Climate Change Vulnerability Study and Resilience Plan Update

Public Service Law (PSL) § 66(29) – PSC Case 22-E-0222

O&R Climate Resilience Working Group
June 22, 2023

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AGENDA

- Progress Update
- Vulnerability Assessment Results
- Potential Adaptation Options
- Climate Change Vulnerability Study Preview
- Climate Change Resilience Plan Outline
- Next Steps

Timeline of Execution

	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Task 3: Adaptation Options & Study							
3.1 Identify Adaptation Options							
3.2 Analyze costs and risk reductions							
3.3 Draft Vulnerability Study				★	Vulnerability Study Filing		
Task 4: Resilience Plan							
4.1 Confirm resilience framework							
4.2 Develop Adaptation Portfolio							
4.3 Costs and benefits of plan							
4.4 Schedule for implementation							
4.5 Estimate 5-year rate impacts							
4.6 Establish governance structure							
4.7 Draft Resilience Plan						★	Resilience Plan Filing
Task 5: Stakeholder Engagement	WG		WG		WG		

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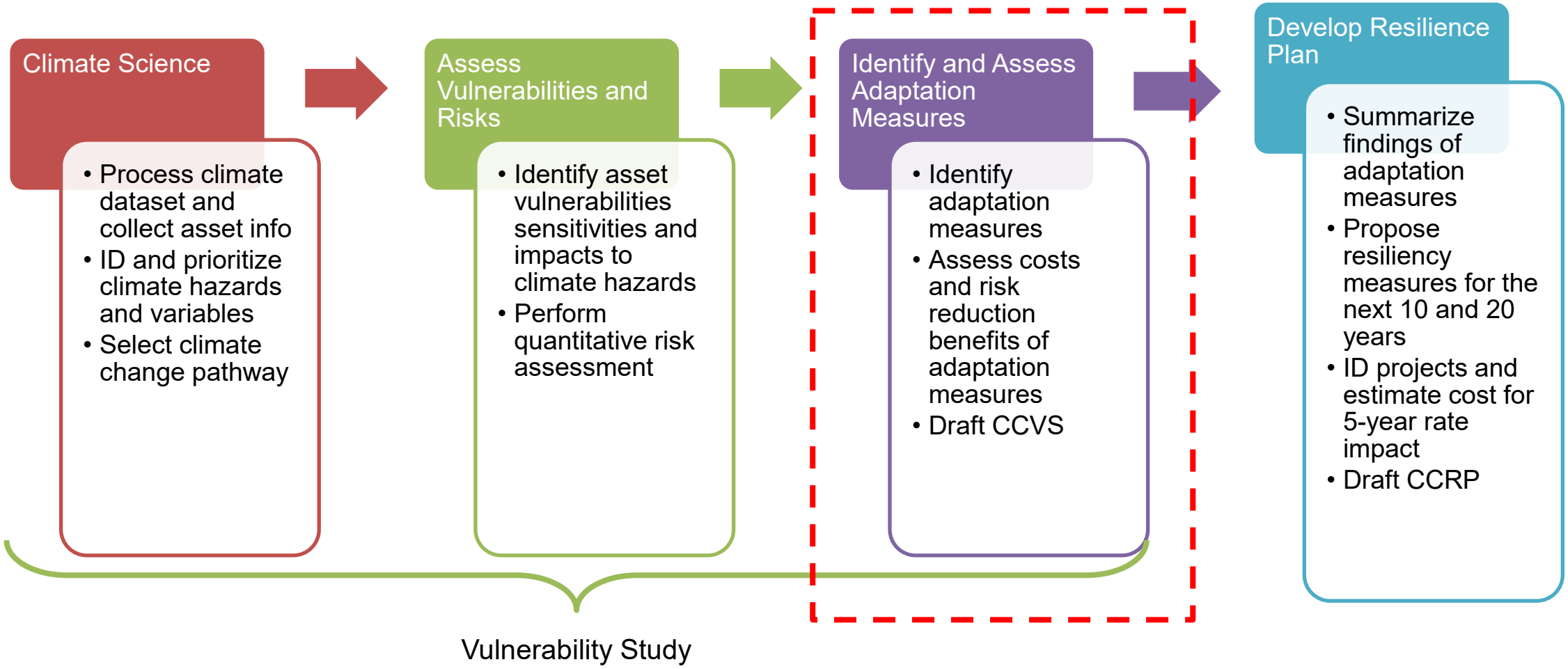
Orange & Rockland CCVS & CCRP Process Flow



