



Energy Technologies Area

Lawrence Berkeley National Laboratory

Future Electric Utility Regulation Report #10:

The Future of Transportation Electrification

September 13, 2018

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Berkeley Lab Electricity Markets and Policy Group

- About the series
- Webinar housekeeping items
- Three perspectives on transportation electrification (15 min. each)
 - Utilities – Philip B. Jones
 - EV charging industry – Jonathan Levy
 - Consumers – Jenifer Bosco
- Q&A (25 min.)

Report posted at <https://emp.lbl.gov/projects/feur/>

Future Electric Utility Regulation Series

- A series of reports from Berkeley Lab taps leading thinkers to grapple with complex regulatory issues for electricity
- Unique multi-perspective approach highlights different views on the future of electric utility regulation and business models and achieving a reliable, affordable, and flexible power system to inform ongoing discussion and debate
- Funded by U.S. Department of Energy's Grid Modernization Initiative
 - Office of Electricity, Electricity Policy Technical Assistance Program
 - Office of Energy Efficiency and Renewable Energy, Solar Energy Technologies Office
- Expert advisory group provides guidance and review (next slide)
- Berkeley Lab also provides technical assistance to states in this area — and on other topics (*see end of slide deck*)

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- Sonny Popowsky, Former consumer advocate of Pennsylvania
- Karl Rábago, Pace Energy and Climate Center, Pace University School of Law
- Rich Sedano, Regulatory Assistance Project

1. *Distributed Energy Resources (DERs), Industry Structure and Regulatory Responses*
 2. *Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight*
 3. *Performance-Based Regulation in a High DER Future*
 4. *Distribution System Pricing With DERs*
 5. *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives*
 6. *The Future of Electricity Resource Planning*
 7. *The Future of Centrally-Organized Wholesale Electricity Markets*
 8. *Regulatory Incentives and Disincentives for Utility Investments in Grid Modernization*
 9. *Value-Added Electricity Services: New Roles for Utilities and Third-Party Providers*
 10. *The Future of Transportation Electrification (Today's topic)*
- Additional reports forthcoming: feur.lbl.gov
 - **Reports, webinar slides and recordings at feur.lbl.gov**



Webinar housekeeping items

- We're recording the webinar and will post it on our web site.
- Because of the large number of participants, everyone is in *listen* mode only.
- **Please use the chat box to send us your questions** and comments any time during the webinar. You may want to **direct your question to a specific author.**
- The report authors will each have 15 minutes to present.
- Moderated Q&A will follow, with the report authors responding to questions typed in the chat box.
- The report and webinar slides are posted at feur.lbl.gov

Today's Speakers



Philip B. Jones is Executive Director of the Alliance for Transportation Electrification, a nonprofit industry association, as well as head of his own consulting firm focusing on regulatory and policy issues related to the electricity grid and cybersecurity. Jones served for 12 years on the Washington Utilities and Transportation Commission and in many advisory roles to federal agencies in the communications and energy sectors. He also served as President of the National Association of Regulatory Utility Commissioners in 2012–13. Jones serves on the Advisory Council of the Electric Power Research Institute and as a Board Advisor to the private equity fund Energy Impact Partners.

Jonathan Levy is Vice President of Strategic Initiatives at EVgo and an Advisor to Vision Ridge Partners, an investment firm focused on sustainable assets, including the controlling position in EVgo. He has been involved with advanced transportation throughout his career, including EVgo activities while working at Vision Ridge as Director of Policy and Strategy until earlier this year. Levy started his career on Capitol Hill as a policy advisor to then-Congressman Rahm Emanuel and served in a variety of positions at the U.S. Department of Energy and the White House, concluding his federal service as Deputy Chief of Staff to U.S. Energy Secretary Ernest Moniz.

Jenifer Bosco is a staff attorney at the National Consumer Law Center (NCLC) with a focus on energy and utility issues that affect low-income consumers. She has advocated for low-income consumers in utility proceedings in several states and is a contributing author of NCLC's treatises, Access to Utility Service and Collection Actions. Prior to joining NCLC, she was the first director of the Office of Patient Protection at the Massachusetts Health Policy Commission. Previously, Bosco held positions with Health Law Advocates, Massachusetts Law Reform Institute and Merrimack Valley Legal Services. She also served as an Assistant Attorney General with the Office of the Massachusetts Attorney General.

