Initial Big Squeeze Analysis (2011)

Objective: To assess the “savings gap” between state-mandated saving targets, i.e. EERS, and current DSM portfolios, and examine options to fill it

Methodology: Modeled a typical DSM portfolio against a typical EERS target
1. ICF’s EEPM model used as the “engine”
2. Built a generic DSM portfolio based on ICF client experience
3. Used ACEEE data to calculate a typical EERS target
4. Established a baseline scenario and “savings gap”
5. Re-estimated the baseline and gap with federal lighting and appliance standards
6. Developed several “gap-filler” scenarios

“Big Squeeze II”:
1. Used the same DSM portfolio as the baseline
2. Thorough review of existing literature and recent evaluation data
3. Used a more robust statistical technique – Monte Carlo simulation through @Risk software
4. Quantified how various feedback types can fill the savings gap estimated previously
The Savings Gap

- By 2020, conventional DSM would likely fall 28% short of an average EERS target

The Savings Gap = 3.67% of 2008 sales, 28% of EERS
“Big Squeeze II”: Overview & Objectives

- Feedback/behavior-based programs have been recognized as a mechanism to provide deeper energy savings and higher customer satisfaction.

- Significant uncertainty associated with their performance due to the limitations of robust ex post program evaluation data

**Objectives:**

1. Quantify the impacts of various feedback programs within a larger DSM portfolio while explicitly accounting for uncertainties associated with their performance.

2. Assess how these emerging programs can fill the gap between the projected savings from typical DSM portfolios and state-mandated saving targets
Uncertainty Analysis - Monte Carlo Simulation

Data from Feedback Program Reports, Surveys & Literature → Probability Distribution of Required Inputs → Probability Distribution of Impact Outputs

- Initial Savings
- Degradation Factors
- EE Program Savings
- Energy Savings
- Participation
- Useful Life
- Impacts on Portfolio Savings
- Impacts on Saving Gap
2010 ACEEE Study – A Meta-Review

Average Household Electricity Savings (4-12%) by Feedback Type

- 3.8% Estimated Feedback
  - Web-based energy audits with info on ongoing basis
- 6.8% Enhanced Billing
  - Household-specific info, advice
- 8.4% Daily/Weekly Feedback
  - Household-specific info, advise on daily or weekly basis
- 9.2% Real-Time Feedback
  - Real-time premise level info
- 12.0% Real-Time Plus Feedback
  - Real-time info down to the appliance level

Based on 36 studies implemented between 1995-2010

Availability of Information

- Low

Cost of Implementation

- High

Web-based Energy Audit Tool

In-Home Energy Display Device
Five Feedback Program Scenarios

<table>
<thead>
<tr>
<th>Scenario No.</th>
<th>Scenario Name</th>
<th>Feedback Type</th>
<th>Participation Plan</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>Enhanced Billing</td>
<td>Indirect</td>
<td>Opt-out</td>
<td>Household Specific Information and advice</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>Estimated Feedback</td>
<td>Indirect</td>
<td>Opt-in</td>
<td>Web-based energy audits without info on ongoing basis</td>
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<tr>
<td>Scenario 3</td>
<td>Daily/Weekly Feedback</td>
<td>Indirect</td>
<td>Opt-in</td>
<td>Household specific info &amp; advice on daily/weekly basis</td>
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<tr>
<td>Scenario 4</td>
<td>Real-Time Feedback</td>
<td>Direct</td>
<td>Opt-in</td>
<td>Real time consumption &amp; cost info at the aggregated level</td>
</tr>
<tr>
<td>Scenario 5</td>
<td>Real-Time Plus Feedback</td>
<td>Direct</td>
<td>Opt-in</td>
<td>Real time consumption &amp; cost info disaggregated at appliance level</td>
</tr>
</tbody>
</table>

• **Opt-out Participation Plan**
  Broad program reach, shallow savings
  High continuing costs to maintain savings
  e.g. mailers

• **Opt-in Participation Plan**
  Narrow program reach, deep savings
  Upfront cost to acquire, low continuing cost
  e.g. give email address

Web-based Energy Audit Tool
Conclusions

- This “Big Squeeze II” analysis confirms previous studies on the potential contributions of residential feedback programs to portfolio savings.

- By 2020, there is a 90% chance that feedback programs increase total DSM portfolio electricity savings by 2% - 14% with the average of 7%.

- By 2020, there is a 90% chance that feedback programs increase residential portfolio electricity savings by 6% - 35% with the average of 17%.

- Program planners/administrators can fill 7%-36% (average of 17%) of the 2020 EERS savings gap by integrating residential feedback programs into DSM portfolio planning.

- The impact of Enhanced Billing could be significant in short-term compared to other feedback types. Given its lower cost of the implementation, this approach could be a very effective short-term solution to meet the near state-mandated saving targets.
Next Steps

- Cost - effectiveness analysis (e.g. TRC test)
- Further sensitivity analysis of saving distributions to input variables and identify the level of impact
- Thorough analysis of change in patterns of final savings across the range of input variables to better understand the impact of each input on savings
- Identify & prioritize the areas of focus for program planners and administrators to more effectively unlock the potentials of feedback programs