Efficiency Through The Years: Program Cost and Impact in the 2010s

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Why the Cost of Saving Electricity and Cost of Saving Peak Demand matter

- To help ensure electricity system reliability at the most affordable cost as part of resource adequacy planning and implementation activities.
- To benchmark utility’s program results with regional and national estimates.
- For initial screening of electricity resource alternatives for meeting future demand.
- To assess how program cost performance may change over time with funding levels and participation.

Program Administrator (PA) Cost of Saving Electricity (CSE) is expressed in dollars per kilowatt-hour ($/kWh).

PA Cost of Saving Peak Demand (CSPD) is expressed in dollars per kilowatt ($/kW).

The PA CSE and CSPD are each calculated based on the costs incurred by program administrators for individual programs. This means the results cannot be combined because it would double the program cost. Each metric must be considered separately.
Analysis approach

- Program administrator cost of saved electricity (PA CSE) and program administrator cost of saved peak demand (PA CPSD) are calculated using the same method:
  - Levelized: amortizes costs over a program’s lifetime, discounts to year of investment
- CSE and CPSD are calculated at program-level and in aggregate
- e.g. sector-level results are calculated using a savings-weighted lifetime of programs

Program Administrator Cost of Saving Electricity =

\[ \text{Capital Recovery Factor} \times (\text{Program Administrator Costs}) \]

Annual Electricity Savings (kWh) or Annual Peak Demand Savings (kW)

where the Capital Recovery Factor (CRF) is:

\[ CRF = \frac{r}{1 - (1 + r)^{-N}} \]

and

- \( r \) = the discount rate
- \( N \) = estimated program lifetime in years and calculated as the savings-weighted lifetime of measures or actions installed by participating customers in a program
Cost of Saving Electricity and Cost of Saving Peak Demand analysis

- In 2018, data collection represents:
  - 67 program administrators in 21 states
  - 92% of reported efficiency spending
  - 84% of reported demand reductions
  - 90% of reported efficiency savings

- Cost of Saving Electricity
  - Analysis period 2010-2018

- Cost of Saving Peak Demand
  - Analysis period 2014-2018
For most sectors and regions, the PA CSE is similar for the whole study period compared to 2018. Average cost of programs over the 2010-2018 study period by market sector:
- C&I - 2.3¢/kWh
- Low Income - 9.1¢/kWh
- Residential - 2.7¢/kWh

<table>
<thead>
<tr>
<th>Region</th>
<th>2010 - 2018</th>
<th>2018 Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levelized CSE ($/kWh)</td>
<td>Sample Size (Number of Programs)</td>
</tr>
<tr>
<td>Total</td>
<td>0.026</td>
<td>11,796</td>
</tr>
<tr>
<td>Sector</td>
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<td></td>
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<tr>
<td></td>
<td>Residential</td>
<td>0.027</td>
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<tr>
<td></td>
<td>C&amp;I</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>Low Income</td>
<td>0.091</td>
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<tr>
<td>Region</td>
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<tr>
<td></td>
<td>Midwest</td>
<td>0.017</td>
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<tr>
<td></td>
<td>Northeast</td>
<td>0.031</td>
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<tr>
<td></td>
<td>South</td>
<td>0.030</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>0.027</td>
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</tbody>
</table>

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Time Trend in program administrator Cost of Saving Electricity over time
All Programs
Cost of Saving Peak Demand
Program administrator Cost of Saving Peak Demand by market sector and region

<table>
<thead>
<tr>
<th>Sector</th>
<th>2014 -2018</th>
<th></th>
<th>2018</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levelized CSPD ($/kW)</td>
<td>Sample Size</td>
<td>Levelized CSPD ($/kW)</td>
<td>Sample Size</td>
</tr>
<tr>
<td>Total</td>
<td>153</td>
<td>5,831</td>
<td>128</td>
<td>1,255</td>
</tr>
<tr>
<td>Sector</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I</td>
<td>145</td>
<td>2,364</td>
<td>134</td>
<td>502</td>
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<tr>
<td>Low Income</td>
<td>386</td>
<td>461</td>
<td>241</td>
<td>94</td>
</tr>
<tr>
<td>Residential</td>
<td>147</td>
<td>1,951</td>
<td>108</td>
<td>410</td>
</tr>
<tr>
<td>Region</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Midwest</td>
<td>105</td>
<td>895</td>
<td>76</td>
<td>231</td>
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<tr>
<td>Northeast</td>
<td>201</td>
<td>1,308</td>
<td>223</td>
<td>292</td>
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<tr>
<td>South</td>
<td>132</td>
<td>1,962</td>
<td>119</td>
<td>375</td>
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<tr>
<td>West</td>
<td>151</td>
<td>1,666</td>
<td>99</td>
<td>357</td>
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</table>
## Trends in the program administrator Cost of Saving Peak Demand over time

<table>
<thead>
<tr>
<th>Program year</th>
<th>Levelized CSPD $/kW</th>
<th>Sample size</th>
<th>Time trend $/kW</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>179</td>
<td>1,036</td>
<td>187</td>
<td>1,008</td>
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<tr>
<td>2015</td>
<td>175</td>
<td>1,058</td>
<td>170</td>
<td>994</td>
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<tr>
<td>2016</td>
<td>160</td>
<td>1,265</td>
<td>162</td>
<td>1,150</td>
</tr>
<tr>
<td>2017</td>
<td>137</td>
<td>1,216</td>
<td>138</td>
<td>1,150</td>
</tr>
<tr>
<td>2018</td>
<td>125</td>
<td>1,255</td>
<td>151</td>
<td>1,130</td>
</tr>
</tbody>
</table>
Distribution of peak demand and energy savings, by Cost of Saving Peak Demand bin and market sector (2014-2018)
Composite cost curve for demand savings from electric efficiency programs (2014-2018)
Key findings for Cost of Saving Peak Demand

- **Levelized CSPD ($/kW)**
  - Residential
  - C&I
  - Low Income
  - 2014 to 2018

- **Levelized Cost of Saved Peak Demand ($2020/kW)**
  - Residential
  - C&I
  - Low Income
  - 2014 to 2018

- **Share of Savings**
  - Demand Savings
  - Energy Savings

- **Portfolio Demand Savings**
  - C&I Custom (16.1%)
  - C&I Prescriptive (14.7%)
  - Residential Lighting (12.9%)
  - Residential Behavior/Education (8.9%)

- **Program Categories**
  - Percent Total
  - Cumulative

- **Share of Portfolio Demand Savings**
  - 0% to 100%
  - All Programs
Additional resources

- All publications, recorded webinars, and visualization tools available on our project page: What It Costs to Save Energy: [https://emp.lbl.gov/projects/what-it-costs-save-energy](https://emp.lbl.gov/projects/what-it-costs-save-energy)
- This research is also available in our interactive visualization tool.
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For more information

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