The Role of Innovation in the Electric Utility Sector

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Webinar logistics

► The report and slides are posted at https://emp.lbl.gov/publications/role-innovation-electric-utility.
► We’re recording the webinar and will post the recording at the link above.
► Because of the large number of participants, everyone is in listen mode only.
► Please use the Q&A box to send us your questions and comments any time during the webinar.
► Moderated Q&A will follow the presentations.
Berkeley Lab’s Future Electric Utility Regulation series

► Leading thinkers provide multiple perspectives on complex regulatory issues for the electricity sector to inform ongoing discussion and debate.
► The U.S. Department of Energy’s Grid Modernization Laboratory Consortium supports the report series.
► Reports, presentations, and recordings are posted at https://emp.lbl.gov/projects/feur/.
► Our Advisory Group includes utility regulators, utilities, consumer advocates, environmental and social justice organizations, and other experts.
### State utility regulators and state energy offices

<table>
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<tr>
<th>Role</th>
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<tbody>
<tr>
<td>Chair Ted Thomas</td>
<td>Arkansas Public Service Commission</td>
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<tr>
<td>Commissioner Jennifer Potter</td>
<td>Hawaii Public Utilities Commission</td>
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<td>Commissioner Abigail Anthony</td>
<td>Rhode Island Public Utilities Commission</td>
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<td>Commissioner Tremaine Phillips</td>
<td>Michigan Public Service Commission</td>
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<tr>
<td>Commissioner Letha Tawney</td>
<td>Oregon Public Utility Commission</td>
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<tr>
<td>Commissioner Sarah Freeman</td>
<td>Indiana Utility Regulatory Commission</td>
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<tr>
<td>John Lochner</td>
<td>New York State Energy R&amp;D Authority</td>
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### Utilities

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<tbody>
<tr>
<td>Jeff Lyng</td>
<td>Xcel Energy</td>
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<tr>
<td>Kristin Munsch</td>
<td>National Grid</td>
</tr>
<tr>
<td>Lon Huber</td>
<td>Duke Energy</td>
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<tr>
<td>Kerri Kirschbaum</td>
<td>Consolidated Edison</td>
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<tr>
<td>Delia Patterson</td>
<td>American Public Power Association</td>
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<tr>
<td>Digaunto Chatterjee</td>
<td>Eversource</td>
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<tr>
<td>Dwayne Pickett</td>
<td>ComEd</td>
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<td>Sam Whelan</td>
<td>Holy Cross Energy</td>
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### Energy justice advocates

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<th>Name</th>
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<tr>
<td>Chandra Farley</td>
<td>ReResolve Consulting</td>
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<tr>
<td>Jean Su</td>
<td>Center for Biological Diversity</td>
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### Regional grid operators and transmission developers

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<th>Name</th>
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<tr>
<td>Asim Haque</td>
<td>PJM Interconnection</td>
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<tr>
<td>Jordan White</td>
<td>GridLiance</td>
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### Non-governmental organizations, academics and other experts

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Ralph Cavanagh</td>
<td>NRDC</td>
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<tr>
<td>Rich Sedano</td>
<td>Regulatory Assistance Project</td>
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<tr>
<td>Janice Beecher</td>
<td>Institute of Public Utilities, Michigan State University</td>
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<tr>
<td>Chris Markuson</td>
<td>BlueGreen Alliance</td>
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<tr>
<td>Sally Talberg</td>
<td>Consultant</td>
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<tr>
<td>Steve Corneli</td>
<td>Strategies for Clean Energy Innovation</td>
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### Utility consumer advocates

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<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Bob Jenks</td>
<td>Citizens Utility Board of Oregon</td>
</tr>
<tr>
<td>Michele Beck</td>
<td>Utah Office of Consumer Services</td>
</tr>
<tr>
<td>Steve Kihm</td>
<td>Wisconsin Citizens Utility Board</td>
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Future Electric Utility Regulation Series

1. Distributed Energy Resources (DERs), Industry Structure and Regulatory Responses
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
10. The Future of Transportation Electrification
11. Utility Investments in Resilience of Electricity Systems
12. Advancing Equity in Utility Regulation
13. The Role of Innovation in the Electric Utility Sector

Other reports funded by this project:
- State Performance-Based Regulation Using Multiyear Rate Plans for U.S. Electric Utilities
- Renewable Energy Options for Large Utility Customers
- All-Source Competitive Solicitations: State and Electric Utility Practices

feur.lbl.gov
Introducing The Role of Innovation in the Electric Utility Sector (1)

► The report provides consumer, labor, utility, third-party provider, and clean technology consultant perspectives on electric sector innovation in the context of state regulation of utilities.

