Designing Effective Electric Grid Resiliency Plans

Brief for Decisionmakers in Entergy New Orleans' Resiliency Planning Process

Prepared for the Alliance for Affordable Energy

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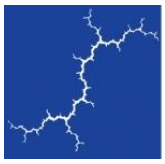

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1. INTRODUCTION

The Alliance for Affordable Energy contracted Synapse Energy Economics, Inc. (Synapse) to draw on its work advising national laboratories, utilities, and public interest organizations on electric grid resiliency planning to provide a brief introduction to resiliency planning standard practices and case studies for informing the development of a resiliency plan for the City of New Orleans. This report provides insights for all stakeholders in the resiliency planning process for ensuring a robust, 'no-regrets 'approach to electric grid resiliency planning.

Electric grid resiliency planning is developing at a time when physical risks to our grid—and our ability to understand them, are rapidly evolving. Risks to reliable power and critical community services posed by extreme weather, high temperature events, and changing rainfall patterns already cost utilities and their ratepayers billions of dollars per year, and underlying physical risks are expected to compound over the next ten to twenty years.[1]

As extreme weather risks continue to increase, maintaining access to service for communities is key to maintaining safety in an increasingly climate-impacted world. In collaboration and coordination with their communities, utilities and their regulators must integrate aspects of *resiliency* into their planning processes. Resiliency (or resilience) is defined by the U.S. Department of Energy (DOE) as "the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions."[2],[3] Threats, including human-made threats and natural threats, can result in an acute disruption of the performance of the electric grid. A utility interested in improving resiliency may want to consider many options such as

- enabling islandable microgrids with longer-lasting backup generation, such as pairing battery storage systems with distributed renewable energy generation, to sustain critical community facilities and customers in extended outages;

[1] Moody's. "Moody's US regulated electric utilities face varied exposure to climate hazards." Moody's press release, January 16, 2020. Available at: https://www.moodys.com/research/Moodys-US-regulated-electric-utilities-face-varied-exposure-to-climate--PBC_1210434.

[2] U.S. Office of the Press Secretary. "Presidential Policy Directive/PPD-21 -- Critical Infrastructure Security and Resilience." February 12, 2013. Available at: https://obamawhitehouse.archives.gov/the-press-office/2013/02/12/presidentialpolicy-directive-critical-infrastructure-security-and-resil.

[3] Resilience is distinct from reliability, which is defined by the DOE as "the ability of the system or its components to withstand instability, uncontrolled events, cascading failures, or unanticipated loss of system components". Reliability benefits are often realized when the consequences of more frequent, short-duration outages, referred to as major event days, are avoided. While reliability is addressed by utilities and regulators as part of the regular course of business, the consequences of resilience events are longer-duration and/or more widespread and considered to be outside of the norm.

- trimming a greater number of trees, trimming trees further, or removing trees and planting utility-friendly trees to avoid transmission and distribution system damages;
- relocating a piece of grid equipment and/or building a barrier to protect that equipment;
- purchasing supplies in advance to accelerate restoration efforts after a significant event beyond that which is deemed necessary for normal operations;
- conducting utility staff training on grid restoration; and
- hardening the transmission or distribution system to a higher degree of rigor or redundancy than a minimum or present-day standard to strengthen the system so it can withstand challenges that are less frequent but of higher consequence.

It's important to keep in mind the purpose of a more resilient grid—not just to protect the poles and wires, but to ensure that people have access to the life-sustaining energy services that allow them to withstand and recover from weather-related hazards.

For New Orleans, resiliency is not a new concept. The city's unique placement and history place questions of resiliency—how communities can mitigate impacts of risky events, but also bounce back after them—at the forefront for many in New Orleans. After Hurricane Ida knocked out electricity service for up to ten days in Fall 2021, actors across New Orleans are responding to ensure the grid is more resilient for the next storm. The following are just a few of the efforts undergone by the people of New Orleans to build resiliency into their energy system:

- The City of New Orleans is working with the U.S. Department of Energy on the Communities Local Energy Action Program (LEAP) to develop distributed solar- and battery-powered microgrids in the City.[4]
- Together, New Orleans is working with local partners to develop Community Lighthouses to provide community service during outages.[5]
- Feed the Second Line's Get Lit Stay Lit program is implementing micro-scale resilient power at the neighborhood level.[6]

While these resilience efforts are impactful and should be integrated into any resiliency planning process, Hurricane Ida's impacts on the utility system as a whole underscore the stakes involved for

[4] City of New Orleans Mayor's Office. "City of New Orleans Selected for U.S. Energy Department's Communities Local Energy Action Program." Mayor LaToya Cantrell Office press release, April 6, 2022. Available at: https://nola.gov/mayor/news/april-2022/city-of-new-orleans-selected-for-u-s-energy-department%E2%80%99s-communities-local-energy-action-program/.

