Recovering and Allocating Costs

Training for States on Distribution System and Distributed Energy Resources Planning

Presented by Ronny Sandoval, Regulatory Assistance Project

November 29, 2023
Agenda

• Introduction and level-setting
• Regulatory challenges
• Proactive distribution upgrades for distributed energy resources (DERs) and electrification
• Treatment of projects that receive federal funding
• Ratepayer vs. taxpayer funding
• Resilience investments
“Allocation of costs is not a matter for the slide rule. It involves judgment of a myriad of facts. It has no claim to an exact science.”

Justice William O. Douglas, U.S. Supreme Court
Colorado Interstate Gas Co. v. Federal Power Commission,
324 US 581, 589 (1945)
Elements of the Ratemaking Process

• **Revenue requirement for utility expenditures in providing electric service**
  • Capital, O&M, Utility Rate of Return, other expenditures
• **Functional cost categories**
  • Generation, transmission, distribution, customer service
• **Classification of costs**
  • Customer-related vs. energy-related vs. demand-related
• **Allocation of costs across customer classes**
  • Residential, commercial, industrial, street-lighting
Embedded Cost of Service Allocation

Diagram for Modern Embedded Cost of Service Study
Simplified Ratemaking Process

Determine revenue requirement

Net rate base
(Plant in service – depreciation reserve)

Rate of return

Depreciation expense
(Plant in service x depreciation rate)

Operating expense
(Fuel + purchased power + labor + labor overheads + supplies + services + income taxes)

Other taxes

$ millions

Allocate costs among customer classes

Residential
Commercial
Industrial
Street lighting

Design retail rates

Dollars per month
Cents per kWh peak
Cents per kWh off-peak
Dollars per month
Cents per kWh peak
Cents per kWh off-peak
Dollars per month
Cents per kWh peak
Cents per kWh off-peak
Dollars per kW monthly
Dollars per light per month

The cost recovery and allocation process involves more than a just an economic exercise

Advancing priorities such as customer affordability and attracting businesses to a desired location requires intentionality

There are trade-offs involved in every aspect of rate design

- Simple rate options can be easy to understand, but don’t provide incentives to adjust consumption in a way that makes the best use of customer and system resources
- Complex rate options (with little use of technologies that automate customer response) can result in customer confusion and limited opportunities to drive intended shifts in behavior
- Opt-in rates provide customers options for intentional participation in time-variant rates, but may primarily benefit only natural “winners”

At some point in the process, a decision must be made on who covers what portions of the costs across the energy system and what rate structures (demand charges, volumetric rates, etc.) will be used to recover these costs

Cost allocation continues to be the foundation of equitable rate design, with additional policy priorities overlayed

- Additional priorities, such as support for income-qualified customers, create shifts in this allocation

Emerging priorities such as support for electrification and local resilience can create added complexity, as these involve new cost causers and introduce different demand interactions with existing system load shapes

Projects that serve multiple service territories require additional care to ensure customer fairness
Customer adoption of DERs that significantly impact distribution system energy flows and congestion can create large costs for the broad customer base.

Distribution system investments may be deployed with demand flexibility tools (such as time of use rates) to relieve local congestion and meet changing energy demand needs.

However, these investments and programs responsive to local demand needs can take some time to deploy at scale.

Unanticipated demand impacts associated with electrification of customer end-use equipment and variable DERs may make it challenging to ensure these demand relief solutions are deployed in time.

Proactive distribution system investments may be made in anticipation of DER and load growth impacts to ensure these assets are in place when needed. However, attempting to allocate these costs across customer classes raises questions related to:

- Adequacy of forecasts to accurately reflect DER growth levels and their location
- Fairness of allocation decision (Customer cost vs. System Cost)
- Prudence of proactive investment if the need does not ultimately materialize
- Contribution from other funding sources, including taxpayer funds
Proactive Distribution Upgrades for DERs and Electrification

• Upgrades required to maintain reliability as energy demand and supply become more dynamic and distributed
  • System monitoring – Advanced Distribution Management Systems, line sensors, Advanced Metering Infrastructure (including communications network)
  • System modeling - using field data obtained from monitoring sources
  • Controls – Automatic Circuit Reclosers, voltage optimization equipment, Distributed Energy Resource Management Systems
  • Demand flexibility – price signals (including time-varying rates and incentives), demand response, load shaping

• Upgrades required to optimize the supply and demand profiles of DERs, allowing more value-based customer transactions with the grid
  • Utility programs and incentives to shift customer consumption and generation during system constraints
  • Market programs to manage market prices, manage demand, and provide ancillary services
  • Revenue grade metering for transactions that require it
  • Additional customer equipment to maximize participation

• Upgrades required to accommodate additional DERs and enable customers to adopt locally-sited energy solutions
  • Distribution system upgrades to increase hosting capacity*
  • Energy storage deployments
  • Advanced load forecasting capabilities

*See utilities’ “DER Cost Allocation” presentation for Massachusetts Grid Modernization Advisory Council, August 10, 2023 (last slides at link)
Who Pays for These Investments?