- National Association of State Utility Consumer Advocates (NASUCA) is an association of 59 utility consumer advocates in 44 states and the District of Columbia, Barbados, Puerto Rico, and Jamaica. NASUCA 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.

- BlueGreen Alliance unites labor unions and environmental organizations to solve today’s environmental challenges in ways that create and maintain quality jobs and build a clean, thriving, and equitable economy.

- Institute for Electric Innovation focuses on advancing the adoption and application of new technologies that will strengthen and transform the power grid. IEI's members are the investor-owned electric utilities that represent about 70% of the U.S. electric power industry.

- Sunrun is the largest residential solar and battery storage company in the United States.

- Build Edison offers advisory and consulting solutions and services to enable startups to transition their technologies to commercial growth and benefit both customers and investors.

► Report authors are NASUCA with assistance from Tim Woolf and Ben Havumaki, Synapse Energy Economics; Kevin Lee, BlueGreen Alliance; Adam Cooper, Lisa Wood and Mike Shuster, Institute for Electric Innovation; Anne Hoskins, Christopher M. Worley, and Keyle Horton, Sunrun; and Kristin Barbato, Barbara Kates-Garnick and Max McCafferty, Build Edison.
Energy utilities on average invest a low percentage of net revenues in R&D compared to similarly situated industries.

Utility regulatory advances can speed innovation in the electric utility sector.

To achieve state targets for clean energy and greenhouse gas emissions, some PUCs are exploring new approaches to spur innovation.

- **For utilities**, regulatory and marketing flexibility, increased funding for demonstration projects, and performance-based ratemaking including multi-year rate plans
- **For third parties**, ways to provide utility customers with innovative products and services directly

Tim Tessier is a Utility Specialist with the Iowa Office of Consumer Advocate where he has worked for the past two years. Previously, Tim worked in various roles in rates, regulatory relations, and emergency preparedness at MidAmerican Energy Company for almost 20 years and then at ITC Midwest for 5 years in the role of Manager, Regulatory Strategy. Tim has Bachelor and Master of Science Degrees in Economics from Illinois State University with a concentration in electricity, natural gas and telecommunications regulation.

Chris Markuson is the Western States Director for BlueGreen Alliance (BGA). He leads the program and policy work of BGA's western states team. His work focuses on identifying and implementing policies and projects that will help build the clean energy economy, reduce emissions, create family-sustaining jobs, and support a just transition for workers and communities. Chris has more than 25 years of experience in local government and the private sector. Previously, he served as Director of Economic Development, GIS and Energy for Pueblo County, Colorado.

Adam Cooper is Senior Director of Research & Strategy at Institute for Electric Innovation. He publishes articles and issue briefs that assess how technology, public policy, and customer expectations are shaping an increasingly clean and innovative electric power sector. Prior to joining IEI, Cooper worked at the Center for Automotive Research and the White House Office of Management and Budget's Energy Branch and was an Economist at Regional Economic Models, Inc.
About the Presenters (2)

► **Anne Hoskins** serves as Chief Policy Officer of Sunrun. She leads the company's policy and market development efforts to expand access to solar energy and storage and to modernize the electric grid. Hoskins previously served as a Commissioner on the Maryland Public Service Commission and was a member of the NARUC Board of Directors and Chair of the NARUC International Relations Committee. Prior to joining the Maryland Commission, she led federal and state policy and advocacy for Public Service Enterprise Group, served as a Visiting Research Scholar at Princeton University, and was Senior Regulatory Counsel at Verizon Wireless.

