Financial Analysis of Incentive Approaches to Promote Energy Efficiency for a Prototypical Southwest Utility

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Lawrence Berkeley National Lab

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Project Approach & Objectives

- **Background**: Current environment is one of substantially increased interest in energy efficiency and demand response
  - Policymakers want and are proposing very aggressive demand-side savings goals in many parts of the country
  - Policymakers want to increase utilities’ motivation to achieve these goals

- **Goal**: Facilitate dialogue on various utility shareholder incentive mechanisms and/or decoupling when EE is implemented by conducting quantitative financial analysis

- **Approach**: Analyze impacts of various utility performance incentives and ratemaking mechanisms on stakeholders (shareholders, ratepayers); calculate earnings, utility bill and rate impacts for prototypical utilities under different utility and incentive mechanism design scenarios
Project Approach & Objectives (2)

• Caveats:
  - We do NOT account for any potential link between the type and/or size of shareholder incentive mechanism and utility’s motivation to increase EE goals or portfolio size
  - We do NOT analyze other potential non-financial motivators of utility behavior and support for EE (e.g., PUC orders, customer relations)

• Project Team
  - Chuck Goldman & Peter Cappers (LBNL)
  - Wayne Shirley (Regulatory Assistance Project)
  - Michele Chait (E-Three)
  - Jeff Schlegel (Consultant)
  - George Edgar (Wisconsin Energy Conservation Corp.)
Developing Prototypical SW Utility

- Examined historical financial, cost and system characteristics of IOUs serving southwestern states
- Used characteristics of Arizona Public Service (APS) and Nevada Power (NP) to help develop our prototype SW utility
  - Also collected data on utility financial, system characteristics and DSM for Pacificorp, Public Service New Mexico (PSNM), Tucson Electric and Rocky Mountain Power Power
- Relied heavily upon publicly available data sources
  - Annual Financial Reports & 10-K filings
  - FERC Form 1
  - Integrated Resource Plan filings
  - Demand Side Management program filings
- Created “business as usual” No EE case for prototypical SW utility
  - EE cases with varying incentive mechanisms compared to this “BAU No EE” case
Prototypical SW Utility: Retail Sales and Demand Forecast

- Retail sales grow @ 2.8% annually
- Peak demand grows @ 2.9% annually
- Declining load factor at this rapidly growing utility
Prototypical SW Utility: Revenue Requirement and Retail Rates

• Both fuel and non-fuel costs are growing faster than sales
• IRP sets out investment schedule for large new generation plant, that EE can help defer
• Retail rates double over 20-year time horizon

<table>
<thead>
<tr>
<th>Utility Budget Category</th>
<th>2008 Level ($B)</th>
<th>2017 Level ($B)</th>
<th>2027 Level ($B)</th>
<th>Annual Growth Rate (%)</th>
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</thead>
<tbody>
<tr>
<td>T&amp;D Capital Expenditure</td>
<td>$0.3</td>
<td>$0.5</td>
<td>$0.7</td>
<td>5.0%</td>
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<tr>
<td>Ratebase</td>
<td>$4.3</td>
<td>$6.7</td>
<td>$11.1</td>
<td>5.1%</td>
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<tr>
<td>Operations and Maintenance</td>
<td>$0.4</td>
<td>$0.8</td>
<td>$2.0</td>
<td>8.8%</td>
</tr>
<tr>
<td>Fuel &amp; Purchased Power</td>
<td>$1.2</td>
<td>$2.3</td>
<td>$4.2</td>
<td>6.7%</td>
</tr>
<tr>
<td>Annual Revenue Requirement</td>
<td>$2.3</td>
<td>$4.2</td>
<td>$8.1</td>
<td>6.9%</td>
</tr>
<tr>
<td>All-In Retail Rate</td>
<td>9.1 ¢/kWh</td>
<td>13.1 ¢/kWh</td>
<td>18.9 ¢/kWh</td>
<td>3.9%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Cost</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>$171M</td>
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<td>$522M</td>
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<td>$195M</td>
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<td>$1,479M</td>
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<td>$211M</td>
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<td>$751M</td>
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<tr>
<td></td>
<td>$454M</td>
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<tr>
<td></td>
<td>$236M</td>
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</tbody>
</table>

