



Future Electric Utility Regulation Report #11:
***Utility Investments in Resilience
of Electricity Systems***

April 30, 2019

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Berkeley Lab Electricity Markets and Policy Group

- About the series
- Webinar housekeeping items
- Four perspectives (15 min. each)
 - States – Lauren Azar, Organization of MISO States
 - Utilities
 - Randy Elliott, National Rural Electric Cooperative Association
 - Scott Aaronson, Edison Electric Institute
 - Consumers – Robert Mork, National Association of State Utility Consumer Advocates

- 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)



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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*
 11. *Utility Investments in Resilience of Electricity Systems (Today's topic)*
- Additional reports forthcoming: feur.lbl.gov
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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



Lauren Azar of Azar Law, LLC, is a former Wisconsin utility commissioner who also served as a senior advisor at the U.S. Department of Energy and as a partner at Michael Best and Friedrich LLP in Madison. The Organization of MISO States (OMS) developed its essay for the report with Lauren's assistance. OMS is a nonprofit, self-governing organization of representatives from each of the 17 regulatory bodies with retail jurisdiction over entities participating in the Midcontinent Independent System Operator, Inc.

Randy Elliott is regulatory counsel for the National Rural Electric Cooperative Association, the national service organization for America's electric cooperatives. He is responsible for matters at the Federal Energy Regulatory Commission. Before joining NRECA in 2017, he was regulatory counsel for the American Public Power Association and practiced law in Washington, D.C., focusing on utility regulation and related litigation. Earlier in his career, he was an appellate attorney at FERC and a law clerk for Judge Thomas P. Jackson at the U.S. District Court for the District of Columbia.

Scott Aaronson is Vice President, Security and Preparedness for Edison Electric Institute (EEI), which represents all U.S. investor-owned electric companies. Its members provide electricity for about 220 million Americans. Scott leads EEI teams focused on cyber and physical security, storm response and recovery, and associated regulatory policy. He also serves as the Secretary for the Electricity Subsector Coordinating Council, which serves as the primary liaison between senior government officials and industry leaders representing all segments of the electric power sector.

Robert Mork is Electric Committee Chair for NASUCA, whose members are designated by the laws of their jurisdictions to represent interests of utility consumers before state and federal regulators and in the courts. Robb has served the Indiana Office of Utility Consumer Counselor since 2000 as Deputy Consumer Counselor for Federal Affairs. He spends much of his time working for the effective development of electric wholesale markets under regional transmission organizations. He was active in the development of the Consumer Advocates of PJM States organization and formerly served as its president. He also is a representative of the Public Consumer Sector on the MISO Advisory Committee.

Questions the report addresses

1. What level and scope of resilience do we need and how much are we willing to pay?
2. Who's responsible for resilience, and how should other entities coordinate with utilities when there are mutual benefits?
3. What types of utility investments have the most impact on improving resilience, and how can utilities and regulators tell whether utility investments in resilience are impactful?
4. Should utilities take more proactive approaches to investments in resilience?
5. How can decisionmaking about resilience investments be improved?

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.

The report and webinar slides are posted at feur.lbl.gov

State Regulator Perspectives on Utility Investments in Resilience

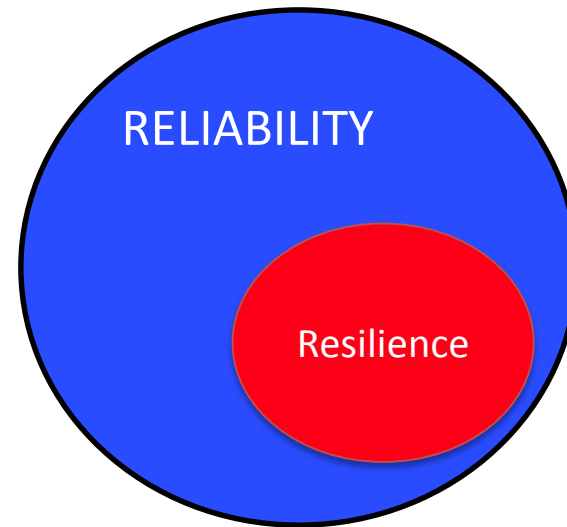
Lauren Azar, technical consultant
Organization of MISO States

- OMS – 17 regulatory bodies within MISO
- Majority approved submission, but not all
- NOTHING reflects positions of any OMS member
- “Range of preliminary ideas and actions” that may change in the future
- Focused outside Bulk Power System



Define Resilience

- Resilience = Reliability



- Resilience \neq Reliability



- Differentiator: Frequency and Magnitude of Event

Resilience Definition – for This Report

- Before a high-impact, low frequency (HILF) event, the ability to prevent or minimize impacts.
- During a HILF event, the ability to respond and adapt to impacts.
- After a HILF event, the ability to restore functionality of electric service.