► **Max McCafferty** joined Build Edison in 2018 with a background in clean energy innovation, commercializing energy technologies, and quantitative financial analysis. Serving as Chief Operating Officer, he provides Build Edison’s clients with strategies to develop energy innovation programs, scale cleantech solutions, and analyze potential investment opportunities. McCafferty focuses on multiple sides of energy solutions and innovation, developing innovation programs and strategies as well as enabling energy startups to scale. He has worked with clients of all sizes, spanning early stage cleantechs, corporations, utilities, investors, and governments.
Protecting Consumers in a Period of Rapid Transformation

National Association of State Utility Consumer Advocates
Presented by Tim Tessier, Iowa Office of Consumer Advocate

This essay represents input from many NASUCA members but does not represent the view of any specific member.
Technology & Policy Drivers of Innovation

Technologies
- Declining costs and improved performance of renewable resources
- Increasing availability and declining cost of distributed energy resources (DERs)
- Expanding grid modernization technologies
- Expanding storage technologies
- Expanding transmission, including long-distance DC lines

Policies
- Increasing renewable portfolio standards
- Increasing regulatory interest in grid modernization
- Legislative drivers:
  - Decarbonization
  - Cybersecurity
  - Resilience
  - Energy equity
  - Customer data and privacy
  - Wholesale market developments
  - Economic development and jobs
The Electric Utility of the Future

Electricity Consumption
- DERs will change consumption patterns, both increasing and reducing use
- Customers will be called upon to reduce peak demands
- Peak demands will shift to different periods

Electricity Pricing
- AMI will increase opportunities for TOU pricing
- Customers will be offered multiple pricing options
- Utilities will seek revenue stability
- Cost allocation will change to reflect different cost causation

Planning, Construction & Operation of the Grid
- Planning will better integrate generation, transmission, distribution, and grid modernization
- Utilities will increase use of non-wires alternatives
- Utilities will need to plan for more third-party providers

Markets & Market Structures
- New and expanded wholesale energy markets will enable increased access to competitive generators
- Markets will allow more access from DERs
- Markets will lead to new revenue streams for utilities
# Consumer Advocacy Under Innovation

## Consumer Representation
- Consumer advocates and other stakeholders should be mindful of both the opportunities and the risks associated with electricity sector innovations
- As the industry becomes more complex, consumer advocates will require increased funding and expertise
- Consumer advocates will expand into more forums (e.g., ISOs, RTOs, FERC, legislatures, civil courts)

## Rising Costs
- Many innovations can lead to higher electricity costs
- Utility investments will require increased review from consumer advocates

## Cost Shifting
- As consumption patterns shift, so too will cost causation
- Need to ensure that customers who receive benefits pay for them

## Energy Equity
- Increased protection of disadvantaged or vulnerable customers
- Might require creating additional customer classes or subclasses

## Risk Shifting
- Innovation can lead to stranded assets
- New regulatory approaches to stranded assets will be needed

## Customer Access & Engagement
- Not all customer will be able to, or will want to, adopt innovative technologies
- Those who can’t, or don’t, will have fewer options to reduce bills
- Increased customer outreach and education will be important
<table>
<thead>
<tr>
<th>Innovations in Electric Utility Regulation (1)</th>
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| DERs  | • Increased emphasis on cost-effectiveness and benefit-cost analysis  
      | • Alternative funding sources for DERs  
      | • More equitable compensation mechanisms for distributed generation  
      | • Improved operational awareness and controls to manage DERs  
      | • Better information for utility planners, customers, and third parties  |
|       | **Cost Allocation,**  
|       | **Rate Design, Pricing**  
|       | • Expanded rate design options, and related improvements to cost allocation  
|       | • Expanded use of time-varying rates  
|       | • Increased unbundling of generation, transmission, and distribution pricing  
|       | • More detailed segmentation of customers into subclasses or alternative groupings  |
| PBR   | • Longer periods between rate cases in multi-year rate plans (MRPs)  
|       | • Better options for recovering capital expenditures and mitigating capital bias  
|       | • Expanded use of metrics, targets, and performance incentive mechanisms (PIMs), especially regarding technical, economic, regulatory, and market innovations  
|       | • More holistic integration of MRPs and PIMs  |
| Enhanced Integrated Planning | • Better integration of DER, grid modernization, distribution, transmission, and generation planning practices  
|       | • Better integration of utility planning with ISO/RTO planning  
|       | • Better planning to meet evolving environmental (especially GHG) requirements  
|       | • Better coordination between planning, ratemaking, and cost recovery  |
## Innovations in Electric Utility Regulation (2)