[5] Lentes, Morgan. 2022. "Community lighthouse to keep lights on in Laplace when next storm hits." WDSU 6 News. May 25. Available at: https://www.wdsu.com/article/community-lighthouse-to-keep-lights-on-in-laplace-when-next-storm-hits/40095711.

[6] Feed the Second Line. "Resilient Restaurants for the Future of New Orleans." *Stay Lit*. Available at: https://www.feedthesecondline.org/programs/getlitstaylit.

electric grid resiliency planning. Identifying the specific hazards posed to the grid, understanding the consequences of grid outages to communities, setting resiliency goals with communities, and systematically considering and comparing all available options in making decisions about where to direct investment to achieve the goals, is critical. Recognizing that different geographies will have different vulnerabilities, investment needs, and priorities is also important. And it is essential to recognize that resiliency planning will change over time as resiliency events shape the relevant solutions, attention, and urgency. Resiliency planning will be an iterative cycle, rather than a single discrete event, and a prudent initial resiliency plan will set the stage for continued success. Investments that are misaligned with resiliency objectives, are not supported by a rigorous vulnerability assessment, further inequities, are not cost-effective after incorporating resiliency related benefits, or fail to mitigate actual risks can exacerbate affordability issues for ratepayers, while resiliency risks continue to grow.

As utilities across the country are engaging in the process of ensuring that their energy infrastructure investments improve resiliency, utility resilience planners and their regulators can build on previous successes and methods. This brief presents an overview of existing efforts related to resiliency in New Orleans, identifies new research and processes that can be leveraged by Entergy in its planning efforts, and discusses how this information could be applied to improve Entergy's electric grid resiliency planning process.

Electric grid resiliency planning is just emerging as an analytical practice for our energy infrastructure. Initial electric grid resiliency plans are likely the start of a more expansive effort toward integrating the consequences of extended grid outages into utility planning, and steps taken today will likely have technical and economic implications into the future. Resilience planners today can pull on the insights of high-quality resilience plans and research to get those initial steps right.

2. KEY COMPONENTS OF HIGH-QUALITY ELECTRIC GRID RESILIENCY PLANS

High-quality electric grid resiliency plans follow the U.S. Department of Energy's *Climate Change and the Electricity Sector: Guide for Climate Change Resilience Planning* in 2016. The report, compiled in partnership with a broad coalition of electricity sector partners through the Partnership for Energy Sector Climate Resilience, has formed the standard for climate resiliency planning since. The Department of Energy's report identifies the following high-level steps:[7]

1. **Collecting Community Perspectives and Priorities.** Engagement with public stakeholders should be among a utility's highest priorities in resilience planning. Successful community stakeholder engagement, including listening to and integrating stakeholder priorities, assets, interests, and concerns, is more likely to produce a resiliency plan that addresses all stakeholders' needs, distributes benefits equitably, and garners the support of multiple stakeholders. Integrating community perspectives should be done at the outset of the resiliency planning process and continue throughout.

2. **Complete an Electric Grid Vulnerability Assessment.** Before understanding the potential resilience solutions, the resiliency plan must articulate the system's vulnerability to resiliency risks. This includes

    a. identifying which utility and community assets and operations are exposed to climate and extreme weather risks;

    b. estimating the potential impact of future climate- or extreme weather-related events; and

    c. synthesizing electricity system exposure with future potential impacts to characterize vulnerability.

    A high-quality vulnerability assessment should include a robust estimation of extreme weather and other climate-related impacts (e.g., increased incidence of flooding, extreme heat events, higher average temperatures). These impacts must be understood in the context of the utility system's existing vulnerabilities, including non-major-event-related outages. Finally, vulnerability assessment should include a view into the communities being served by utilities, their critical needs during major weather events, and the consequences of extended grid outages.