Questions the Report Addresses

1. What are the potential benefits and risks of transportation electrification — to electric utilities, to retail electricity customers and to society?
2. What roles should utilities versus competitive providers play in accelerating deployment of EV infrastructure? What infrastructure investments are others making, and how should utilities complement those investments?
3. Who will use EVs — and how?
4. What types of utility infrastructure will be needed to serve EV users, who should pay for it, and how will utilities recover their fixed costs?
5. What incentives should EV customers face to encourage right-time charging and discharging?

6. What policy and regulatory approaches will:
- Encourage efficient siting of charging stations — including fast-charging
 - Enable utilities to participate in infrastructure deployment
 - Foster competition by competitive EV charging providers
 - Establish enforceable standards to facilitate consumer adoption of EVs
 - Address underserved markets
 - Protect consumers

Please use the chat box to send us your questions and comments any time during the webinar. You may want to **direct your question to a specific author**. We'll address as many questions as we can following the presentation.

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A Utility Industry Perspective on the Future of Transportation Electrification

Philip B. Jones, Executive Director,
Alliance for Transportation Electrification



Alliance for
Transportation
Electrification

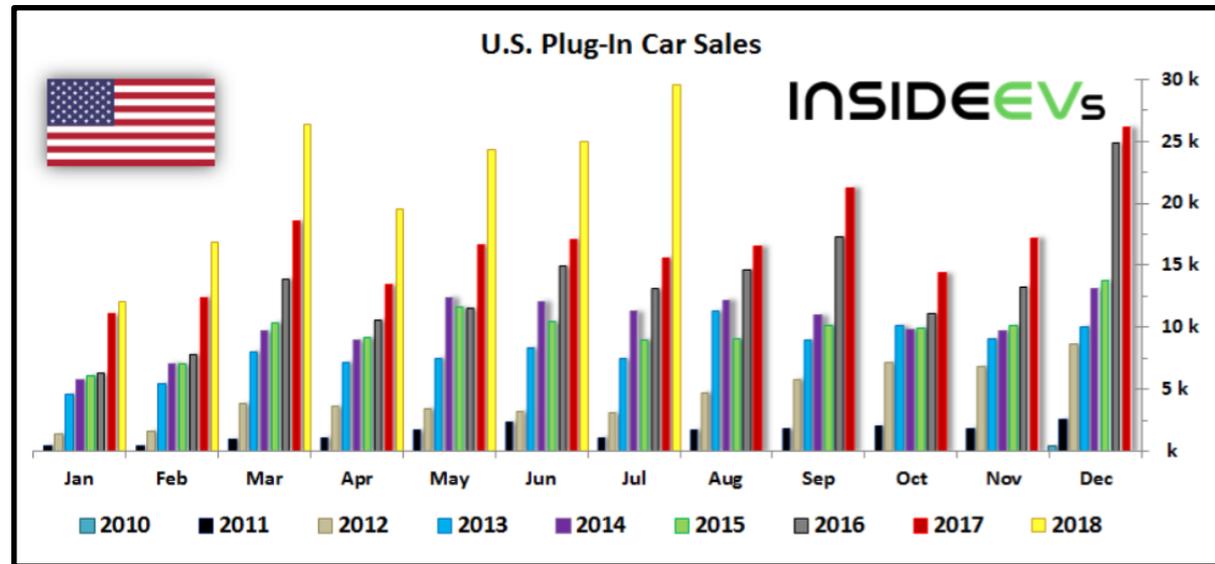
EV Market is Growing



Alliance for
Transportation
Electrification



- Dozens of new electric models (light, medium, heavy duty + buses and off-road) are coming
- Growth is accelerating (already ~30+% YoY)
- Global annual EV sales ~30M by 2030 (Bloomberg)
- U.S. market, assuming 20% share by 2030, would be 6 to 7.5 million EV sales per year



- EVs need to charge
- At home, at work, shopping, and on the go
- Not a single region nor use-case is ready
- Even California is behind despite cash from:
 - Electrify America and Volkswagen Appendix D
 - Air Quality Management Districts / LCFS
 - Utility and private investment
- State-wide gap analyses required across America
- Potential benefits to consider: lower transportation costs, more competitive industries, lower tailpipe emissions, and more efficient use of distribution grid (with rate design, managed charging)