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Climate Hazards

Heat		Temperature & Humidity*	Flooding		Wind & Ice	
Gradual	Extreme	Gradual	Gradual	Extreme	Gradual	Extreme
Increasing maximum summer temperatures	Increasing frequency of 3-day heatwaves	Increasing maximum summer electric load	Projected sea level rise	Expansion of coastal and inland floodplains (100-year)	Increasing average wind speeds	Increasing likelihood of hurricane with CAT 2+ wind speeds
Increasing number of high heat days		Increasing number of days per summer with high electric load	Increasing number of days per year with >2 in. of precipitation			Increasing accumulation from major winter storm events
Increasing average summer temperatures						

*Temperature and humidity are evaluated in terms of their combined effect on Temperature Variable (TV), which is an engineering variable that is an indicator of load demand for cooling in the summer.

MIT Dataset Key Takeaways

- **What is it?** Dynamically-downscaled climate projections for the Northeast U.S., with gridded 3km, hourly data to derive tailored projections.
- Created using regional climate modeling that allows for severe weather, such as thunderstorms.
- MIT projections do not resolve all storm event types, such as tropical cyclones, and may not be fully calibrated for all extreme variables (e.g., deluge precipitation).
- **MIT provides a snapshot of climate change in the near-future to help us understand potential risks but does not derive a probabilistic range of outcomes that could be used to revise design standards.**

Columbia/NYSERDA	MIT
Ensemble of 14-16 Global Climate Models	One Global Climate Model
SSP2-4.5 and SSP5-8.5	RCP 8.5
2030s-2080s time horizons	One near-term time horizon (2025-2041)
30 years of data for each time horizon	17 years of data for one future time horizon
Daily time resolution	Hourly time resolution

