conEdison

Climate Change Resilience and Adaptation

Summary of 2020 Activities

January 2021

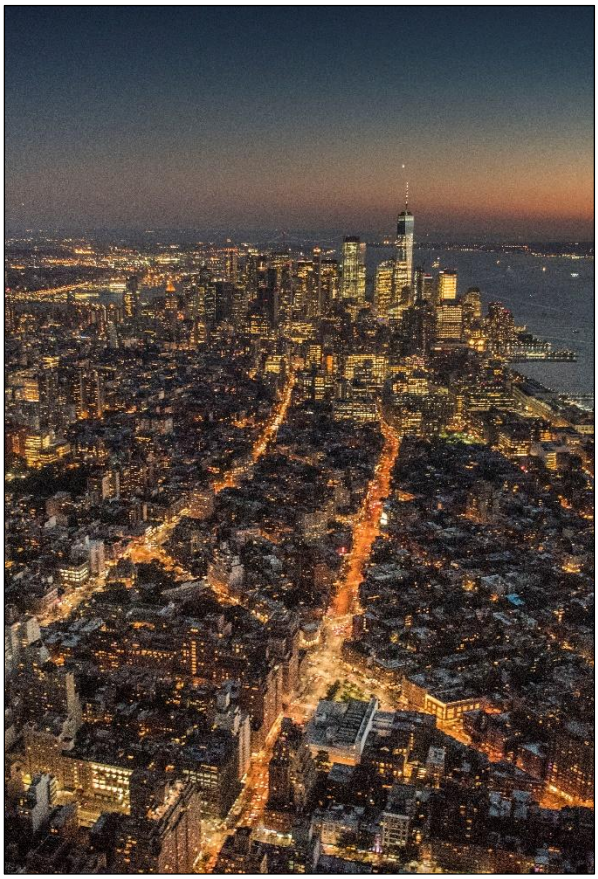
Table of Contents

Executive Summary

A History of Adaptation

Consolidated Edison Company of New York, Inc. (Con Edison or the Company) has long recognized the importance of maintaining a resilient energy supply system in the face of extreme weather events to preserve safe and reliable service for our customers. Thomas Edison built the world's first underground electric grid in lower Manhattan in 1882. His decision preceded the famous Blizzard of 1888 that caused significant outages and safety issues related to overhead wires in a dense urban environment. Since then, safety has always been one of the Company's principal goals and we have continually upgraded our system designs to take the impact of extreme weather into account.

In recent years we have adopted an ever more proactive, forward-looking approach to system resiliency to address increasingly severe weather due to climate change. After Superstorm Sandy, we upgraded our infrastructure to be resilient to a 100-year storm plus one foot of sea level rise. In 2019, we completed a multi-year Climate Change Vulnerability Study (CCVS)[1] to understand local climate change projections, identify potential system vulnerabilities that could result from the changing climate, and explore potential adaptation options to protect our infrastructure. As detailed below, in 2020, we again partnered with ICF's climate adaptation and resilience experts to build upon the CCVS findings by developing a formal Climate Change Implementation Plan[2] (Implementation Plan). The Implementation Plan outlines how we reviewed, and intend to continue to assess and adjust as necessary, our planning, engineering, operations, and emergency response practices to adapt to climate change.



This Summary of 2020 Activities provides a detailed description of the proactive steps taken by Con Edison in 2020 to advance energy resilience in the face of climate change.

Our work to make our systems more resilient to the effects of climate change will be an ongoing process. The need for ever more resilient electric service will only increase as low-carbon heating and electric transportation – key strategies for combating climate change – become more widespread.

[1] The Climate Change Vulnerability Study is available here.
[2] Case Nos. 19-E-0065 and 19-G-0065, Con Edison Climate Change Implementation Plan, December 29, 2020. The Climate Change Implementation Plan is available here.

Con Edison's Resilience Journey

Storm Hardening: Ongoing

- Built the world's first underground network in 1882 to increase safety and resilience to extreme weather.
- Continued adjusting system design after lightning strikes in 1977, Hurricane Andrew in 1992, and Hurricane Irene in 2011.
- Invested $1 billion to strengthen the system after Superstorm Sandy.
- Continue to learn from storm events (e.g., Riley and Quinn in 2018, Isaias in 2020) and invest in storm hardening.
- These initiatives have increased the resilience and reliability of the system to future extreme weather events.

Analyzing Risks: 2017-2019

- Conducted a comprehensive review of climate change vulnerabilities across the electric, gas, and steam systems. This first-of-its-kind study established a foundational understanding of the risks facing Con Edison systems.

Changing Practices: 2020

- Established a climate change governance structure to continue and enhance the incorporation of climate change into existing processes and practices.
- Developed the Climate Change Implementation Plan to systematically incorporate climate change into planning, design, operations, and emergency response practices.

A Resilient Future: 2021+

- Additional climate science studies.
- Refinement of tools, methods, and approaches in engineering and planning.
- Continuing to build resilience and adaptation into the business.
- New assets built considering climate change.
- Programs for existing assets to be updated for climate change impacts.

Key Takeaways

In 2020, Con Edison continued to make progress toward strengthening our energy systems to address adverse impacts of climate change and natural disasters. In addition, working across our company, we changed the way we do business to address climate change risks and continue maintaining safe, reliable service for the millions of people who rely on us. This included adopting forecasting and design processes that more fully incorporate future impacts of climate change. Our Climate Change Implementation Plan, filed with the New York State Public Service Commission in December 2020, addressed the areas specified in our recent Rate Plan Order and

significantly advanced our climate adaptation governance strategy. Staying ahead of climate change impacts will require additional investments. The steps we are taking today give us a mechanism to monitor climate change developments, plan timely adaptations, and help reduce the future costs of resiliency efforts.

Our progress and plans reflect not only the experience of experts across Con Edison, but also the feedback, input, and experience of an engaged working group comprised of more than 50 stakeholders, including New York State Department of Public Service staff, municipal representatives, customer advocacy groups, and environmental advocacy organizations. This working group met and consulted regularly with the Company throughout the development of the Implementation Plan.

This Summary of 2020 Activities describes steps we have taken, and will take, to plan and design infrastructure, and conduct operations, in a manner that addresses the effects of climate change. Our efforts will help us to maintain a safe working environment, support for our customers and communities, and operational excellence as the climate changes.

We recognize that our approach needs to be flexible as more is learned about climate change impacts. Continued collaboration with stakeholders will be key to our ability to continue to provide safe, reliable, resilient energy to our customers in a changing climate.

Key 2020 Accomplishments

1. **Created a governance structure to manage climate change risks and build resilience:** A newly created Climate Change Adaptation and Resiliency Corporate Instruction[3] (the Corporate Instruction) establishes clear responsibilities within our Company for climate change adaptation and resiliency efforts. It creates a new Climate Change Risk and Resilience Group, with oversight by an executive level Climate Risk and Resilience Committee.

2. **Set a clear pathway to prepare our system:** Our Climate Change Planning and Design Guideline (the Guideline) reflects the best available climate science and aligns with regional benchmarks. The Guideline will help us consistently evaluate our system and operations. We will review and update it over time, as needed, to help support continued safe operations and reliability.

3. **Adjusted how we plan and design infrastructure for increasing climate change:** By reviewing our specifications, procedures, and practices against anticipated changing climate conditions, we better understand how to proactively adapt our planning, operations, and emergency response. We have already made changes to address climate risks that will support the resilience of our system and customers.

[3] Con Edison uses Corporate Instructions to describe major courses of action in conducting Company business that impact major activities or functions of more than one department or affect all or a major segment of Company personnel.

Climate Risk and Resilience Governance

Con Edison recognizes the importance of a clear governance structure and responsibilities related to climate change adaptation to create accountability for action. This clear governance structure is essential for our Company to continue our progress on incorporating anticipated climate change into our operations and the design, planning, and construction of our energy systems.

Through the Corporate Instruction, which applies to all Company employees and departments responsible for adaptation to climate change, Con Edison is reinforcing its comprehensive and coordinated efforts to address climate change risks and resilience. The Corporate Instruction governs how the Company will use the Guideline to integrate climate change information into its procedures and specifications for designing, building, and investing in resilient infrastructure, as well as planning for extreme weather events and a safe working environment.

The Corporate Instruction also establishes a Climate Risk and Resilience Executive Committee and a Climate Risk and Resilience Group to support the Company's current and future work on climate change adaptation. Con Edison, Inc.'s Board oversees the Company's policies related to climate change risk and resilience and the Corporate Leadership Team will provide senior executive oversight.

Finally, Con Edison will continue to provide regular public reporting on its progress, continued risk management activities, and financial risks related to climate change through the Company's annual Sustainability Report and other industry-standard risk reporting frameworks.