- Private investment at customer sites
- Tax credits and government incentives
- Ratepayers in a manner set by utility regulators
Treatment of Projects That Receive Federal Funding

• Identification of funding opportunities that advance customer and local priorities
• Assessment of funding requirements and performance obligations
• Ensuring proposed responses to federal funding opportunities reflect projects that can demonstrate prudence and are in the best interests of ratepayers
• Securing support for use of ratepayer funds to meet cost-sharing obligations
• Managing implementation risk – meeting obligations for grant agreements and customer cost recovery
## Select ARRA Project Awards Addressing Resilience

<table>
<thead>
<tr>
<th>Resilience Dimension</th>
<th>Selectee</th>
<th>State(s)</th>
<th>Project Description</th>
<th>Federal Cost Share</th>
<th>Recipient Cost Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Control Technologies</td>
<td>NSTAR Electric Company</td>
<td>MA</td>
<td>Expand the system's distribution automation capabilities by implementing &quot;self-healing&quot; functions on the grid that will reduce the impact of outages on the system and the power quality and efficiency of the distribution grid.</td>
<td>$10,061,883</td>
<td>$10,061,883</td>
</tr>
<tr>
<td></td>
<td>Hawaiian Electric Co. Inc</td>
<td>HI</td>
<td>Automate high load distribution circuits feeding eastern Oahu, reducing outage duration and community impacts.</td>
<td>$5,347,598</td>
<td>$5,347,598</td>
</tr>
<tr>
<td></td>
<td>Oklahoma Gas and Electric Company</td>
<td>OK, AR</td>
<td>Deploy a smart grid network and implement advanced distribution automation technologies that will facilitate &quot;self-healing&quot; and power restoring properties on the grid.</td>
<td>$130,000,000</td>
<td>$163,201,332</td>
</tr>
<tr>
<td>Monitoring and Control / Adaptive Control Technologies</td>
<td>CenterPoint Energy</td>
<td>TX</td>
<td>Strengthen the reliability and self-healing properties of the grid by installing more than 550 sensors and automated switches that will help protect against system disturbances like natural disasters.</td>
<td>$200,000,000</td>
<td>$439,187,435</td>
</tr>
<tr>
<td></td>
<td>Florida Power &amp; Light Company</td>
<td>FL</td>
<td>By incorporating intelligence into the transmission, distribution and customer systems, the utility will be able to anticipate and respond to grid disturbances, empower customers through alternative rate programs, and enable the integration of renewable and on-site energy sources.</td>
<td>$200,000,000</td>
<td>$378,963,325</td>
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<tr>
<td>Monitoring and Control</td>
<td>Navajo Tribal Utility Association</td>
<td>AZ, NM, UT</td>
<td>Integrate the smart grid system as part of the distribution network, which will help quickly identify any system outages.</td>
<td>$4,991,750</td>
<td>$5,620,099</td>
</tr>
<tr>
<td></td>
<td>Sioux Valley Energy</td>
<td>SD, MN</td>
<td>Install a smart grid network across the full customer base that will allow for automated electricity readings and additional monitoring of the system in case of outages or disruptions.</td>
<td>$4,016,368</td>
<td>$4,016,368</td>
</tr>
<tr>
<td></td>
<td>Woodruff Electric</td>
<td>AR</td>
<td>Install smart meters that will provide time-of-use data, help monitor demand and reduce outages.</td>
<td>$2,357,520</td>
<td>$2,658,480</td>
</tr>
<tr>
<td></td>
<td>Avista Utilities</td>
<td>WA, ID</td>
<td>Implement a distribution management system, intelligent end devices, and a communication network to reduce distribution system losses, enable automatic restoration to customers during outages, and allow for the integration of on-site generating resources.</td>
<td>$20,000,000</td>
<td>$20,048,996</td>
</tr>
<tr>
<td></td>
<td>Idaho Power Company</td>
<td>ID, OR</td>
<td>Modernize the electric transmission and distribution infrastructure, implementing an outage management system and irrigation load control program that will reduce peak and overall energy use and improve system reliability.</td>
<td>$47,000,000</td>
<td>$47,000,000</td>
</tr>
<tr>
<td></td>
<td>City of Auburn, IN</td>
<td>IN</td>
<td>Integrate and modernize multiple components within the electrical system, including installing a smart meter network, enhancing reliable and fast communication capabilities, upgrading cyber security technologies, expanding grid monitoring and improving responses to power outages.</td>
<td>$2,075,080</td>
<td>$2,075,080</td>
</tr>
</tbody>
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# Summary of 2023 Grid Resilience Project Awards