3. **Define Shared Resiliency Goals and Scope.** At the outset of any resiliency planning process, utility decisionmakers and community members should identify the purpose of the resiliency plan and set out shared goals for the resiliency plan and analysis. At this stage, resiliency planners should also set out the scope for analysis. Which assets and

[7] U.S. Department of Energy, Office of Energy Policy and Systems Analysis. 2016. *Climate Change and the Electricity Sector: Guide for Climate Change Resilience Planning*. Available at: https://toolkit.climate.gov/reports/climate-change-and-electricity-sector-guide-climate-change-resilience-planning.

operations are being considered? Which climate hazards are being considered, and over what geographic area and time horizon? What efforts are being made to ensure that communities are able to equitably benefit from electric grid resilience? When stakeholders are able to align on these questions before analysis begins, they can more easily agree on the conduct and results of the resiliency planning process.

4. **Evaluating Resiliency Options and Defining a Resiliency Plan.** Using the stakeholder input and vulnerability assessment, resiliency planners should identify a range of measures and interventions available for addressing these vulnerabilities, aiming to implement 'no-regrets' investments in the short term. Plans should demonstrate consideration of a variety of investment types, including: (1) transmission and distribution system, (2) generation (including local distributed energy resources such as energy efficiency, demand response, load curtailment, electric vehicles, and renewable energy paired with storage), (3) automation and controls, and (4) cross cutting (including microgrids, critical load identification and prioritization, training, and practice drills). Resiliency planners should use a combination of quantitative tools like benefit-cost analysis (BCA) and qualitative, holistic assessments to form their resiliency plan. BCA is a systematic approach for assessing the costs and benefits of a range of investments and allows decisionmakers to compare many different types of investments consistently and comprehensively. Finally, plans should include concrete, short-term action items and steps describing how implementation will begin.

5. **Flexibility, Improvement, and Ongoing Monitoring & Evaluation.** Resiliency plans should be designed with flexibility and continual improvement in mind. These are long-term plans, put together under uncertainty about actual future conditions and opportunities, and, as such, the plans should be designed with future decision points to evaluate more effective pathways as they are identified. Resiliency planners should also engage in monitoring and evaluation to ensure that their resiliency investments are performing as expected. Planners should make changes to resiliency planning methods and outcomes if performance targets are not being met.

This analytical framework represents a robust, long-term, and 'no-regrets 'approach to resiliency planning. Beyond the U.S. Department of Energy's guidance document, resiliency planning at the California Public Utilities Commission, ConEdison in New York, and Seattle City Light are implementing this pathway. Resiliency planners who omit one or more of these steps, risk making resiliency investments that do not respond to actual resiliency risks or fail to perform for the communities they serve.

Integrating Equity Concerns

The ultimate goal of any electric grid resiliency planning process is to ensure that the community being served receives the benefits of a resilient electricity system. Resiliency plans should also ensure that those benefits are distributed consistently and fairly across the community being served. If equity is not defined and pursued during the resilience planning process, then resilience measures may exacerbate, rather than ease, inequities in the energy system. At a minimum, resiliency planners should integrate equity concerns into resiliency planning in the following ways:

- **Proactive stakeholder engagement and priority-setting.** Resiliency planning should include input from a variety of stakeholders, including stakeholders from disadvantaged communities. Resiliency plans should make efforts to ensure that stakeholder engagement processes are accessible to all relevant stakeholders. Understanding the lived experience of stakeholders during major power outages can help inform effective resiliency plans.

- **Understand resiliency's role in achieving equity.** When considering whether a resiliency plan is equitable, resiliency planners, stakeholders, and regulators should consider equity across multiple categories. These include economic concerns (e.g., energy burden), environmental health concerns (e.g., local air pollution), and reliability & resilience concerns (e.g., access to critical energy services).

- **Integrate energy equity landscape into resiliency planning.** Resiliency plans should begin with a baseline of understanding the distribution of electric grid outcomes across the community being served, including differences in outage frequency or duration and energy burden. Resiliency benefits articulated through the resiliency planning process should reflect these differences.

Distributed Energy Resources

Because distributed energy resources (DERs) like solar, storage, and microgrids are able to offer decentralized, zero-emission, zero-fuel power when electric grid service is interrupted, they provide clear resiliency benefits. As costs for these resources continue to decline and they are deployed across the grid, it is critical for resiliency planning to reflect their increasing role. Nevertheless, resiliency planning efforts to date have under-counted resiliency benefits from distributed energy resources because conventional reliability performance is designed for grid-scale use and can miss distributed resiliency benefits. At a minimum, resiliency plans should implement the following practices to ensure that distributed energy resources are being fairly valued in resiliency planning:

- **Include distributed energy resources as resiliency measures.** Resiliency plans should investigate deployment of a variety of DERs as resiliency measures, including distributed solar and storage as well as microgrids.

