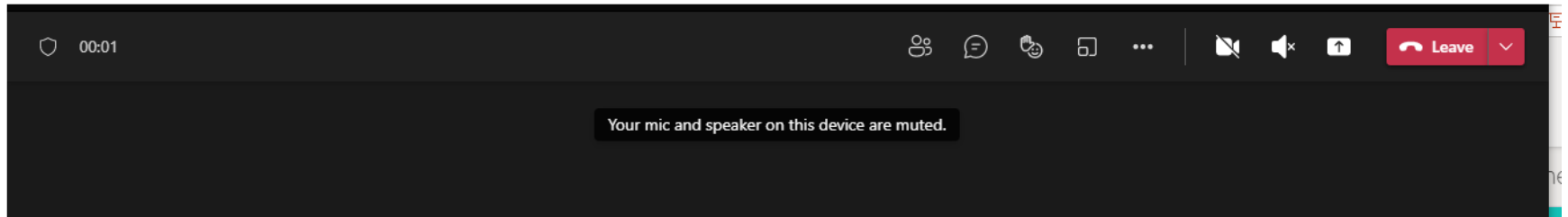


**WELCOME TO THE
Climate Change Vulnerability
& Resiliency Plan
Working Group Session – Resiliency Plan
Review**

The meeting will begin shortly

Engagement during this call

Please Note: This meeting is being recorded



Chat box – you can type comments or questions

Climate Change Vulnerability & Resiliency Plan Working Group Session – Resiliency Plan Review

October 5, 2023

Agenda

- Welcome and introductions
- Project Context & Role of the Working Group
- Recap of Last Meeting and Filed Study
- Draft Resiliency Plan and Recommendations
- Discussion & Feedback
- Next Steps – Review of Final Plan

Project Description & Role of the Working Group

Why are we here?

Meeting Purpose

New York State recently passed legislation requiring electric utilities to perform climate vulnerability studies designed to understand the impacts for the expected increase in severe weather due to climate change.

Following the study, utilities will prepare resilience plans detailing what changes are needed to prepare for harsher climate realities, including stronger storms, more flooding, temperature extremes.

The Resilience Plans will be reviewed and approved by the Public Service Commission.

The purpose of today's meeting is to tell you more about these new requirements and timeline as well as Central Hudson's efforts to respond.

An important part of our planning is to understand and incorporate local concerns and priorities. We will discuss with you today how we can organize those discussions.



NY Public Service Law §66(29) Effective 3/22/2022 and PSC Case 22-E-0222

Climate Change Vulnerability Study

- Establish “climate resilience working group” by 3/2023 to advise on Resilience Plan including municipalities, customer advocacy groups, and energy/environmental advocates
- Study Due September 2023
- Evaluate infrastructure, design specifications, and procedures to identify vulnerabilities
- Include adaptation measures to address vulnerabilities; feeds into Resilience Plan
- Study to be performed with supporting climate data from NYSERDA & Columbia University

Climate Change Resilience Plan

- Due November 2023
- Propose storm hardening measures for next 10 and 20 years
- Detail how climate change reflected in planning, design, operations, & emergency response
- Address impacts on costs, outage times, potential for undergrounding lines, etc.
- Additional requirements the PSC may identify

PSC Review and Approval

- Within 11 Months of Filing Resilience Plan
- Stakeholder engagement into utility plans is an important component

Central Hudson Current Working Group

Name	Organization	Name	Organization
Natalie Quinn	City of Poughkeepsie	Jessica Ridgeway	Orange County
Julie Nobel	City of Kingston		Greene County
	City of Newburgh	Bridget Frymire Afredita Bardhi Eric Moore Brandon Goodrich	DPS Staff
Patrice Perry Don Meltz	Columbia County	Danielle Panko Gregg Collar	NYS DOS UIU
Michael Madison Everett Erichsen	Ulster County	Simon Strauss	Town of Olive
Allan Page	Dutchess County	Robert Mack	NYSERDA
Patrick Curran	Albany County	Melanie Franco Michael Mager	Multiple Intervenors
Justin Rocque	Sullivan County	Laurie Wheelock	PULP
Ilona Campo	Putnam County	John Rath	NY Geo
Melissa Everett	Sustainable HV	Manna Jo Greene	Clearwater

