

Energy Markets & Planning
BERKELEY LAB

Advancing electricity affordability through distribution system planning

Sean Murphy
NASUCA Annual Meeting
November 17, 2026

This work was funded by the U.S. Department of Energy Office of Electricity and Building Technologies Office under Contract No. DE-AC02-05CH11231.

Contents

- Background and motivations
- Approach
- Options for advancing electricity affordability through planning
- Key takeaways

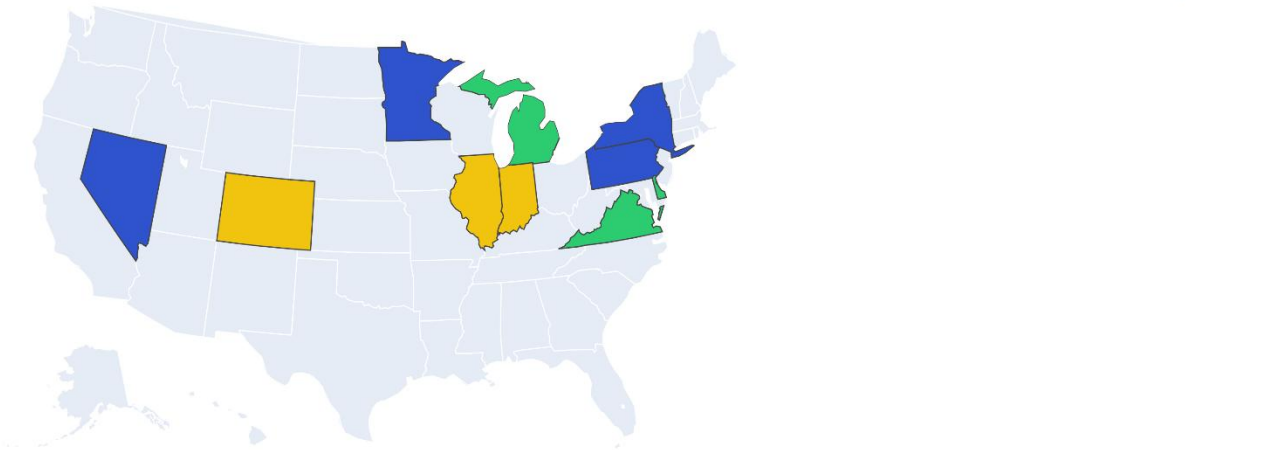
Background and motivations

- About a third of U.S. households report experiencing some form of energy insecurity.
- Recent increases in electricity rates in some states compound these challenges.
- Distribution system spending has been a significant driver of electricity rate increases.
  - About a third of nominal increases to electricity rates from 2014 to 2024 are attributable to distribution system spending.
- Recent research addressed how state public utility commissions (PUCs) can address affordability through utility:
  - Financial frameworks (e.g., performance-based regulation, multi-year rate plans)
  - Capital structure and earnings (e.g., debt-to-equity ratio, cost of equity, return on equity)
  - Customer programs (e.g., weatherization)
  - Rate design (e.g., discounted rates)
- PUCs can advance affordability through oversight of transparent distribution system planning, including improved prioritization processes for grid expansion necessary to meet growing energy needs.

We reviewed commission orders related to distribution system spending in 10 states

- Orders addressed distribution system plans and rate cases.
  - We reviewed documents that discussed or made judgements about distribution system spending.
- Based on this review, we:
  - Documented how commissions commented on electricity affordability.
  - Identified criteria commissions used to assess whether proposed spending was reasonable.
  - Summarized actions that commissions took to promote electricity affordability.
- We then identified how commissions could go beyond the practices we observed by advancing electricity affordability through oversight of distribution system planning activities.