<table>
<thead>
<tr>
<th>Resilience Dimension</th>
<th>Selectee</th>
<th>State(s)</th>
<th>Project Name</th>
<th>Federal Cost Share</th>
<th>Recipient Cost Share</th>
</tr>
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<tbody>
<tr>
<td><strong>Microgrids</strong></td>
<td>Kit Carson Electric Cooperative</td>
<td>NM</td>
<td>Building a Modern, Intelligent Distributed BESS for Resiliency in Northern New Mexico</td>
<td>$15,430,118</td>
<td>$7,715,580</td>
</tr>
<tr>
<td></td>
<td>Jamestown Board of Public Utilities</td>
<td>NY</td>
<td>Jamestown Board of Public Utilities Microgrid</td>
<td>$17,377,945</td>
<td>$5,792,648</td>
</tr>
<tr>
<td></td>
<td>PECO Energy Company (PECO)</td>
<td>PA</td>
<td>Creating a Resilient, Equitable, and Accessible Transformation in Energy for Greater Philadelphia (CREATE)</td>
<td>$100,000,000</td>
<td>$156,761,176</td>
</tr>
<tr>
<td></td>
<td>Entergy New Orleans, LLC (ENO)</td>
<td>LA</td>
<td>Line Hardening and Battery Microgrid in New Orleans, LA</td>
<td>$54,828,178</td>
<td>$54,828,178</td>
</tr>
<tr>
<td></td>
<td>Electric Power Board of Chattanooga</td>
<td>TN</td>
<td>EPB Chattanooga Grid Resiliency Upgrades: Network Conversions &amp; Microgrids</td>
<td>$32,375,691</td>
<td>$32,375,691</td>
</tr>
<tr>
<td><strong>System Hardening</strong></td>
<td>Sumpter Electric Cooperative</td>
<td>FL</td>
<td>Improving Reliability through Grid Hardening in Florida</td>
<td>$52,857,560</td>
<td>$17,619,190</td>
</tr>
<tr>
<td></td>
<td>Southern Maryland Electric Cooperative</td>
<td></td>
<td>SMECO Transmission, Distribution, and Communications Resiliency Initiative</td>
<td>$33,567,016</td>
<td>$15,642,000</td>
</tr>
<tr>
<td></td>
<td>Fort Pierce Utilities Authority</td>
<td>FL</td>
<td>Mitigating Impacts of Extreme Weather and Natural Disasters Through Increased Grid Resiliency</td>
<td>$5,828,993</td>
<td>$2,907,882</td>
</tr>
<tr>
<td></td>
<td>Consumers Energy</td>
<td>MI</td>
<td>Sectionalization and Circuit Improvements to Mitigate Outage Impacts for Disadvantaged Communities</td>
<td>$100,000,000</td>
<td>$100,310,996</td>
</tr>
<tr>
<td><strong>System Hardening / Wildfire Mitigation</strong></td>
<td>Hawaiian Electric Company Inc.</td>
<td>HI</td>
<td>Climate Adaption Resilience Program</td>
<td>$95,313,716</td>
<td>$95,313,718</td>
</tr>
<tr>
<td></td>
<td>Xcel Energy</td>
<td>CO, MN, NM, TX, WI</td>
<td>Wildfire Mitigation and Extreme Weather Resilience for Xcel Energy</td>
<td>$100,000,000</td>
<td>$142,020,463</td>
</tr>
<tr>
<td></td>
<td>Tri-County Electric Cooperative</td>
<td>SC</td>
<td>Electrical Grid Modernization and Wildfire Reduction in South Carolina</td>
<td>$4,665,803</td>
<td>$2,332,903</td>
</tr>
<tr>
<td></td>
<td>PacifiCorp</td>
<td>CA, OR, UT</td>
<td>PacifiCorp’s Equity-aware Enhancement of Grid Resiliency</td>
<td>$99,633,723</td>
<td>$106,105,519</td>
</tr>
<tr>
<td></td>
<td>Mora-San Miguel Electric Cooperative, Inc.</td>
<td>NM</td>
<td>Three-Part Wildfire Damage Mitigation Project</td>
<td>$11,270,193</td>
<td>$3,756,731</td>
</tr>
<tr>
<td></td>
<td>Holy Cross Energy</td>
<td>AZ, CA, CO, ID, KS, MN, MO, ND, NE, NM, OK, OR, SD, UT, WA, WY</td>
<td>Wildfire Assessment and Resilience for Networks (WARN)</td>
<td>$99,328,430</td>
<td>$45,762,816</td>
</tr>
</tbody>
</table>