Climate Change Pathways

A critical step in the development of the Implementation Plan was the selection of climate change pathways. The Company-selected pathways define standardized climate projections for variables related to temperature, precipitation, and sea level rise and provide a consistent understanding of projected climate change in the service territory to guide the Company's adaptation efforts. Con Edison selected pathways align with regional benchmarks, including New York City's Climate Resiliency Design Guidelines[4] and the Port Authority of New York and New Jersey's Climate Resilience Design Guidelines,[5] and are consistent with climate change projections relied on by the New York Independent System Operator in preparing the state's electric transmission grid for future

In addition to the adaptation efforts outlined in this Summary of 2020 Activities, Con Edison supports and is investing in significant actions to decarbonize energy use to help mitigate climate change.* All of Con Edison's clean energy future work will also consider approaches to addressing physical adaptation risks.

*For more information, see Con Edison and its affiliates' Clean Energy Commitment: https://www.coned.com/en/our-energy-future/our-energy-vision/our-energy-future-commitment

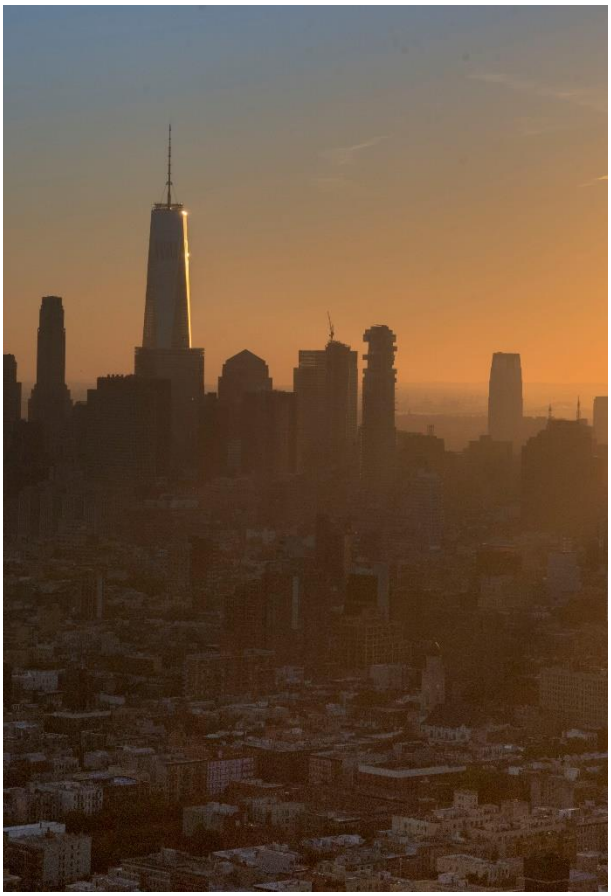
[4] New York City Mayor's Office of Resiliency. (2020, September). Climate Resiliency Design Guidelines, Version 4. https://www1.nyc.gov/assets/orr/pdf/NYC_Climate_Resiliency_Design_Guidelines_v4-0.pdf

[5] The Port Authority of New York and New Jersey. (2018, June). Climate Resilience Design Guidelines, Version 1.2. https://www.panynj.gov/port-authority/en/about/Environmental-Initiatives/sustainable-resilient-development.html

extreme weather events.[6] The pathways plan closer to the future "worst-case" than "best-case" by considering the upper range of potential climate change and thus establish a risk-averse basis for adaptation. Specifically, Con Edison will use the 75th percentile of Representative Concentration Pathway[7] (RCP) 8.5 projections for temperature, precipitation, and related variables. For sea level rise, Con Edison will use the middle of the 25th to 75th percentile range of merged RCP 4.5 and 8.5 sea level rise projections developed by the New York City Panel on Climate Change (NPCC).[8]

To promote departmental consistency and readiness for climate change impacts, the Company has developed a Climate Change Planning and Design Guideline. The Guideline serves as a reference for departmental specifications to aid in the design, construction, operations, and maintenance of Company assets, revising corporate environment, health, and safety procedures and planning for emergencies in response to a changing climate. The Guideline provides explanations of pathways, their purpose and supporting science, and climate projections relevant to Con Edison processes.

Con Edison will update the selected climate projections with new climate science at least every five years. In addition, Con Edison will review the pathways annually to determine if updates are necessary. These reviews may reflect improved climate science and climate projections. Policy changes, changing customer needs and expectations and other factors may trigger these reviews and pathway updates.



Updates to Con Edison's Processes

Con Edison engaged more than 40 internal subject matter experts to review the Company's specifications, procedures, and practices and determine approaches for addressing climate change resilience. These approaches built on existing Con Edison resilience efforts and expanded those efforts to cover new aspects of the Company's work.

[6] NYISO climate change impact studies are available at: https://www.nyiso.com/ny-power-system-information-outlook.
[7] RCPs consider different evolutions of fossil fuels, technologies, population growth, and other controlling factors on greenhouse gas emissions through the 21st century.
[8] The NPCC 2015 Report is available at https://nyaspubs.onlinelibrary.wiley.com/toc/17496632/2015/1336/1

For example, in the wake of Superstorm Sandy, Con Edison established a strong flood-design standard that exceeded city code by requiring an additional foot of elevation be added to the required 100-year flood protection measures or site elevations to account for sea level rise. Con Edison then invested to harden all existing assets to this new protection level. Today, viewed through the climate change pathway selected during development of the Implementation Plan, this foot of additional protection will address projected sea level rise through 2040. In response, Con Edison has updated its flood design standard to require that infrastructure design account for the 100-year flood, two feet of freeboard, and sea level rise through the useful life of the site (see Figure 1). For example, a new facility that will be in operation for 80 years will be designed to accommodate three feet of sea level rise on top of the building code requirements for protection against the 100-year storm and freeboard. As the flood design standard evolves, Con Edison will review its existing assets and identify any appropriate changes. Con Edison similarly reviewed how it should update other internal processes to incorporate the new climate change pathways.

The final set of process updates and the associated impacts on Con Edison are summarized in Table 1.

Figure 1: The components of the Design Flood Elevation (DFE) in the new sea level rise-adjusted flood protection, which includes the FEMA 1% annual chance Base Flood Elevation, 2 feet of freeboard, and a sea level rise (SLR) adjustment corresponding to the asset useful life

