CCIF

CRITICAL CONSUMER ISSUES FORUM

Security & Resilience at the Distribution Level

Integrating Technologies at the Grid Edge











July 2018

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INTRODUCTION

Investments in distribution grid security and resilience measures can reduce the impact of, and facilitate recovery from, major incidents such as storms or cyber attacks; however, the level of such investment must be carefully considered in light of both the benefits and costs to the system and to electric customers. Additionally, technologies such as the Internet of Things (IoT), microgrids, and energy storage increasingly are being integrated into the distribution grid. These technologies may enhance security and resilience at the distribution level, but they also may present challenges. Leadership of the Critical Consumer Issues Forum (CCIF) recognized a need for its three core groups—state regulators, consumer advocates, and energy companies—to come together to compare experiences, share lessons learned, and propose ideas concerning these complex issues and their potential impacts on electric customers and the energy grid.

In response, CCIF formally began its dialogue on these issues in November 2017 in Baltimore during its annual Kickoff Forum. Over a series of spring summits that followed, participants shared a great deal of information and resources, much of which is featured in this report. Summit participants also worked together to develop the 25 consensus principles that we hope will spur additional dialogue and other positive outcomes in the local, state, and federal arenas.

The principles and featured information are divided into the following three sections of the report:

- *Security – Physical and Cyber*. In the first section, principles recognize that the increasingly interconnected distribution grid must be secured sufficiently—ideally to prevent, but in any event, to recover from, physical and cyber security incidents.
- *Distribution Grid Resilience*. In this section, CCIF highlights important considerations in the process of making the distribution grid more resilient.
- *Integrating Technologies at the Grid Edge*. While several past CCIF reports have touched upon integration issues, particularly with respect to distributed energy resources, this report was developed with a broader array of energy technologies, applications, and services in mind. The principles in this section call for balanced regulatory and policy approaches that allow benefits to be realized while customers are adequately protected and the grid is reliably and securely maintained.

CCIF trusts that the valuable perspectives reflected within this report will prove instrumental in building upon these ideas through further constructive dialogue among state regulators; consumer advocates; energy companies; leaders at the local, state, and federal levels; and the broader stakeholder community. Given the continuing importance of issues pertaining to resilience, security, and the integration of technologies at the distribution grid's edge, CCIF encourages—and may initiate—additional discussion related to these topics in the future.



At CCIF's 2017 Kickoff Forum in Baltimore, New Jersey consumer advocate Stefanie Brand, New York Commissioner Diane Burman, North Carolina consumer advocate Chris Ayers, EEI's Scott Aaronson, and Duquesne Light's Shelby Linton-Keddie explore regulatory and policy considerations concerning distribution grid resilience and security.

SECURITY – PHYSICAL AND CYBER

To keep pace with new technologies and threats, the increasingly interconnected distribution grid must be secured in new ways to prevent and to recover from security incidents. Participants recognize that such incidents can have a detrimental impact on grid reliability and disrupt the flow of power to customers.

Consensus Principles

1. Security of the energy grid must be a top priority. While new technologies may create new choices and benefits for customers, they also may introduce vulnerabilities that could impact the safety, reliability, and resilience of distribution networks.
2. As new technologies are integrated into the distribution system and as physical and cyber threats evolve, energy companies and other energy providers must deploy sufficient resources and must develop strategies to anticipate and to respond to such threats.
3. Energy companies must understand the relevant physical and cyber security threats to distribution systems and address those threats, taking into account the benefits, costs, and risk probabilities.
4. Energy companies, other energy providers, technology companies, regulators, governmental agencies, and other applicable security professionals should collaborate to ensure the security of the distribution system.
5. Commissions should understand the relevant physical and cyber security issues in their jurisdictions.
6. Energy companies proactively should assist state consumer advocates and state commissions in understanding the relevant physical and cyber security risks in their jurisdictions.
7. Because not all incidents can be prevented, energy companies and other energy providers should be prepared to respond to—and recover from—physical and cyber security incidents (e.g., supplemental operating strategies and mutual assistance).
8. Government agencies, energy companies, vendors, and service providers should improve actionable and timely information sharing regarding incidents, responses, and recovery efforts to prevent cybersecurity incidents from spreading.
9. Commissions and other organizations in receipt of sensitive system information should take appropriate steps to ensure the protection of this sensitive information and should have appropriate internal security protocols to avoid unnecessary risks.