Role of Working Group and Stakeholder Engagement Roadmap



September 2022	February 2023	Spring 2023	Summer 2023	Fall 2023 and Beyond	Fall 2024 and beyond
<ul style="list-style-type: none"> Initial Outreach to Create Awareness and Seek Preliminary Input 	<ul style="list-style-type: none"> Local Community Feedback to Identify Priorities 	<ul style="list-style-type: none"> Initial Meeting Climate Resilience Working Group Input into scenarios 	<ul style="list-style-type: none"> Development of Stakeholder Feedback Loop in Draft Study and Plan 	<ul style="list-style-type: none"> Input from Stakeholders on Plan Filing of Resilience Plan Approval and Execution 	<ul style="list-style-type: none"> Report to Stakeholder on plan and other updates

Study Approach and Plan Development



System Asset Exposure



Assess Asset Sensitivity



Determine Negative Asset Impact



Identify System or Asset Vulnerability



Identify Potential Measures to Address Impact



Determine Costs and Benefits

- **With the help of Utility Consultants and Climate Scientists**
- **With input from Stakeholder Engagement and Working Groups**
- **With Review and Approval by the Public Service Commission**

Recap of Vulnerability Study Results

Climate Variables Assessed

Extreme Heat

Extreme Cold and Ice

Extreme Precipitation

Flooding

Wind/Compound Storm
Events

Central Hudson Assets Assessed

❖ Transmission:

- Line structures (poles/towers)
- Conductors (overhead)
- Conductors (underground)
- Switching devices

❖ Substation:

- Transformers
- Voltage regulators
- Circuit breakers
- Instrument transformers (CTs and PTs)
- Reactors
- Controllers for regulators and LTCs
- Switching devices
- Surge arresters

❖ Distribution:

- Poles
- Conductors (overhead)
- Conductors (underground)
- Transformers (overhead)
- Transformers (padmount)
- Voltage regulators
- Capacitors
- Switching devices
- Surge arresters
- Reclosers
- Manholes



Vulnerability Assessment Process

Exposure

The degree to which assets, operations, or systems could face climate hazards, based on their physical locations and projected hazards.

Potential Impact

The potential for negative outcomes in the event of climate hazard exposure.

Sensitivity

The degree to which assets, operations, or systems could be affected by exposures.

Consequence

Estimated magnitude of negative outcomes associated with impacts. Incorporates criticality and adaptive capacity.

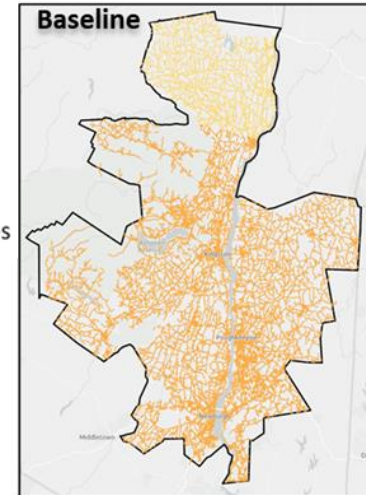
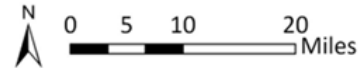
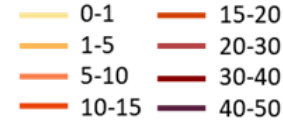
Vulnerability

The potential of assets or operations to be affected by projected hazards, and the significance of the potential consequences.