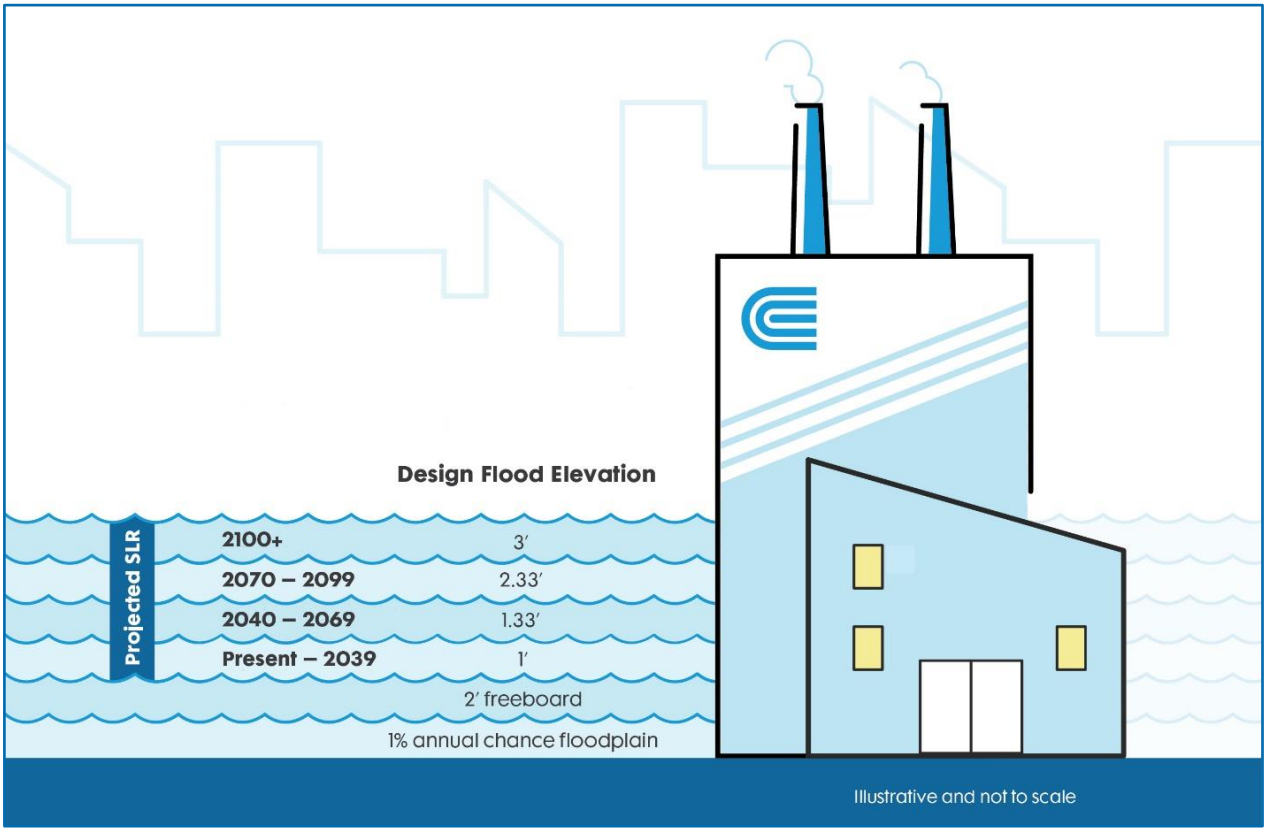


Table 1: Summary of Process Updates and Key Findings

Key Areas	Summary of Process Updates	Key Findings
Load Forecasting	• Climate information will be included in future load forecasts for all commodities beginning in 2020. • Con Edison will incorporate anticipated temperature variable (TV)[9] increases into load forecasting, currently estimated at a 1-degree TV increase per decade beginning in 2030.	• The electric summer peak is expected to increase by 700 to 900 megawatts (MW) due to increased TV by 2050.
Load Relief	• Beginning in 2021, Con Edison will incorporate projected climate change-driven increases in load and reductions in power equipment ratings in the 10- and 20-year load relief plans.	• A relatively small impact on power transformers and network transformer ratings is expected due to ambient temperature rise between 2040 and 2050.
Reliability Planning	• Reliability modeling will use forward looking climate change-adjusted load forecasts and projected increases in TV. • In 2021, the Company will conduct a review of extreme event projections to determine whether additional model updates are warranted.	• Temperature increases and extended heat waves are expected to affect the reliability of distribution networks by 2030, absent adaptations.
Asset Management	• Con Edison processes will assess the extent to which expected future temperature changes impact ratings. • The Climate Change Planning and Design Guideline sets a flood design standard to account for increasing sea level rise, which applies to the electric, gas, and steam systems.	• The sea level projection exceeds the current design criterion of one foot of sea level rise by 2040.
Facility Energy Systems Planning	• Con Edison is updating designs to provide more flexibility for modifications during heating, ventilation, and air conditioning system replacement.	• Due to increases in temperature, the size of the cooling equipment in Con Edison's facilities may require an increase of up to 40% by 2040.
Emergency Response Activations	• Discussions are underway on how to incorporate heat, flooding, and precipitation projections into the weather and impact forecast model used to establish the Company's emergency response preparation to weather events. • The Company will plan for drills and exercises based on projected pathway criteria.	• Projected climate pathways could impact future weather and storm impact forecasts. • The Company will continue reviewing ways to incorporate climate change into a forward-looking model.
Worker Safety	• Con Edison will monitor climate change for impacts on worker safety. In 2022, the Company will consider whether additional heat stress protocols for climate change adaptation are warranted.	• An increase in temperature and heat index may exacerbate worker heat stress.

[9] It is common practice in the industry to consider temperature and humidity together in the load forecasting and planning process. Temperature variable is Con Edison's approach to this practice.

Next Steps

While Con Edison has made progress to increase resilience, work remains. The Company plans to advance its work by:

- Continuing to incorporate climate change projections for temperature, precipitation, and sea level rise into Company operations to mitigate climate change risks to assets and operations.
- Continuing to implement strategies to communicate the Company's comprehensive and coordinated efforts on adaptation and resilience to all Company employees and departments.
- Establishing holistic approaches to increase resilience to extreme storm events.
- Continuing to update specifications, methods, and resources.
- Conducting additional climate studies, including reviews of extreme wind.
- Monitoring changes in climate in the service territory.
- Adapting forward-looking climate change planning and associated resilience into the Company's long-range planning practices.
- Further integrating resilience matters into the rate case process.
- Continuing coordination with external stakeholders.

Introduction

Con Edison provides electric service to 3.5 million customers in New York City and Westchester County, an approximately 660-square-mile service area with a population of more than nine million. Con Edison delivers gas to approximately 1.1 million customers in Manhattan, the Bronx, parts of Queens, and most of Westchester County. Con Edison also delivers steam service to approximately 1,590 customers in Manhattan through the largest steam distribution system in the United States.

Con Edison's 2020 work on climate change adaptation builds on the Company's long-standing efforts to provide safe, reliable, and resilient power in a changing climate. Aspects of our current system design, including its reliable underground electric networks and system redundancies in the densest areas, have their origins in providing safe and resilient power in the face of extreme weather events. Thomas Edison knew that the proliferation of wires in lower Manhattan was a safety issue and decided that he would build the world's first electric grid underground. When his Pearl Street station started generating electricity on September 4, 1882, serving an initial load of 400 lamps at 82 customers, the wires serving those customers were all underground. His decision preceded the famous Blizzard of 1888 that caused significant outages and safety issues related to overhead wires in a dense urban environment. Since then, safety has always been one of the Company's principal goals and we have continually upgraded our system designs to take the impact of extreme weather into account.

Climate change **mitigation** differs from climate change **adaptation**: While mitigation strategies focus on identifying and reducing greenhouse gas emissions (which cause climate change), adaptation strategies aim to minimize the negative impacts of climate change (e.g., sea level rise, increasing temperatures) on systems and communities.

Although Con Edison and its affiliates are undertaking significant mitigation efforts, such as decarbonization, this report focuses on the Company's **adaptation** efforts and their implementation.

The Company has continued this legacy of learning and building back stronger following recent extreme weather events like Hurricane Andrew in 1992, Hurricane Irene in 2011, Superstorm Sandy in 2012, and back-to-back winter storms Riley and Quinn in 2018. For example, Con Edison invested $1 billion in storm hardening after Superstorm Sandy and is now in the midst of investing another $100 million in Westchester County. Since 2014 these investments have reduced the number of storm-related customer outages by over 680,000.

In recent years Con Edison has adopted an ever more proactive, forward-looking approach to system resiliency to address increasingly severe weather due to climate change.

This Summary of 2020 Activities provides an overview of the work Con Edison conducted, in partnership with ICF's climate adaptation and resilience experts, in 2020 during the development of its Climate Change Implementation Plan. The Implementation Plan, which the Company filed with the New York State Department of Public Service in December 2020, implemented recommendations from the Company's 2019 Climate Change Vulnerability Study (CCVS)[10] and was developed in accordance with the 2019 Joint Proposal.[11]

The CCVS was a multi-year effort to evaluate present-day infrastructure, design specifications, and procedures against a range of projected climate changes to better understand Con Edison's vulnerability to climate-driven risks. The analysis identified sea level rise, coastal storm surge, inland flooding from intense rainfall, hurricane-strength winds, and extreme heat as the most significant climate-driven risks to Con Edison's systems. Con Edison has unique energy systems, and vulnerabilities vary across those systems. The study found that the utility's electric, gas, and steam systems are all vulnerable to increased flooding and coastal storms; workers across all commodities are vulnerable to increasing temperatures; and the electric system is also vulnerable to heat events.

Having completed the CCVS, Con Edison agreed with stakeholders to address the following areas in its Implementation Plan:

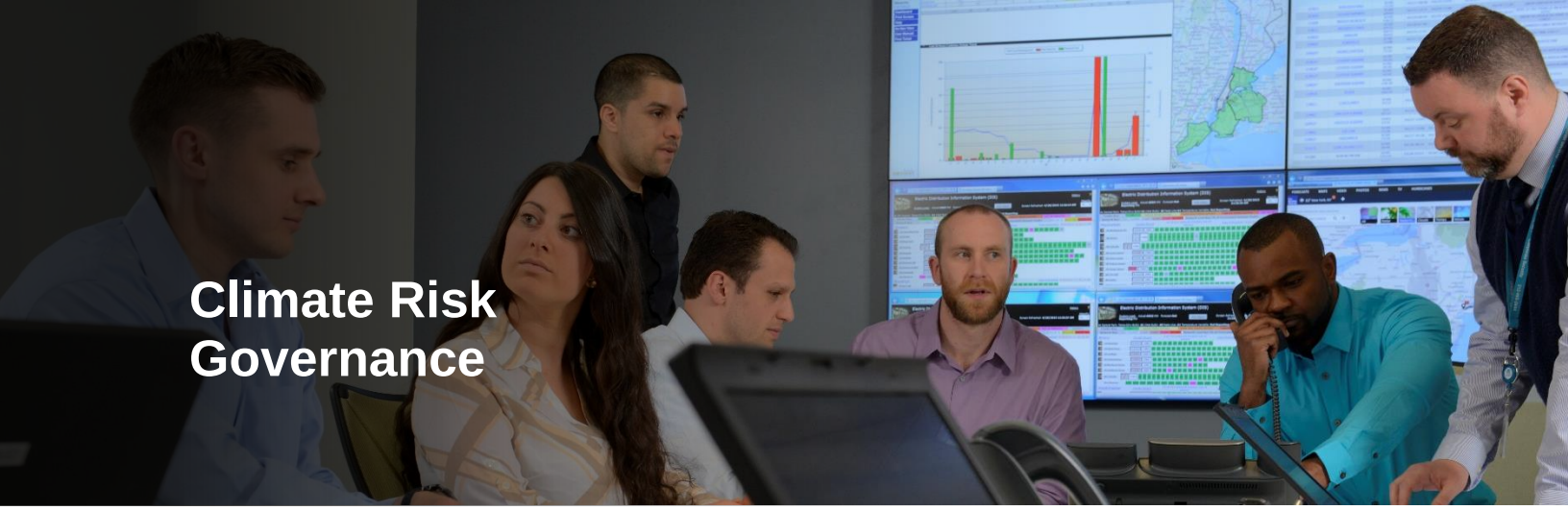
- Governance
- Load forecasting
- Load relief planning
- Reliability planning for the sub-transmission and distribution systems
- Asset management
- Facility energy system planning
- Emergency response activations
- Examination of worker safety protocols

While developing the Implementation Plan, Con Edison held five working group meetings with stakeholders to review the plan and actions Con Edison was considering taking to adapt to climate change. This process involved more than 50 stakeholders, including Department of Public Service Staff, municipal representatives, environmental and customer advocacy organizations, and outside experts.

The remainder of this summary outlines Con Edison's climate risk governance approach, the selection of climate change pathways, the Company's approach to integrate resilience into its work, and next steps.

[10] The CCVS identified the range of potential climate changes in the Company's service territory and associated potential impacts on the Company's electric, gas, and steam systems. Based on these findings, the CCVS provided a set of potential climate change adaptation strategies that could help the Company withstand future changes in climate, reduce the impact of extreme events, and facilitate a rapid recovery.

[11] Case Nos. 19-E-0065 and Case 19-G-0066, Proceeding on Motion of the Commission as to the Rates, Charges, Rules, and Regulations of Consolidated Edison Company of New York, Inc. for Electric and Gas Service (October 16, 2019).



Climate Risk Governance

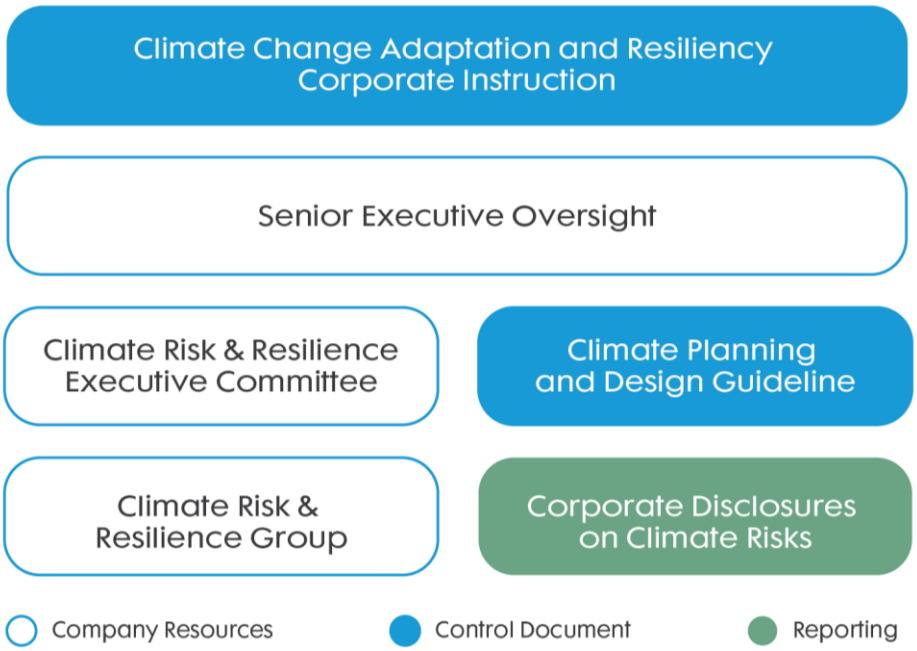
Con Edison's governance of climate risk and resilience establishes clear structure and responsibilities. This structure enables the Company to maintain progress on incorporating climate change into the Company's assets, operations, and planning. The governance approach includes:

- Corporate Instruction that governs how the Company will integrate climate change information into its procedures for designing, building, and investing in resilient infrastructure, as well as planning for emergency weather events.
- Climate Change Planning and Design Guideline that provides climate change projections and guidance on its use in design, construction, operations, and other Company processes.
- Con Edison, Inc.'s Board oversees the Company's policies related to climate change risk and resilience and the Corporate Leadership Team will provide senior executive oversight.
- Climate Risk and Resilience Executive Committee responsible for providing oversight and organizational support for the development, coordination, communication, and implementation of strategies to prepare and adapt to climate change and incorporate climate change projections into Company organizations, policies, and practices.
- A Climate Risk and Resilience Group that will assist operating groups with their adaptation and resilience efforts, continue to monitor climate change science, and continue the Company's engagement with stakeholders. It will report to the executive committee.
- Con Edison will continue to provide regular public reporting on its progress, continued risk management activities, and financial risks related to climate change through the Company's annual Sustainability Report and other industry-standard risk reporting frameworks.[12]

These governance components work together to help Con Edison sustain its comprehensive and coordinated climate change adaptation efforts, and to provide the necessary oversight, guidance, and support. Figure 2 shows how these components relate to one another.

[12] CEI reports using the ESG/Sustainability disclosure guidelines and templates developed by the Task Force on Climate-related Financial Disclosures (TCFD), the Sustainability Accounting Standards Board (SASB), and the Edison Electric Institute (EEI) and the American Gas Association (AGA). These disclosures are accessible at https://www.conedison.com/ehs/2019-sustainability-report/eei-esg-template/.

Figure 2: Climate risk and resilience governance structure.



Governance Guiding Documents

Con Edison's Climate Change Adaptation and Resiliency Corporate Instruction

Con Edison's Corporate Instructions provide clear direction on key topics and are an important part of the Company's governance. Con Edison has adopted a Corporate Instruction on Climate Change Adaptation and Resiliency that establishes the processes for adapting to changing climate conditions. These processes include requiring application of the Climate Change Planning and Design Guideline. The Corporate Instruction applies to all parts of the Company organization, reinforcing the Company's comprehensive and coordinated efforts at addressing climate change risks and resilience.

Climate Change Planning and Design Guideline

To promote departmental consistency and readiness for climate changes, the Company has developed a Climate Change Planning and Design Guideline. This guideline serves as a reference for departmental specifications to aid in the integration of climate change information into its procedures and specifications for designing, building, and investing in resilient infrastructure, as well as planning for extreme weather events and a safe working environment.

From a governance perspective, the guideline outlines the responsibilities and guiding principles for incorporating projections into departmental process changes. This includes information to

address anticipated changes to ambient temperatures, heat and cold extremes, heavy precipitation, coastal flooding, and variables specific to load forecasting.

The Guideline provides explanations of climate change pathways and climate projections relevant to Con Edison processes. It provides direction for monitoring climate science and updating Company procedures and processes to account for climate change (see "Climate Change Pathway Updates" section for more information). The Guideline will be referenced in Con Edison departmental specifications to provide consistency in the application of climate change projections. Con Edison intends that the Guideline will be a "living document" that will provide the flexibility to respond to updates in climate change, projected impacts as they are learned, and findings or recommendations from working group members or other climate change professionals.

Governance Roles and Responsibilities

Con Edison's Corporate Board of Directors Oversight

Con Edison Inc.'s Board oversees the Company's policies related to climate change risk and resilience. The Board's Safety, Environment, Operations and Sustainability Committee will review significant climate change issues, as outlined in its charter. This committee will also oversee the Company's management of climate change risks identified through the Company's enterprise risk management program.

Senior Executive Oversight

As part of the Corporate Instruction and governance structure, the Company's Corporate Leadership Team will monitor and oversee climate risk and resilience, including strategy, investments, and policy. The Company's Corporate Leadership Team is a senior-level executive committee, consisting of the CEO, President, and all senior vice presidents.