Ratepayer vs. Taxpayer Funding

- **Potential for taxpayer funds to defray costs that would otherwise be borne by ratepayers**
  - Awards made through federal and state funding opportunities are conditional and come with certain performance requirements that must be met to maximize funds received
  - Funding opportunities are often structured to advance projects that have not already been authorized or are underway – however, projects that have been contemplated and planned to some extent are often allowed and encouraged
  - Awards are subject to negotiation and any cost-share from regulated utilities using ratepayer funds requires Commission approval

- **Potential for taxpayer funds to reduce utility returns**
  - Utilities earn a return on their invested capital
  - Grants can reduce the required invested capital by utilities and reduce the utility’s absolute return from these projects
  - However, many projects may not have advanced without these awards and may ultimately result in a net-positive return position for utilities

- **Opportunities to optimize ratepayer and taxpayer funds to advance shared goals and minimize redundant costs**
  - Federal and state opportunities often allow various types of entities to apply for funding
  - There may be opportunities to collaborate with other entities to pool together resources for greater impact, including through joint planning, deployment, and funding (formula + competitive grants)
  - Developing funding strategies with partners that harness their respective areas of strength and advance mutual priorities can maximize impact, with more judicious use of resources
Case Study: CenterPoint Energy Distribution Automation

- In 2017, Hurricane Harvey brought 52 inches of rain to Texas and Louisiana
- Distribution automation, including intelligent switches, helped CenterPoint energy isolate power quickly – avoiding 41 million outage minutes for customers
- Other technologies including smart meters provided increased visibility and efficiency of response

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<th>Allocation</th>
</tr>
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<tbody>
<tr>
<td>Distribution</td>
<td>Energy-related</td>
<td>All Classes</td>
</tr>
</tbody>
</table>

Case Study: New Jersey Energy Resilience Bank

- The NJ Energy Resilience Bank provided grants and loans to critical facilities to enhance resilience following Superstorm Sandy
- Operated by the New Jersey Economic Development Authority using $200 M awarded to the State from Community Development Block Grant Disaster Recovery Funds
- Higher grant allocations covering “resilience costs,” with project costs not explicitly tied to enhancing resilience supported by smaller cost-share and loans

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<td>Distribution and Customer</td>
<td>Customer-related</td>
<td>Commercial and Industrial</td>
</tr>
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</table>

Case Study: Xcel Energy Resilience as a Service Pilot

• Program designed for commercial and industrial (C&I) customers seeking energy resilience and business continuity through power outages
• Xcel Energy of Wisconsin pays most of the upfront costs of these systems and is paid back by participant over 10 years
• As of year-end 2022, one government project was under construction, with additional projects at manufacturing, wastewater, airport, and other facilities in the study stage
• Technologies include solar, storage, microgrids and back-up generators

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Case Study: Connecticut Green Bank – Energy Storage Solutions

• Program that helps Commercial, Industrial, and Institutional customers install energy storage to maintain operational continuity through power disruptions

• Ratepayer funded program administered by the CT Green Bank and state’s IOUs

• Upfront and annual performance-based incentives provided, with additional incentive adders for small businesses, critical facilities, and other strategic applications

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</tr>
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What Is Resilience?

• “Resilience is the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions.”

• “Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents.”