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<th>Improved Treatment of Stranded Costs</th>
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<td>• More efficient, direct, and timely review of major utility investments</td>
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<tr>
<td>• Increased regulatory pre-review of major utility investments</td>
</tr>
<tr>
<td>• Clearer regulatory guidance on what qualifies as stranded costs</td>
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<tr>
<td>• Better approaches for addressing stranded costs that result from</td>
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<td>o <em>Unreasonable</em> or <em>imprudent</em> utility decision making</td>
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<tr>
<td>o <em>Reasonable</em> and <em>prudent</em> utility decision making</td>
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<td>o Federal or state mandates</td>
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<th>More Attention to Energy Equity</th>
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<tr>
<td>• Expanded stakeholder input and participation opportunities</td>
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<tr>
<td>• Better understanding of, and attention to, energy burden and affordability</td>
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<tr>
<td>• Improved methods for allocating benefits to disadvantaged customers</td>
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<tr>
<td>• More detailed and transparent data on utility performance and treatment of disadvantaged customers</td>
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<td>• Better utility DER programs to serve disadvantaged customers</td>
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<th>Policies to Address Climate</th>
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<tr>
<td>• Increased reliance upon carbon-free resources and DERs</td>
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<tr>
<td>• Improved coordination and planning for decarbonization initiatives</td>
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<tr>
<td>• Increased requirements for resilience and storm hardening</td>
</tr>
<tr>
<td>• Increased efforts to capture carbon emissions</td>
</tr>
<tr>
<td>• Improved treatment of stranded costs</td>
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A Labor Perspective on Innovation to Meet Climate Goals for the Electricity Sector

Chris Markuson
BlueGreen Alliance
The scale of clean energy build out as an opportunity for local communities and workforces

Evolution of wind and utility-scale solar projects, E+ Base

As of end 2020 (modeled year)

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<tr>
<th></th>
<th>Wind</th>
<th>Solar</th>
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<tr>
<td>Capacity installed (TW)</td>
<td>0.15</td>
<td>0.07</td>
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<tr>
<td>Land used (1000 km²)</td>
<td>Total: 58</td>
<td>1.08</td>
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<tr>
<td></td>
<td>Direct: 0.6</td>
<td>0.97</td>
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Note: Site capacity factors are reflected in solar capacity (0.92 for direct).
The experience of a local community matters a great deal

- Public support for infrastructure projects in electricity generation, transmission and distribution is critical to getting projects built and on-time to meet climate goals.

- Communities that perceive clean energy as a net job loss may be more resistant to new infrastructure.

- 36 states now have some form of local ordinance restricting renewable development.

- Positive public support for any kind of local infrastructure project is largely a product of meaningful participation in the process and local benefits to the community.

- Truly local workforces can provide a vital link between local communities and clean energy development.
The decline of utility workforces

- Job loss has occurred not just in coal plants but across transmission and distribution as well.
- Use of contracted workers is on the rise.

Regulatory pathways

► PUC evaluation and review of regulated utility staffing levels as part of existing authorities to ensure reliable customer service
► Performance standards that include workforce metrics for staffing levels, wages, benefits
► Transparency requirements for use of contracted workers

Legislative pathways

► Where needed, expanding PUC authority to include workforce development, local economic impact
► Policies that prioritize local hiring, prevailing wages, and project labor agreements that include career pathways for disadvantaged workers for most jobs in generation, transmission, distribution
U.S. Electric Companies Are Innovating to Provide the Solutions and Options that Customers Want

Adam Cooper
Institute for Electric Innovation
About The Institute for Electric Innovation (IEI)

► IEI promotes the sharing of information, ideas, and experiences among regulators, policy makers, technology companies, thought leaders, and the electric power industry.