Wind Speeds Examples

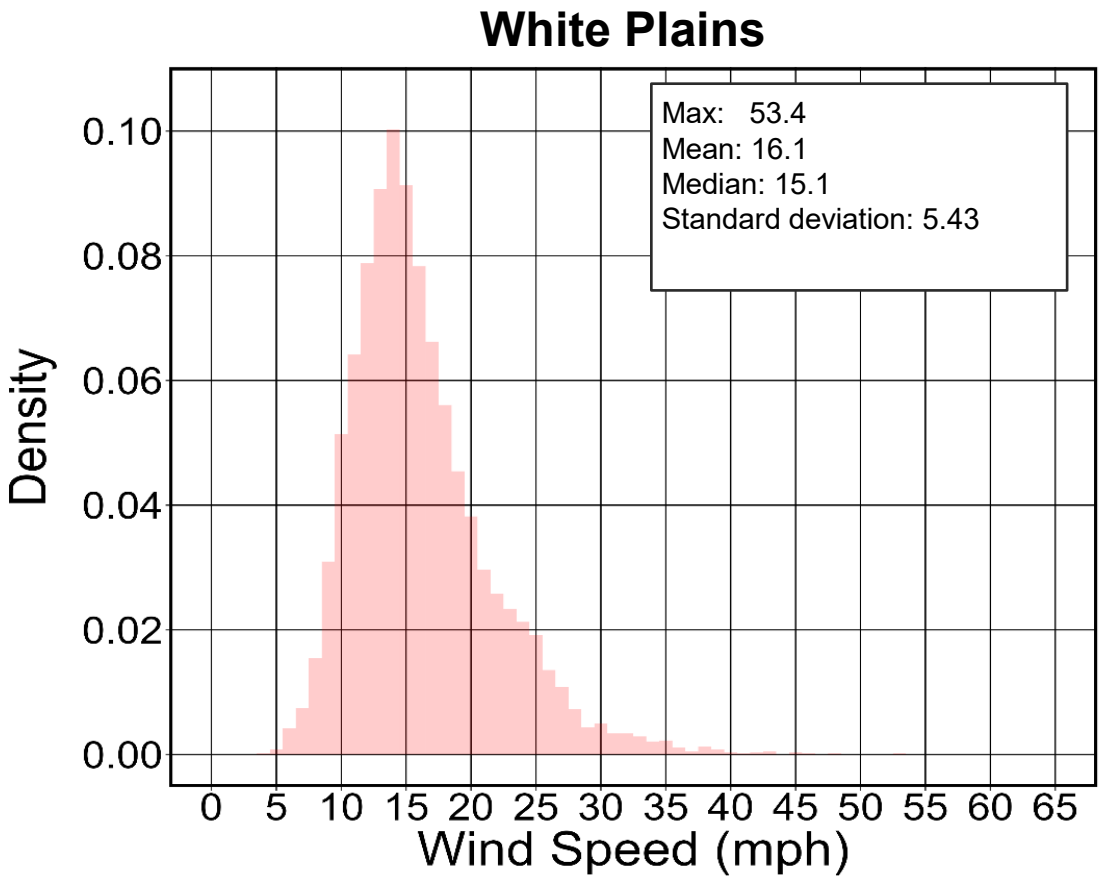

Figure. Histogram of the daily maximum 1-minute wind speeds at White Plains (the closest applicable station for this data set).

- The distribution is right tailed, meaning there is a large range of higher wind speeds at White Plains in MIT dataset.
- The most common winds are between 11 and 17 mph, peaking at 53.4 mph.
- Limitation: There is no baseline data due to different time-scales between model projections and historical actuals.

Radial Icing Examples

- High interannual variability in annual radial icing, with potential for significant icing on occasion.

- Limitation: There is no baseline data.

Annual Radial Icing Projections at White Plains		
Year	Total Annual Radial Icing (in.)	Number of Hours with Radial Ice Accumulation
2025	0.21	29
2026	0.05	7
2027	0.08	3
2028	0.07	11
2029	0.08	5
2030	0.76*	28*
2031	0.00	0
2032	0.06	3
2033	0.05	13
2034	0.04	3
2035	0.00	0
2036	0.17	6
2037	0.59	27
2038	0.11	10
2039	0.13	14
2040	0.96*	58*
2041	0.48	18

*Red values highlight the two highest years

Vulnerability Assessment Results

- Are there any specific vulnerabilities that concern you the most?

Vulnerability assessment results based on sensitivity and exposure of asset classes to climate hazards and is based on SME scoring input and climate projections for the O&R service territory.

	Temperature (Heat)		Temperature & Humidity	Flooding/Sea Level Rise		Wind & Ice	
	Gradual	Extreme	Gradual	Gradual	Extreme	Gradual	Extreme
Substations							
Overhead Transmission							
Overhead Distribution							
Underground T&D							
Critical Facilities							

High vulnerability
Medium vulnerability
Low vulnerability

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Identified Climate Resilience and Potenti

- What adaptation options are you considering in your community?

Assessment of highly vulnerable asset/climate hazard risk led to identification of potential adaptation options to address climate hazards

Climate Variable	Temperature & Humidity (Heat)	Flooding/Sea Level Rise	Wind & Ice (Major Storms)
Potential Impact	• Equipment degradation and derating limiting system capacity during times of peak demand	• Disabling of equipment, access restrictions, and circuit failures	• Failure of overhead lines and structures resulting in system outages
Potential Adaptation Options	• Run peak load forecasts for multiple climate change scenarios • Review of transformer design standard • Acceleration of projects (i.e., substation, transformer replacement)	• Install temporary flood barriers • Install walls around substation equipment • Elevate control house • Raise site grade elevation • Replacement of substations in flood prone areas • Expand shoreline protection and erosion monitoring programs	• Additional selective undergrounding • Reinforce/replace poles and towers • Additional Smart Grid/Distribution Automation • Reinforced tree-resistant overhead cable • Review wind design standards • Additional weather station monitoring

Operational Vulnerabilities

Multiple O&R departments provided input to determine what processes/operations may be impacted by climate change. This table shows some key considerations and possible actions to address climate change.