Types of Security:

- **Cybersecurity**

  From National Renewable Energy Laboratory (NREL) *Guide to Cybersecurity, Resilience, and Reliability for Small and Under-Resourced Utilities*, January 2017:

  > Cybersecurity: the ability of the grid to resist, respond to, and adapt to attacks on its computer systems.

- **Physical Security**

  From Department of Energy (DOE) *Quadrennial Technology Review: An Assessment of Energy Technologies and Research Opportunities*, September 2015:

  > Physical security measures include activities that can harden assets, improve situational awareness, deter and respond to man-made threats, and mitigate risks.

Resources

National Association of Regulatory Utility Commissioners (NARUC) Security Resources:

- The NARUC Center for Partnerships & Innovation is developing a six-part Cybersecurity Manual, which is expected to be released in December 2018.
- *Cybersecurity: A Primer for State Utility Regulators, Version 3.0*, January 2017.
- *Resolution Regarding Cybersecurity*, February 2010.
- Critical Infrastructure Committee – Provides state regulators a forum to analyze solutions to utility infrastructure security and delivery concerns, as well as to share best practices and collaborate among themselves and their federal counterparts. Serves as a resource on state commission efforts on security (e.g., Commissions that support cybersecurity offices or functions, such as the examples of Colorado, Illinois, and Pennsylvania that were highlighted by CCIF participants).

Edison Electric Institute (EEI) Security Resources:

- *Electric Distribution System Cybersecurity Is Critical in Today's Interconnected Society*, April 2018.
- *Protecting the Energy Grid for Customers*, March 2018.
- *Grid Security: Key Messages*, March 2018.
- *Grid Security: Protecting Against Electromagnetic Pulses (EMPs) and Geomagnetic Disturbances (GMDs)*, March 2018.

Electricity Subsector Coordinating Council (ESCC) Security Resources:

- Electricity Subsector Coordinating Council (ESCC) – Serves as the principal liaison between the federal government and the electric power industry, with the mission of coordinating efforts to prepare for, and respond to, national-level disasters or threats to critical infrastructure.
- ESCC Cyber Mutual Assistance Program – Serves as the mechanism for the electric power and natural gas industries to coordinate with the government and provide mutual assistance to address cyber threats.
- ESCC Ransomware Preparedness – Considerations for energy companies to reduce the risk and associated impact of ransomware (developed in collaboration with the American Gas Association, Downstream Natural Gas ISAC, and Electricity ISAC).

U.S. Department of Energy (DOE) Security Resources:

- DOE Cybersecurity Web Page
- *Multiyear Plan for Energy Sector Cybersecurity*, March 2018.
- *Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure*, May 2018.

National Institute of Standards and Technology (NIST) Security Resources:

Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1, April 2018. This report features the following Cybersecurity Framework Core Functions:

1. Identify – Develop the organizational understanding to manage cybersecurity risk to systems, assets, data, and capabilities.
2. Protect – Develop and implement the appropriate safeguards to ensure delivery of critical infrastructure services.
3. Detect – Develop and implement the appropriate activities to identify the occurrence of a cybersecurity event.
4. Respond – Develop and implement the appropriate activities to take action regarding a detected cybersecurity event.
5. Recover – Develop and implement the appropriate activities to maintain plans for resilience and to restore any capabilities or services that were impaired due to a cybersecurity event.

Center for Internet Security (CIS) Security Resources:

The following CIS Top 20 Controls (Version 6) are a prioritized set of actions to protect organizations and data from known cyber attack vectors:

Basic CIS Controls

1. Inventory of Authorized and Unauthorized Devices
2. Inventory of Authorized and Unauthorized Software
3. Secure Configurations for Hardware and Software
4. Continuous Vulnerability Assessment and Remediation
5. Controlled Use of Administrative Privileges
6. Maintenance, Monitoring, and Analysis of Audit Logs

Foundational CIS Controls

7. Email and Web Browser Protections
8. Malware Defenses
9. Limitation and Control of Network Ports
10. Data Recovery Capability
11. Secure Configurations for Network Devices
12. Boundary Defense
13. Data Protection
14. Controlled Access Based on the Need to Know
15. Wireless Access Control
16. Account Monitoring and Control

Organizational CIS Controls

17. Security Skills Assessment and Appropriate Training to Fill Gaps
18. Application Software Security
19. Incident Response and Management
20. Penetration Tests and Red Team Exercises

Other Security Resources:

- National Governors Association (NGA) Resource Center for State Cybersecurity
- National Conference of State Legislatures (NCSL) Task Force on Cybersecurity
- Public Utility Research Center (PURC) Working Paper *State Public Utility Commissions' Role in Cybersecurity and Physical Security Issues: Trade-Offs and Challenges*, December 2017, by Lynne Holt and Mary Galligan.