► IEI’s Technology Partner Roundtable
  ■ Brings together senior executives from ten of the industry’s technology partners committed to working with electric companies to develop and deploy the next generation of customer solutions.
Innovations for Residential and Commercial Customers

► Innovations in providing services and solutions to residential customers with technology and data analytics
- Advance energy management and clean energy goals
- Effectively transition customers onto time-varying rates
- Expand rate, billing, and payment options to meet customer needs

► Innovations in providing carbon-free energy solutions to corporate customers
- FPL’s SolarTogether Program
- Georgia Power’s Customer Renewable Supply Procurement Program
- AES-Google 24/7 Carbon Free Energy Solution
- NV Energy’s Solar/Storage Solution for Google
- Southern California Edison’s Clean Energy Optimization Pilot

“Will it be fast enough to satisfy the evolving expectations and needs of customers? That will depend on the pace of regulatory change”
Examples: Innovative Solutions and Services for Residential Customers Provided by Electric Companies (1)

**DTE Insight App** offers personalized insights on bill and budget management, advanced rate coaching, and disaggregated load management for 300,000+ households. Customers are engaging with the DTE Insight App 14 times per month for more than 2 minutes at a time.

**APS’ online marketplace** supports pre-enrollment of smart thermostats for customers which can increase program adoption rates by 200 to 300 percent. 37,000+ residential customers reliably provide 40 MW of flexible load.

**Georgia Power** offers multiple TOU rates, demand-based rates, and guaranteed fixed bills to provide residential customers more choice, certainty, and control over their energy bills. Today, 50% of customers are opting for these “non-standard” rates vs. 90% of customers 5 years ago.
Examples: Innovative Solutions and Services for Residential Customers Provided by Electric Companies (2)

PGE Peak Time Rebate program has enrolled nearly 100,000 customers since launching at scale in 2019. Unlocking AMI data to zero in on individual value propositions for every customer, leading to a range of personalized programs.

PG&E’s Opt-Out TOU Rate Plan leveraged digital communications and online tools to support 2.5 million customers transition onto new rates. The rate comparison tool helps customers explore future usage scenarios for behavior changes and major energy purchases, such as electric vehicles.
Examples: Carbon-Free Energy Solutions for Large Customers Provided by Electric Companies

SCE Clean Energy Optimization Pilot is a first-of-its-kind, performance-based, greenhouse gas (GHG) reduction program. Customers have a portfolio of options including energy efficiency, demand response, on-site renewables, clean transportation, & storage to reduce GHGs while lowering costs.

NV Energy and Google to supply a data center with 350 MW of solar and 280 MW of battery storage, including a capacity-sharing mechanism in which the cost of battery storage facilities is shared between NV Energy and Google. Battery power will be dispatched for all customers during peak summer evening hours.

“CFE solutions require, in part, some amount of 24/7, zero-carbon generation. Today nuclear energy provides that generation.”

“Transition from annual matching of renewable or carbon-free energy purchasing to hourly matching of customer load using a diverse set of regional, carbon-free resources.”

“In the future, other resources to consider include hydrogen, natural gas with carbon capture and storage, advanced wind and solar energy systems, and long-duration storage.”
Innovating the Electricity System from the Hearing Room to the Edge of the Grid

Anne E. Hoskins, Sunrun
Christopher M. Worley, Sunrun
Climate Challenges Demand Bold Regulatory Action

► Our electric grid is overstressed and not up to supporting the urgent need for widespread electrification. Extreme weather events repeatedly expose the fragility of the grid.

► Many utilities are not delivering resilience and reliability — not moving fast enough to decarbonize.
  ■ Low-income and disadvantaged communities are most at risk.

► A rapid, equitable, and orderly transition away from fossil fuels will require regulatory leadership and diversification from centralized power generation and long-distance transmission of power.