States with reviewed commission orders



Summary of proceedings and orders

State	Utility	Proceeding	Reviewed order
Colorado	Xcel Energy	2025-2029 Distribution System Plan	Decision C25-0903, 12/15/2025
Delaware	Delmarva Power	2023-2032 Long Range Distribution Plan 2025 rate case	Order No. 10134 Order No. 11037
Indiana	Duke Energy	Transmission, Distribution, and Storage System Improvement Charge Rate Schedule adjustment 2025	Order on Cause 45647 TDSIC 5, 4/8/2026
Illinois	Commonwealth Edison	2023-2027 Integrated Grid Plan	Order on Refiling, 12/19/2024
Michigan	DTE Energy	2025 rate case 2023 Distribution Grid Plan	Order on Case U-21860, 2/29/2026 Order on Case U-20147, 9/26/2024
Minnesota	Xcel Energy	2023 Integrated Distribution Plan 2025 proactive distribution upgrade proposal 2024 rate case	Order on E-002/M-23-452, 9/16/2024 Order on E-002/M-25-142, 6/5/2026 Order on E-002/GR-24-320, 7/31/2026 (rate case)
Nevada	NV Energy	2025 rate case	Order on Docket 25-02016, 11/18/2025
New York	Consolidated Edison	2025 rate case	Order on Case 25-E-0072, 1/22/2026
Pennsylvania	PPL	2025 rate case	Order on R-202503057164, 6/4/2026
Virginia	Dominion Energy	2025 rate case	Order on Case No. PUR-2025-00058, 11/25/2025

Commission perspectives on electricity affordability

- Commissions **expressed concern** about the ability of customers to afford spending proposed by utilities.
  - The New York Department of Public Service (DPS) noted the detrimental impact of rate increases on customers.[1]
  - The Delaware Public Service Commission (PSC) called for Delmarva Power to withdraw its rate case filing in light of affordability concerns.[2]

- Commissions **set expectations** for proposed spending.
  - The Colorado PUC stated that actual spending on investments described in Xcel Energy's 2025-2029 distribution system plan should be lower than the utility's proposed spending due to affordability concerns.[3]
  - The Illinois Commerce Commission (ICC) opined that Commonwealth Edison should propose investments that 'mitigate delivery service costs to customers where possible.'[4]

[1] New York DPSs, Order on Case 25-E-0072, 1/22/2026
[2] Delaware PSC, Order No. 11037, 7/1/2026.
[3] Colorado PUC, Decision C25-0903, 12/15/2025
[4] ICC, Order on Refiling, 12/19/2024

Commissions have multiple options for advancing electricity affordability through oversight of utility distribution system planning

- Assuring that proposed investments are appropriately justified
- Evaluating costs and benefits of proposed spending
- Analyzing planning scenarios
- Reviewing load-forecasting and grid-needs assessments
- Considering both customer loads and generation in assessing needed investments
- Advancing geotargeted solutions
- Requiring hosting capacity analyses
- Setting clear provisions for data sharing
- Mitigating the electricity rate impacts of approved spending

Assuring that investments are needed and justified (1)

- **Confirm that the proposed spending addresses a grid need**
  - The Michigan PSC rejected spending on converting a line to 13.2kV after determining there was no need for additional capacity.[1]
  - The ICC expressed concern that concentrating corrective maintenance work into a single year risked inefficiencies and work not aligning with actual reliability needs.[2]

- **Determine whether the utility provided justification for the proposed spending**
  - The Michigan PSC:[1]
    - Disallowed spending on a software system to manage grid-edge resources in the absence of a business case for its necessity
    - Rejected DTE Energy's proposed spending for transformer protection systems because its magnitude and rate lacked justification
    - Reduced proposed spending on a circuit conversion by 20% due to a lack of justification
  - The ICC rejected Commonwealth Edison's proposed increases in spending on a targeted reliability program due to insufficient explanation for investment needs.[2]

[1] Michigan PSC, Order on Case U-21860, 2/29/2026
[2] ICC, Order on Refiling, 12/19/2024

Assuring that investments are needed and justified (2)

- **Assess whether proposed spending is feasible**
  - The Michigan PSC reduced spending by 20% due to concerns that DTE Energy would not be able to spend it at the proposed rate.[1]
  - The ICC stated that historical project completion rates did not suggest that Commonwealth Edison could finish upgrades that would support data center development during the planning period.[2]

- **Assess whether planned spending creates rate pressure by concentrating costs into a short time frame**
  - The ICC scaled down spending on a cost-effective vegetation management program in part because it put pressure on ratepayers by concentrating spending in a short period.[2]

- **Establish criteria for determining that spending is needed**
  - The ICC identified “objective indicators of customer commitment” that Commonwealth Edison could use to justify new business spend: “monetary deposits, signed contracts, land purchases or leases, and mandatory service relocations.”[2]

