Climate Resilience Working Group
Update

An important part of our planning is to collaborate with stakeholders including state, regional and local planning and emergency response officials, customer and environmental advocates and other interested parties to understand and incorporate their concerns and priorities, ultimately informing our investment decisions. With that in mind, National Grid utilizes our climate resilience working group [CRWG] to solicit feedback and collect information from stakeholders as well as update stakeholders and the public on developments and findings to review our work and provide input into the creation of our resilience plans.

June 5th meeting recap

If you didn't get a chance to attend our last working group meeting, here's a link to the video of our June 5th CRWG Meeting
Check out the presentation attached.

NationalGrid_CRWG Meeting 2.pdf

National Grid Vulnerability Matrix

We have provided our Vulnerability Matrix, please let us know if you have any questions or comments regarding the matrix. The matrix identifies climate hazards and associated system vulnerabilities, along with many other factors we are considering as we work through our process. Are your concerns showing up on the matrix?

NG_Vulnerability Matrix_03312023.xlsx

Next meeting:

Our next CRWG meeting is slated for **October, 2023**

Feedback and Responses

Your input encourages us to consider all perspectives and challenges us to create a better plan and study. Following up from our prior meeting, here are our responses to the feedback you had.

Question	Response
1. "Is there a summary of the resources that would be at risk at the different levels? Cost to upgrade at different risk exposures?"	Our vulnerability matrix identifies the vulnerabilities for each asset type for a given climate hazard. We are in the process of developing specific recommendations and associated costs to address high priority vulnerabilities. These recommendations are based on analysis where projected climate conditions are compared to equipment thresholds at our substation and line locations. Several of the visualizations included in the 6/5 working group presentation illustrate this analysis (see pages 22-29).
2. "How is risk determined at different temperature levels"	Equipment is evaluated based on temperature design thresholds. For example, substation transformers are presently specified to operate under a maximum average ambient temperature of 32 degrees C, (89.6 degrees F) and projected temperatures above this level will reduce the amount of load a transformer can handle. Therefore, risk increases as conditions rise above design thresholds. For the substation transformer example, for each degree C by which temperatures exceed the design threshold, the capacity of the transformer is reduced by about 1.5%.
3. "It would be interesting to understand some examples of actual risk and levels of potential mitigation with cost"	We are in the process of developing recommendations and associated costs, and we do not have the final results at this time. One example, where we have draft recommendations and costs is for substation flood mitigation. We anticipate recommending the addition of flood walls at 18 substations at a total cost of $28M where FEMA data along with climate projections indicate a high risk of flooding. Food walls will mitigate the risk of flood damage to these sites and avoid not only the cost for repairs, but also the associated equipment and customer outages.
4. "…we understand that it is supposed to get hotter, windier, and the potential for flooding is supposed to increase. I think what would be good is to understand the <u>actual exposure of the actual assets</u> along with the different levels of mitigation that could be implemented."	The visualizations on page 22-29 of the 6/5 working group presentation show the exposure of our lines and substations to each climate hazard (wind, icing, temperature, and flooding) and are compared to the relevant design thresholds. For example, transmission line structures were built to withstand wind gusts based on NESC guidelines which is currently 95 MPH. In areas where we project wind gusts in excess of this level, we are evaluating recommendations to specify upgraded designs that can withstand higher wind levels to be installed in those areas going forward. Although we have not finished developing recommendations at this time, this example illustrates the general approach we are taking to address other vulnerabilities as well.