Climate Risk and Resilience Executive Committee

The Corporate Instruction also establishes a new Climate Risk and Resilience Executive Committee. This committee, composed of engineering, emergency preparedness, operations, strategic planning, and other vice presidents, has a number of important duties, including reviewing, monitoring, and providing oversight of ongoing climate change adaptation activities in the Company. This committee will be supported by a Climate Risk and Resilience Group. Specifically, the committee is charged with:

- Providing feedback on work that will further the Company's climate change and resilience efforts.
- Reviewing the Company's climate change adaptation and resilience strategy. This review includes, but is not limited to, activities conducted by the Climate Risk and Resilience Group to:
  - Align climate adaptation investment planning with other Company planning, including Company long-range plans and plans to meet climate change emissions mitigation policy goals.

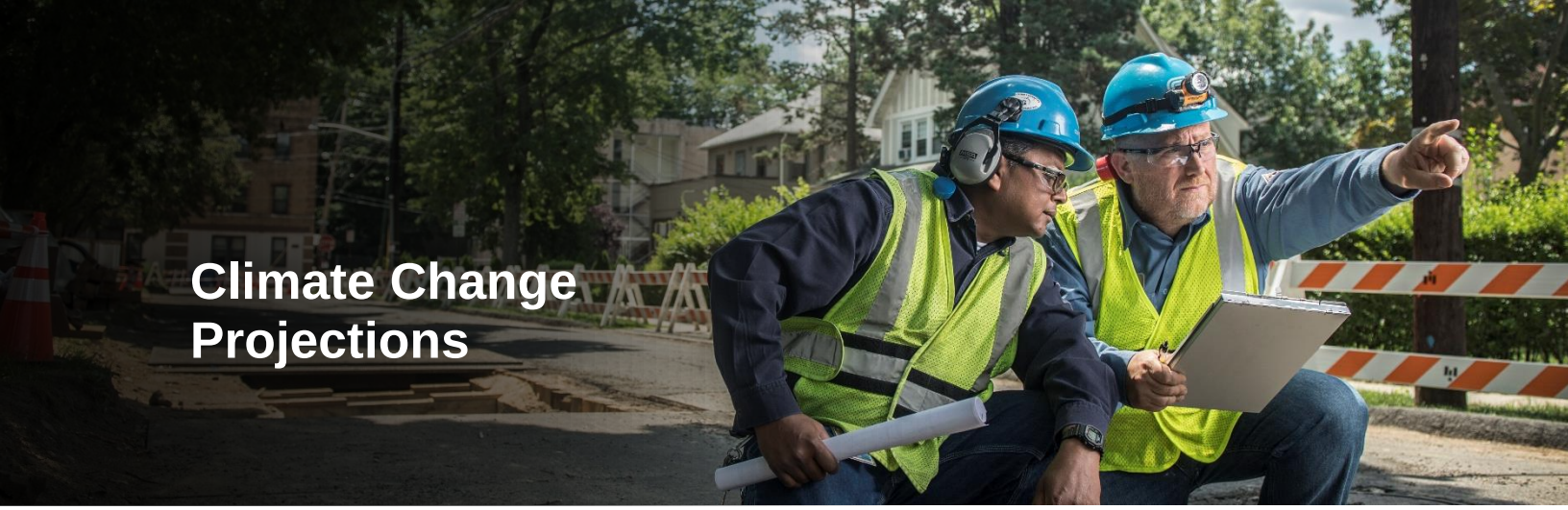
  - Determine the risks that will be accepted and addressed through emergency response preparedness efforts and new or expanded capital investment programs, and determine the triggers and timeframe for implementing programs to address identified risks.
  - Identify and position the Company for emerging climate adaptation issues.
  - Support energy system resilience associated with extreme weather events.
- Promoting coordination across Company departments.
- Reviewing updates to the Company's Climate Change Adaptation Corporate Instruction, as needed.
- Advising on revisions by the Climate Risk and Resilience Group to the Climate Change Planning and Design Guideline.
- Providing monitoring and oversight of climate adaptation activities, including, but not limited to, those coordinated by the Climate Risk and Resilience Group, such as:
  - Revisions and additions to specifications, procedures, and practices to maintain that all new assets are designed and built considering projections of future climate change. This includes assets installed for new business and business-as-usual replacements.
  - Implementation of incremental projects and programs to adapt the existing asset base to acceptable risk thresholds related to future climate.
  - Identification and planning for operational measures to manage assets built to older standards when the future climate risk is realized.
  - Stakeholder engagement on climate change adaptation and resilience issues.
- Providing oversight of additional Company activities to integrate climate adaptation into internal processes, project design, programs, asset management, and planning (e.g., white papers, rate case investments, 5-year budgets), and advance relevant adaptation and resilience metrics developed by the Climate Risk and Resilience Group.
- Providing oversight and guidance to the Climate Risk and Resilience Group on the integration of climate adaptation into enterprise risk management and other risk management activities.
- Providing oversight of the development and integration of new climate science research, as appropriate.

Additional responsibilities for the committee may be identified over time to assist in the governance of climate change risk and resilience for the Company.

Climate Risk and Resilience Group

In addition to the governance by Company senior leaders, Con Edison has established a Climate Risk and Resilience Group that can carry out day-to-day climate adaptation activities. This group will provide support to the Climate Risk and Resilience Executive Committee by performing a range of duties. These duties include, but are not limited to:

- Facilitating ongoing engineering and design follow-through on:
  - Specification updates, load forecasts, and asset ratings
  - Near- and long-term investments
  - Department quality assurance/quality control
- Reviewing climate science advancements: ongoing monitoring, review, consideration, and incorporation of future advances in climate science into the Company climate change pathways, as well as updates to other information/signposts relevant to climate adaptation (e.g., updates to the New York City Resiliency Design Guidelines, new climate variables).
- Providing management for the development of new climate science research (e.g., winds, future ground temperature), as appropriate.
- Coordinating the determination of changes in Company impact from updated climate information.
- Managing the Guideline, including disseminating information about the updated pathways/climate science within the Company.
- Advancing resilience to extreme events, including:
  - Considering the integration of climate change into emergency preparedness activities.
  - Coordinating reliability programs that also provide resilience benefits.
  - Identifying new resilience programs for extreme events to improve reliability.
- Developing and maintaining a climate adaptation strategy, including:
  - Aligning climate adaptation investment planning with other Company planning efforts, including Company long-range plans.
  - Identifying and positioning the Company for emerging climate adaptation issues.
  - Supporting resilience and emerging issues; tracking and coordination of the Company response to new or emerging climate adaptation issues, including adaptation activity (e.g., coastal barriers) owned by non-Company entities in the territory (e.g., New York City); and supporting flexible adaptation.
- Managing stakeholder internal and external relationships, including:
  - Producing materials to support stakeholder engagement.
  - Organizing internal or external events to share work with peers, promote information exchange, and accelerate the understanding of climate adaptation.



Climate Change Projections

Background

Con Edison reviewed and selected climate change pathways to support its Implementation Plan. Climate change projections provide a range of plausible climate futures, reflecting uncertainty in future greenhouse gas concentrations, climate sensitivity to greenhouse gas increases, natural climate variability, and other factors. The pathways the Company selected narrow this range and provide standardized climate change projections to guide the Company's adaptation efforts. Pathways address a range of variables, including future ambient and extreme temperatures, precipitation levels, sea level rise, and the temperature variable (TV) the Company uses to produce load forecasts.

To determine the pathways for the Implementation Plan, Con Edison reviewed the climate science in the Company's 2019 CCVS and determined that it did not need updates. The CCVS used downscaled climate projections based on global climate models developed as part of Coupled Model Intercomparison Project Phase 5.[13] These form the foundation for recent national and international climate change assessments and also the climate projections for New York City.

How Con Edison Leverages Climate Change Projections

- Con Edison has selected a set of climate change pathways, which define when and how much climate change is projected to occur in the service territory based on the best available science.
- Pathways address a range of climate hazards and align with regional resiliency standards.
- Pathway projections guide design, construction, operations, and maintenance of company assets, as well emergency preparedness.
- The Company will refine and update pathways over time.

