility customers under the auspices of the California Public Utilities Commission

October 1, 2012
Summary of Best Practices

Reduce Energy Consumption within Water and Wastewater Treatment and Distribution Systems
- Optimize pump efficiency (high efficiency motors, pumps & VFDs; regular testing and O&M; reduction of friction in pipes & pumps)
- Optimize aeration system efficiency (high efficiency blowers, fine bubble aeration, DO Control)
- Install efficient lighting, HVAC, other building systems
- Reduce wet weather pumping & treatment energy by reducing storm water infiltration
- Reduce heat losses & recover/productively use waste heat
- Retrofit systems for new cost-effective efficiency technologies

Improve Energy Management Systems
- Monitor/manage energy consumption at the sub-system and/or driver level (e.g. use of SCADA)
- Continually re-balance systems and processes to maximize efficiency

Increase Ability to Participate in Demand Response
- Integrate flexibility into systems design and operations to enable load shifting
- Integrate storage (water, wastewater, electric &/or gas) where beneficial to minimize on-peak electricity consumption

Self-Produce Energy (Electricity & Gas) as a By-Product of Systems Operations
- Produce electricity through transport of water & wastewater (e.g., in-conduit hydropower)
- Increase production & use of biogas/bio-methane from wastewater treatment (anaerobic digestion, co-digestion with other bio-wastes, upstream collection of FOG)
A close relationship between water agencies and energy utilities is instrumental to achieving significant energy savings in the water sector.

A significant amount of data is available to baseline the energy use of water agency; however, availability of data is not required to identify promising energy saving opportunities.

Technology risk and the need for investment prioritization may prevent water agencies from installing certain efficiency measures.

Newly adopted South Coast Air Quality Management District (AQMD) emissions limits may prevent EMWD and other water agencies from continuing to beneficially use biogas without significant and costly alterations to their system.

Integrating all energy management activities into one central location can prove challenging for water agencies.
Thank you

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Southern California Edison

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