How Much Resilience Is Needed?

- Unique answers for each state
 - Differing HILF events
 - Differing critical infrastructure
 - Differing priorities
 - Differing regulatory structures

- Planning:
 - Utility proposed
 - Rulemaking or generic docket

- Evaluation of Need (or What is Used and Useful)
 - Fact specific
 - Without standard or goal, will likely include:
 - Risk Analysis
 - Cost-Benefit Analysis

- Risk Analysis
 - Probability of HILF event(s)
 - ID Critical Infrastructure and Key Resources (CIKR)
 - Probability and magnitude of the consequences
 - Costs for steps that would:
 - Reduce probability of consequences
 - Minimize magnitude of consequences including response, adaption and recovery
- Cost/Benefit Analysis
 - Scope of damages evaluated will drive result

- Scope of Utility Planning
- Uncertainty of Need
 - Analysis is multivariate and probabilistic
- Cost Allocations
 - Cross-sector benefits
 - Benefits beyond service territories

- Distribution system
- Address multiple threats
- Address reliability and resilience
- Response, adaptation and recovery

- Broad: Resilience and Reliability
 - Grid modernization
 - Distribution planning – risk based
 - Inspections, Reporting and Monitoring
 - Enabling Statutes

- Targeted: Resilience Only
 - Cybersecurity

- Regularly scheduled process for changing threats
- Feedback loops for measuring effectiveness of investments
- Interstate and regional data access
 - Out-of-state threats and vulnerabilities
 - Regional and multi-sector resilience planning
- Share best practices

A Cooperative Perspective on Utility Investments in Resilience

Randolph Elliott

National Rural Electric Cooperative Association

- Power 56% of the nation's landmass
- Own and maintain 42% (2.6 million miles) of the nation's electric distribution lines
- Serve 42 million people at over 20 million homes, businesses, schools and farms in 47 states and across 88% of U.S. counties
- 831 distribution cooperatives (retail)
- 62 generation and transmission cooperatives (wholesale)

- No universal definition or established metrics
- FERC (2018): “The ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event.”
- NRECA working definition: *The ability to maintain normal or near-normal service or status through planning, prevention, mitigation, response, and recovery efforts.*

- Focus on end-use consumers (members)
- Consider more than infrastructure — people, processes, organization, coordination, and emergency response
- Consider more than reliability — economic and human consequences, surviving an event, ensuring vital public services
- Focus more on “black sky” events (HILF)
- *Key: local planning and local decisionmaking by the cooperative*

- Resilience investment decisions are part of co-op's overall long-term planning
- Co-op can take “all hazards” approach and mitigate multiple risks
- Co-op can use cost-benefit analysis with system and member-consumer data
- Co-op can devise equitable rate structures
- Resilience investment decisions driven by consequences for co-op member-consumers

- Widely dispersed among public and private entities
- Can be seen as feature, not bug — “strength through diversity” without federal standards
- Important for other entities to coordinate with utilities in planning, emergency response
- Existing coordination includes mutual assistance, equipment sharing
- Grid evolution and DER growth create new coordination challenges for utilities

- Many potential types of investments
- Many resilience investments require local decisions driven by local circumstances
- *Ex post* evaluation of resilience investments remains difficult
- Some good ways to enhance resilience:
 - Harden distribution against weather risks
 - Pursue a balanced resource portfolio
 - Enhance cybersecurity