- 600 MW IGCC
- 551 MW CCGT
- 214 MW Gas CT

Annual Revenue Requirement

2008 2013 2018 2023 2028

- 6.9% growth in annual revenue requirement

- Retail rates double over 20-year time horizon
Savings and Costs of Alternative EE Portfolios

- Assume utility delivers EE programs for 10 years
- Assume 11 year avg. measure lifetime of EE portfolio
- Assume Sig. and Agg. EE portfolios have higher costs than Mod. EE portfolio due to more expensive measures and higher customer incentives
- EE still costs considerably less than supply-side alternatives under consideration

<table>
<thead>
<tr>
<th>Energy Efficiency Portfolio</th>
<th>Target % Reduction in Incr. Retail Sales</th>
<th>Energy and Demand Savings</th>
<th>Program Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Program Admin. Costs (¢/Lifetime kWh)</td>
<td>Total Resource Costs (¢/Lifetime kWh)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peak Period Savings (GWh)</td>
<td>Off-Peak Period Savings (GWh)</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.5%/Year</td>
<td>10,452</td>
<td>4,479</td>
</tr>
<tr>
<td>Significant</td>
<td>1.0%/Year</td>
<td>19,433</td>
<td>8,328</td>
</tr>
<tr>
<td>Aggressive</td>
<td>2.0%/Year</td>
<td>34,314</td>
<td>14,706</td>
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</tbody>
</table>
Conflict Between Shareholder and “Societal” Value of EE

**Energy Efficiency Portfolio**

<table>
<thead>
<tr>
<th>Total Resource Benefits ($B)</th>
<th>Total Resource Costs ($B)</th>
<th>Net Resource Benefits ($B)</th>
<th>Benefit Cost Ratio</th>
<th>Achieved After-Tax ROE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>None</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>10.43%</td>
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<tr>
<td>Moderate</td>
<td>$0.67</td>
<td>$0.26</td>
<td>$0.41</td>
<td>2.6</td>
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<tr>
<td>Significant</td>
<td>$1.22</td>
<td>$0.55</td>
<td>$0.67</td>
<td>2.2</td>
</tr>
<tr>
<td>Aggressive</td>
<td>$2.06</td>
<td>$1.20</td>
<td>$0.86</td>
<td>1.7</td>
</tr>
</tbody>
</table>

- Large-scale, sustained energy efficiency efforts produce significant net resource benefits; EE portfolios are very cost-effective
- However, the more aggressive the EE effort, the more such efforts will conflict with shareholders’ interest
  - Utility unable to achieve authorized earnings and ROE (10.75%) before EE is implemented as costs are growing faster than sales between rate cases
    ◦ Achieving deep and sustained EE savings exacerbates this problem
  - EE defers need for future supply-side investments that generate earnings
    ◦ Replace them with EE investments that provide NO contribution to earnings
Effect of Decoupling on Utility Earnings and ROE

- Revenue-Per-Customer decoupling mechanism removes financial disincentive to EE as utility ROE is comparable to the BAU No EE case for any EE portfolio.

![Graph showing the effect of decoupling on utility earnings and ROE.](image-url)
Alternative Shareholder Incentives

• Several shareholder incentive mechanisms are also being considered:
  
  - **Performance Target**
    - Utility receives performance-based incentive of an additional 10% of program costs if it achieves EE portfolio goals
  
  - **Cost Capitalization** (similar to approach used in NV)
    - Utility capitalizes the annual cost of the EE program over the first 5 years of the installed measures @ Authorized ROE (10.75%) + 500 basis points
  
  - **Shared Net Benefits** (Similar to approach used in CA and MN)
    - Utility retains 15% of the PV of TRC net benefits from the portfolio of EE programs
Assessment of Shareholder Incentives

- Because the Performance Target and Cost Capitalization are tied to costs, their share of total program costs (~15%) is invariant to size of EE portfolio.
- The Shared Net Benefits mechanism directly integrates both benefits AND costs and so incentive level impacted (i.e., reduced) as savings levels increase.
- All three mechanisms provide ratepayers with lion’s share of total resource benefits.