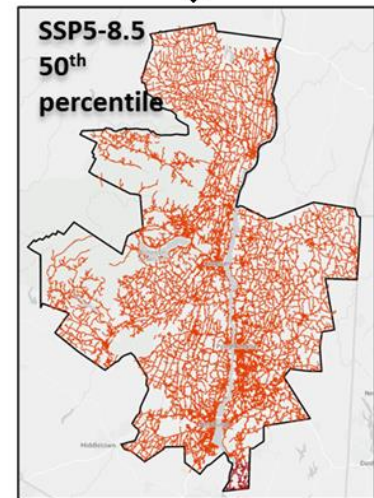
Vulnerability Study Results

Legend

Days with maximum temperatures over 95°F



2050



• Extreme Heat

- Asset exposure to extreme heat is currently considered **low** and is projected to be **moderate** by mid-century and **high** by late-century
 - Baseline: Average of **1.3** days/year with Tmax > 95°F
 - 2050s: Average of **11.4** days/year with Tmax > 95°F
 - 2080s: Average of **35.5** days/year with Tmax > 95°F
- Most vulnerable asset types:
 - Substation transformers
 - Transmission overhead conductors

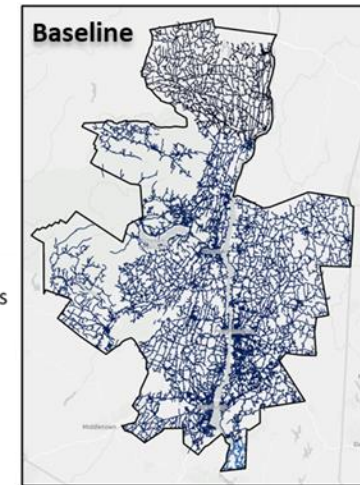
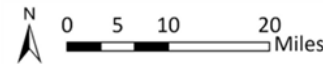
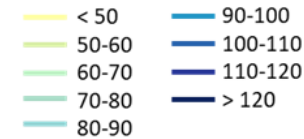
Vulnerability Study Results

- Extreme Cold and Ice

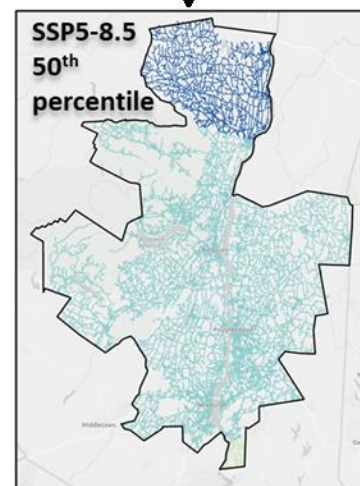
- Asset exposure to freezing and extreme cold temperatures is currently considered **low** and is projected to become **lower** by both mid-century and late-century
 - Baseline: Average of **139.2** days/year with $T_{min} < 32^{\circ}F$
 - 2050s: Average of **102.3** days/year with $T_{min} < 32^{\circ}F$
 - 2080s: Average of **77.6** days/year with $T_{min} < 32^{\circ}F$
- As temperatures warm through the 21st century, the frequency of freezing and extreme cold temperatures is projected to decrease, and a smaller proportion of Central Hudson's service territory could be exposed to extreme cold temperatures.

Legend

Days with minimum temp below 32°F



2050



Vulnerability Study Results

- Extreme Precipitation

- Asset exposure to extreme precipitation is currently considered **moderate** and is projected to increase gradually but remain **moderate** by both mid-century and late-century

- Baseline: **5.2"** maximum five-day precipitation totals
- 2050s: **5.8"** maximum five-day precipitation totals
- 2080s: **6.3"** maximum five-day precipitation totals

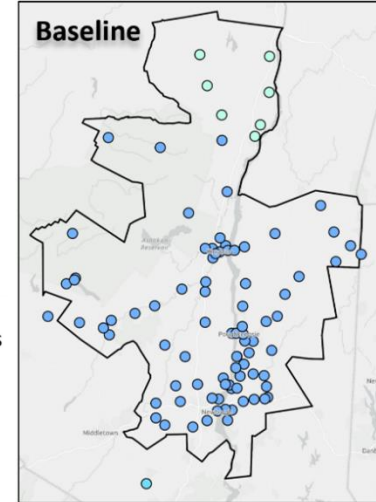
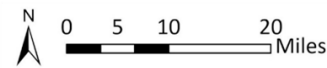
- Most vulnerable asset types:

- Distribution poles
- Distribution underground conductor
- Substation switchgear-style circuit breakers