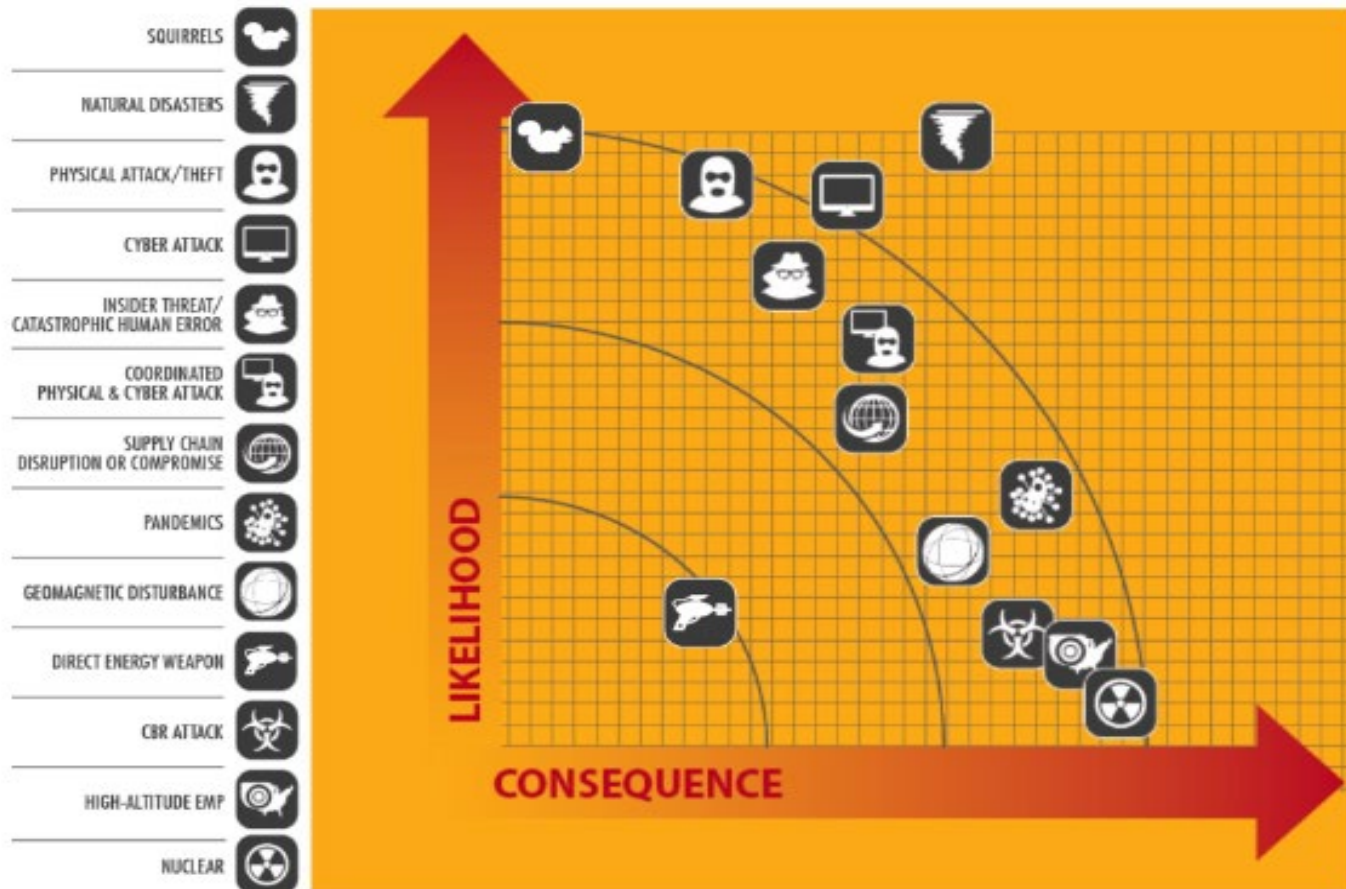
- Dispersed responsibility for resilience enables electric utilities, working with regulators and their communities, to be key decisionmakers on investments to enhance the resilience of their systems
- Co-ops are especially well-positioned in this regard, given their close relationships with their local communities
- Resilience can and should be a component of all utility investment decisionmaking

- Consensus resilience definitions and measurement criteria
- Better data
- Enable more analytical rigor in distribution and transmission planning
- Improve communication with regulators and communities about resilience issues
- Enable wholesale market design to incorporate resilience (e.g., fuel security, resource diversity, ERS)