DISTRIBUTION GRID RESILIENCE

Electricity underpins all sectors of the nation's economy and powers everyday life. The availability of electricity impacts other critical services such as public health and safety, communications, transportation, and water and wastewater treatment. With that in mind, participants focused on the importance of electric distribution grid resilience and reliability, the desire to try to prevent certain incidents, and the need to prepare for quick restoration and continued operation in the face of hazards.

Consensus Principles

10. Regulators, consumer advocates, and energy companies should focus on cost-effective investments in electric system infrastructure to improve resilience and otherwise modernize and protect the distribution system. When possible, resilience should be considered as a fundamental component of all infrastructure investments.
11. Stakeholders should engage in discussions to ensure that appropriate actions are taken regarding measures to provide additional distribution system resilience, including but not limited to:
    - Preparedness efforts
        - Vegetation management
        - Targeted training and drills
        - Preemptive measures in blue-sky times
        - Coordination with other utility infrastructure sectors and stakeholders (e.g., larger customers, first responders, hospitals, public transportation agencies)
    - Communications
        - Interagency communication
        - Intra-agency communication (breaking down silos within the energy company or its regulator)
        - Companies to customers: providing estimated times of restoration (ETR)
        - Customers to companies: directly and via smart meters where available
        - Company to company
    - Restoration and response
        - Mutual assistance
        - State and federal government
    - Post-incident reporting
        - Reports to regulators and public officials
        - Identification of areas of success and areas in need of improvement
    - Underlying infrastructure
        - Assessment of age and condition of existing systems
        - Hardening (e.g., reinforced poles, targeted undergrounding)
        - Microgrids, storage and distributed energy resources (DERs)

- Visibility in the distribution network
- Fuel diversity

12. Energy companies must have visibility concerning energy technologies integrated into the system by other providers that could impact reliability, resilience, safety, security, cost, and affordability of the distribution system.
13. As energy companies modernize or enhance their systems, they should coordinate with other service providers to minimize customer disruption.
14. Safety, reliability, and cybersecurity needs should be pursued in a cost-effective manner when distribution systems are upgraded for any reason, including the integration of DERs and emerging technologies.

Definition of Resilience:

From Federal Energy Regulatory Commission (FERC) *Order Terminating Rulemaking Proceeding* (January 8, 2018) regarding the Secretary of Energy's Proposed Rule on Grid Reliability and Resilience Pricing:

> To help guide consideration of issues related to resilience of the bulk power system, the Commission understands resilience to mean:
>
> 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.

Note: While this definition was helpful in discussions of the concept of resilience, CCIF participants focused on resilience of the distribution system and not the bulk power system.

From National Renewable Energy Laboratory (NREL) *Resilience Roadmap*:

> The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions through adaptable and holistic planning and technical solutions.

Definition of Reliability:

From National Renewable Energy Laboratory (NREL) *Guide to Cybersecurity, Resilience, and Reliability for Small and Under-Resourced Utilities*, January 2017:

> Reliability: The ability of the grid to resist interruptions.

From *Glossary of Terms Used in NERC Reliability Standards*, updated January 31, 2018:

> Reliable Operation: Operating the elements of the [Bulk-Power System] within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.

Resources

NARUC Resilience Resources:

- NARUC *Regional Mutual Assistance Groups: A Primer*, November 2015.
- NARUC *Resilience in Regulated Utilities*, November 2013.

New Jersey Board of Public Utilities (BPU) Resilience Resources:

During the summits, New Jersey BPU Commissioners shared information about the BPU's efforts following Hurricane Irene and an October snowstorm in 2011, as well as Hurricane Sandy in 2012. For more information, see the respective BPU Orders below that highlight the results of the Commission's extensive reviews into their energy companies' preparedness efforts; communications; restoration and response; post-event reporting; and underlying infrastructure issues.