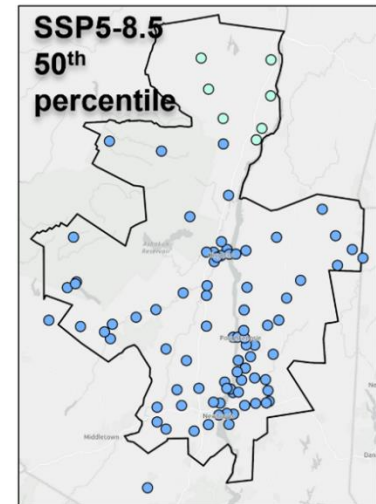
Legend

Maximum annual 5-day precipitation totals (in)

- 3-4
- 4-5
- 5-6
- 6-7



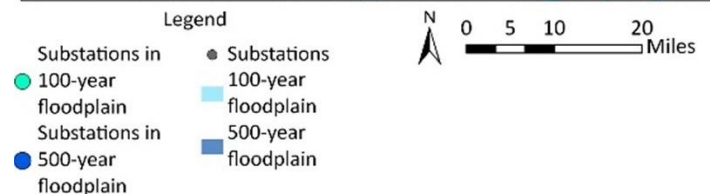
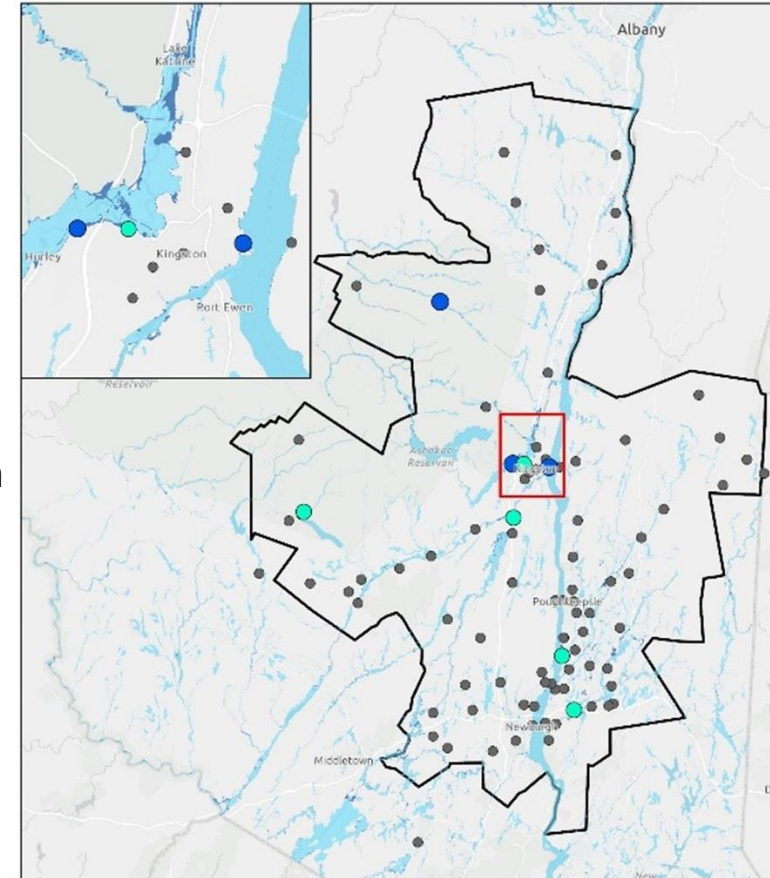
2050



Vulnerability Study Results

• Flooding

- Asset exposure to flooding is currently considered **low** and is projected to increase to **moderate** by mid-century and remain **moderate** by late-century.
- Percentage of Central Hudson assets located within 100- and 500-year FEMA Floodplains:
 - Substations: 5% 100-year → 9% 500-year
 - Transmission structures: 8% 100-year → 9% 500-year
 - Distribution poles: 4% 100-year → 5% 500-year
 - Underground conductor: 3% 100-year → 4% 500-year
- Compounded by sea level rise (SLR) affecting the Hudson River
 - 16" SLR projected by 2050
 - 30" SLR projected by 2080
- Most vulnerable asset types:
 - Distribution poles
 - Distribution underground conductor
 - Substation switchgear-style circuit breakers



