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watersmartinnovations.com
Using Business Intelligence to Improve the Cost-Effectiveness of Residential Water Conservation Programs

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Our Challenge

• Overcome the market failures of customer information deficits and lack of capital to improve residential water efficiency
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• Customer participation in utility conservation programs is extremely low

From 2009 to 2011, only 15% of households stated they had participated in at least one energy efficiency program in the previous 12 months.
Implication

• Eliminate the need for customer-supplied data for Demand Side Management (DSM) activities
  – Improve the cost effectiveness of new and existing utility DSM programs
    1. Benchmark all utility customers in a service territory
    2. Lower the cost of saved water for direct installs by geo-targeted marketing customers with appropriate incentives
  – Business Intelligence (BI) with prescriptive analytics to systematically integrate external data with utility data.
Goal of BI

• Leverage utility and external data sources to provide actionable insights to
  – Increase utility profitability
  – Improve customer satisfaction
  – Improve operational effectiveness

• Go beyond information dashboards and data summaries
  – Customized recommendation that prescribe cost-effective DSM for each single family residence!
Status Quo Customer Targeting

• Which Single Family Residence (SFR) is a better candidate for targeted marketing for turf replacement rebates?

**Candidate 1:**
Climate Zone 9
10 CCF / month summer usage

**Candidate 2:**
Climate Zone 9
10 CCF / month summer usage
1. Benchmarking

• #1 has a higher water-use intensity
• But, #2 has a larger cost effective outdoor supply
• Normalized metric of water demand for analysis:

**Candidate 1:**
Built in 2010
8 Occupants
5,000 ft² lot
2.0 CCF / 1,000 ft²

**Candidate 2:**
Built in 1955
2 Occupants
20,000 ft² lot
.50 CCF / 1,000 ft²

CCF / ft² lot area
Benchmarking Analytics

Inputs:
- Single Family Residential (SFR) Billing Data
- US Census Demographic Data
- NOAA Climate Data
- Building Data

Advanced Econometrics

Household Energy Intensity Score (HIS)
Home Water Intensity Score ($HIS_w$)
Prescriptive Analytics

Outputs:
- Targeted Marketing
- DSM Resource Potentials
- Benchmarking High Use Households
- Efficiency and Demand Response
- Peer (Neighbor) Energy Consumption Reports
  - Program Implementation
  - Program Planning
  - HVAC and Other Programs
  - Demand Response
  - Behavioral Programs
Analytics Performance

- Data from a sample of houses in CA Climate Zone 9
- Climate and Lot Size variables explain about 37% of monthly water consumption
- Detailed customer data only adds another 1%
- The Home Water Intensity Score is a robust need indicator for DSM programs!
2. Customized Recommendations

Next, given the Benchmarking Results

• Additional econometric techniques make specific program recommendations (indicative only):
  – Interior SFR water conservation measures
    • Retrofit kit
    • Front loading washer rebates
  – Exterior measures
    • Pool covers
    • Low flow sprinklers
    • Weather-based or irrigation clock controller rebates
    • Landscape rebates
  – Interior + exterior conservation programs
    • Advanced metering
    • Water audits
3. Targeted Marketing

- **Baseline Uptake:** Statewide, about 25% of single family households have front loading clothes washers.
- **High Usage Uptake:** High kWh customers show about a 5.6% higher probability of purchasing a front loader.
- **BI Uptake:** Target households that have a 29% higher probability.
Customized Efficiency Reports

- Prescriptions analytics are sent to high probability customers
- Highlight bill savings and incentives that are available from the utility
- Report content developed by program staff
- Peer comparison reports also available

### Water Efficiency Report

<table>
<thead>
<tr>
<th>Customized for:</th>
<th>These measures are likely to save water at your household:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Nelson Family</td>
<td>Toilet Retrofit Kit</td>
</tr>
<tr>
<td>123 Limestone Rd</td>
<td>Low Flow Faucet and Showerhead</td>
</tr>
<tr>
<td>Claremont, CA 91711</td>
<td>Drip Irrigation Kit</td>
</tr>
<tr>
<td>Account# 10001</td>
<td>Smart Sprinkler Controller</td>
</tr>
<tr>
<td>Report Date Jan-14</td>
<td></td>
</tr>
</tbody>
</table>

![Graph showing water bill savings](image)

**Annual Savings $594**

**Next Steps:**
To begin saving water and money each month, visit our website at: www.yourutility.com
Click on the start savings button!
Business Intelligence Visualization

- Spatial capabilities allow dashboard of DSM opportunities
- CCF of Energy Efficiency Supplies by Zip Code (illustration)
Software Dashboard

- HTML interface with dynamic menus that allow users to ask questions of the data and visualize the results
Real Time Program Feedback

• Monitor CCF/day consumption by program or system-wide

• Program group versus a propensity-matched control group

• No need to wait 3 years to assess program effectiveness!
Business Intelligence Software

• Utility-facing **software tool**: analytical package with no customer interface
  – Targeting water utilities in the US
  – Transforms utility data into business intelligence
  – Improve customer satisfaction
  – Reduce costs of water conservation

• Targets **Single Family** homeowner and renter segments

• BI components:
  1. Database integration and publishing
  2. Packaged analytics
  3. Customizable outputs (SQL, SAS, MS Office)
Program Benefits from BI

- BI can revolutionize residential SFR water planning and outreach
  - DSM demand indicator developed from rigorous econometric modeling
  - Lower costs of saved water:
    - CCF efficiency potentials by account, municipality, zip code, service territory
  - Defer investment in distribution system
    - Geo-target conservation in areas with older / constrained distribution infrastructure
BI in the DSM Program Lifecycle

- **Measure**: Need indicator offers “bottom up” DSM potentials at the service territory level
- **Implement**: Targeted marketing of customers with the highest need for DSM
- **Modify**: BI evaluation module can offer “real-time” insights into program savings
Questions and Comments?

- Thanks for your interest in our exciting project!
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For more information visit: www.Res-Intel.com