DSM Portfolio Development: City of Tallahassee

Florida Public Service Commission
Staff Workshop
4/25/08
City’s DSM Portfolio

- Developed during the most recent IRP Study
- Measures identified using a unique dynamic analysis method to establish cost-effectiveness
- Represents an ambitious expansion of the City’s existing DSM/EE efforts
- Projected to provide significant benefits
  - Demand savings of 167 MW (21% of 2026 peak)
  - Energy savings of 561 GWh (14% of 2026 sales)
  - Eliminates need to add resources until 2016 based on latest load forecast
Initial DSM Evaluation

Utilized traditional RIM + PT approach to select DSM for use in the IRP Study
- 191 measures evaluated
- Avoided unit was gas combined cycle

No measures passed RIM
- Avoided unit economics too attractive vs. existing generation

City Commission authorized alternative screening method
- Measures must pass PT and TRC
- Choose measures with RIM > 0.75
Initial DSM Evaluation

Alternative screening method resulted in only 38 measures selected for use in the IRP

- 52 residential measures: 19 passed PT; 10 passed TRC; 5 with RIM > 0.75
- 139 commercial measures: 86 passed PT; 76 passed TRC; 33 with RIM > 0.75

City Commission directed staff to seek other methods that would allow more robust consideration of DSM in the study
Developing the DSM Portfolio

- Characterized more complete list of measures
- Compared DSM measure and supply-side levelized costs
- Estimated market size, penetration and implementation rate for discrete DSM “bundle”
- Meta-analysis of DSM potential studies used as cross-check on overall estimated level of savings
- Developed measure load shapes, to “subtract” from base system forecast load profile
- Assessed cost-effectiveness using IRP tools (present worth revenue requirements comparisons)
DSM/EE Measure Data

- Definitions of DSM measure/baseline technologies, energy savings, incremental cost, and measure life
- Candidate measures from available datasets (CA, New England, Austin Energy, GA Power and FL utility filings, etc.)
- Energy Gauge software used to model savings for certain weather-sensitive measures
- Included measures accounting for bulk of available savings (not all conceivable measures) and measure bundles
Busbar Screening Step

- Individual DSM/EE measure costs compared to busbar cost of similar supply-side resources
  - Levelized cost of the measure savings computed over the measure life
  - Busbar cost of a comparable supply-side resource computed over the measure life of the DSM/EE alternative(s)
- Most DSM/EE measures were lower cost than the supply-side resource
Sample Busbar Screening Chart

Levelized Cost Comparison for DSM Measures with 20% - 30% Capacity Factor

[Graph showing levelized cost comparison for DSM measures with 20% - 30% capacity factor.

DSM Measures/Generation Options:

- PV system
- Pin-base CFL
- Dishwasher

Capacity Factor

Levelized Cost ($/MWh)
Estimate of Market Size & Penetration

Market Size

Overall Market Size

Only Facilities with End use

Only Feasible Situations

Non-Free Riders

Only Willing Customers

Market Penetration

• Assumed aggressive utility incentives – depending on the measure:
  – 2-year payback buydown (e.g., attic insulation)
  – 50% of capital cost (e.g., CFL)
  – $750/kW (e.g., PV)

• Payback acceptance curve estimated penetration for each payback period
  Residential examples:
  2-year payback – 68%
  3-year payback – 45%

• Penetration ceiling – 80% of willing & feasible market size
Market Penetration & Ramp-up Rate

Payback acceptance curve – based on measure economics for the customer, used to estimate market penetration for various payback periods.

Implementation rate curve – used to estimate percentage of maximum penetration occurring each year – assumed gradual ramp-up to maximum penetration over 20 years.

Note: This curve implicitly includes factors such as stock turnover, new construction, program ramp-up rates.
Meta-analysis of DSM Potential Studies

- Essentially a top-down analysis
  - Reviewed achievable savings estimates from 17 studies
  - Selected most recent/most geographically appropriate studies
  - As needed, converted maximum savings potential estimates to average annual estimates
  - Accounted for limited activities that a single Florida municipal utility could undertake
  - Results: 0.7-0.9%/year savings potential (sales)

- Compared results to bottom-up results: 0.7% savings potential
Load Shape Development

- Used end-use load shapes developed and vetted for California utilities
- Compiled DSM measures into bundles addressing specific end uses
- Mapped each measure bundle to appropriate end-use load shape
- Results used to develop overall DSM portfolio savings load shape (subtracted from system load shape for IRP analysis)
Cost-Effectiveness Test

- DSM portfolio cost effectiveness was confirmed using IRP tools (optimization & production costing)
- Plans were developed and costs estimated both with and without DSM
  - Variations of DSM portfolio also tested
- Plans with DSM had lower system costs (Present Worth of Revenue Requirements)
  - Recognizes the dynamics of system dispatch
  - Also reflects changes in the optimized resource plan(s) when DSM is included
Portfolio Contribution
(Summer Peak Reduction)

- Commercial Space Conditioning: 22%
- Residential Space Conditioning: 20%
- Commercial Lighting: 14%
- Commercial New Construction: 7%
- Residential New Construction: 6%
- Residential Appliances: 3%
- Residential WH: 2%
- Residential Lighting: 2%
- Commercial WH & Other: 2%
- Res & Comm DR: 22%
Portfolio Contribution
(Annual Energy Savings)

- Commercial New Construction: 8%
- Residential New Construction: 7%
- Commercial Space Conditioning: 25%
- Residential Space Conditioning: 22%
- Commercial Lighting: 16%
- Residential Appliances: 7%
- Commercial WH & Other: 4%
- Residential WH: 4%
- Residential Lighting: 7%
- Commercial New Construction: 8%
- Residential Space Conditioning: 22%
- Commercial Lighting: 16%
DSM Portfolio Impact

- Peak w/o DSM
- Peak w/ Res DSM
- Peak w/ Res & Comm DSM

21% reduction versus 2026 peak demand without DSM
Plan Cost Savings w/DSM

<table>
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<tr>
<th>Case</th>
<th>Base (Millions)</th>
<th>100% Achievable Potential (Millions)</th>
<th>50% Achievable Potential (Millions)</th>
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<tr>
<td>Case 4 - All Gas</td>
<td>4,870</td>
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<td>4,500</td>
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<td>Case 8 - TEC</td>
<td>4,815</td>
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<td>Case 9B - IGCC</td>
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<td>4,893</td>
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Pros & Cons

**Pros**
- Cost-effective screening
- Reflects reality of program designs
  - More focus on end uses and programs than on individual measures
- Dynamic, rather than static assessment
- Understandable from decision-makers’ viewpoint

**Cons**
- Not as good for supply vs. DSM scenarios in which DSM measure cost effectiveness is generally marginal
  - Lower cost supply options
- Requires more complete dataset (impacts, load shapes) & effort to develop bundles
Questions?

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