Vulnerability Study Results

- Wind
 - Quantitative regional projections for wind not available using current climate models
 - Daily average wind speed is not projected to be heavily impacted by climate change
 - The most extreme winds and wind gusts during severe weather events could increase by the end of the 21st century
 - Most vulnerable asset types:
 - Distribution poles and overhead conductors
 - Impacts are primarily wind on **vegetation** which in turn contacts poles and wires

Resilience Plan Process and Results To Date

Resilience Plan: Process

- Determining Priority Assets for Resilience:
 - Load Service
 - Critical Customers
 - Storm Performance
 - Critical Infrastructure
 - Asset Health
- Initial Results:
 - 36 Distribution Circuits
 - 15 Substations
 - 3 Transmission Lines

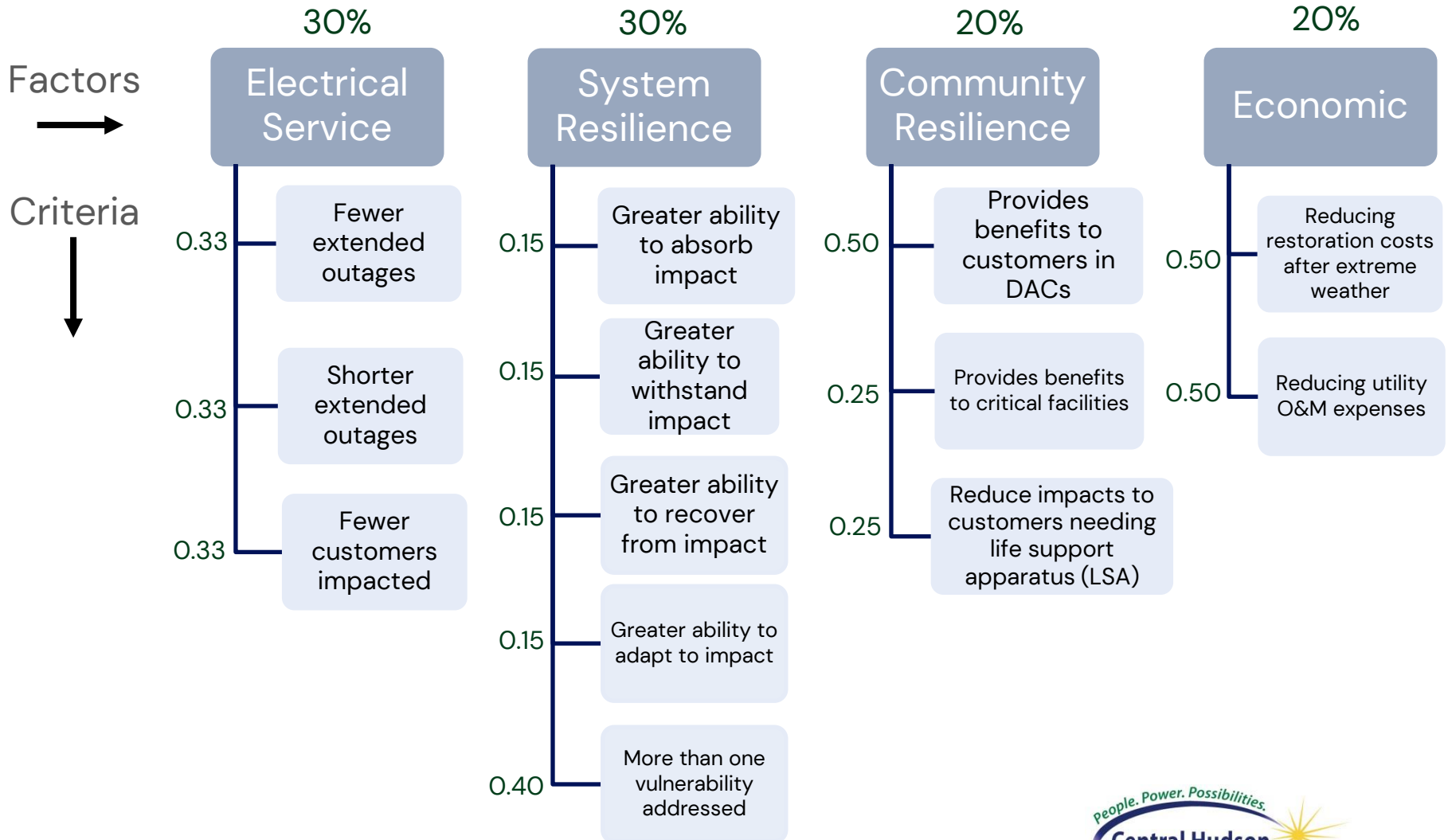
Resilience Plan: Process

- Selecting Mitigation Measures:
 - Began with a large list that was the result of a brainstorm between Central Hudson subject matter experts and consultant ICF for each of the most vulnerable asset/hazard combinations identified in the Vulnerability Study
 - Looked at each combination of Priority Asset and applicable Mitigation Measure and asked the questions:
 - Is it feasible?
 - Does it make sense to consider?
- Narrowed-Down Results:
 - 36 Distribution Circuits
 - 3 Substations
 - 2 Transmission Lines