- Public utility commissions
- Regional and local transportation planners
- Governors
- State energy offices



- Don't wait. Get ahead of the issues
- “Pathway to 2030” planning
 - Establish a generic proceeding
 - Broad stakeholder process
 - Technical workshops with experts
 - Policy statement or policy guidance, through Commission Order, so that utilities and stakeholders have more certainty
 - Emphasize market transformation and portfolio approach
 - Best practices: WA, MD, HI, CA, IL, OH, MN



- Scale is crucial and capital can be expensive
- Utilities are well-suited to respond
 - Infrastructure is core competency
 - Strong balance sheet
 - Long time horizon
 - Access to capital
- Catalyst for private sector investment
- Utility investment can buy down high capex
- Universal service-type principles
- Consistent and transparent pricing



- Take a holistic portfolio approach
 - Cost-benefit is on overall portfolio, not each measure
 - Worked for energy efficiency
- Options include:
 - Targeted grid modifications / upgrades
 - Behind the meter “make-ready”
 - Rebates for hardware / installation
 - Degrees of utility ownership
 - Fully integrated / utility-branded
 - Customer-selected (and subsidized) hardware and service provider





- At this early stage, with such a huge gap, the regulated utility model works better than the unregulated model to serve all consumers (universal service), and address the critical nature of all transportation services
- Utility investment can support and supplement competitive markets, especially where private sector won't step in



- Open and interoperable protocols and standards are important as the EVSE industry scales up
- To date, this has not been the case
 - Proprietary systems have been deployed both on the front end and the back end of the EV ecosystem
- Utilities have the heft to steer the market to efficient standards
- Now is the time to act, before certain vendors or automakers lock in their standards that could stifle competitiveness and innovation

- Protocols and standards need to be open and interoperable for:
 - Grid integration and smart charging (Open ADR)
 - Customer-facing interoperability so drivers can roam between networks without multiple memberships and to facilitate single-service billing
 - Avoiding vendor lock and allowing charging devices to be able to be supported by more than one network provider (OCPP)



- Changes in vehicle manufacturing and supply chains, IT and power sectors pose significant challenges requiring urgent attention of state commissions and policymakers.
- Collaborations before state commissions and policymakers are needed, rather than litigation and pursuit of short-term interests.
- A variety of market models are possible, with utilities playing a vital role in developing the EVSE market to benefit all consumers.
- Existing regulatory tools for planning, utility filings and cost recovery will serve the public interest well.
- Rate design and incentives for smart, managed charging during off-peak hours will be critical.
- Utilities and commissions can help ensure protocol development for interoperability and open standards to benefit consumers.
- Collaborative stakeholder processes are needed.

An Industry Perspective on the Future of Transportation Electrification

Jonathan Levy

**Vice President of Strategic Initiatives, EVgo
Advisor, Vision Ridge Partners**

EVgo: The nation's largest public EV fast charging network



- Located in 66 markets covering 90% of new EV sales
- 90% of Californians live within 35 miles of an EVgo fast charger
- 100,000+ charging sessions every month
- >5M miles powered every month

- No longer a question of “If” EVs will proliferate, but rather “how quickly”
- Automakers have committed to mass investments to improve supply availability
- The infrastructure footprint has grown significantly, but much more is needed
- Public charging infrastructure—and especially DCFC—is critical to selling EVs
- Consumers—especially ridesharing and other fleets—benefit massively from electrification
- We have to work together as an industry to build customer-centric infrastructure; not just what is best for the utilities
- Utilities have a key role to play but are not the only (or quickest) game in town
- “Coopetition” will be the name of the game, especially near term
- “Future-proofing” is about more than just throughput, it’s also about use case
- Policy has been and will continue to be important, from ZEV and purchase incentives to demand charges and TOU rates
- Growth will continue to accelerate, and experienced players are necessary to build quickly and smartly—but they need to have an opportunity for profit

1. Benefits and Risks of Electrification

- Better way to drive
- Lower TCO (Fuel savings, maintenance, etc)
- Ratepayer and system benefits (avoided generation, DER potential, lower rates)
- Massive environmental/public health benefits
- “ACES” enabling

