THE ENERGY EXCHANGE

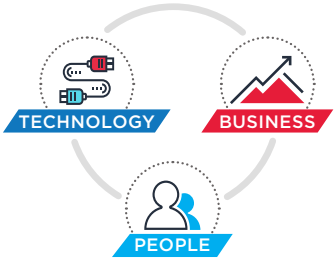
Concise and actionable intelligence for today's most relevant Grid Modernization topics

Significance—*Why does this matter?*

"Keeping the lights on" is a bedrock principle of utility operations. Resiliency is an important topic that is growing in relevancy, both in a traditional sense (i.e., being prepared to mitigate the impacts of storm events) and also in terms of a utilities' capability to be prepared for the utility landscape of the future (i.e., system hardening and grid modernization investments). The quest for greater utility resiliency occurs over a time continuum, which spans traditional resiliency infrastructure topics (preparation before), on-going maintenance activities (preparation during), and forward-leaning initiatives (preparation for the future).

Structure—*What do I need to know?*

The Energy Exchange Brief framework focuses on three primary areas —technology, business, and people—to comprehensively explore Grid Modernization topics from various grid practitioner perspectives.



TECHNOLOGY CONSIDERATIONS

- *Traditional overhead distribution system infrastructure reinforcement and hardening (e.g., overhead poles and foundations, wires, line components)*
- *Targeted distribution infrastructure like-for-like or like-for-unlike (e.g., updated materials, configurations, technologies) component replacement*
- *System-level distribution infrastructure upgrades (e.g., tie switches on radial distribution grids and sectionalized undergrounding distribution plans)*
- *Deployment of evolving and synergistic grid technologies for fault location, isolation, and restoration and enhanced system resiliency (e.g., advanced distribution management system, fault indicators, tie switches, microgrid, SCADA, topology optimization)*
- *On-going exploration and implementation of evolving grid technologies at various maturity levels (e.g., OT/IT technology convergence, holistic grid management systems, customer-centric platforms)*

> *"At the most basic level, ensuring resilience requires that we both determine which risks to the grid we are going to protect against, and identify the steps, if any, needed to ensure those risks are addressed."*
>
> —FEDERAL ENERGY REGULATORY COMMISSION

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EnerNex
A CESI Company

BUSINESS CONSIDERATIONS

- *Establishment and updating of standards-based distribution infrastructure processes*
- *Establishment of distribution infrastructure inspection and audit programs*
- *Pilot project implementation for varying degrees of grid modernization*
- *Development, execution, and evaluation of appropriate resiliency maintenance (e.g., corrective, preventative, condition-based, reliability-centered, performance-focused)*
- *Development of a strategic grid modernization roadmap from a holistic enterprise architecture perspective that results in time-sequenced, coordinated, and financially prudent grid resiliency investments*

PEOPLE CONSIDERATIONS

Utility-Centric (Internally Facing)

- *Prioritized staff training to cover a spectrum of grid modernization topics (e.g., infrastructure, maintenance, smart technology software and devices, cybersecurity)*
- *Establishment, execution, and evaluation of storm restoration preparation exercises and post-event data collection*
- *Hiring staff with expertise to effectively leverage new technology platforms, data analysis capabilities, and customer-centric deployment approaches*

Customer-Centric (Externally Facing)

- *Coordination with local government and other relevant stakeholders to identify critical infrastructure, conduct risk assessments, and implement associated mitigation activities*
- *Enabling two-way, near-real time, and targeted communications to and from impacted customers during outage events*
- *Enabling evolving platforms for future energy services that increase customer participation with resiliency efforts (e.g., DERs, Volt/Var regulation via customer inverters, data analytics, fuel switching, transactive energy)*

Steps—*What do I do now?*

For further elaboration on the topic of resiliency, download the EnerNex white paper: ***The Resiliency Continuum***. Like any other strategic planning effort, a starting point should be identified (current state), a desired destination (end state), and a pathway and purpose for going there (directional vision and strategy). The resiliency white paper provides a means for grid practitioners to score and evaluate their current state of resiliency efforts according to the following resiliency maturity scorecard.

1 INITIAL	*Initial resiliency efforts exist, but additional planning and capability growth is needed. This level of maturity should focus on developing preparedness plans under the 'Managing Resiliency' section.*
2 BASIC	*Basic resiliency efforts and plans have been established. This level of maturity likely requires additional focus in developing 'Managing or Maintaining Resiliency' areas further.*
3 INTERMEDIATE	*Intermediate resiliency efforts and plans have been established. This level of maturity only requires slight optimization within the 'Managing or Maintaining Resiliency' areas and should begin to focus efforts in the 'Modernizing Resiliency' area.*
4 ADVANCED	*Advanced resiliency efforts and plans have been established. This level of maturity is almost exclusively focused in developing the 'Modernizing Resiliency' area and are robustly prepared within the 'Managing or Maintaining Resiliency' areas.*
5 OPTIMIZING	*Optimal resiliency efforts and plans have been established and are consistently being refined. This level of maturity is on the leading edge of grid modernization and is well positioned to manage all levels of concern along the resiliency continuum.*