Investor-Owned Electric Company Perspectives on Investments in Resilience

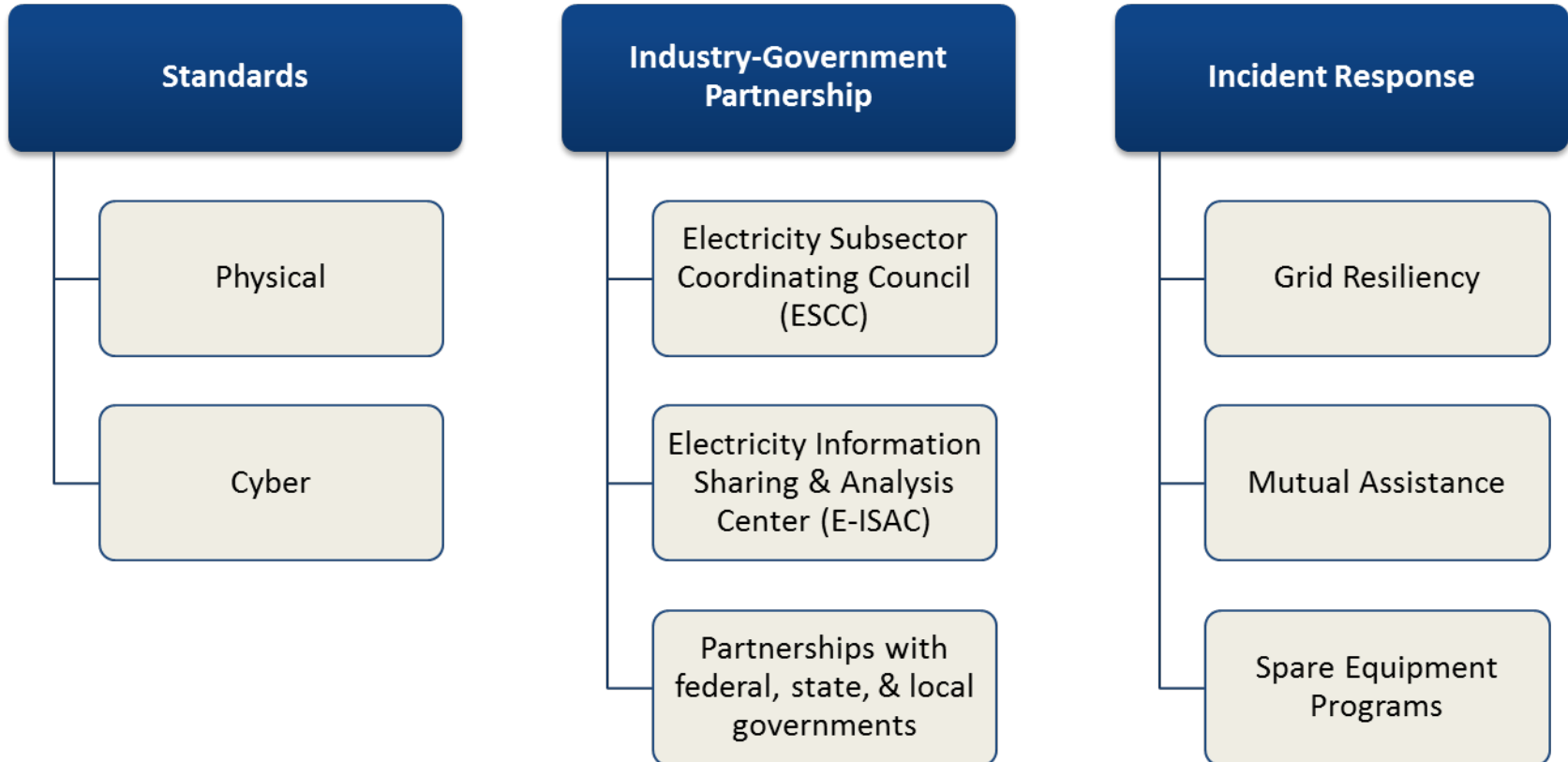
Scott Aaronson
Edison Electric Institute