	Key Considerations	Possible Actions
Worker Health & Safety	Hotter temperatures and extreme events pose a risk to staff who work in the field.	Revise protocols for working in high heat.
Emergency Response	More frequent extreme events will require more frequent activation of emergency response protocols.	Increase trainings, drill exercises and additional resources.
Design Standards	Changing temperature and wind patterns may mean design standards no longer account for projected climate conditions.	Update design guidelines using new climate data.
Load Forecasting	Higher temperature variable will lead to more demand on the system. Combined potential lower equipment capacity from higher operating temperatures, this could cause capacity issues.	Update load forecasting calculations and system planning to account for higher temperature variable and operating temperature.
Vegetation Management	Hotter temperatures and more precipitation will cause vegetation to grow faster, possibly infringing on O&R overhead lines.	Monitor for outage impacts, evaluate vegetation management cycles if necessary.

Climate Change Vulnerability Study

- Are there any other topics that you feel should be included?

Section	Contents
Executive Summary	Key Takeaways
Introduction	• Background • Broad baseline assumptions • Summary of priority vulnerabilities • Importance of equity
Historical Climate Data and Future Projections	• Methods • Results and Output
Vulnerability Assessment	• Methods • Identified Vulnerabilities • Anticipated future conditions
Potential Adaptation Measures	• High-level categories for consideration in Resilience Plan
Conclusion and Next Steps	• Knowledge gaps and anticipated needs • Consideration of equity moving forward

Climate Change Resilience Plan ("CCRI

- Are there any other topics that you feel should be included?

- Executive Summary
- Introduction and Background
- Summary of potential adaptation measures from the Study
- Potential Consequences
- Engagement of the Climate Resilience Working Group
- Multi-pronged Resilience Strategy and Approach
- Consideration of Equity
- Investment Plan
- Governance
- Performance Measures
- Conclusion and Next Steps

Next Steps

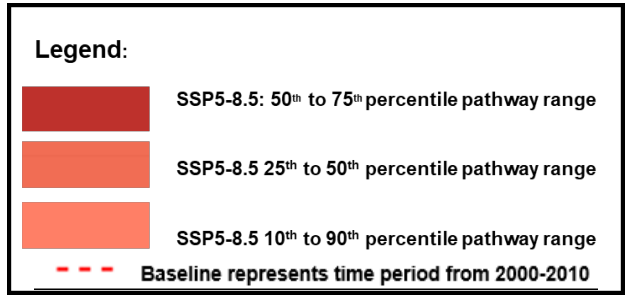
- Develop draft 10- and 20-year resilience plans with additional details for the first 5 years
- Provide draft CCVS to Working Group for review in mid-August
- Next O&R Climate Resilience Working Group Meeting expected in late August