[1] Michigan PSC, Order on Case U-21860, 2/29/2026
[2] ICC, Order on Refiling, 12/19/2024

Evaluating costs and benefits of investments: reviewing costs

- **Disallow placeholder values or costs that lack justification**
  - The Michigan PSC stated that it was not reasonable for DTE Energy to use placeholders and justify them later.[1]
  - Similarly, the ICC stated that Commonwealth Edison's projected costs must be substantiated even if future proceedings reconciled differences between realized and projected costs.[2]

- **Confirm that cost escalation is substantiated**
  - DTE Energy proposed spending for emergent replacements based on historical costs adjusted for price increases for material and labor.[1]
  - The Michigan PSC rejected inflation adjustments, citing downward trends in spending on related activities. The PSC also established a test for whether inflation adjustments are reasonable: a utility must show how a lack of inflation adjustments underfunds its activities.[1]

- **Compare proposed costs to historical costs**
  - The ICC rejected the doubling of a cable replacement budget in part because recent spending on the program was sufficient for safe and reliable operation.[2]

[1] Michigan PSC, Order on Case U-21860, 2/29/2026
[2] ICC, Order on Refiling, 12/19/2024

Evaluating costs and benefits of investments: reviewing benefits

- **Determine whether the rate of spending prevents assessment of the benefits of the spending**
  - The ICC reduced authorized spending on a vegetation management program because the short implementation period prevented an assessment of whether program has beneficial impacts.[1]
- **Confirm that proposed spending will yield the stated benefits to the distribution system**
  - The ICC rejected Commonwealth Edison's request for a cable replacement budget because the utility did not establish that the program would avoid failures.[1]
  - The Michigan PSC disallowed proposed spending on outage tracking because DTE Energy did not report on the system impacts of past spending and its effectiveness was uncertain.[2]
- **Require cost-effectiveness evaluations for some projects**
  - The ICC required cost-effectiveness analysis for all "discretionary projects" that were not necessary for safe and reliable service, company obligations, or maintenance or were not "mandated by law, regulation, order, or tariff."[1]

[1] ICC, Order on Refiling, 12/19/2024
[2] Michigan PSC, Order on Case U-21860, 2/29/2026

Evaluating costs and benefits of investments: cost-effectiveness analysis

How could it advance affordability?

- Cost-effectiveness evaluations could identify **lowest reasonable cost** solutions among alternatives, including traditional investments.
- **Transparency** in data inputs, assumptions, and methods can inform commission review.
  - For example, costs, escalation rates, discount rates, and investment lifetimes are important inputs into benefit-cost analyses.
  - The outcome of benefit-cost analysis may be sensitive to these assumptions.
- However, a benefit-cost analysis could reasonably justify increased spending if it finds the investment yields net benefits.

How do you assess the effectiveness of the investment?

- Compare the cost of the solution identified as lowest reasonable cost to alternatives to find if there are cost savings.
- Determine whether the utility based its decisions on proposed spending on information shared through cost-effectiveness evaluation.

Scenario analysis

How could it advance affordability?

- An **affordability-focused scenario** could characterize the minimum set of investments needed to maintain system safety and reliability.
- Scenarios can support commission review by **illustrating planning uncertainty and risk**.
- Scenarios can identify **least-regret investments** that address multiple planning objectives over the planning period.
  - For example, a higher-capacity feeder could support load growth and improve reliability.
  - Such investments may be less costly compared to solutions developed independently for different grid needs.

How do you assess the effectiveness of the investment?