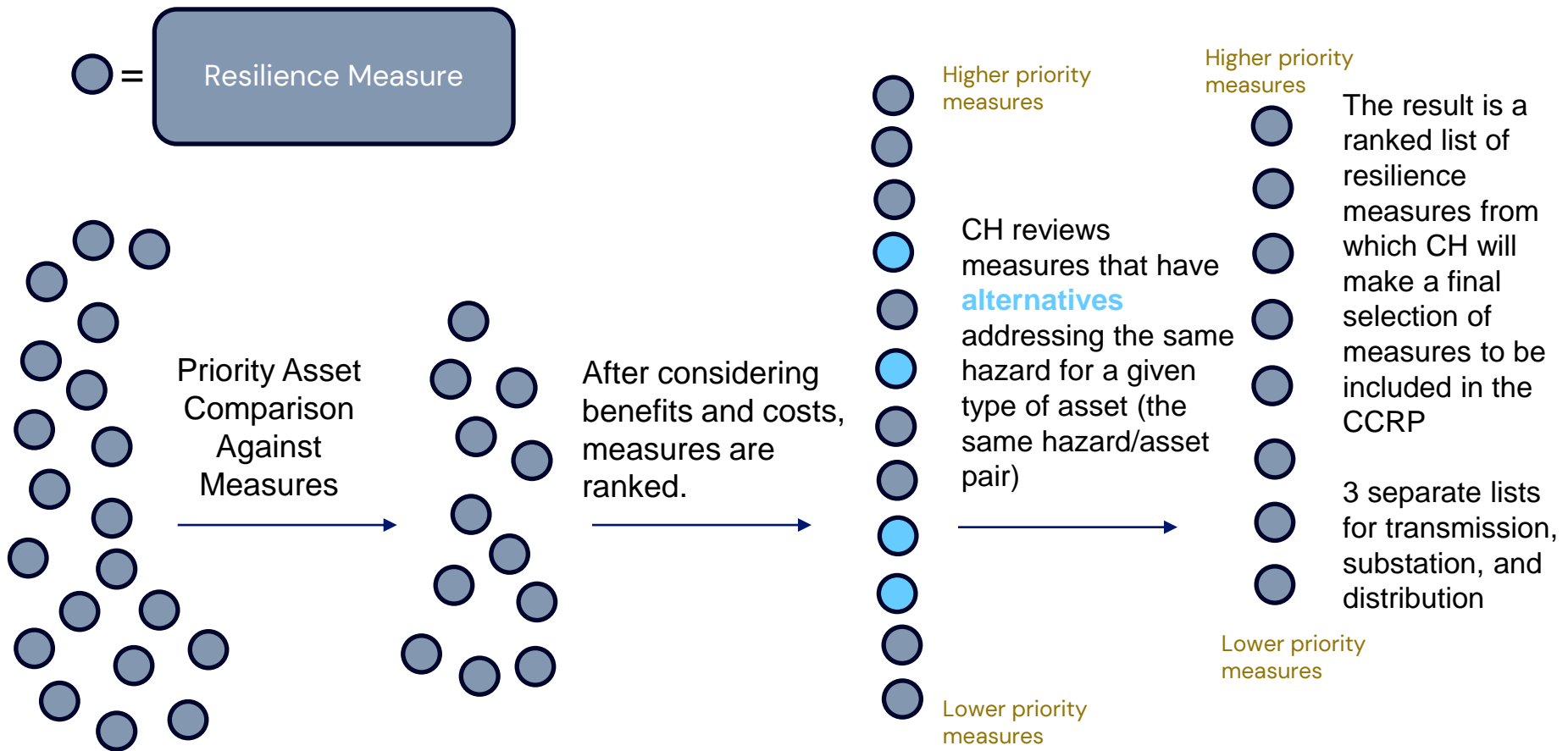
Resilience Plan: Process

- Prioritizing measures
 - Gather costs and determine benefits for each resilience measure
 - Benefits determined using Multi-Criteria Decision Analysis (MCDA) framework

Resilience Plan: MCDA Framework for Calculating Benefit Scores



Resilience Plan: Prioritization



Note: the number of circles is for demonstration purposes and is not intended to represent any exact numbers.

Resilience Plan: Proposed Mitigation Measures

- Substation:
 - Raise vulnerable switchgear at three substations in flood plain
 - Timing to correlate with next major station upgrades to save costs
 - Costs of raising switchgear to be tracked separately from other planned “business as usual” station work
 - No substation transformer upgrades will be proposed as part of the Resilience Plan
 - Current design criteria can accommodate projected temperature increases
 - Substation transformers anywhere close to design limits already have planned projects as part of “business as usual” work

Resilience Plan: Proposed Mitigation Measures

- Transmission:
 - Reviewing options for addressing the effects of increased wind hazards on vegetation affecting two Priority-identified transmission lines
 - 1-mile section identified on one line and 2-mile section identified on the other
 - Option #1: Increasing transmission corridor width and performing tree removals on additional width
 - Option #2: Incremental hazard tree removals in existing corridor
 - Option #3: Undergrounding
 - Use of high temperature low sag (HTLS) conductor on one Priority-identified transmission line
 - Timing to correlate with next major line upgrade to save costs
 - Incremental cost of conductor to be tracked separately from other planned “business as usual” upgrades
