The Sensitive Side of Cost Effectiveness

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Cost Effectiveness

- Used for program planning and evaluation
- Ensures effective use of public funds
- Many inputs with varying levels of uncertainty and changeability
Cost Effectiveness Sensitivity Analysis

- Performed for the California Public Utilities Commission
- Ex Ante Portfolio from the 2010-2012 EE Program Cycle
- Performed using the Cost Effectiveness Tool (sql-based tool that mimics the excel based calculator as directed for use by the IOUs)
Cost Effectiveness Sensitivity Analysis

- What is the TRC?
- What is so sensitive?
- Why do we care?
Total Resource Cost Test

\[ TRC = \frac{NPV \sum (Net \text{ Avoided Cost Benefits})}{Gross \text{ Program Costs} + (Net \text{ Participant Incremental Measure Cost})} \]
## Parameter Adjustments

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Who Has an Effect?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Savings</td>
<td>X</td>
<td></td>
<td>Evaluators</td>
</tr>
<tr>
<td>Realization Rate</td>
<td>X</td>
<td></td>
<td>Evaluators</td>
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<tr>
<td>Effective/Remaining Useful Life</td>
<td>X</td>
<td></td>
<td>Evaluators</td>
</tr>
<tr>
<td>Growth Rate of Avoided Costs</td>
<td>X</td>
<td></td>
<td>Policy Makers</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>X</td>
<td>X</td>
<td>Policy Makers</td>
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<tr>
<td>Net-to-Gross</td>
<td>X</td>
<td>X</td>
<td>Evaluators</td>
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<tr>
<td>Gross Measure Cost</td>
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<td>Evaluators</td>
</tr>
<tr>
<td>Incentives</td>
<td>X</td>
<td></td>
<td>Program Planners</td>
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<tr>
<td>Administrative Costs</td>
<td>X</td>
<td></td>
<td>Program Planners</td>
</tr>
</tbody>
</table>
California’s Statewide Portfolio Sensitivity

Numerator

Both

Denominator

TRC

-25%  +25%  Base Case

<table>
<thead>
<tr>
<th>Base Case</th>
<th>UES</th>
<th>RR</th>
<th>EUL/RUL</th>
<th>Avoided Costs</th>
<th>Discount Rate</th>
<th>NTG</th>
<th>Measure Costs</th>
<th>Incentives</th>
<th>Admin Costs</th>
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</thead>
<tbody>
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<td>1.4</td>
<td>1.2</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
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</tr>
</tbody>
</table>

Numerator:
- Base Case
- UES
- RR
- EUL/RUL
- Avoided Costs
- Discount Rate
- NTG
- Measure Costs
- Incentives
- Admin Costs

Denominator:
- Base Case
California’s Statewide Portfolio Sensitivity

![Bar chart showing sensitivity analysis for various factors including Numerator, Both, and Denominator. The chart compares values for different measures such as TRC, avoided costs, discount rate, measure costs, incentives, and admin costs. The chart indicates sensitivity at -25% and +25% changes from the base case.](chart.png)

- **TRC** (Total Revenue Change)
- **Base Case**
- **UES**
- **RR**
- **EUL/RUL**
- **Discount Rate**
- **NTG**
- **Measure Costs**
- **Incentives**
- **Admin Costs**

- **-25%**
- **+25%**
- **Base Case**

IEPEC Long Beach 2015
Unit Energy Savings and Gross Realization Rate

25% increase = 25% increase in TRC

Avoided Cost Benefits =

\[ \text{NTGR} \times \text{Energy Savings} \times (\text{Generation Avoided Cost} + \text{T&D Avoided Cost}) + \]

\[ \text{NTGR} \times \text{Demand Reduction} \times \text{Capacity} \]
Unit Energy Savings and Gross Realization Rate

- Takeaways:
  - Direct relationship
  - Focus evaluations on measures with the largest portion of the portfolio
  - Focus on the most uncertain measures
California’s Statewide Portfolio Sensitivity

The graph shows the sensitivity of the portfolio to various factors, including avoided costs, discount rate, NTG, measure costs, incentives, and admin costs. The x-axis represents different factors, while the y-axis shows the TRC (Total Resource Cost). The graph uses different colors to indicate base case, -25%, and +25% scenarios. The numerator, both, and denominator categories are marked on the top of the graph.
Effective Useful Life and Remaining Useful Life

25% increase = 0% - 22% increase in TRC

Why?
- Avoided costs are discounted in the future
  - A 25% increase in a longer lived measure is discounted more than a 25% increase in a shorter lived measure.