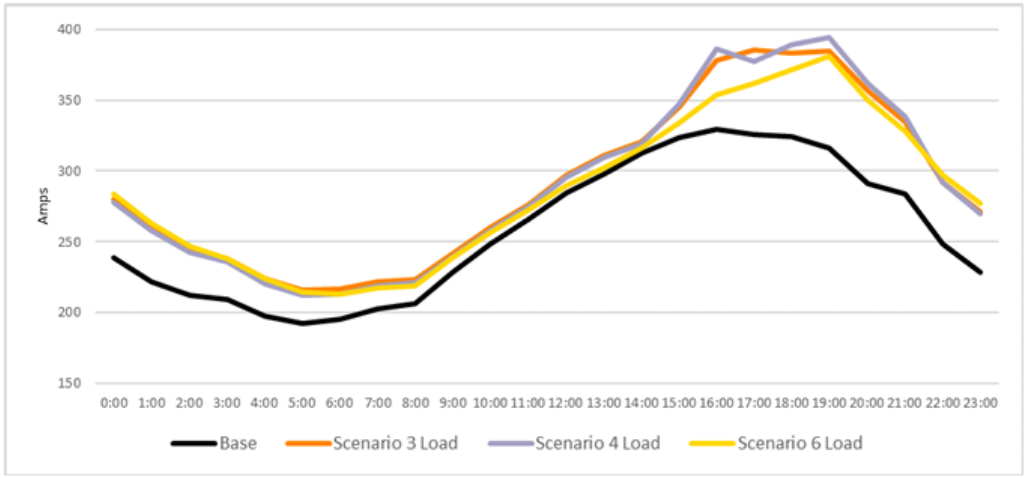
- Assessing whether decisions to reject or reduce proposed spending were based on information provided by scenario analysis.

Load forecasting and grid needs assessment

How could it advance affordability?

- **Transparent methods and assumptions** support commission review of proposed investments.
  - Justification of proposed investments may be sensitive to timing and degree of grid need.
  - Reviewing methods and assumptions could change the load forecast and grid needs assessment, potentially affecting the justification for investments.

Figure 5-30: Example Feeder Load Profile



Commonwealth Edison 2024

How do you assess the effectiveness of the investment?

- Determine if revisions to load forecasting or grid needs assessment changed planned investments.
- Changes to methods and assumptions in response to commission review also may *increase* forecasts and potentially lead to higher levels of investment.

-The Colorado PUC required that Xcel Energy Minnesota provide forecast inputs and outputs and details on new customer connections.[1]

-The ICC determined that Commonwealth Edison's load forecast did not support requests for spending related to data centers, pointing out that recent updates to the forecast reduced projected sales.[2]

[1] Colorado PUC, Decision C25-0903, 12/15/2025
[2] ICC, Order on Refiling, 12/19/2024

Investments considering both load and customer technology adoption

How could it advance affordability?

- Making investments ahead of anticipated growth in load or grid-edge resource adoption could avoid higher-cost ad-hoc investments in the future.



Source: MTA

How do you assess the effectiveness of the investment?

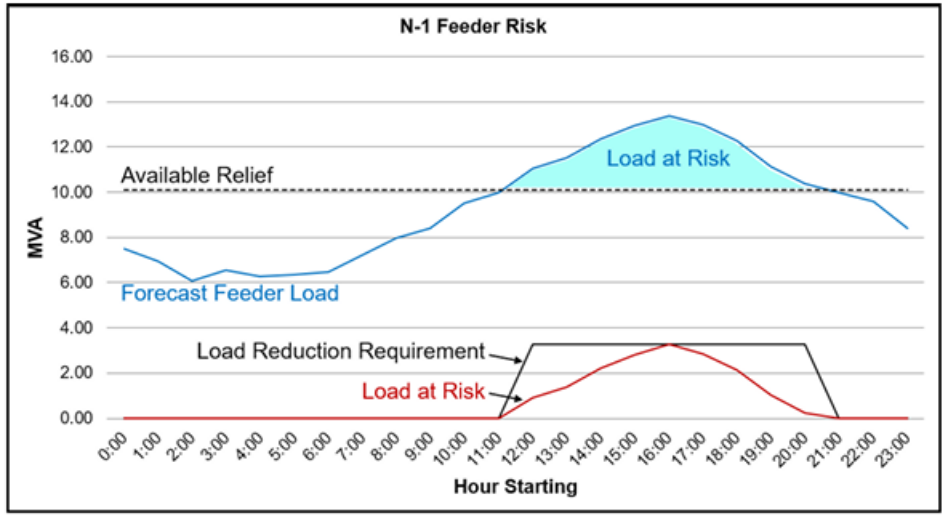
- Assess whether anticipated grid needs were realized.[1]
  - Did anticipated load growth or resource needs materialize as expected?
- Confirm that the asset addressed the anticipated grid need.[1]
  - If other investments were necessary to address the grid need, the original investment may not have been optimal.
- Determine if costs were allocated properly.[1]
  - Were the beneficiaries of the investment the customers to whom costs were allocated?