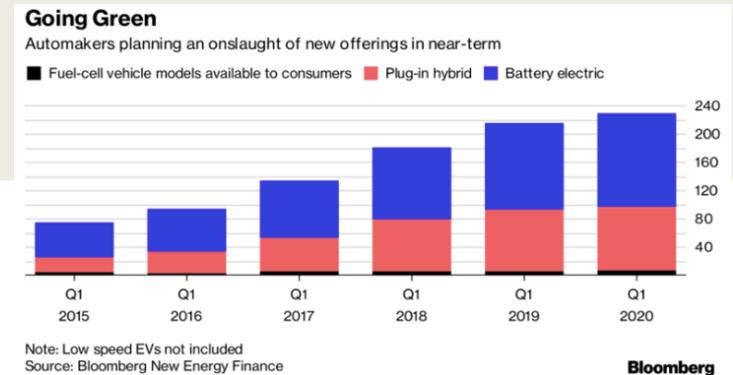
- Siting/Planning for the electricity system rather than drivers/riders
- Stranded Assets
- Interplay between profitability and EVSE availability



EV Model Commitments are Astounding

Sellers:

- In the last 12 months OEMs announced 127 new battery electric models^{BNEF}
 - GM 20 models; Ford 13; BMW 12; Fiat 30; VW 80; Volvo all by 2019; Mercedes all
 - Porsche 50% sales by 2025 / only electric by 2030; Nissan has sold 500,000 Leafs worldwide
- Decreasing battery costs point to price parity in 2022^{BNEF}
- The proverbial 1% of sales is expected to be 20% in 2030 (3.5M)^{McKinsey}



Buyers:

- Awareness remains the greatest gap in the market^{UC Davis}
- Range anxiety remains the decision pivot whether to go electric or not – confidence in ability to charge when needed
- Highly visible public charging stations are market signal buyers need to see



Public Charging on the Rise, More Needed

Current and Projected Charging Needs

- Today there are ~2,000 networked public DCFC
 - More than half are EVgo
 - Rapid growth coming
- NREL's national study targets 15M EVs in 2030
 - **27,500 DCFC and 600,000 slow chargers by 2025** to slightly lead the car market
- California's 5M ZEV by 2030 goal
 - **10,000 DCFCs and 250,000 slow chargers by 2030**
- Morgan Stanley projects \$400B of investment needed by 2040



- **Profit motive, policy, and partnership key to bridging the gap**
- **Even if 90% of charging is at home and work, we still need 100,000 DCFC in the next two decades**
- Rapid changes coming on TNC and MDUs means use case shifting
- Market needs to respond to customer needs
- All forms of charging needed: trickle, L2, DCFC, and higher throughputs

2. 4. Utilities Need Experienced Partners

- There remains disagreement inside the industry about the appropriate role of utilities in terms of financing, owning, and operating EV charging infrastructure
 - Utilities have critical roles to play, but that may not always be as the owner and operator of public charging infrastructure
 - “Coopetition” opportunities depending on market conditions, regulatory frameworks, and community needs
 - Again, customer-centric approach key
-
- Consensus: utilities should rate base and invest in “make ready” infrastructure and supplement private capital where the market is too early
 - Growing competitive private marketplace needs to be nurtured and supplemented
 - Tariff reform, siting, and more all will benefit from earnest engagement

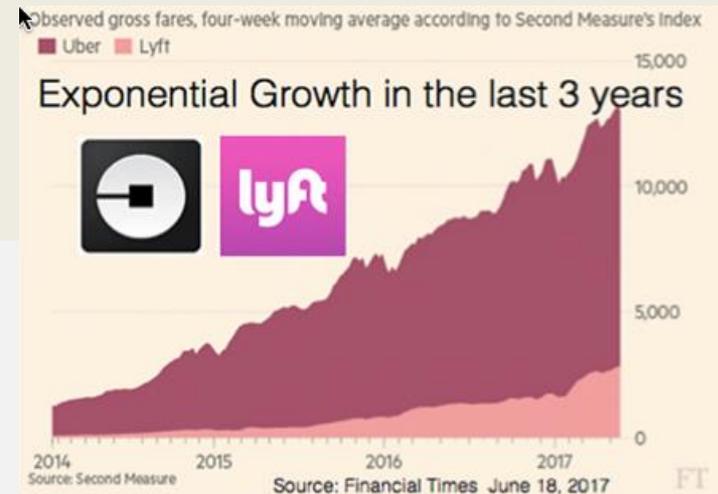
3. EV Users

- Critical inflection point moving from early adopters to mainstream and high VMT users
- Remove barriers to EV ownership/usage
- DCFC key to all of these drivers, especially TNC