- NJ BPU Order In the Matter of The Board's Review of Utilities' Response to Hurricane Irene, January 2013.
- NJ BPU Order In the Matter of The Board's Review of Utilities' Response to Hurricane Sandy, May 2013.

Hawaii Public Utilities Commission (PUC) Resilience Resources:

A Hawaii Public Utilities Commissioner shared information with participants about the designation of Honolulu on the island of Oahu as part of the 100 Resilient Cities action plan pioneered by the Rockefeller Foundation. In 2016, the City and County of Honolulu Office of Climate Change, Sustainability and Resiliency (CCSR) was established. As part of the U.S. Department of Energy's project, "Designing Resilient Communities," the CCSR currently is undertaking an island-wide effort to develop a framework to align grid investment with community resilience planning focused on modernization of the energy grid with partners like Sandia National Laboratories and various public, industry, and university participants. During the 2018 legislative session, the Hawaii State Legislature passed HB 2110, directing the Hawaii PUC to establish a microgrid services tariff to encourage the development and use of energy-resilient microgrids.

National Institute of Standards and Technology (NIST) Resilience Resources:

Center for Risk-Based Community Resilience Planning: A NIST-Funded Center of Excellence: The Center Team is composed of more than 90 individuals, including researchers, programmers/developers, NIST collaborators, postdoctoral scholars, and graduate students from Colorado State University.

CCIF 2016 Consumer Solutions Report – Resilience Discussion:

In its 2016 report, CCIF noted that military customers concerned about resilience and security were working with energy companies to address their objectives from a national security perspective. In fact, projects are being developed that benefit both military and non-military customers, without cost shifts. For more information, see the CCIF Report on *Consumer Solutions*. CCIF 2018 Summit participants further discussed that many other customers, including universities, local governments, businesses, commercial customers, and industrial customers, increasingly are concerned with security and resilience, and some are exploring microgrids for resilience purposes.

INTEGRATING TECHNOLOGIES AT THE GRID EDGE

Some customers are using the electric system differently with adoption of energy innovations such as electric vehicles (EVs), storage, distributed renewables, Internet of Things (IoT) devices, and microgrids. These technologies offer potential benefits for customers (e.g., more options and functionalities) and for the energy grid (e.g., export of stored power from an EV back to the grid). They also introduce potential challenges for customers (e.g., more complexities) and for the grid (e.g., the need for more dynamic grid management). CCIF summit participants support balanced regulatory and policy approaches that facilitate the realization of customer and grid benefits while ensuring customers are protected adequately and the grid is maintained reliably and securely.

These changes in the distribution system are challenging the traditional roles in providing electric service, and energy companies may seek to provide customer services "behind the meter." Although traditional demarcations "in front of the meter" and "behind the meter" may no longer be applicable in all cases, they remain important indicators for certain legal, regulatory, and business functions. In this section, these and other complex issues—as well as potential regulatory and policy actions—are explored further.

Consensus Principles

15. Energy companies, which have an obligation to serve all customers, should not be prohibited from offering services solely based on the meter demarcation point.
16. Each state commission should determine whether, and under what conditions, an energy company may provide "behind the meter" services and/or seek cost recovery. Regulators and consumer advocates must have sufficient resources to participate in these determinations.
17. As the number and complexity of services, applications, and providers grow, consumer protection, outreach, and education become increasingly crucial and must include transparent, objective, unbiased, fact-based, and plainly worded information to help customers as they make decisions.
18. States should consider reexamining customer rate classes, rate design, and cost allocation principles as customers increasingly invest in more customized or diversified products and services that impact the energy grid in new or different ways. Voluntary dynamic or alternative pricing for customers should be considered.
19. Due to increasingly diverse customer expectations and an array of complex technologies, services, and applications, state regulators, consumer advocates, energy companies, and other stakeholders should discuss whether current rate classes appropriately represent cost causation on the grid and whether additional rate classes or subclasses may be necessary in the future to accomplish regulatory and other policy objectives.
20. States should evaluate whether to establish requirements—including registration, consumer protection, and complaint jurisdiction—for specific providers and/or certain types of energy products and services.
21. States should consider developing policies and regulations to protect the confidentiality of customer energy usage information.
22. States should assess whether any of the new providers of energy products engage in fraudulent or deceptive practices and whether additional consumer protection measures are needed.
23. Investments in the distribution system to facilitate integration of energy technologies by customers or third parties should be made in a cost-effective and efficient manner.