► Some regulated utilities view onsite solar as a competitive threat due to eroding retail sales.
  ■ Proposing new fixed fees or lower compensation rates for distributed generation
  ■ Reducing customer value proposition of DER investments

► Regulators should change utility incentives and update rate designs to support DER adoption and two-way flows of electricity.
  ■ Realign utility incentives so that onsite generation is embraced as a resource to meet strong climate, affordability and equity goals
  ■ Good examples from Vermont and Hawaii
Vermont—Green Mountain Power

- **GMP Solar Map** visualizes circuit-level hosting capacity, guiding DER developers away from grid constraints

- **GMP Multi-Year Regulation Plan** stabilize rates and decouples financial interests from electricity sales
  - Fixes non-power costs (including infrastructure and O&M costs) to discourage excessive capital expenditure

- **Innovative Pilots Program** provides a quick pathway to implement pilots without regulatory delays
  - Projects costing less than $5 million can be implemented with 15-day advance notice

- Nation’s first **Bring Your Own Device (BYOD)** program for behind-the-meter batteries
  - Upfront incentive in exchange for battery usage data and access to the stored energy to reduce peak demand
  - Competitive alternative allowed
► **Integrated Grid Planning** docket takes holistic approach to address the total system needs, including reliability, resilience, and affordability
  - RESOLVE capacity expansion modeling tool publicly available

► **Performance-Based Regulation** established multi-year rate plans, revenue decoupling and earnings sharing, and performance mechanisms

► **Distributed Energy Resource Tariffs** provide bill credits for solar-plus-storage customers to export energy during the system peak

► **Emergency Demand Response Program** to address the retirement of a coal power plant
  - Compensation for remote emergency dispatch
  - Streamlined process for new demand response programs
Recommendations

Near-term Solutions

► Reduce Barriers to Innovation — create regulatory sandboxes for pilot programs
► Foster a DER Market — ensure aggregated DERs (“virtual power plants”) can provide grid services
► Incentivize DERs for Resilience — build public purpose microgrids
► Facilitate Service Upgrades and Interconnection — so customer-sited upgrades can be completely quickly
► Promote Transparency and Accountability — ensures greater public participation and likely improves equity of outcomes

Long-term Solutions

► Set a Cap on Non-power Costs — remove incentives for overinvestment; will better stabilize customer bills
► Share Program Savings with Utilities — ensure benefits accrue to both customers and utilities
► Establish Performance-based Regulation — reward utilities for exemplary performance on desired goals and outcomes
► Consider Decoupling Revenue from Retail Sales — realign utility shareholder incentives away from electricity sales
Scaling Utility Innovation: Identifying a Path to Action

Max McCafferty
Build Edison
Introduction

► Energy and climate goals are accelerating around the country.
  ■ Massachusetts, Maine, New York, California, and 14 other states have developed substantive clean energy and climate action policies, linked with strict timelines.

► Simultaneously, energy infrastructure is failing to cope with major storms, and strain on the grid will continue to mount as we further electrify energy usage, energy resources become increasingly decentralized, and variable renewable resources continue to grow.

► Efficiently scaling innovative clean energy solutions is critical to meeting these goals and to cope with rapidly evolving needs of the grid.
  ■ IEA: “Without a major acceleration in clean energy innovation, net-zero emissions targets will not be achievable.”*

*https://www.iea.org/reports/clean-energy-innovation?mode=overview

Source: National Regulatory Research Institute. November 2021
Utilities Are Underutilized In Scaling Innovative Solutions

- Utilities are a critical component of our electrical infrastructure and have a leading role to play in enabling innovation in the transition to a clean energy future.
  - They have access not only to the physical assets of the grid, but data on customers and, in the case of vertically integrated utilities, generation and transmission data.

- This understanding of the technical demands of the grid as well as the demands of customers and grid assets means that utilities are central in identifying, deploying, and scaling necessary innovative energy solutions.
  - No third parties have the combined access, resources, expertise, and reach to achieve the same level of impact.

- Yet in the process of identifying and deploying new solutions, scaling has been largely neglected by both utilities and regulators.
  - First, innovative solutions to energy and grid challenges are often trapped in pilot after pilot with no clear path to scaled deployment.
  - Second, regulators broadly do not allow sufficient opportunity for utilities to recover the costs of scaling of new technologies.
The Gap Between Proven and Scaled: Timeline Doesn't Keep Pace

Historically electric utilities have struggled to effectively shepherd solutions from demonstration projects to broad deployment.

One example of this challenge is time of use (TOU) rates.