Con Edison selected pathways based on a range of underlying considerations, including climate science, external benchmarking, high-level system sensitivity, and potential co-benefits. Con Edison sought pathways that would broadly align with regional benchmarks,

[13] Global climate models simulate the climate system and future climate change. The Coupled Model Intercomparison Project was initiated in 1995 to organize a standard set of global climate model simulations and forward-looking modeling objectives in support of the United Nations Intergovernmental Panel on Climate Change assessment process. Each Intergovernmental Panel on Climate Change assessment incorporates the latest generation of Coupled Model Intercomparison Project models in order to establish the state-of-the-science regarding climate change and evaluate potential consequences.

including the New York Panel on Climate Change (NPCC) climate projections used in the New York City Climate Resiliency Design Guidelines,[14] and the Port Authority of New York and New Jersey Climate Resilience Design Guidelines.[15] These and other peer organizations often adopt a risk-averse approach by planning closer to the upper end of potential climate change. This approach addresses warming and system sensitivity to warming under a range of plausible greenhouse gas concentration increases, including beyond the goal set by the Paris Agreement of limiting global warming to below 1.5 degrees Celsius (°C) compared with pre-industrial levels. Finally, the pathways provide additional co-benefits, such as maintaining performance and reliability under regular weather conditions.

Climate Change Pathways

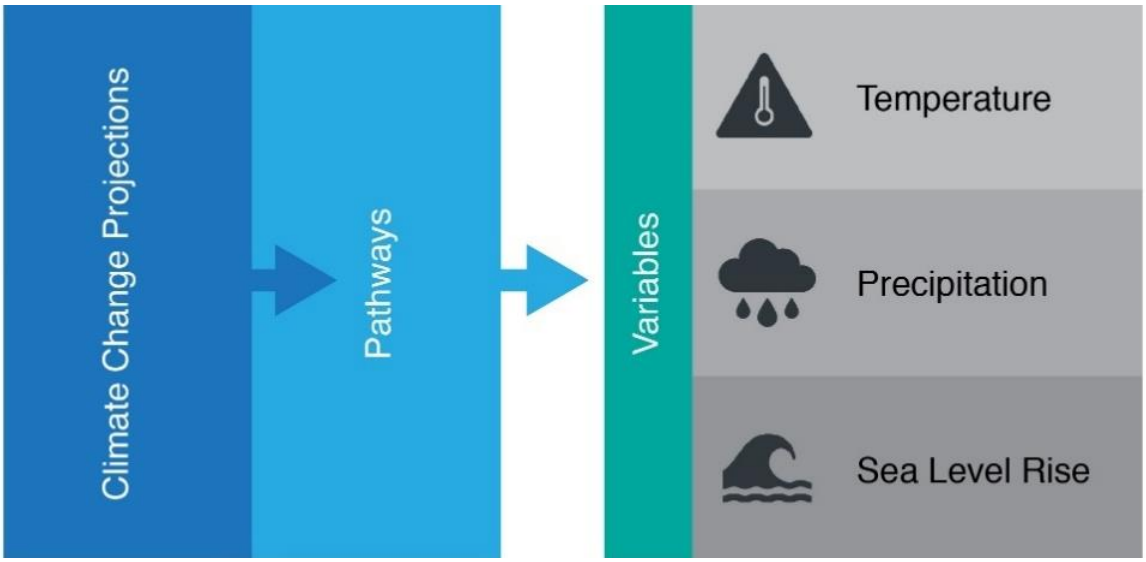
The pathways establish the climate change projections that Con Edison has incorporated into planning and adaptation efforts to increase resiliency to climate change. Climate projections provide benchmark values of future climate conditions to guide design, construction, operations, and maintenance of Company assets, as well as emergency preparedness.

Con Edison's pathways for temperature, precipitation, and related variables use upper-range climate projections developed for the CCVS based on a high emission scenario. Specifically, pathways use the 75th projection percentile drawn from an ensemble of 32 and 26 global climate models for temperature and precipitation variables, respectively, under RCP 8.5. RCP 8.5 provides a high-risk aversion lens through which to plan for potential climate change.[16]

Con Edison's pathway for sea level rise uses the middle of the 25th to 75th percentile range of merged RCP 4.5[17] and 8.5 sea level rise projections developed for the NPCC 2015 Report.[18] The sea level rise pathway is combined with storm surge and freeboard criteria to determine the Company's coastal flood protection standard (see "Asset Management" section for more information).

[14] New York City Mayor's Office of Resiliency. (2020, September). Climate Resiliency Design Guidelines, Version 4. https://www1.nyc.gov/assets/orr/pdf/NYC_Climate_Resiliency_Design_Guidelines_v4-0.pdf
[15] The Port Authority of New York and New Jersey. (2018, June). Climate Resilience Design Guidelines, Version 1.2. https://www.panynj.gov/port-authority/en/about/Environmental-Initiatives/sustainable-resilient-development.html
[16] RCP 8.5 represents a hotter future corresponding to comparatively large increases in greenhouse gas concentrations through the century. Warming similar to RCP 8.5 may be possible even under lower emissions if carbon cycle feedbacks are large, or climate sensitivity is greater than previously anticipated as new climate modeling suggests is possible.
[17] RCP 4.5 represents a moderately warmer future based on a peak in global greenhouse gas emissions around 2040.
[18] The NPCC 2015 Report is available at https://nyaspubs.onlinelibrary.wiley.com/toc/17496632/2015/1336/1

Figure 3: Pathways define climate change projections for a range of variables to guide operations and planning of Con Edison assets.



To incorporate climate risks into operations, some processes will continue to use higher risk factors or consider projections different from the pathways explained above for other reasons. For example, RCP 8.5 75th projections do not represent a risk-averse design basis for processes impacted by cold weather extremes. That is because projected warming corresponding to that that pathway does not capture the continued chance of cold snaps.[19,20] In addition, departments such as Emergency Preparedness and Enterprise Risk Management do not have design thresholds that require the use of single pathways. These departments benefit from analyzing multiple future scenarios (including tail-end risks) rather than a single design basis. More information on these cases is in later sections of this Summary of 2020 Activities.

Climate Change Pathway Updates

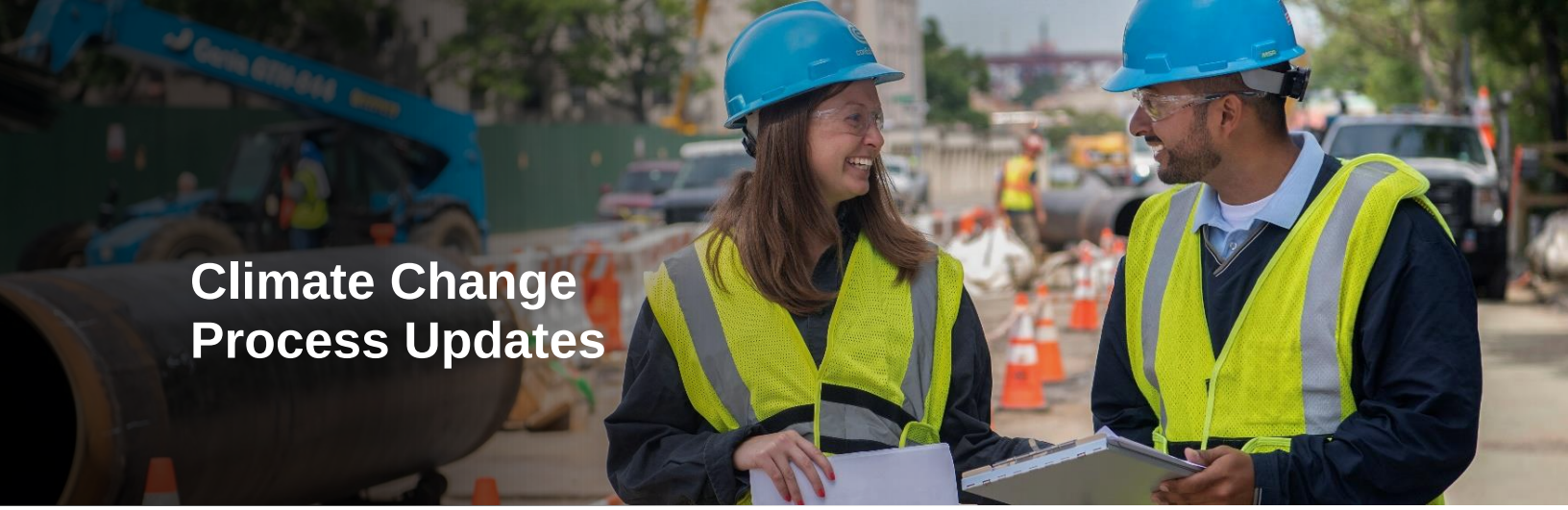
While no updates were required to prepare the Implementation Plan, the Company will refine and update the pathways over time. Updates may reflect advances in climate science and climate change projections for the New York City region. While it is anticipated that the pathways will be updated at least every five years, Con Edison plans to review the pathways annually to determine if updates are necessary. This process will consider at a minimum:

- The completion of new Coupled Model Intercomparison Project projections and their inclusion in at least two landmark climate assessments, including:
  - Intergovernmental Panel on Climate Change Assessment Reports,
  - NPCC reports that establish new climate projections of record for New York City, or
  - U.S. Global Change Research Program National Climate Assessment.