The Threat Landscape



CBR – Chemical, Biological, Radiological
EMP – Electro-magnetic Pulse

Approach to Grid Resilience



Response & Recovery



- There is **no one-size-fits-all** approach
- Preference is be **threat agnostic** while managing consequences
- **Technology paradox**: improves situational awareness and operations, but also introduces new vulnerabilities
- Costs need to be considered to inform **risk-based investment**

Consumer Advocates' Perspectives on Utility Investments in Resilience

Robert Mork

National Association of State Utility
Consumer Advocates

National Association of Utility Consumer Advocates

- Members are designated by the laws of their respective jurisdictions to represent the interests of utility consumers before state and federal regulators and in the courts
- More than 55 utility consumer advocates in 43 states
- Across the board – restructured and vertically integrated, market and non-market, fossil fuels and renewables, east and west, north and south

A combined effort by a subcommittee of the NASUCA membership, with the help of our consultant Sheri Givens

- The views expressed reflect the diversity of thinking within our membership
- Particular views contained in the report do not necessarily reflect the opinion of NASUCA as a whole, or of any individual member
- Nor do they necessarily reflect the views of my office

- Different generation resource mixes as we go into the future and by region
- Different states have different regulatory regimes (vertically integrated versus restructured), RTO/non-RTO
- Transmission limitations
- Role in energy market design to appropriately value/incentivize desirable generation characteristics
- Cybersecurity is crucial

Resilience is a new way of looking at the grid, and each set of comments flagged this issue

- Partly about flexibility of the system to keep the lights on, partly about the ability to recover when they go out
- Includes an element of considering the unexpected; reliability tends to focus on more familiar sources of outages
- Needs to recognize that we can't afford to build a grid that is invulnerable to every imaginable contingency
- *Essential to recognize the overlap between resilience and reliability, otherwise customers will end up “double-paying”*

Question 1 – How Much???

What level and scope of resilience do we need and how much are we willing to pay?

- All of the comments recognize that one size does not fit all
- Need for an Analytical Framework
- We outline several possible approaches
- Keys are 1) probability, 2) impacts, and 3) costs/benefits
- Important to develop metrics, as well as cost-benefit analysis and quantification of the savings to customers
- Prioritizing different customer types?
- Resilience should not be a tacked-on cost, i.e. not recovered through abbreviated do-the-math trackers that do not provide an opportunity for substantive review.

Who is responsible for resilience, and how should coordination for mutual benefit take place?

- A wide range of entities involved, but distribution is primarily a state-level function which will vary regionally
- Utilities
- State utility commissions and legislatures
- Other state entities
- Local emergency response
- A state issue, but federal entities should participate

Question 3 – Best Impacts?

What types of investments have the most impact, and how can we tell which ones?

- Distribution investments are most impactful, including vegetation management
- Need for developing metrics, benchmarks and an analytical framework
- Need for prioritizing, thinking about how much resilience is desired, and for employing cost-benefit analysis
- Recognition that different customers may value resilience differently

Question 4 – How Proactive?

Should utilities take more proactive approaches to investments in resilience?

- Yes, but . . .
- The unexpected cannot always be predicted
- Resilience is not just about hardened assets, but also includes issues like workforce turnover and supply chain issues
- *As always, cost-benefit analysis, prudence, and affordability need to be part of the analysis*

How can decision-making about resilience be improved?

- Still a developing issue
- Involve stakeholders
- Analytical framework and metrics
- Improve communications between utilities and interested agencies
- Better integrated distribution planning
- *And, as always, we need an emphasis on cost-benefit analysis*

NASUCA's Bottom-Line Recommendations

- Define Resilience
- Analytical Framework & Evaluation Metrics
- Emphasize the Grid, Especially Distribution
- Assess Vegetation Management
- Comprehensive Financial Audits
- Understand and Distinguish among Different Consumer Needs
- Investigate Cost-Sharing and Ensure No “Double-Paying”
- Avoid Trackers

NASUCA's Bottom-Line Recommendations (cont.)

- Understand Cost-Benefit Relationships May Vary by Region
- Improve Communications and Coordination of Resilience Planning
- Include Consumer Advocates in Cybersecurity Discussions

NASUCA would very much enjoy working with DOE, its national laboratories and other stakeholders on these issues, especially in developing appropriate Analytical Frameworks and Evaluation Metrics.

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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