24. As multiple energy technologies are integrated into the distribution system, sufficient visibility is necessary so that system costs and benefits are identified fully and are allocated fairly and equitably.
25. State regulators, consumer advocates, energy companies, and other stakeholders should assess current regulatory policies and practices, identify any changes needed due to the integration of new energy products and services into the distribution system, and collaborate to develop more proactive policies and practices accordingly.

Discussion on Balancing Usage and Conservation:

The summits featured engaging discussions about the efficient delivery and use of electricity in jurisdictions with significant investment in variable distributed generation resources (largely customer-owned). Energy companies in those jurisdictions now may need to *encourage usage of* electricity at certain hours that previously were considered peak hours for which such companies (and their states) *encouraged conservation* through a range of policies and incentives.

Resources

Consumer Awareness / Outreach / Protection Resources:

- *Consumer's Guide to Impostor Utility Scams*, Utilities United Against Scams, November 2017.



Citizens Utility Board of Wisconsin's Corey Singletary, Idaho PUC President Paul Kjellander, and Southern Company's Noel Black listen carefully to the dialogue among the three core groups at CCIF Summit 3.

CONCLUSION

Objective Met

A number of state utility regulators, consumer advocates, and energy company representatives worked together to begin an important dialogue on the key issues featured in this report. Recognizing that the report does not address all issues with respect to this expansive topic, it serves as a useful tool for additional dialogue and collaboration among state utility regulators, consumer advocates, energy company representatives, policymakers, and other stakeholders.

Special Recognition

The CCIF Executive and Advisory Committees would like to acknowledge the following individuals and organizations whose valuable contributions resulted in this report:

- The National Association of Regulatory Utility Commissioners (NARUC), the National Association of State Utility Consumer Advocates (NASUCA), and the Edison Electric Institute (EEI), particularly the guidance of their respective leaders and the valuable input and hard work of their respective teams;
- All participating state utility regulators, consumer advocates, and energy company representatives; and
- All speakers at the 2017 Kickoff Forum and 2018 Summits.

Disclaimer

Due to the nature of the collaborative process and the extensive degree of participation, the principles developed within the 2018 summit process or other featured information within this report should not be attributed to specific individuals or to the organizations that he or she represents. The principles are not intended to override any individual or collective policies or positions developed by state commissioners, consumer advocates, energy companies, or by NARUC, NASUCA, EEI, or other organizations represented by certain participants. Instead, CCIF work products are meant only to complement such policies or positions and to provide a framework for additional discussion and policy development.



At CCIF Summit 3, Hawaii PUC Commissioner Lorraine Akiba engages with fellow "Setting the Stage" panelists Barbara Lockwood (APS) and Mark Schuling (Iowa Office of Consumer Advocate) and moderator Elizabeth Stipnieks (EEI).

APPENDIX

CCIF EVENTS ON SECURITY & RESILIENCE AT THE DISTRIBUTION LEVEL

Fall Kickoff Forum

November 11, 2017
Hilton Baltimore
Baltimore, MD

Spring Summit 1

February 26-27, 2018
Grand Hyatt Tampa Bay
Tampa, FL

Spring Summit 2

April 11-12, 2018
Hilton Chicago O'Hare International Airport
Chicago, IL

Spring Summit 3

May 17-18, 2018
Westin Denver International Airport
Denver, CO

Breakfast & Report Release

July 17, 2018
Fairmont Scottsdale Princess
Scottsdale, AZ



NASUCA President and Montana Consumer Counsel Bob Nelson provides closing remarks at the CCIF Fall 2017 Kickoff Forum in Baltimore.

