CALSSA Response to E3 Value of Solar and Storage Report

SMUD Board Meeting
September 16, 2020
Highlights

• With GHG compliance value and environmental costs included, customer-sited solar and storage provides a net benefit
• Analysis should focus on exported electricity
• “Helps Meet Clean Energy Goals” does not reflect realistic utility procurement practices
• Values should include avoided GHG compliance cost
• Avoided methane should include all leakage
• Future benefits should be higher and costs lower than shown in VoSS report
Overarching Critiques
Analysis Should Be Based on Exports Only

- VoSS study considers electricity produced and used onsite as a cost to SMUD
- Under NEM, SMUD only pays solar customers for electricity exported to the grid
- Electricity used on site in real time should be treated like other energy efficiency investments
Board Should Focus on Incremental Clean Energy Scenario

- The “Helps Meet Clean Energy Goals” scenario assumes that rooftop solar replaces only utility-scale solar
- Not a realistic reflection of procurement process
  - SMUD staff do not forego a MW of utility-scale solar for every MW of rooftop solar installed
- RPS requires SMUD to serve a minimum percentage of power it procures for customers with renewable energy
- Adoption of rooftop solar reduces SMUD’s load, reducing SMUD’s procurement of a mix of renewable and fossil-based electricity
Illustrative Example of RPS Effect

RPS and Non-RPS Electricity Avoided by Customer Solar

- Non-RPS Electricity
- RPS Electricity

KWh

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Critiques of Near-Term Values
Value of Solar Should Include Non-Cap & Trade GHG Costs

- Two approaches to valuing avoided GHG emissions beyond cap & trade value
  - Social cost of carbon
  - Avoided cost of compliance to meet GHG goals
SMUD Study Includes Social Cost

- Study notes that including social cost of carbon increases solar value by up to 7.2 c/kWh
- The highest value in the literature reviewed by E3 adds 16.3 c/kWh
- These and other environmental costs are excluded from the cost shift analysis
Background on Avoided Cost Calculator

• CPUC has used E3’s calculator to evaluate the value of efficiency and other DERs since 2004

• The calculator includes most of the value categories assessed in the SMUD report
GHG Compliance Value of Avoided Emissions

• For the CPUC, E3 used another approach to calculating non-C&T value

• The ACC GHG adder is based on the cost to reduce an additional ton of CO$_2$ from the electricity sector

• This value is higher than C&T price because the electricity has more stringent targets
SMUD VoSS and ACC GHG Compliance Costs
Summary of SMUD VoSS and ACC GHG Costs
Fugitive Methane Emissions

• Methane leaks occur in production fields and pipelines across North America to supply California’s natural gas

• VoSS study only includes leakage at SMUD’s power plants, resulting in negligible value

• ACC included only upstream sources in California, yielding 0.7% leakage rate

• Because avoided GHG benefits are global, societal benefit should use the comprehensive 2.4% US leakage rate
## Summary of Environmental Adders

<table>
<thead>
<tr>
<th>Category</th>
<th>$/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG Compliance Adder</td>
<td>0.030</td>
</tr>
<tr>
<td>Ecological Value of Land</td>
<td>0.004</td>
</tr>
<tr>
<td>Air Pollution Damages</td>
<td>0.008</td>
</tr>
<tr>
<td><strong>Fugitive Methane, CA only</strong></td>
<td><strong>0.009</strong></td>
</tr>
<tr>
<td>Fugitive Methane, all</td>
<td>0.031</td>
</tr>
<tr>
<td>Total</td>
<td>0.073</td>
</tr>
</tbody>
</table>
# SMUD VoSS 2020 Results w/ and w/o Environmental Adders

<table>
<thead>
<tr>
<th></th>
<th>Solar Only</th>
<th>S+S Cust Dispatch</th>
<th>S+S Utility Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>VoSS Reported Value</td>
<td>$0.070</td>
<td>$0.091</td>
<td>$0.125</td>
</tr>
<tr>
<td>Value w/ Adders</td>
<td>$0.143</td>
<td>$0.164</td>
<td>$0.198</td>
</tr>
<tr>
<td>Revenue Loss, All Gen</td>
<td>$0.123</td>
<td>$0.135</td>
<td>$0.119</td>
</tr>
<tr>
<td>Revenue Loss, Exp Only</td>
<td>$0.062</td>
<td>$0.068</td>
<td>$0.060</td>
</tr>
<tr>
<td>VoSS Net Cost/Ben</td>
<td>-$0.053</td>
<td>-$0.044</td>
<td>$0.006</td>
</tr>
<tr>
<td>Net Ben w/ Adders, All Gen</td>
<td>$0.020</td>
<td>$0.029</td>
<td>$0.079</td>
</tr>
<tr>
<td>Net Ben w/ Adders, Exp Only</td>
<td>$0.082</td>
<td>$0.097</td>
<td>$0.139</td>
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</tbody>
</table>
Long-Run Considerations
Avoided Wholesale Energy Costs Are Low Compared to ACC
Cap & Trade GHG Price Forecast Should Be Much Higher

<table>
<thead>
<tr>
<th>Source</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACC (CEC IEPR forecast)</strong></td>
<td>$19.48</td>
<td>$39.62</td>
<td>$80.70</td>
<td>$125.55</td>
<td>$179.65</td>
</tr>
<tr>
<td><strong>SMUD VoSS (C&amp;T floor price)</strong></td>
<td>$16.68</td>
<td>$24.04</td>
<td>$34.75</td>
<td>$50.04</td>
<td>$72.08</td>
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</tbody>
</table>
### Summary of ACC and VoSS Discrepancies

<table>
<thead>
<tr>
<th>Category</th>
<th>SMUD VoSS</th>
<th>ACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030 Energy Cost, $/MWh</td>
<td>$30</td>
<td>$62</td>
</tr>
<tr>
<td>2030 GHG Cap &amp; Trade, $/met ton</td>
<td>$35</td>
<td>$81</td>
</tr>
<tr>
<td>2030 GHG Compliance, $/met ton</td>
<td>$62</td>
<td>$121</td>
</tr>
<tr>
<td>Fugitive Methane Adder</td>
<td>negligible</td>
<td>5.6%</td>
</tr>
</tbody>
</table>
Retail Rate Projections May Be Unrealistic

- Future retail rates are the “cost” to SMUD from customer generation
- Escalating NEM costs are based on assumed 3.5% per year rate increase to 2050
- From 2001 to 2018 SMUD’s annual rate increase averaged 2.3%
- Over 20 years equivalent to 100% rate increase vs 58% rate increase
T&D Impacts of Meeting SMUD’s Climate Goals

• VoSS found small avoided transmission and distribution value

• Aggressive building and transportation electrification will likely require distribution upgrades

• SMUD should reassess T&D impacts in light of climate emergency declaration