- **Integrate community resilience metrics into resiliency planning.** Distributed energy resources are well-suited to providing critical energy services to communities during long periods of time without electric grid service. Resiliency planning should include the benefit of providing these critical services.

- **Conduct spatial analysis and consider a 'resilience nodes' approach.** As opposed to grid-scale approaches, distributed energy resources provide location-specific energy services. In the context of planning for the resiliency of a community overall, resiliency plans should use spatial analysis to determine where localized energy services could provide the greatest community benefits. Spatial analysis can identify optimal locations of 'nodes' of resilient power.

Key Takeaways:

- Electric Grid Resiliency Planning processes should begin with collaboration between a range of resiliency stakeholders, including communities, to determine the policy goals of resiliency planning and the appropriate size and scope of the effort. Evidence of the opportunity for participation, effective outreach to solicit input, and responsiveness to input are requirements.
- Robust electric grid resiliency planning is built on a foundation formed by a high-quality, scientifically informed electric grid vulnerability assessment that accounts for the consequences of extended grid outages for communities.
- Electric Grid Resiliency Plans should demonstrate consideration of all available resiliency interventions relevant to the pre-determined size and scope of the plan. Comparisons of several different options are a requirement.
- Electric Grid Resiliency Plans should include details on the timing and processes for ongoing monitoring, update, and improvement.

Key Sources:

U.S. Department of Energy ("US DOE") (2016). Climate Change and the Electricity Sector: Guide for Climate Change Resilience Planning.

U.S. Department of Energy (2016, May). A Review of Climate Change Vulnerability Assessments: Current Practices and Lessons Learned from DOE's *Partnership for Energy Sector Climate Resilience*.

California Public Utilities Commission, (2016). Climate Adaptation in the Electric Sector: Vulnerability Assessments & Resiliency Plans.

ConEdison (2019, December). Climate Change Vulnerability Study.

Schwartz, L., & Organization of MISO States, National Rural Electric Cooperative Association, Edison Electric Institute, and National Association of State Utility Consumer Advocates (2019, April). Utility Investments in Resilience of Electricity Systems. Future Electric Utility Regulation Report No. 11. Lawrence Berkeley National Laboratory.

Webb, R., Panfil, M., & Ladin, S., (2020). Climate Risk in the Electricity Sector: Legal Obligations to Advance Climate Resilience Planning by Electric Utilities. Columbia Law School and Environmental Defense Fund.

National Association of Regulatory Utility Commissioners ("NARUC") (2019). The Value of Resilience of Distributed Energy Resources: An Overview of Current Analytical Practices.

Zitelman, K. (2020, April). Advancing Electric System Resilience with Distributed Energy Resources: A Review of State Policies. National Association of Regulatory Utility Commissioners.

Gundlach, J. (2019, December). Getting the Value of Distributed Energy Resources Right: Using a Societal Value Stack. Institute for Policy Integrity.

Raymond, C. (2015). Seattle City Light Climate Vulnerability Study and Adaptation Plan.

3. CRITERIA FOR DEVELOPING AND EVALUATING AN ELECTRIC GRID RESILIENCY PLAN

In 2019, Sandia National Laboratories contracted Synapse to research the integration of electric grid resiliency investment planning as part of the Designing Resilient Communities project. Synapse's collaboration with Sandia National Laboratories resulted in several reports, including *Performance Metrics to Evaluate Utility Resilience Investments* and *Application of a Standard Approach to Benefit-Cost Analysis for Electric Grid Resilience Investments,* both released in May 2021. Together, these reports form a framework for evaluating the strengths and weaknesses of a resiliency plan, during plan formation as well as during ongoing monitoring and evaluation. The reports share the following high-level findings:

- **Regulators, utilities, and communities have unique roles to play in developing and evaluating electric grid resiliency plans.** Achieving resilient communities requires the cooperation of a diverse set of stakeholders to align on goals, share data, and evaluate plan together. Specifically
    - regulators can direct utilities to develop high-quality electric grid resiliency plans informed by well-designed performance metrics and benefit-cost analysis frameworks;
    - utilities can act as a central repository for data and ideas, organize priorities, and lead reporting on resiliency outcomes;
    - communities can work with regulators to define critical customers, facilities, and geographies and support utilities by providing resiliency-related data that utilities cannot readily access; and
    - other stakeholders, such as research institutions, can conduct research and analysis to address gaps in data needed to understand the costs and benefits of grid resiliency investments.
- **Development and evaluation should be mindful of multiple perspectives.** *Performance Metrics to Evaluate Utility Resilience Investments* and *Application of a Standard Approach to Benefit-Cost Analysis for Electric Grid Resilience Investments* report identify the utility system, host customer, community, and society as four distinct perspectives with their own view of costs and benefits. Ensuring resilient power at a critical institution, such as a hospital or municipal building, can generate immediate benefits for that institution but also generate quality-of-life benefits for the broader community.
- **High-priority electric grid resiliency investments should include critical community facilities and critical customers.** Low-probability, high-impact outages often create impacts beyond momentary inconvenience that can have significant impacts on community health, well-being, and quality of life during and after outages. Understanding the needs of the broader community, the critical institutions for meeting

those needs during extreme weather events, and how those institutions can best be supported is essential.

- **Electric grid resiliency plans should consider all available resiliency interventions.** Benefit-cost analyses provide the most information when they are able to illustrate the potential costs and benefits of a range of actions, rather than functioning as a "test" for a single type of intervention. In the context of resiliency, potential interventions should not be limited to transmission and distribution investments: distributed generation, system automation, microgrids, and planning and analytical capabilities should also be included.

- **Performance goals and metrics should be identified upfront and assessed regularly.** The *Performance Metrics to Evaluate Utility Resilience Investments* report develops criteria for and examples of effective performance metrics, identifies relevant data, and lays out potential utility performance mechanisms such as standards, targets, or incentives. The report also includes an Excel-based tool for monitoring key indicators over a baseline period and the lifetime of resiliency investments. As a starting point, utilities should collect and present important baseline information which can include

    - the average frequency and duration of major resiliency events;
    - the definition of critical customers;
    - the number and proportion of customers considered critical;
    - the amount and proportion of load considered critical;
    - the number and percent of islandable resources; and,
    - the types of islandable resources.

    Benefit-cost analysis should also be used to compare the costs and benefits of different resiliency approaches, rather than as a 'gating' test for a single resilience pathway. Resiliency-related benefits must be identified and incorporated into a benefit-cost analysis that includes resiliency-related costs.

In *Application of a Standard Approach to Benefit-Cost Analysis for Electric Grid Resilience Investments,* the Sandia/Synapse project team elaborated a series of principles that represent sound economic and regulatory practice. These principles are presented, in adapted form, below:

- **Treat resources consistently.** All utility resources should be compared using consistent methods and assumptions to avoid bias across resource investment decisions.

- **Align with policy goals.** Jurisdictions invest in or support energy resources to meet a variety of goals and objectives. The jurisdiction-specific BCA test should therefore reflect this intent by accounting for the jurisdiction's applicable policy goals and objectives.

- **Ensure symmetry.** Asymmetrical treatment of benefits and costs associated with a resource can lead to a biased assessment of the resource. To avoid such bias, benefits and costs should be treated symmetrically for any given type of impact.

- **Account for hard-to-quantify relevant impacts.** BCA tests should include all relevant impacts including those that are difficult to quantify or monetize.

- **Conduct forward-looking, long-term incremental analyses.** Transparency helps ensure engagement and trust in the BCA process and decisions. BCA practices should therefore be transparent, where all relevant assumptions, methodologies, and results are clearly documented and available for stakeholder review and input.

- **Ensure Transparency.** Transparency ensures trust in the process and allows for tracking the performance of resiliency investments in the future.

Key Takeaways:

- Ensure that resiliency plans receive input from multiple stakeholders and from multiple perspectives, maintaining attention toward critical electricity service for communities.

- Use benefit-cost analysis consistently across various types of investments. Ensure analyses identify the best path forward across all available options for all stakeholders, rather than represent a simple test for a single proposed pathway.

- Benefit-cost analysis should align with the goals of the program, treat costs and benefits consistently and symmetrically, and be part of a transparent, long-term evaluation framework.

- Resiliency plans should anticipate long-term performance tracking and evaluation, using performance mechanisms like targets, standards, or incentives/penalties as deemed appropriate by regulators.