ACKNOWLEDGMENT OF 2018 SUMMIT PARTICIPANTS

Due to the nature of the collaborative process and the extensive degree of participation, specific principles developed within the 2018 summit process or other featured information within this report should not be attributed to specific individuals or to the organizations that he or she represents. With that understanding, CCIF acknowledges the following individuals* who participated in CCIF events focused on the topic of *Security & Resilience at the Distribution Level: Integrating Technologies at the Grid Edge:*

Scott I. Aaronson
Edison Electric Institute

Matthew Acho
National Association of Regulatory Utility Commissioners (NARUC)

Hon. Lorraine H. Akiba
Hawaii Public Utilities Commission

Christopher J. Ayers
North Carolina Utilities Commission Public Staff

David Batz
Edison Electric Institute

Adam Benshoff
Edison Electric Institute

Noel Black
Southern Company

Drew Bolin
Colorado Public Utilities Commission

Gregory A. Bollom
Madison Gas & Electric Company

Hon. Maida Coleman
Missouri Public Service Commission

Paula M. Carmody
Maryland Office of People's Counsel

Hon. Upendra Chivukula
New Jersey Board of Public Utilities

Hon. David W. Danner
Washington Utilities and Transportation Commission

Gerardo J. Delgado
Illinois Commerce Commission

Larry Duran
Colorado Public Utilities Commission

Gregory Elcock
Consolidated Edison Company of New York

John Evans
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Kelli Fritts
AARP Colorado

Lisa W. Gafken
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D.C. Office of the People's Counsel

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New Jersey Board of Public Utilities

Hon. Mike Huebsch
Public Service Commission of Wisconsin

Elin Swanson Katz
Connecticut Office of Consumer Counsel

Cynthia E. Kinser
Tennessee Attorney General's Office - Consumer Protection and Advocate Division

Hon. Paul Kjellander
Idaho Public Utilities Commission

Rebecca Harsh Knox
Edison Electric Institute

David Kolata
Citizens Utility Board of Illinois

Bill Levis
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Barbara Lockwood
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Montana Consumer Counsel

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South Dakota Public Utilities Commission

David Nickel
Kansas Citizens' Utility Ratepayer Board

Hon. Sadzi Martha Oliva
Illinois Commerce Commission

Hon. James Patterson
North Carolina Utilities Commission

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Iowa Utilities Board

Teresa Reed Wagner
Pennsylvania Office of Small Business Advocate

William J. Welzant
Baltimore Gas & Electric

Hon. Jordan White
Utah Public Service Commission

*List represents individuals and their organizations at the time of participation in the summits.

During CCIF Summit 3, John Evans with the Pennsylvania Office of Small Business Advocate listens to the dialogue, and North Carolina Utilities Commissioner James Patterson waits patiently to engage.



CCIF OVERVIEW

CCIF Formation, Leadership & Process

Formed in 2010, the Critical Consumer Issues Forum (CCIF) brings state commissioners, consumer advocates, and energy company representatives together to tackle consumer-focused energy issues through interactive discourse and debate, to find consensus when possible, and at a minimum, to achieve a clearer understanding of—and appreciation for—each other's perspectives and positions.

To provide leadership, CCIF organized Executive and Advisory Committees, each with balanced representation from the three core communities. Current members are recognized on the next page and guide CCIF initiatives at each of the following steps in the process:

1. A large open kickoff forum, typically collocated with the NARUC & NASUCA Annual Meetings, to introduce a topic and initiate discussion among CCIF's three core communities and other stakeholders;
2. A series of invitation-only summits in which the three communities engage in facilitated dialogue; and
3. A report issued in the summer to share key takeaways with the broader stakeholder community and serve as a foundation for additional dialogue on numerous fronts.

CCIF Value & Successful Track Record

By providing a non-adversarial, collaborative environment in which participants from the three core groups can candidly discuss and proactively address a variety of energy issues with potentially broad impacts on electric consumers, CCIF has consistently produced credible reports that:

- Demonstrate support for key concepts to the broader stakeholder community;
- Demonstrate leadership of the three core groups on a range of energy topics;
- Initiate, inform or focus dialogue at the state level (regulatory and broader public policy dialogue); and
- Focus on consumer aspects of energy topics and facilitate proactive consumer education & protection.

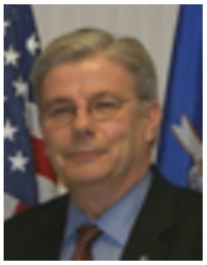
Specifically, the following CCIF reports have contributed to the energy policy debate in a constructive way:

- *Grid Modernization Issues with a Focus on Consumers*, July 2011
- *Focus on The Regulatory Process*, July 2012
- *Policy Considerations Related to Distributed Energy Resources*, July 2013
- *DG: A Balanced Path Forward: Providing Customer Choice While Ensuring Reliability*, July 2014
- *The Evolving Distribution System: Helping Consumers Navigate Access to Products, Services and Technologies*, July 2015
- *Consumer Solutions: Meeting Consumer Needs on All Levels*, July 2016
- *Connecting Communities: Smart Cities, Enabling Technologies, and the Grid*, July 2017

All CCIF reports are available for download at www.CCIForum.com.