[19] Kretschmer, M., Coumou, D., Agel, L., Barlow, M., Tziperman, E., & Cohen, J. (2018). More-persistent weak stratospheric polar vortex states linked to cold extremes. *Bulletin of the American Meteorological Society*, *99*(1), 49–60.
[20] Kim, B., Son, S., Min, S., Jeong, J., Kim, S., Zhang, X., Shim, T., & Yoon, J. (2014). Weakening of the stratospheric polar vortex by Arctic sea-ice loss. *Nature Communications*, *5*(4646).

- The development of peer-reviewed or authoritative projections for climate variables that are currently difficult to model, not addressed by climate change pathways, or a significant improvement upon the Company's current science base. These include, for example, projections of wind gusts, sub-daily temperatures, below-ground temperatures, and other extreme weather variables. Projection data may be developed through:
  - NPCC reports,
  - New York State Research and Development Authority (NYSERDA) projects,
  - New York City Mayor's Office of Resiliency (MOR) projects,
  - Peer-reviewed academic studies, or
  - Con Edison projects and studies.
- Pathway updates also will consider updates to the following elements that may justify the selection of more or less risk-averse projections:
  - Industry shifts in climate change risk tolerance,
  - Changes in external standards/codes, such as those established by the city or state, including updates to the MOR Climate Resiliency Design Guidelines,
  - Global emissions policies,
  - Lessons learned from implementation and costs associated with adaptation,
  - Observations of long-term climate change in the service territory,
  - Observations of extreme events in or outside of the service territory, or
  - New climate science information submitted by stakeholders.

Pathway updates would trigger reconsideration of departmental specifications on the design, construction, operations, and maintenance of Company assets. This includes updates to the Company's flood risk standard (see "Asset Management" section for more information).

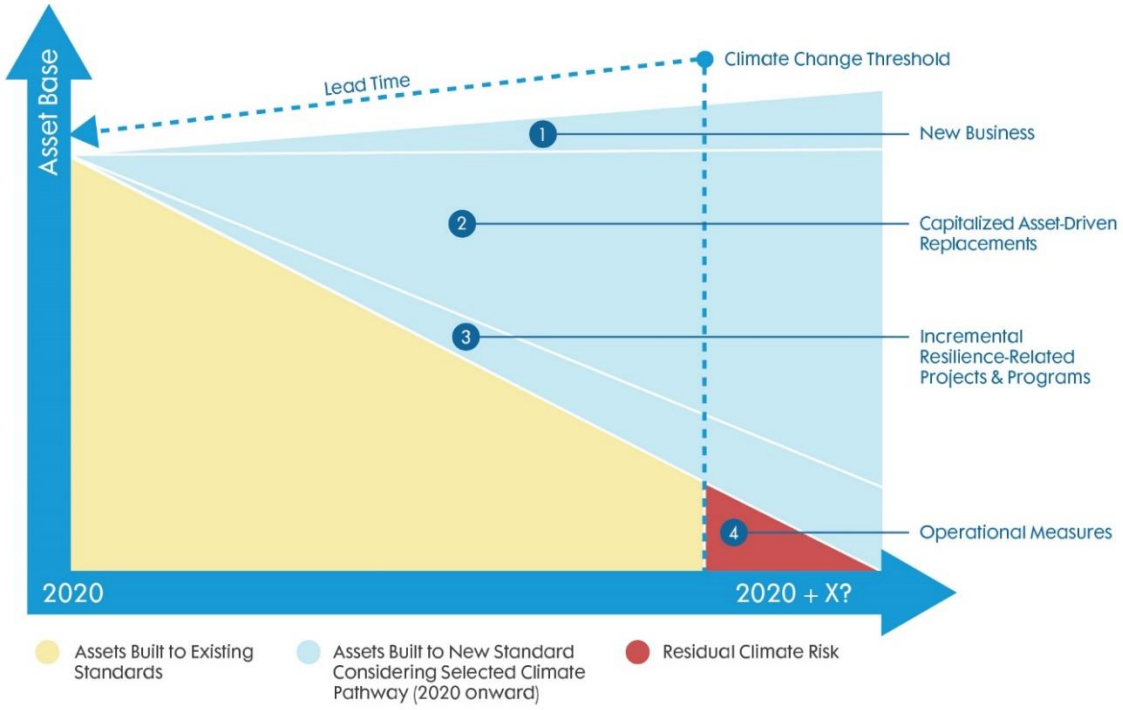


Climate Change Process Updates

In 2020, more than 40 Con Edison experts reviewed specifications, procedures, and practices to determine proactive approaches for enhancing climate change resilience. Figure 4 illustrates the scope of Con Edison's climate adaptations efforts, which include:

- Revisions and additions to specifications, procedures, and practices so that the design and construction of all new energy infrastructure, whether for new business or asset replacement, recognizes climate change projections.
- Incremental resilience-related projects and programs to adapt the existing asset base to acceptable risk thresholds. This includes consideration of the lead time to address these assets.
- Identification and planning for operational measures (e.g., sandbags, moving vehicles out of potential flood areas) to manage assets built to prior standards when the future climate risk is realized.

Figure 4: Scope of Con Edison's adaptation to climate change (illustrative)



This review has informed the continued integration of climate resilience into the Company's work. The following subsections provide summaries of the climate change dependencies and modifications to specifications, procedures, and practices for load forecasting, load relief planning, reliability planning, asset management, facility energy systems planning, emergency response activations, and worker safety.

Load Forecasting

Background

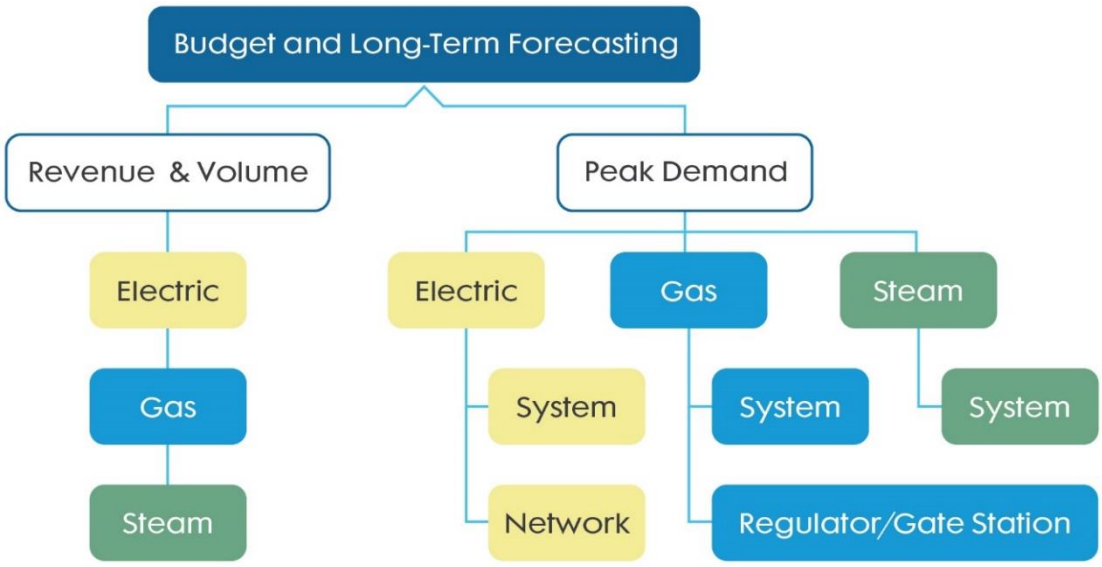
Con Edison plans and invests in its systems to meet the current and future needs of its customers. Forecasts for the electric, gas, and steam systems form a basis for these activities.

Each year, the Company produces 20-year electric, gas, and steam peak forecasts to plan investments to meet projected growth in demand. Con Edison's forecasting considers recent weather and drivers of demand, such as scheduled new construction and economic activity in its service territory. Figure 5 presents the typical range of forecasts developed by Con Edison.

Summary of Load Forecasting Updates

- Con Edison has integrated a climate change-driven increase in TV increase into its load forecasting process. During system peak, this is presently estimated to be a TV of 1 degree in 2030 (87°F TV) and 2 degrees in 2040 (88°F TV).
- Future forecasts will include line items specifying the incremental load impacts from climate change.

Figure 5: Forecasting for the electric, gas, and steam systems



As depicted in Figure 5, forecasts cover anticipated peak demand and expected revenue and volume. Peak demand forecasts predict the maximum amounts of energy customers will need. Volumetric forecasts show the expected amount, or throughput, of electricity, gas, or steam passing through the system to customers under normal weather. Revenue forecasts are derived from volumetric forecasts and market projections.