Key Sources:

Kallay, J., Hopkins, A., Napoleon, A., Havumaki, B., Hall, J., Whited, M., Chang, M., Broderick, R., Jeffers, R., Jones, K., & DeMenno, M. (2021, April). The Resilience Planning Landscape for Communities and Electric Utilities. *Designing Resilient Communities: A Consequence-Based Approach for Grid Investment Report Series.* Sandia National Laboratory and Synapse Energy Economics.

Kallay, J., Letendre, S., Woolf, T., Havumaki, B., Kwok, S., Hopkins, A., Broderick, R., Jeffers, R., Jones, K., & DeMenno, M. (2021, April). Application of a Standard Approach to Benefit-Cost Analysis for Electric Grid Resilience Investments. *Designing Resilient Communities: A Consequence-Based Approach for Grid Investment Report Series.* Sandia National Laboratory and Synapse Energy Economics.

Kallay, J., Napoleon, A., Havumaki, B., Hall, J., Odom, C., Hopkins, A., Whited, M., Woolf, T., Broderick, R., Jeffers, R., & Garcia, B. M. (2021, April). Performance Metrics to Evaluate Utility Resilience Investments. *Designing Resilient Communities: A Consequence-Based Approach for Grid Investment Report Series.* Sandia National Laboratory and Synapse Energy Economics.

Synapse Energy Economics (2021, April). Excel Tool: Performance Metrics to Evaluate Utility Resilience Investments.

4. SURVEYING EXISTING EFFORTS AND NEW OPPORTUNITIES FOR COLLABORATION

Electric grid resiliency is ultimately a product of a wide variety of non-utility actions, regular regulatory proceedings, and explicit resiliency initiatives, and it is important that resiliency plans identify, recognize, and synergize with this ecosystem, rather than ignoring them and risking redundant investments. This section outlines, at a high level, ongoing proceedings, efforts, and opportunities that should inform any resiliency planning process conducted in New Orleans.

Ongoing Regulatory Processes

Entergy New Orleans' Electric and Gas Formula Rate Plan Application

Entergy New Orleans filed an application to change its formula rates to reflect a variety of changes in cots in April 2022. Entergy New Orleans identifies that the majority of capital investments proposed in the application are related to Entergy New Orleans 'distribution system, with a portion of the $64.4 million in investments dedicated to non-recurring distribution programs.

Incremental distribution investments, such as those proposed in Entergy New Orlean's applications, have clear implications for assessing the resiliency and vulnerability of the system. Resiliency planning processes should incorporate a view of the system that takes the resiliency impact of these investments into account. Likewise, any analysis or proposed revision of these incremental distribution projects conducted through the resiliency planning process should be reflected in ongoing regulatory processes. Consistent with least-cost planning principles, regulators should ensure that the investments contemplated in Entergy New Orleans 'application represent 'no-regrets 'investments that would be cost-effective across a range of resiliency measures deployments.

Existing Resiliency Planning Efforts in New Orleans

Grid Modernization Laboratory Consortium: Grid Analysis and Design for Energy and Infrastructure Resilience in New Orleans (2016-2017)

Over 2016-2017, experts from Sandia National Laboratories and Los Alamos National Laboratory conducted interviews with a range of stakeholders in New Orleans and performed an analysis of improving access to electricity services across New Orleans after a major storm event. Their analysis used a set of performance metrics developed in consultation with stakeholders and engaged in a detailed spatial analysis that identified potential resilience 'nodes 'for providing critical energy services to community members.

This resiliency process incorporates several of the best practices incorporated in this document, including defining objectives in consultation with stakeholders, conducting a robust vulnerability assessment that informed resiliency plans, and using a spatial analysis that highlighted the role of distributed energy resources. The report associated with this project also identifies several opportunities

to fill in critical information, including a projection of population needs, a characterization of interdependence between gas and electric infrastructure, and a more detailed characterization of exposure to resiliency events over the next thirty years.

Key Takeaway: The stakeholder conversations and rigorous, cutting-edge analysis included in *Grid Analysis and Design for Energy and Infrastructure Resilience* render it an invaluable resource for contemporary resiliency planning effort in New Orleans. Ongoing resiliency planning efforts should build on the scoping and alignment conversations started during this project and capitalize on the resiliency analysis already conducted.

U.S. Department of Energy's Communities Local Energy Action Program (2022)

The City of New Orleans announced in April 2022 that it had been selected as a recipient of the U.S. DOE's Communities Local Energy Action Program (LEAP). As a part of the LEAP program, the U.S. Department of Energy will provide targeted technical assistance to the City in accessing additional DOE and federal funding for interventions like distributed solar, storage, and district-scale microgrids.