**Pre-Tax Incentive as % of Program Costs**

**Ratepayer Share of Net Resource Benefits**

- Performance Target
- Cost Capitalization
- Shared Net Benefits
### Shareholder Perspective

**Effect of Decoupling or Shareholder Incentives**

- Decoupling removes financial disincentive but provides no positive reward to shareholders for utility’s achievement of EE savings goals.

- Shareholder incentive mechanisms may improve utility’s business case for EE if utility management is focused on ROE (depending on design of incentive mechanism) rather than absolute level of earnings.

#### Graphical Representation

![Graph showing change in achieved ROE from BAU No EE](image)

<table>
<thead>
<tr>
<th>Change in Achieved ROE from BAU No EE (Basis Points)</th>
<th>Mod. EE</th>
<th>Sig. EE</th>
<th>Agg. EE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Financial Incentive</td>
<td></td>
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<tr>
<td>Decoupling</td>
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<tr>
<td>Performance Target</td>
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<tr>
<td>Cost</td>
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<tr>
<td>Capitalization</td>
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<td>Shared Net Benefits</td>
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<td>No Financial Incentive</td>
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<td>Shared Net Benefits</td>
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</table>

####例图

- **Mod. EE**
  - No Financial Incentive
  - Decoupling
  - Performance Target
  - Cost
  - Capitalization
  - Shared Net Benefits

- **Sig. EE**
  - No Financial Incentive
  - Decoupling
  - Performance Target
  - Cost
  - Capitalization
  - Shared Net Benefits

- **Agg. EE**
  - No Financial Incentive
  - Decoupling
  - Performance Target
  - Cost
  - Capitalization
  - Shared Net Benefits

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**Energy Analysis Department / Electricity Markets and Policy Group**
Ratepayer Perspective: Avg. Bills
Effect of Decoupling or Shareholder Incentives

- EE reduces fuel and purchases power costs and defers supply-side resources; value of EE to ratepayers increases with deeper savings levels ($1B to $2.3B in savings for Moderate and Aggressive EE portfolio)
- Average utility bills decrease by 3-6% with EE, even with decoupling or shareholder incentives applied
Ratepayer Perspective: Avg. Rates
Effect of Decoupling or Shareholder Incentives

• Average retail rates decrease by 0.1 mills/kWh in Mod. EE case and increase by ~1.0 – 3.5 mills/kWh for Sig. and Agg. EE portfolios.

• Additional cost of decoupling (~0.1 mills/kWh) or shareholder incentives (0.1 to 4.0 mills/kWh) increases rates minimally (<0.1% to 2% higher in 2027).
Conclusions & Take-Aways

- Aggressive and sustained EE efforts can produce significant net resource benefits; however the larger the EE effort, the more such efforts conflict with utility shareholder financial interests
  - Shareholder returns decrease as net resource benefits rise and ratepayer bill savings increase
- Decoupling can remove the financial disincentive to EE; shareholder incentives may improve the business case for EE to a utility or its shareholders
- Jointly offering decoupling and incentive mechanisms that provide relatively stable returns to shareholders over wide range of EE savings targets present less risk to shareholders…
  - … but may not induce the achievement of EE savings levels desired by ratepayers and regulators
National Trends in EE Incentives

- Approach and attitudes towards decoupling and shareholder incentives differ substantially across the country and among stakeholder groups
  - EE and environmental groups: Typically prefer “well-designed” decoupling to a “lost revenue recovery mechanism
  - Increasing interest in “sustainable” business models for EE among utilities and some other parties
  - Contentious debate on the earnings basis and appropriate level of compensation for EE (e.g. Save-A-Watt offers different risk and reward structure)
  - Consumer advocates and others looking at non-utility models for EE administration
    - Particularly if utilities propose incentive mechanisms that provide significant share of net resource benefits to shareholders or increase program costs significantly
- EE Portfolio standards in some states adds new wrinkle to incentives discussion
  - Consumer groups: Legislative mandate establishes minimum, acceptable EE performance level for utility (without incentives); EE efforts beyond that level may be eligible for incentives
  - Where EE savings targets have been set by state regulators, broader space for shareholder incentives discussion
Questions?

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