- Between 1975 and 2020, there were four generations of pilots for TOU rates.
- It took 43 years and 4 generations of pilots to achieve only 4% residential customer penetration for TOU rates by 2018.*

Timelines for grid modernization projects are similar.

- The timeline for approving utility grid modernization projects for innovative solutions is 1 year and 1 month on average and can be as long as 3 years.
- Furthermore, the average project takes five to eight years to complete from the initial filing.

Why This Gap Exists: Innovation Conflicts with Current Utility Models

► Fear of Failure
- Fear of failure and economic punishment for failure prevent utilities from investing in pilots and new technologies.

► Outdated Incentivization of Utilities
- A “failed” pilot is still used and useful, as it can provide valuable insights into the technology and future pilots. Investments in pilots should be treated as such when it comes to utility cost recovery.
- Regulators do not prioritize innovation or long-term outlooks on technology investments, and utilities generally do not have sufficient opportunities to recover the costs of scaling of new technologies.

► Utility Culture
- Innovation is siloed within utilities, making it difficult to efficiently evaluate and scale innovation for the core business. Identifying and incorporating innovative solutions needs to be integrated as a central responsibility of utilities.

► Incomplete Innovation Programs
- While capital and engagement for pilots and demonstration stages for innovative utility technologies are increasing, there is a lack of focus on processes and investment for successful pilots to efficiently scale technologies for broad deployment.
Regulatory Opportunities: Incentives for Utilities to Scale From Pilots

► Utility Incentivization

■ If the goal is utility investment in scaling solutions to meet state energy and climate goals, utilities need to have the opportunity to make money doing it, above their base rate of return.

■ This might mean allowing utilities to own and operate certain assets, allowing them to earn a higher return on certain investments, or establishing performance-based incentives. Different technologies will require different approaches.

► Expanding Key Performance Indicators (KPIs)

■ Investments in grid infrastructure need to support not only the needs of customers and the grid today, but future needs as well. Methodologies for assessing reliability, resilience, affordability, and functionality ought to be expanded.

► Reliability

■ Technologies which are not yet scaled but would increase the reliability of the future grid should be given the same consideration as investments which would increase reliability today.

► Prudence

■ The perspective of future requirements of customers and the grid should be considered in determining prudence.

■ Flexibility and continued reliability of the grid must be considered with expansion of DER and electrification of heating and transportation.

“It was a golden cage, and [utilities] were protected by regulations focused solely on anachronistic KPIs around reliability and access.”
- Senior NY Policy Advisor
Innovation Programs: How To Scale From Successful Pilots

► Analysis of innovation programs across states finds numerous opportunities to pilot technologies, but limited support to scale successful technologies for broad adoption.
  ■ Often, once solutions are piloted and evaluated, the pilot program ends.
  ■ Pilots typically have no predefined steps and channels to scale if successful.

Scaling solutions needs to become a core pillar of innovation programs and should be included in planning from the start.
  ■ The goal of every energy infrastructure pilot program should be identifying which technology solutions ought to be scaled quickly to support the utility's efforts towards meeting state energy and climate goals.
  ■ Scaling and next steps for successful pilots and identifying utility and government resources that can be leveraged to scale successful solutions in advance should be required components of pilot program design.

► A central reason for the gap between pilot programs and scaling efforts lies in the fundamentals of utility culture.
  ■ Pilot programs and scaling are separated within utilities, often by design.
  ■ Utilities can evolve internally to overcome this challenge by bringing experts and diverse problem-solvers to the table who integrate across divisions and departments.

“The issue that is consistent across different countries and different states is that innovation is often conducted separately from the core business of the utility. For example, if you want to build a new type of control system, the people who are running the control systems don't have the time or capacity to engage with the innovation project. This means you are working with an innovation team or an R&D team who are acting as proxies, attempting to represent what the utility needs. As a result, technologies can get stuck in this 'innovation' world, while not actually engaging with the ultimate end customer of the utility. Solutions going through pilots might think they successful, but once they move beyond pilots to the core utility teams, they often find out that in reality they are not making the progress towards deployment that they thought.”

- Grid Technology Cleantech Founder
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