

Group Work for May 22 Workshop
Due May 17

Grid resiliency enhancements	<i>How can we strengthen the resilience and flexibility of the grid while ensuring affordability for customers?</i>
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Prepare **up to** a two page memo with the answers to the following questions. The memo should include 1-2 sentences or bullets at the top that summarize your key findings.

Questions to answer in memo:

1. Briefly describe the nature of this policy tension/question - What is happening?

Our workgroup was tasked with examining how we can strengthen the resilience and flexibility of the grid while ensuring affordability for customers. We understand that the electric grid needs to be resilient in the face of disasters including but not limited to: the impact of weather events, cyber and physical attacks, and solar storms. The electric grid also needs to be flexible to address: rapid advancements in renewable and DER technology, rapid advancements in grid technology, and changing customer expectations. Since grid flexibility is being dealt with in another workgroup, we focused our efforts on grid resilience.

In discussing grid resilience, it is important to start with a definition of resilience. There is a difference between reliability and resiliency, but there is a great deal of overlap. In general, both hardening the grid against disasters and providing redundant systems will improve both reliability and resiliency.

Addressing the needs of resiliency calls for investments, which should be determined through cost benefit analysis and detailed risk assessments. Just as the insurance industry which has a great deal of experience in valuing the impact of uncertain risks, grid regulators must understand how to assess and prioritize grid investments based on risk assessments and/or CBAs.

2. To what extent does this policy tension exist in NC, if so, why is it relevant to the state?

The need to strengthen grid resilience certainly exists in North Carolina, perhaps even more so than in other states across the country. NC has seen significant hurricanes and other major storms for the past several years. The risk of cyber and physical attacks is very real. New grid technology and other investments can improve both reliability and resilience. Duke Energy has shared Grid Improvement Plans to strengthen the resilience of the grid, and is exploring the fundamental tension revolving around how to fund for the investments.

3. What policy or regulatory action might be required to address the tradeoffs you see? What entity would need to take the action you've identified?

Consideration of the appropriately affordable level of grid investment to strengthen the grid will ultimately fall to the NC Utilities Commission (NCUC) or cooperative/municipal utilities. The NCUC could open a proceeding to determine the proper framework for assessing the appropriate level of investment to strengthen the grid, how to measure the investment over time, and appropriate incentives for electric utilities to make those investments in the grid. As part of that framework determination, there needs to be additional work on the meaning of resiliency versus reliability. Until this issue is more fully addressed, utilities nationwide will struggle investing in grid resiliency. There should also be some consideration of co-benefits (such as societal costs of outages) and not simply a focus on direct cost benefit analyses alone.

4. How are people in other places responding to this tension? What are the most innovative and promising solutions? Do they seem feasible in NC?

Many states have annual reporting and/or cost recovery proceedings to monitor and encourage grid investment to address resilience needs. While this workgroup does not take a position in support or opposition to any specific legislation, it is worth noting the existence of Senate Bill 559, which is currently pending before the NC legislature. This enabling legislation would permit the North Carolina Utility Commission (NCUC) to consider using ratemaking tools for utilities to recover costs that could include grid resiliency investments. Those ratemaking tools are already in use by other utility commissions across the country.

5. Are there ways you think NC should consider responding to this tension? What entity would need to take the action you've identified?

In summary of the policy options discussed above, the NCUC should define resilience, develop protocol for risk and cost benefit assessments, and identify challenges and possible solutions. In terms of possible solutions for grid resiliency, it is important to outline technologies that exist today to strengthen grid resiliency. When exploring technologies to strengthen grid resilience, the system should be divided into at least three parts – transmission, distribution, and customer/end user – each of which has different characteristics. Resilience should be considered from the aspect of the four National Infrastructure Advisory Council (NAIC) Resilience Constructs: robustness, resourcefulness, rapid recovery, and adaptability. With regards to increasing robustness of the three parts of the grid listed above, there are at least two options; withstanding the disaster through hardening and updated systems and having redundant systems in case one system does not withstand the disaster. Potential examples for each part are given in the table below:

	<u>Transmission</u>	<u>Distribution</u>	<u>End User</u>
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Withstand	Harden and update	Harden and update	??
Redundant	Add lines	Islanding microgrids	Islanding storage

The state could also consider incentivizing investment in combined heat and power by state university system and other end users who have a constant need for both heat/cooling and electricity.