WHAT TO WATCH:

The shift to new mobility

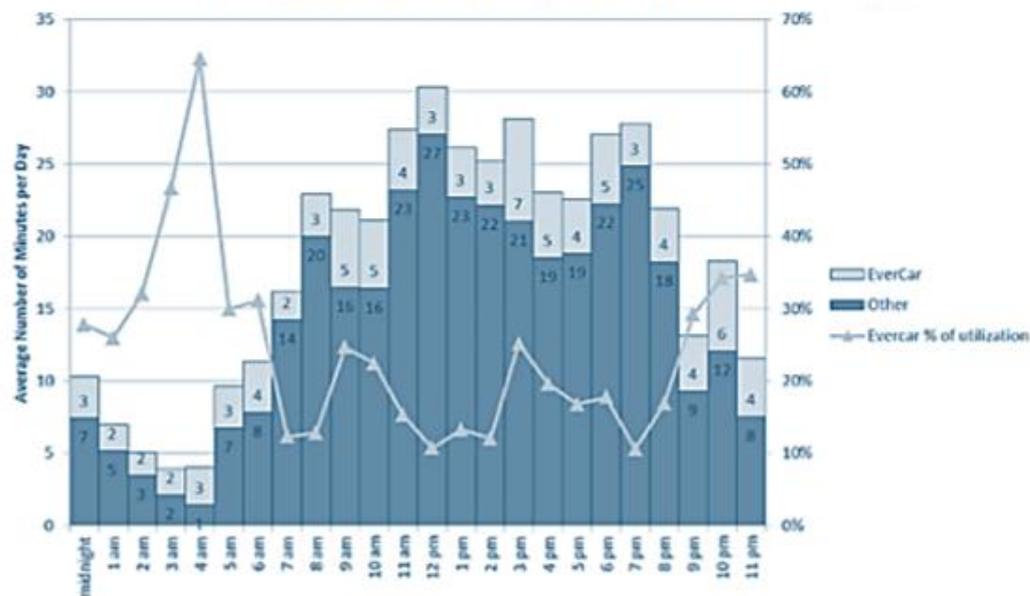
- On demand ride-hail and ride-share
- 5-7x VMT compared to POV
- More charges per day per car, though fewer cars
- Only getting more important every day



5. TOU

- Current TOU pilots tend to be focused on home charging
- Economic incentives for irrational behavior vis-à-vis the duck curve
 - Coincident vs non-coincident peak demand
- TNC usage beneficial to the system
- Price signals will be increasingly relevant over time
- “Shoulder” risks

Figure 13: Average daily DCFC session minutes by Evercar and non-Evercar customers at top 3 sites
Evercar sites, per site, on weekdays, by time (08/07/2016 to 10/02/2016)



6. Policy Opportunities

- EV adoption remains primary goal
 - Purchase incentives
 - ZEV
 - Statewide goals
- Tariff Reform
 - Demand charges, demand charges, demand charges
- Grants
- Host incentives
- TNC and other fleet penetration
- Permitting

- EV ubiquity is on its way
- EVSE industry is key to delivering **today** and tomorrow
- Need to work together to do what's best for riders and drivers

Thank you!

A Consumer Advocate's Perspective on the Future of Transportation Electrification

Jenifer Bosco

National Consumer Law Center

Report co-authors: John Howat and John W. Van Alst

- Since 1969, the nonprofit National Consumer Law Center® (NCLC®) has used its expertise in consumer law and energy policy to work for consumer justice and economic security for low-income and other disadvantaged people in the United States through policy analysis and advocacy, publications, litigation, and training.
- <https://www.nclc.org/>

- Advance solutions that will:
 1. Increase transportation access and security for economically disadvantaged consumers
 2. Equitably allocate costs and benefits for economically disadvantaged consumers
 3. Reduce air pollution and emissions to achieve public health benefits and carbon emission reductions

Question 1: What are the potential benefits and risks of transportation electrification?