Takeaways:
- Focus on shorter lived measures with uncertain EULs
California’s Statewide Portfolio Sensitivity

TRC

-25% +25% Base Case

Numerator

Both

Denominator

Base Case
UES RR EUL/RUL Avoided Costs Discount Rate NTG Measure Costs Incentives Admin Costs
Growth Rate in the Avoided Costs

25% increase = 2% - 11% increase in TRC

Why?
- Avoided costs are generally assumed to increase in the future
- Avoided costs are discounted in the future

Takeaway:
- The TRC is affected more the higher the growth rate in early years
California’s Statewide Portfolio Sensitivity

![Graph showing sensitivity analysis for different factors with TRC values for Base Case, UES, RR, EUL/RUL, Avoided Costs, Discount Rate, NTG, Measure Costs, Incentives, Admin Costs. The graph includes bars for -25% and +25% variations from the Base Case.]
Discount Rate

25% increase = 5% - 17% decrease in TRC

Why?
- Affects the Benefits (numerator) almost exclusively
- The higher the discount rate the lower the avoided costs in the future

Takeaway:
- Keep in mind for policy decisions related to the value of long-lived versus short-lived measures
California’s Statewide Portfolio Sensitivity

![Graph showing sensitivity analysis for various factors in California's statewide portfolio. The x-axis represents different factors such as base case, UES, RR, EUL/RUL, Avoided Costs, Discount Rate, NTG, Measure Costs, Incentives, and Admin Costs. The y-axis represents the TRC (Total Risk Cost) ranging from 0.0 to 1.6. The graph includes bars for -25%, +25%, and Base Case, with different colors representing these scenarios.](image-url)
Net – to – Gross Ratio

25% increase = 5% - 14% increase in TRC

- Why?
  - Affects the whole numerator and part of the denominator (participant incremental measure cost)

- Takeaway:
  - Programs with high admin costs compared to participant costs are more affected by the NTG ratio
California’s Statewide Portfolio Sensitivity
Incremental Measure Cost and Rebates/Incentives

\[
TRC = \frac{\text{NPV} \sum (\text{Net Avoided Cost Benefits})}{\text{Gross Program Costs} + (\text{Net Participant Incremental Measure Cost})}
\]

\[
\text{Net Participant Incremental Measure Cost} = \text{NTGR} \times (\text{Incremental Measure Cost} - \text{Incentive})
\]

\[
\text{Gross Program Cost} = \text{Administrative Costs} + \text{Incentives}
\]
Incremental Measure Cost

25% increase = 0% - 18% decrease in TRC

Incentives

25% increase = 1% - 4% decrease in TRC
Incremental Measure Cost and Rebates/Incentives

- **Takeaways:**
  - The incentives largely cancel each other out
  - Changes that result in a higher participant cost will result in a decreased TRC
  - This relationship differs in different jurisdictions’ calculation of the TRC Costs
California’s Statewide Portfolio Sensitivity

![Graph showing California’s Statewide Portfolio Sensitivity with various metrics and scenarios such as Base Case, UES, RR, EUL/RUL, Avoided Costs, Discount Rate, NTG, Measure Costs, Incentives, and Admin Costs. The graph includes red and blue bars representing -25% and +25% changes, respectively, compared to the Base Case.]
Administrative Costs

25% increase = 0% - 14% decrease in TRC

Why?

- Increasing part of the denominator decreases the TRC

Takeaway:

- Increases in the administrative costs of programs with a larger share of administrative costs versus participant costs are more effected.
Administrative Costs

% Change in TRC w/ 25% Increase in Admin Cost

Admin Cost % of Total TRC Cost
Conclusions

- There are nuanced effects of each parameter.
- Careful consideration should be given on how to spend evaluation dollars based on the sensitivity and uncertainty of each parameter.
- Careful consideration should be given when making policy decisions related to the parameters of the TRC.
Thank you!!!
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