Key Takeaway: Technical and analytical capacity provided by the LEAP program could benefit current resiliency planning efforts, and any additional funding secured by LEAP for resilient generation would have resiliency implications for any ongoing planning efforts.

Community-Based Resiliency Efforts

In the wake of Hurricane Ida, community organizations have initiated their own energy resiliency efforts in the city. These include:

- **Community Lighthouses (Together New Orleans):** Together New Orleans is working with local partners to develop Community Lighthouses with resilient solar and storage installations to provide community service during outages. Together New Orleans' ultimate goal is to create 85 of these Lighthouses across New Orleans.
- **Get Lit Stay Lit (Feed the Second Line):** Feed the Second Line's Get Lit Stay Lit program is implementing micro-scale resilient power at the neighborhood level. The program is currently raising funds to deploy these resilient restaurants.

Key Takeaway: These efforts underscore that resiliency of electricity service is borne by the whole community, and there are alternatives beyond traditional transmission and distribution planning to bolster resiliency. Just as integrated resource planning tracks non-utility energy resources such as energy efficiency and distributed energy resource investments, resiliency planning should incorporate community-based assets into resilience analysis.

The 2021 Infrastructure Investment and Jobs Act

The Infrastructure Investment and Jobs Act (IIJA) became law in November 2021, and authorized federal funding for many programs and initiatives. The electric grid is a crucial part of national infrastructure, and this bill establishes multiple funding opportunities for programs that will ensure its reliability and resiliency—opportunities that New Orleans, Entergy New Orleans, and other entities could take

advantage of to drive resiliency benefits. Key components of the IIJA are summarized below, with relevant dates included where available.

Grid Resiliency Formula Grants

In particular, Section 40101 of the IIJA provides $5 billion in federal funding over the next five years to support activities that reduce the likelihood and consequence of impacts to the electric grid due to extreme weather, wildfire, and natural disaster. Section 40101(d) establishes the $2.3 billion state and Indian tribe grant program that currently allocates $8 million per year to Louisiana and $62,000 to the Chitimacha Tribe of Louisiana.[8]

Upgrading Our Electric Grid and Ensuring Reliability and Resiliency

Section 40103: Electric Grid Reliability and Resilience Research, Development, and Demonstration established the Program Upgrading Our Electric Grid and Ensuring Reliability and Resiliency. This program will provide $5 billion in federal funding over the next five years to eligible entities that demonstrate innovative approaches to grid hardening and regional grid resilience. The estimated application opening date of this program is the 3rd quarter of 2022.[9]

Smart Grid Investment Grant Expansion

Section 40107 provides an additional $3 billion in funding to the Smart Grid Investment Matching Grant Program established by the Energy Independence and Security Act of 2007. The goal of this program is to deploy technologies that enhance grid flexibility. This could include increased visibility into the electrical system, the integration of distributed energy resources and renewable generation, the installation of energy storage, transmission upgrades, and other investments that increase the ability to anticipate and mitigate the impacts of extreme weather on grid resiliency.

State Energy Security Plans

Section 40108 updates prior guidance on state energy security plans. Federal financial assistance is available for the development, implementation, review, and revision of a state energy security plan. In order to qualify, the plan must propose methods to strengthen the ability of the state to secure energy infrastructure, mitigate the risk of energy supply disruptions, enhance the response to energy disruptions, and ensure that the state has reliable, secure, and resilient energy infrastructure. The state must also provide a risk assessment and mitigation approach in its plan.

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[8] Department of Energy. *DOE's Draft Allocation of Funds under IIJA Section 40101(D)-Formula Grants to States and Indian Tribes for Preventing Outages and Enhancing Resilience of the Electric Grid*. Available at: https://netl.doe.gov/sites/default/files/netl-file/IIJA%2040101d%20-%20DRAFT%20Allocation%20of%20Funds.pdf .

[9] Department of Energy. "Program Upgrading Our Electric Grid and Ensuring Reliability and Resiliency." *Bipartisan Infrastructure Law*. Available at: https://www.energy.gov/bil/program-upgrading-our-electric-grid-and-ensuring-reliability-and-resiliency.