- Residential customer benefits – what we hope to see, especially for under-resourced consumers
 - Lower electric rates
 - Lower transportation costs
 - More transportation options
- Residential customer risks
 - Short-term (or longer?) rate increases to fund utility infrastructure investment
 - Will benefits be equitably shared?

- Societal benefits
 - Public health and environmental benefits
 - Lower transportation costs overall
 - Efficient use of DERs with managed charging
- Societal risks
 - Will low-income drivers be the last ones driving gasoline-fueled cars?
 - Will additional electricity be produced with renewable energy or fossil fuels?
 - Would less expensive transportation lead to higher VMTs?

Question 2: What roles should utilities vs. competitive providers play?

- EV infrastructure investments must be pursued in a way that will lessen the impact on ratepayers and shield struggling low-income ratepayers from unaffordable rate increases, while providing sufficient infrastructure to support broad adoption of EVs
- Limit utility investments to those consistent with public interest which may include make-ready, multi-family
- Very small rate increases so far but be mindful of bill impacts
- Use rate design, discount rates, bill payment assistance to protect low-income consumers
- Private investment, VW settlement funds, Electrify America investment, state and federal funding as options

Question 3: Who will use EVs — and how?

- Average vehicle age is 11.6 years
- Lower income consumers are more likely to lack access to a vehicle, a trend more pronounced for people of color
- Those low income drivers who own tend to own older vehicles
- For some low income consumers, non-ownership alternatives such as public transit or subsidized car share programs may be an equitable way to share in benefits of transportation electrification

Question 4: What types of utility infrastructure will be needed/who will pay/cost recovery?

- Infrastructure to support public uses like electrification of public transit, school buses
- Multi-family housing
 - Regulators have recognized this need and allowed for utility investment (e.g., California, Florida, Massachusetts)
 - Public interest and equity principles support funding through sources other than utility investment where possible, and when utility investment is needed, mitigating rate impacts on low-income consumers
- Rate design options could include EV-only tariffs, amortizing investment costs over long periods of time, applying “used and useful” cost recovery principles, bill payment assistance programs

Question 5: What incentives . . . to encourage right-time charging and discharging?

- Time-varying and time of use rates – but consider needs of disadvantaged consumers
 - Some low income consumers conserve energy so well that it is difficult to shift load
 - May lack appliances such as central air conditioning, dishwashers, clothes dryers
 - May use medical equipment
 - More likely to work irregular schedules
- Possibilities include EV-only TOU rates (instead of whole house), one year “hold harmless” trial period, shadow billing, opt-in TOU rate
- AMI costs paid by participants

- Efficient siting of charging stations including fast charging
 - Data collection and transportation needs assessments in low income communities
- Utility involvement
 - AMI only if cost effective, and with consumer protections from remote disconnection for nonpayment
 - Stronger consumer protections to prevent disconnection will be needed as beneficial electrification moves forward

- Address underserved markets
 - Community mobility needs assessments can help identify the most beneficial types of programs for an underserved community, such as installation of chargers in multi-family housing, enhanced purchase and lease incentives, public transit, school buses, ride sharing, car sharing, scrap & replace, electric bike or scooter sharing, addressing digital divide issues

Please use the chat box to send us your questions and comments. You may want to **direct your question to a specific author**.

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- Berkeley Lab's Electricity Markets and Policy Group provides independent and unbiased technical assistance to state utility regulatory commissions, state energy offices, tribes and regional entities in these areas:
 - Energy efficiency (e.g., financing, evaluation, utility programs, behavior-based approaches, cost-effectiveness, administrative options, program planning and design, cost recovery)
 - Demand response (e.g., time-varying pricing), smart grid and grid modernization
 - Utility regulation and business models (e.g., financial impacts to utility and utility customers)
 - Renewable energy resources
 - Transmission and reliability
 - Resource planning
- DOE's Solar Energy Technologies Office, in partnership with Berkeley Lab, Pacific Northwest National Laboratory and National Renewable Energy Laboratory, provides analytical support for PUCs on topics related to distribution utility planning and regulatory, policy, programmatic and technology assessments of DERs.