Financial Impacts of Distributed PV on Utility Rates and Profitability

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Project Overview: Quantifying the Financial Impact of Distributed Solar on Utility Rates and Profitability

Motivation

• Rising debate about the impacts of net metering on utility profitability and customer rates, but general lack of understanding about the underlying drivers and conditions that affect the size of those impacts

Scope

• Scoping analysis to characterize the scale of financial impacts of distributed solar on utilities, assess impact of key underlying drivers and efficacy of potential mitigation approaches
• Leverage LBNL pro-forma financial model of utility costs and revenues
• Assess change in achieved earnings and ROE, customer average rates, and total utility bills
How does this study compare to other related work?

A wide range of other studies address related issues

- Solar valuation
- Solar or net metering cost-benefit analyses
- Broader conceptual literature on distributed resources and utility business models

The current study is generally distinct from those others

- More detailed analysis of utility ratemaking process, but more simplified analysis of PV value
- Analyzes impacts on utility shareholders and ratepayers
- Limited ability to measure cost-shift or distinguish between participant/non-participant impacts
General Structure of the Analysis

Two “prototypical” utilities
- Southwestern vertically integrated utility
- Northeastern wires-only utility and default service provider

Analytical elements
- Quantify the impacts of PV
- Explore sensitivities and potential mitigation approaches
# Prototypical Southwest Utility (2013-2022)

<table>
<thead>
<tr>
<th>Key Input</th>
<th>Southwest Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility type</td>
<td>Vertically integrated</td>
</tr>
<tr>
<td>Asset Ownership</td>
<td>G, T, &amp; D</td>
</tr>
<tr>
<td>2013 Retail Sales Level (CAGR)</td>
<td>30,460 GWh (2.1%)</td>
</tr>
<tr>
<td>2013 Peak Demand Level (CAGR)</td>
<td>6,531 MW (2.1%)</td>
</tr>
<tr>
<td>Commodity Costs CAGR</td>
<td>5.6%</td>
</tr>
<tr>
<td>Non-fuel O&amp;M CAGR</td>
<td>2.6%</td>
</tr>
<tr>
<td>RPS Compliance Strategy</td>
<td>Build &amp; Buy</td>
</tr>
<tr>
<td>2013 All-in Retail Rate Level</td>
<td>11.34 ¢/kWh</td>
</tr>
<tr>
<td>Frequency of GRC</td>
<td>3 years</td>
</tr>
<tr>
<td>Regulatory Lag</td>
<td>1 year</td>
</tr>
<tr>
<td>Test Year</td>
<td>Historic</td>
</tr>
<tr>
<td>Authorized ROE</td>
<td>10.00%</td>
</tr>
<tr>
<td>Debt and Equity Share (Ratio)</td>
<td>46%:54% (0.85)</td>
</tr>
</tbody>
</table>

CAGR = Compound Annual Growth Rate, O&M = Operations & Maintenance, GRC = General Rate Case
Customer-sited PV reduces retail sales and peak demand
Customer-sited PV also reduces the utility’s costs

$M (10-yr NPV @ WACC)

- Taxes
- Return on Rate Base
- Interest on Debt
- Depreciation
- O&M
- Commodity

% of 2022 Retail Sales Met by Customer-Sited PV

2.5% 5% 7.5% 10%
Customer-sited PV generally reduces utility revenues greater than it reduces utility costs.
Customer-sited PV negatively impacts utility shareholders

![Bar chart showing SW Utility After-tax Return-on-Equity (20-yr PV @ WACC) for Base - 0% PV and Base - 10% PV. The Authorized return is 7.99% for Base - 0% PV and 7.76% for Base - 10% PV.]

SW Utility After-tax Return-on-Equity (20-yr PV @ WACC)

- Base - 0% PV: 7.99%
- Base - 10% PV: 7.76%
Analysis results are robust to changes in the utility’s operating environment.

<table>
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<tr>
<th>Difference in Change in Achieved ROE due to 10% PV Relative to Base</th>
<th>Prototypical SW Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Growth Relative to Base</td>
<td>Low</td>
</tr>
<tr>
<td>Load Growth</td>
<td>●</td>
</tr>
<tr>
<td>Fixed O&amp;M Cost Growth</td>
<td>○</td>
</tr>
<tr>
<td>Non-Gen Cap-Ex Cost Growth</td>
<td>○</td>
</tr>
</tbody>
</table>

○ ±19 Basis Points or less   ● ±20 Basis Points or more
Ability to Mitigate Impact on Shareholder Returns

Changes to Utility Business Model

- Alternative Rate-making
  - Straight Fixed Variable
  - Demand Charge

- Lost Fixed Cost Recovery
  - Decoupling
  - Lost Revenue Adjustment

- Lost Shareholder Returns
  - Leasing Solar PV
  - Shareholder Incentives
Changes to business model can mitigate impact of PV on shareholder returns

- Utility Ownership of PV - 10% PV: $86
- RPC Decoupling - 10% PV: $564
- High Fixed Charge - 10% PV: $487
- Base - 10% PV: -$528
- Base - 0% PV: $6,484

Achieved Earnings ($M; 20-Yr PV @ WACC)
Changes to business model can increase average rates for electricity customers

- **RPC Decoupling - 10% PV**: 0.27¢
- **High Fixed Charge - 10% PV**: 0.23¢
- **Base - 10% PV**: 0.35¢
- **Base - 0% PV**: 14.24¢

*Average All-in Retail Rate (cents/kWh; 20-Yr Avg @ 5%)*
Conclusions

- There are negative financial impacts from customer-sited PV *in isolation*, but not of a magnitude that suggests the utility "death spiral"

- Customer-sited PV increases average rates for all customers, but not of a magnitude that would dramatically tilt the customer-economics of DG, storage, and other technologies

- Incremental changes to the utility business model can ameliorate some/all impacts on shareholder returns, but may present a tradeoff in terms of increased cost to customers

- Further analysis of participant/non-participant impacts and alternative ratemaking approaches is warranted
For More Information…

For our publications and to sign-up for notices of new publications, see:
http://emp.lbl.gov/reports

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