5. "Understanding what could happen in terms of the climate is important but understanding the impact on the actual National Grid system is what we want to understand. <u>Will the Vulnerability Study be looking at the actual system and specific assets?</u> It would be good to know <u>what is at risk</u> and at <u>what level of climate change the risk becomes real."</u>	Yes, the vulnerability study is looking at specific assets such as transmission structures, distribution poles, transformers, and conductors and assessing their vulnerability based on when climate hazards will exceed the conditions they were designed for.
6. "If by 2080 the majority of substations are going to see more than 4 days per year with temps over 95 degrees <u>what does that mean?</u> [For the system] I do not believe I have heard of substations failing at 95 degrees (or even higher). With many areas of the country that already experience multiple days of 95+ what are they doing? Are they experiencing failure?"	Important substation equipment such as transformers will experience accelerated "loss of life" if they experience temperatures above what they were designed for, with the possibility of failure at higher levels. The ambient temperature is only one of several factors that impact the overall temperature of the transformer with the loading (MW/Amps) being a significant factor. We currently specify and develop ratings for substation transformers based on a maximum average ambient temperature of 32 degrees C (89.6 degrees F) with higher temperatures resulting in lower ratings (reduced capacity) or increased loss of life for transformers that are fully loaded. So, the consequence could range from having reduced capacity which we may need to serve customers on hot summer days, to decreasing the life of our assets, and in some cases even equipment failures and associated outages. One option that we are considering is to increase the average ambient temperature in our transformer design specifications to allow the transformers to operate at higher temperatures without experiencing these consequences. For example, increasing the average ambient temperature in our transformer spec from 32 to 40 deg C will result in our transformers being designed and built to withstand higher ambient temperatures without needing to be de-rated. The impact is similar to purchasing a transformer with a higher rating, but we believe this option will allow us to keep close to the existing transformer dimensions/size to minimize the need for more costly rebuilds that can be required when upgrading to a larger transformer. Simply increasing the nameplate rating of the transformers we specify would be more likely to increase the dimensions/size and could make asset condition replacements more costly.

7. [What is the vulnerability due to wind?]	Our transmission, sub-transmission, and distribution structures and poles are the most vulnerable to high winds. To use transmission as an example, we currently design structures to withstand wind gusts of 95 MPH per NESC standards. Areas with forecasted wind speeds greater than that level could result in a failure of one or more structures, which would result in a transmission line outage.
8. "The flooding issue would be very specific to flood zones or expected flood zones. A review of assets, and their preparedness for flooding, in those expected zones is what is needed for that. …there are assets in flood zones that are already at the highest point in that zone. Understanding what could really be at risk would be helpful."	To evaluate the substations at risk for flooding we identified their risk based on FEMA flood maps as well as using our climate change risk tool (CCRT) which incorporates future precipitation projections. A review was then conducted by subject matter experts (SMEs) with knowledge of the specific geography of the substation sites to further zero in on the substations at greatest risk of flooding.
9. When you look at priority, do you also consider what customers would be impacted (e.g., disadvantaged communities, emergency/medical services, etc.)?	Yes. Understanding the consequence and impact of a climate vulnerability includes factors such as whether critical customers would be impacted. When we evaluate recommendations to address climate vulnerabilities, we will also factor in considerations of equity so that disadvantaged communities are benefiting alongside other areas.
10. When rating the potential impacts and sensitivities, how many SMEs were involved and what was that process like?	We have about 40 SMEs directly working on our "Deep Dive Groups" evaluating vulnerabilities. These SMEs also reach out to other experts within their respective organizations as needed. We also have support from a consultant with extensive climate science expertise.

National Grid Leads

Peter Haswell

Project Manager

Peter.haswell@nationalgrid.com

Katie Meyer

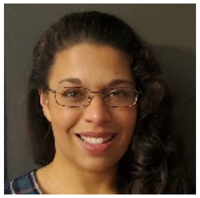
Technical Lead

Kaitlyn.Meyer@nationalgrid.com

Rachel Stowell

Stakeholder Lead

Rachel.stowell@nationalgrid.com



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For your reference, please see attached presentation and link to recording. You can also access these and other information on our webpage. https://www.nationalgridus.com/Our-Company/New-York-Climate-Resiliency-Plan

Any questions you may have regarding climate change can also be sent to our dedicated email address. box.NYClimateresiliency@nationalgrid.com