Orange & Rockland

Climate Change Pathways Background

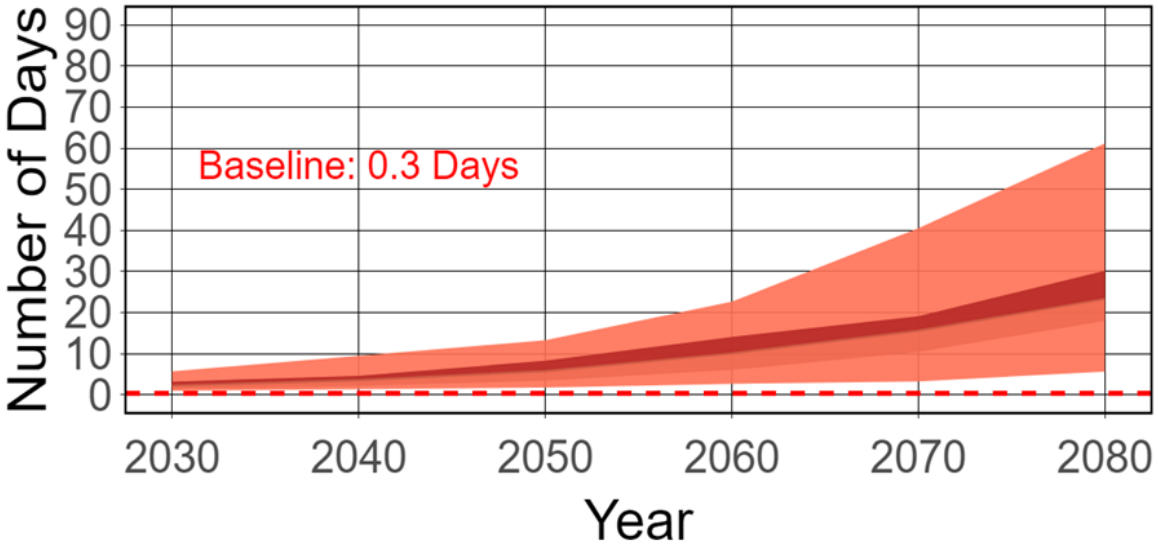
Climate Change Pathway selection to guide the design and planning process

Climate Change Pathways represent O&R's level of risk tolerance to future climate projections and are based on scenarios of socioeconomic activity, levels of GHG emissions and their atmospheric concentrations, known as Shared Socioeconomic Pathways (SSPs)



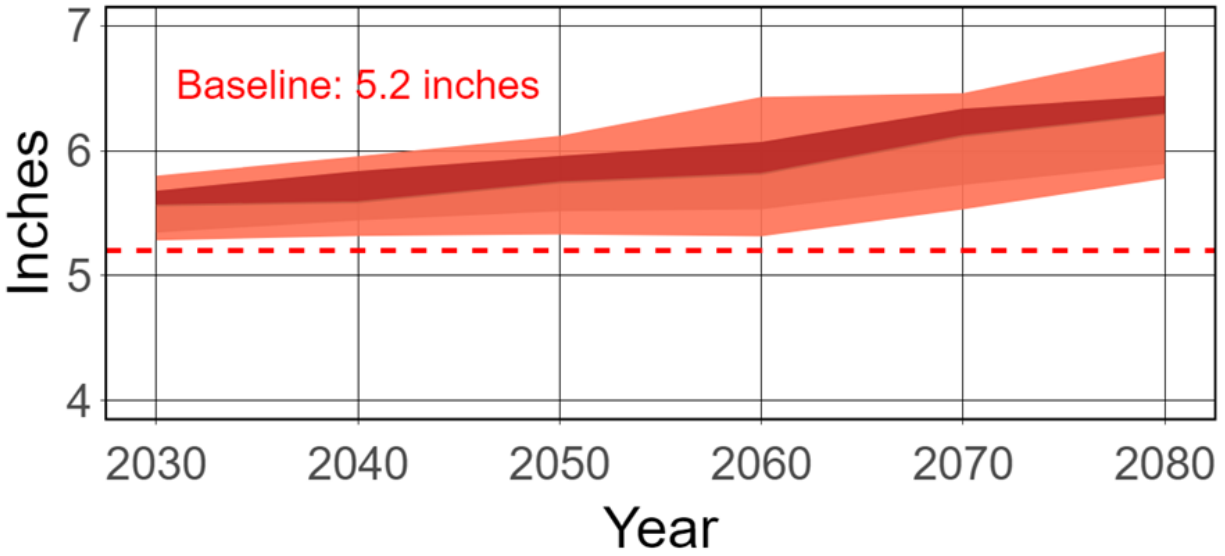
Mohonk SSP5-8.5 Projections:

Days per year with ambient daily temperature>86°F



Mohonk SSP5-8.5 Projections:

Maximum 5-day Precipitation (inches)



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