Justice40 Initiative

Executive Order 14008, published on January 27, 2021, established the Justice40 initiative, which will direct 40 percent of the benefits of Federal investments related to energy, environmental issues, housing, transit, and employment to disadvantaged communities. The Office of Management and Budget released additional interim guidance on in July 2021.

The OMB guidance identifies disadvantaged communities (DACs) according to several indicators based on energy burden, socioeconomic vulnerability, fossil dependence, and environmental and climate hazards, alongside a methodology for identifying DACs. The Energy Justice Dashboard, currently in beta testing on the U.S. Department of Energy's website, specifically identifies several census tracts in New Orleans that contain DACs. As Justice40 Initiative guidance develops, resilience projects in New Orleans could represent a strong candidate for Justice40-related resilience investments.

Key Takeaways:

- Resiliency plans should look to build on the efforts of previous resiliency efforts, rather than duplicate efforts.
- Plans should leverage existing institutional knowledge or relationships between decisionmakers with regard to resiliency planning.
- Plans should capitalize on existing funding from a diverse set of sources, including state, philanthropic, and federal funding to drive best outcomes for ratepayers.

Key Sources:

Jeffers, R., Hightower, M., Brodsky, N., Baca, M., Wachtel, A., Walsh, S., Aamir, M., Gibson, J., Fogleman, W., Peplinski, W., Vugrin, E., Ewers, M., Pasqualini, D., & Ambrosiano, J. (2017). A Grid Modernization Approach for Community Resilience: Application to New Orleans, LA. Sandia National Laboratories.

Executive Office of the President (2021, January). Executive Order on Tackling the Climate Crisis at Home and Abroad.

Young, S., Mallory, B., McCarthy, B. (2021, July). Interim Implementation Guidance for the Justice40 Initiative. Office of Management and Budget

US DOE (2021). Justice40 Initiative.

5. Conclusion: Questions to Ask When Developing (or Reviewing) an Electric Grid Resiliency Plan

This brief concludes by offering a series of questions for utility planners, regulators, and community members to use when determining whether a given resiliency plan is in alignment with resiliency planning best practices. This is not a comprehensive list of questions, but a starting point for determining the prudence of a resiliency proposal and/or a set of initial points for consideration

- **Defining Scope & Objectives:**
    - Have appropriate stakeholders been convened for defining scope and objectives? Have efforts been made to make stakeholder engagement accessible? Are stakeholders' insights, priorities, and proposed revisions being integrated into resilience planning?
    - Are the objectives of the electric grid resiliency plan clear?
    - Has the resiliency planning process identified its equity goals and integrated them into the planning process?
    - Does the resiliency plan integrate other ongoing resiliency efforts at the city and community level?
    - Does the resiliency plan take advantage of available technical and analytical resources for developing the resilience plan?
- **Vulnerability Assessment:**
    - Is there a vulnerability assessment conducted as a part of the resiliency planning process?
    - Does the vulnerability assessment use a robust method for projecting physical resiliency impacts?
    - Does the vulnerability assessment assess the full scope of physical resilience impacts?
    - Does the vulnerability assessment put incremental reliability impacts in the context of the system's existing drivers of service outages?
    - Does the vulnerability assessment integrate risks to operations and assets with service needs of the community being served?
    - Does the vulnerability assessment integrate socio-economic vulnerability and infrastructure into a spatial analysis?

- **Resiliency Plan Definition:**
    - Does the resiliency plan consider a wide variety of resiliency measures?
    - Does the resiliency plan's evaluation of potential measures include multiple perspectives and integrate critical services and critical customers?
    - Does the resiliency plan's development integrate a spatial analysis to understand most at-risk populations?
    - Does the resiliency plan include fair consideration of distributed energy resources as a resiliency measure?
    - Is the resiliency plan's benefit-cost analysis transparent? Does it treat costs and benefits consistently and symmetrically?
    - Is cost-benefit analysis used as a supplemental evaluation tool to differentiate resiliency pathways?
    - Does the resiliency plan integrate the impacts of existing regulatory proceedings in front of regulators?
    - Does the resiliency plan build on previous or ongoing resiliency efforts?
- **Ongoing Resiliency Planning:**
    - Is the resiliency plan designed with ongoing monitoring, assessment, and re-evaluation in mind?
    - Does the resiliency plan identify future decision points where planned investments can be re-evaluated?
    - Has the plan defined performance metrics for evaluating resiliency performance?
    - Are there clear accountability mechanisms for ensuring that the resiliency plan is delivered upon and effective?