[1] Pereira et al. 2025

Geotargeted solutions

How could it advance affordability?

- Front-of-meter (utility-owned) or behind-the-meter (typically customer-owned) resources located at specific locations on the distribution system can complement traditional infrastructure investments.



Xcel Energy 2023

How do you assess the effectiveness of the investment?

- Conduct performance evaluations[1] to confirm that the asset fulfilled its role in addressing the anticipated grid need.
  - Did the geotargeted assets perform as expected?
- Confirm that the costs of developing and operating the geotargeted solution were as expected.
  - Annual reporting on costs can indicate whether the geotargeted solution remains within budget.

Consolidated Edison 2024

Hosting capacity analysis

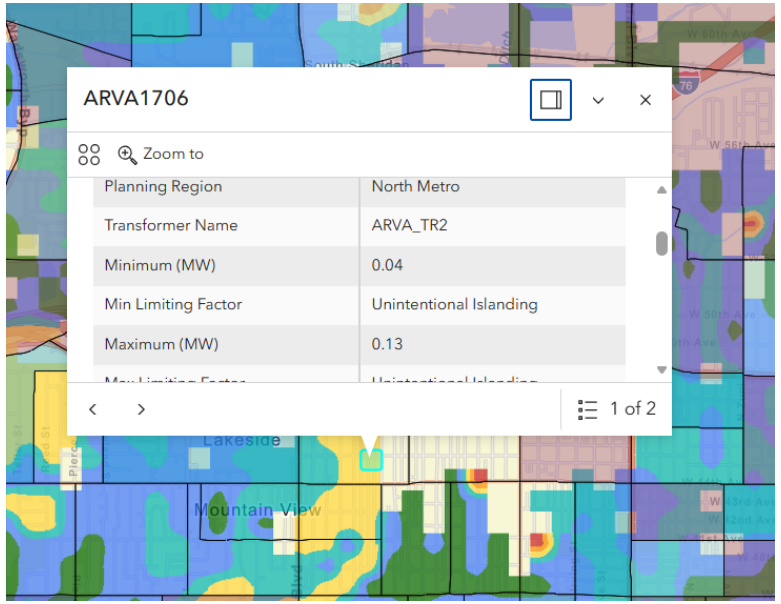
How could it advance affordability?

- Support the speed and **reduce the cost of integrating grid-edge resources**.
  - Grid-edge resources can reduce electricity system costs by generating low-cost power, reducing peak demand (e.g., battery storage), and harnessing customer investments.

- **Increase the hosting capacity** of the distribution system by analyzing options to mitigate constraints to hosting capacity (e.g., exceeding thermal limits).

How do you assess the effectiveness of the investment?

- Assess whether the availability of hosting capacity data or the mitigation of hosting capacity constraints increased deployment of grid-edge resources.
- Calculate the electricity system costs avoided by grid-edge resources.



Xcel Energy Colorado 2026

Mitigating the electricity rate impacts of approved spending (1)

- **Direct utilities to fund activities with over-collected revenues.**
  - The New York DPS reduced the revenue requirement for distribution system investments by allocating over-collected revenues, which the Commission had previously reserved, to fund the investments.[1]
- **Encourage the use of funds from other sources.**
  - The Michigan PSC called on “utilities to seek alternative funding options, other than ratepayer dollars”.[2]
- **Require that utilities refund unspent resilience program funds.**
  - The Minnesota PUC addressed historical underspending on vegetation management by requiring Xcel Energy Minnesota to refund money they do not spend.[3]
    - The PUC reasoned that refunding unspent funds was more reasonable than a reduction in budget because it (1) incentivizes utilities to follow through on proposed work and (2) smaller budgets could defer work not needed until a future year.[3]
- **Categorize certain costs as operations and maintenance (O&M) instead of a capital investment.**
  - The ICC treated a vegetation management pilot that used remote sensing technologies as O&M to reduce rate impacts.[4]