CCIF LEADERSHIP

Executive Committee



John W. "Jack" Betkoski III
Connecticut Public Utilities Regulatory Authority Vice Chairman &
NARUC President



Elin Swanson Katz
Connecticut Consumer Counsel &
NASUCA President



Philip D. Moeller
EEI Executive VP of Business Operations Group &
Regulatory Affairs

Advisory Committee



Maida J. Coleman
Commissioner
Missouri Public Service Commission



David W. Danner
Chairman
Washington Utilities and Transportation Commission



Christopher J. Ayers
Executive Director
North Carolina Utilities Commission Public Staff



J.R. Kelly
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Consumer Advocate
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A former Florida Public Service Commissioner (2006–2009), Katrina McMurrian draws upon extensive regulatory experience to organize and facilitate relevant policy forums and to advise an array of entities on key regulatory and policy issues in the energy arena.

McMurrian currently serves as the Executive Director of the Critical Consumer Issues Forum (CCIF), a unique national forum in which state utility regulators, consumer advocates, and energy companies – via a series of facilitated, interactive dialogues – engage in productive debate and often develop consensus on key issues of importance to consumers and policymakers. CCIF has produced reports on a range of energy topics including grid modernization, distributed generation, consumer solutions, and smart communities.

McMurrian also serves as the Executive Director of the Nuclear Waste Strategy Coalition (NWSC), an ad hoc organization representing the collective interests of member state utility regulators, state consumer advocates, other state officials, tribal governments, local governments, electric utilities with operating and shutdown nuclear reactors, and other public and private sector experts on nuclear waste policy matters.

In these roles, McMurrian frequently interacts with Congress; Administration officials; state and federal utility regulators; state and national consumer organizations; industry representatives; and numerous other public and private stakeholders.

McMurrian serves on the Southwest Research Institute Board of Advisory Trustees, as an associate member of the Financial Research Institute (FRI), on the Smart Energy Consumer Collaborative Awards Advisory Panel, and as a member of the American Nuclear Society (ANS), the Institute for Nuclear Materials Management (INMM), and U.S. Women in Nuclear (U.S. WIN).

A Northwest Florida native, McMurrian received a Bachelor's degree in finance and an MBA from Florida State University. She and her husband currently reside near Nashville, Tennessee.

RECOGNITION OF ELIZABETH R. STIPNIEKS

CCIF leadership and participants express our sincere appreciation to Elizabeth "Liz" Stipnieks for her commitment to the exceptional collaborative process that has advanced the regulatory and policy dialogue on a number of energy topics. Liz and EEI colleague Rebecca Harsh Knox envisioned the concept of bringing state utility regulators, consumer advocates, and energy company representatives together and worked to ensure CCIF's success. "Liz recognized an untapped potential for valuable engagement among these three leading communities on energy issues," said Katrina McMurrian. "We thank her for her demonstrated leadership in encouraging collaboration and elevating the discourse."



CCIF

CRITICAL CONSUMER ISSUES FORUM

Save the Date for CCIF 2018 Kickoff Forum



Saturday, November 10, 2018 2:00–5:00 pm

Loews Royal Pacific Orlando Orlando, FL

Registration Registration will open at www.CCIForum.com in late August. There is no charge to participate, but a separate registration with CCIF is required. Please make your hotel reservations accordingly. Commissioners and consumer advocates will be eligible for 1-night hotel stipends but are responsible for making their own hotel reservations, including any additional nights to attend the forum.

For More Info Information about the forum will be posted at www.CCIForum.com. You may also contact Katrina McMurrian, CCIF Executive Director, by e-mail at: katrina@CCIForum.com or by phone at 615-905-1375.

This event is not sponsored by NARUC or NASUCA and is not a part of the agendas of the 130th NARUC Annual Meeting or 2018 NASUCA Annual Meeting.

CCIF

CRITICAL CONSUMER ISSUES FORUM

For more information about CCIF or this report:
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