 - Change to Central Hudson Transmission Design Guidelines to utilize alternate foundation design for structures being replaced in flood plain

Resilience Plan: Proposed Mitigation Measures

- Distribution:
 - To address increased wind on vegetation affecting Priority-identified circuits:
 - 4 microgrid projects
 - Strategic undergrounding program
 - Lateral line rebuild program using composite poles
 - Targeted “Ground to sky” trimming program on Priority-identified circuits
 - To address increased extreme precipitation and flooding on Priority-identified circuits:
 - Change to CH Standards to install a pole wrap if installing a pole in the flood plain to prevent premature rot

Participant Questions & Feedback

Questions

Comments

Feedback

Next Steps: Resilience Plan Feedback

- Through November 2023 (filing date):
 - Incorporate Feedback from today's session
 - Complete the draft plan to share with the working group
 - Set up an additional working group session (if desired) to collect feedback
 - Incorporate feedback and finalize plan

Working Group Next Steps

Climate Resiliency Working Group

- Central Hudson's Vulnerability Study was filed in Case 22-E-0222 on September 22, 2023
- Looking ahead
 - Please provide any feedback from today's discussion.
 - Central Hudson will send to the group the draft Resiliency Plan by the last week in October.
 - If interested, we will convene another meeting a week after the draft plan is sent to review the Resiliency Plan.

Additionally, if you or your organization would like to make your voice heard in the statewide proceeding, you can submit comments directly to the PSC by filing comments in the case number 22-E-0222.

Thank You