[1] New York DPS, Order on Case 25-E-0072, 1/22/2026
[2] Michigan PSC, Order on Case U-20147, 9/26/2024
[3] Minnesota PUC, order on E-002/M-25-142, 6/5/2026
[4] ICC, Order on Refiling, 12/19/2024

Mitigating the electricity rate impacts of approved spending (2)

- **Penalize overcollection by utilities.**
  - The Colorado PUC adopted a carrying charge for the over-recovery of costs.[1]
- **Reduce existing customers' exposure to new system costs.**
  - Nevada PUC directed NV Energy to create a regulatory liability account to collect revenues from incremental customers and load that are made possible by new undergrounding projects.[2]
- **Determine whether the utility has used existing funds.**
  - The Michigan PSC rejected proposed spending by DTE Energy because the utility underspent past budgets and failed to address deferred maintenance and substation repairs.[3]

[1] Colorado PUC, Decision C25-0903, 12/15/2025
[2] Nevada PUC, Order on Docket 25-02016, 11/18/2025
[3] Michigan PSC, Order on Case U-21860, 2/29/2026

Setting clear provisions for data sharing[1] (1)

- **Create standardized cost categories.**
  - Reporting templates and data dictionaries can make information easier to find and understand.
  - Consistent definitions across utilities, and over time for a single utility, can support benchmarking.

- **Avoid an overload of reported data.**[2]
  - Establish reporting requirements for distribution system planning processes.
  - Make data requests as specific as possible.
  - Streamline reporting across distribution system plans and other filings to avoid duplicated information.

- **Require utilities to provide data in spreadsheet format to facilitate analysis**.

[1] Murphy et al. 2025
[2] Pereira et al. 2026

Setting clear provisions for data sharing (2)

- **Utilities can report how distribution system investments affect affordability.**
  - The ICC required Commonwealth Edison to “provide an affordability analysis that isolates the delivery service rates component of customers’ bills.”[1]

- **Granular reporting on spending helps facilitate refunds to customers.**
  - The Minnesota PUC directed Xcel Energy to track and report vegetation management spending as part of a requirement to refund unspent revenue from customers.[2]

- **Utilities can report on the accuracy of forecasts.**
  - The Minnesota PUC required that Xcel Energy compare forecasted load to actuals.[3]

- **Comparing distribution system investment plans across proceedings can mitigate overlap in proposed spending.**
  - The Colorado PUC required that Xcel Energy detail the spending and assets associated with other proceedings that affect the distribution system.[4]

[1] ICC, Order on Refiling, 12/19/2024, [2] Minnesota PUC, order on E-002/M-25-142, 6/5/2026,
[3] Minnesota PUC, order on E-002/M-23-452, 9/16/2024, [4] Colorado PUC, Decision C25-0903, 12/15/2025

Key takeaways

- Transparent distribution planning processes can promote electricity affordability by shaping utility investments, informing commission and stakeholder review, and supporting cost-effective grid-edge resources.
- Commissions can evaluate the costs and benefits of proposed utility investments and expenses.
- Commissions can signal that the utility will not receive cost recovery for spending that is not justified.
- Commissions have tools that can mitigate electricity rate impacts of distribution system spending.
- Clear data reporting that supports commission and stakeholder review.
- Commissions can improve prioritization processes for grid expansion to meet growing electricity needs.

Disclaimer

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor The Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or The Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or The Regents of the University of California.

Ernest Orlando Lawrence Berkeley National Laboratory is an equal opportunity employer.

Copyright Notice

This manuscript has been authored by an author at Lawrence Berkeley National Laboratory under Contract No. DE-AC02-05CH11231 with the U.S. Department of Energy. The U.S. Government retains, and the publisher, by accepting the article for publication, acknowledges, that the U.S. Government retains a non-exclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this manuscript, or allow others to do so, for U.S. Government purposes

Contacts

Sean Murphy: smurphy@lbl.gov

For more information

Download publications from the Energy Markets & Planning: https://emp.lbl.gov/publications

Sign up for our email list: https://emp.lbl.gov/mailing-list

Follow the Energy Markets & Planning on social media: @BerkeleyLabEMP.bsky.social and @BerkeleyLabEMP

Acknowledgements

This work was funded by the U.S. Department of Energy Office of Electricity and Building Technologies Office, under Contract No. DE-AC02-05CH11231.

The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or The Regents of the University of California.