• High-impact disruptions can create challenges for meeting critical services, as well as result in large economic losses due to a lapse in business continuity.
Measures for Mitigating the Impact of Disruptions

- Hardening of power lines, facilities, substations, and other systems
- Undergrounding of electrical equipment
- Vegetation and fuel-load management
- Monitoring and control technologies
- Use or construction of DERs for enhancing system adaptive capacity during disruptive events, including microgrids and battery-storage
- Adaptive protection technologies
- Advanced modeling technologies

## Utility and State Examples: Resilience Investments and Cost Recovery

<table>
<thead>
<tr>
<th>Lead Entity</th>
<th>Program Offering</th>
<th>Grid Dimension</th>
<th>Description</th>
<th>Why It’s Notable</th>
</tr>
</thead>
<tbody>
<tr>
<td>CenterPoint Energy</td>
<td>Distribution Automation</td>
<td>Electric Grid</td>
<td>Distribution automation, including intelligent switches supported by smart meters, increased visibility and efficiency of outage response</td>
<td>Investments beyond system hardening avoided 41 million outage minutes for customers during record-breaking Hurricane Harvey</td>
</tr>
<tr>
<td>Arizona Public Service</td>
<td>Microgrid Program</td>
<td>Microgrid</td>
<td>Provides support for microgrids, battery storage, solar power and low-emission generators to enhance resilience of large customers</td>
<td>Provides planning, construction, site monitoring, maintenance, and reporting services depending on customer needs</td>
</tr>
<tr>
<td>Xcel Energy Wisconsin</td>
<td>Resilience as a Service Pilot</td>
<td>Microgrid</td>
<td>Utility program to enhance C&amp;I customer resilience through solar, storage, microgrids, and back-up generator installation</td>
<td>Utility pays most costs of resilient systems upfront and is paid back by participant (not ratepayers) over 10 years</td>
</tr>
<tr>
<td>Connecticut Green Bank</td>
<td>Energy Storage Solutions</td>
<td>Customer</td>
<td>Energy storage offering for C&amp;I customers administered together with IOUs to maintain operational continuity</td>
<td>Upfront and annual performance-based incentives provided, with additional incentive adders for small businesses, critical facilities, and other strategic applications</td>
</tr>
<tr>
<td>Alabama Power</td>
<td>Connected Communities</td>
<td>Microgrid</td>
<td>Utility-owned microgrid including energy efficiency, solar, storage, and natural gas generators supporting single-family homes</td>
<td>Can operate independently of the grid to provide community energy service through outages; additional new home construction to have microgrid services at the outset</td>
</tr>
<tr>
<td>New Jersey Economic Development Authority</td>
<td>Energy Resilience Bank</td>
<td>Microgrid</td>
<td>Provides grants and loans for critical facilities to enhance resilience following Superstorm Sandy</td>
<td>Leveraged federal funding allocated for recovery to seed bank and offer facility specific support for resilience costs</td>
</tr>
<tr>
<td>New Jersey Transit</td>
<td>TransitGrid</td>
<td>Microgrid</td>
<td>Microgrid provides critical transportation services through power disruptions</td>
<td>Leveraged $400M in federal transportation funding to enhance resilience and create 4,000 new jobs</td>
</tr>
</tbody>
</table>
• The cost recovery and allocation process incorporates both art and science, with rate design decisions reflecting the values and consumption behaviors that Commissions seek to encourage or discourage across customer classes.

• Proactive distribution system investments and supportive flexible demand programs, including time of use rates, can help ensure grid-readiness ahead of anticipated DER and load growth impacts.

• Grid modernization technologies can enable innovative rate designs and provide options for customers to better respond to price signals that lower bills and provide long-run electric system benefits, including grid congestion relief.

• However, allocating costs associated with DER-related proactive system investments requires careful examination of policies and issues that vary by jurisdiction, including:
  • Adequacy of forecasts to accurately reflect DER growth levels and location
  • Fairness of allocation decision (Customer cost vs. System Cost)
  • Prudence of proactive investment if need does not ultimately materialize
  • Contribution from other funding sources, including taxpayer funds

• Resilience investments can increase the complexity of the cost recovery process depending on the solutions selected, who stands to benefit, the available funding streams, and rate structures selected.
References

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- Resilience as a Service Program Annual Compliance Report | Xcel Energy | 2022 | [4220-TE-106 RaaS Annual Report 2022.docx](wi.gov)
- The First Smart Neighborhood of its Kind in the Southeast | U.S. Department of Energy | Accessed April 24, 2023 | [The First Smart Neighborhood of its Kind in the Southeast](aps.com)
- NJ TRANSITGRID | New Jersey Transit | Accessed April 24, 2023 | [NJ TRANSITGRID](njtransitresilienceprogram.com)
- ERB Financing Program Guide | New Jersey Board of Public Utilities and New Jersey Economic Development Authority | 2014 | [ERB Financing Program Guide](state.nj.us)
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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