Climate Dependencies in Forecasting

Temperature is the main weather variable driving Con Edison's future investment in the electric system. Con Edison has developed its own customized temperature indicator for forecasting purposes—temperature variable (TV),[21] which correlates with the peak demand for power.

Con Edison's peak demand forecasts are temperature and TV sensitive. Con Edison's electric peak demand forecasts are calculated based on historical data that indicate an average TV of 86 degrees Fahrenheit (°F) in NYC and 85 degrees Fahrenheit (°F) in Westchester County. A rise in TV will mean higher peak demand and investment to meet it.

Table 2 provides a TV reference associated with Con Edison's selected temperature pathway.

Table 2: Sample TV Projections Relevant to Electric Load Forecasting

Variable	Location	2030s	2050s	2080s
Days per year with TV > 86°F[22,23]	LaGuardia Airport	6	15	35
	White Plains (Westchester County)	3	9	25

In addition, Con Edison's future volumetric forecasts will require adjustment due to climate change.

Incorporating Climate Change into Load Forecasting

As illustrated above, inputs to Con Edison's load forecasts will change. Con Edison recognizes the importance of capturing these changes in its forecasts. It will require a significant adjustment in the current process and a departure from the approach the industry has traditionally followed.

Forecasts typically rely on historical climate conditions as an input. Con Edison will shift this approach to include climate projections (i.e., forecasted future values). This change will affect electric peak demand forecasts, as well as revenue and volume forecasts for electric and gas.

[21] It is common practice in the industry to consider temperature and humidity together in the load forecasting and planning process. Con Edison's approach to this practice is the calculation of Temperature Variable.
[22] In the summer months, the TV for the electric system is calculated as the 3-day weighted sum of the maximum rolling 3-hour average of wet and dry bulb temperatures.
[23] Within Con Edison's service territory, historical data support TV forecasting differences between New York City and Westchester County due to regional differences in climate. As such, Con Edison uses different temperatures and temperature variables in these regions.

Table 3 summarizes the potential implications for Con Edison's forecasts.

Table 3: Key Takeaways for Con Edison Forecasts[24]

System (Peak Season)	Peak Demand Forecasts	Volumetric Forecasts
Electric (Summer)	Preliminary detailed analysis suggests that annual peak demand (summer) is expected to increase between 700 MW and 900 MW by 2050 due to incorporation of the climate pathways.	Climate change is expected to drive cooling loads and volumetric load higher.
Gas (Winter)	Annual peak demand is not expected to be impacted[25] as cold snaps and extreme cold weather events will continue to occur.[26]	Climate change is expected to drive volumetric load lower.
Steam (Winter)	As with the gas system, annual peak demand on the steam system is not expected to be impacted as cold snaps and extreme cold weather events will continue to occur.	Climate change is expected to drive volumetric load lower.

The Company developed its 2020 electric peak demand forecast incorporating the selected temperature pathway. The changes in the incremental peak demand forecast as a result of climate change reflect a TV increase of 1 degree from current day in 2030 and 2 degrees in 2040. It is important to note that other factors, such as energy and environmental policy, may result in more significant changes in Con Edison's demand growth. For example, New York State policy goals have the potential to increase electric demand and use for the purposes of heating and transportation. Regardless, climate change will change customer demand for electricity, gas, and steam. The Company will adjust its planning and investments to reflect the changes in demand. Con Edison will develop additional forecasts for revenue and volume in 2021 during the Company's regular planning cycle. These also will include line items specifying the incremental load impacts from climate change, if any, for the period of the forecast.

As noted above, Con Edison does not expect peak demand for gas and steam to increase due to climate change. Throughput on these systems will decrease due to a warming trend starting in about 2030. However, climate change does not preclude the chance of cold snaps, and thus Con Edison will continue to forecast and plan according to its current design temperature variables.

[24] Shows the impacts of climate change only and does not include the potential implications of energy and environmental policy related to renewables and decarbonization.
[25] There is, however, a potential for higher summer gas demand driven by electric generation for additional summer cooling load. This higher generation load does not affect the Company's customer delivery volume forecast.
[26] Warming due to climate change will not preclude the chance of cold snaps in the service territory. During the 2013/2014 and 2017/2018 winters, record cold snaps impacting the New York City metropolitan region were linked to weakened polar vortex events. While uncertain, some evidence suggests that such events may become more frequent in the future due to climate change.

Load Relief Planning

Background

Con Edison evaluates the growth in electricity peak demand annually to identify areas where the load could exceed system capacity. The Company then designs solutions to meet this growth and maintain equipment ratings within design parameters. This process, conducted for the electric system, is called load relief planning.[27]

Summary of Load Relief Planning Updates

Beginning in 2021, Con Edison will incorporate climate change-driven increases in load and incremental power equipment deratings in the 10- and 20-year load relief plans.

Con Edison performs yearly load relief planning at the distribution level. This planning cycle begins in the fall and is based on temperature-adjusted, actual peak loading from the summer, which is when the load peaks due to air conditioning. This load relief planning is targeted toward both the feeder and sub-feeder levels and is often implemented on a shorter planning cycle.

The 10-year load relief program identifies projects and investment costs to meet the growth in electrical demand. The 10-year load relief program is updated annually and informs budgets. The Company also develops a 20-year load relief program as part of its strategic planning activity. This longer-term plan is used to consider broader system trends and the scale of potential future required investments.

Climate Dependencies in Load Relief Planning

Con Edison's selected temperature pathway indicates an increase in temperature and TV[28] due to climate change. As a result, future load relief planning will need to account for increased loads (driven by air conditioning use) and reduced electrical equipment capacity.[29] Figure 6 illustrates these impacts on the load relief planning process.

[27] Additionally, Con Edison conducts its Local Transmission Planning Process (LTPP) as part of the New York Independent System Operator (NYISO) Comprehensive System Planning Process (CSPP). Similar to the load relief planning process, Con Edison's LTPP also considers load growth and equipment ratings, which will reflect the selected climate change temperature pathway.

[28] It is common practice in the industry to consider temperature and humidity together in the load forecasting and planning process. As previously noted, Con Edison's approach, TV, considers wet and dry bulb temperatures.

[29] Capacity of electrical equipment, such as substation transformers, primary distribution lines, and other assets, is determined primarily by equipment and system "ratings". Every electrical device on the Con Edison system has a specified rating based on a reference ambient temperature. Equipment ratings are set by equipment manufacturers and are applied by engineers to design systems at a safe and reliable system capacity. Increases in ambient temperature due to climate change would affect equipment ratings and capabilities. Including this consideration in our load relief planning will help the Company to meet the forecasted change in summer temperatures.

Figure 6: Climate change impacts on the load relief planning process.

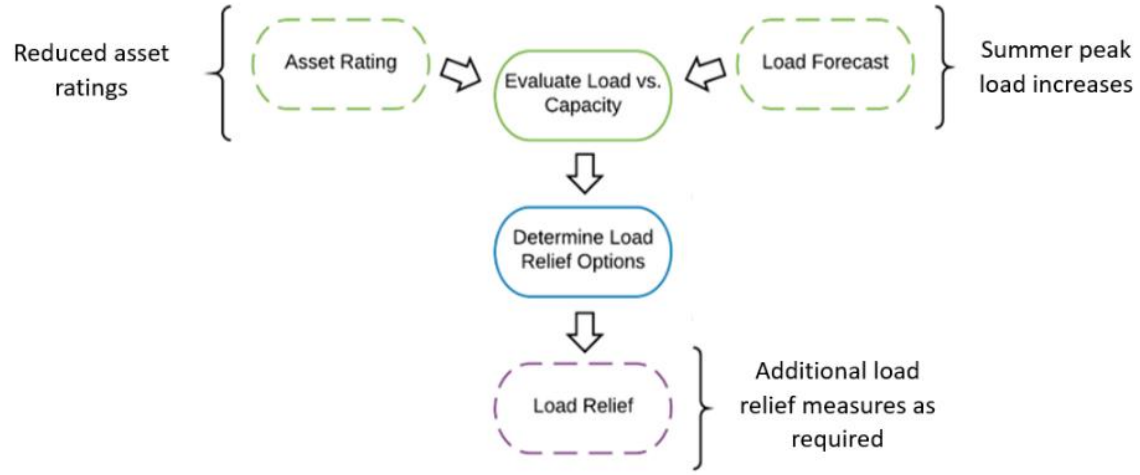


Table 4 provides sample climate variables associated with Con Edison's selected temperature pathway and relevant to load relief planning. The table presents information referred to as lifecycle data, which allows Con Edison engineers and planners to assess climate conditions over the lifecycle of a system asset.[30]

Table 4: Sample TV and Temperature Projections Relevant to Load Relief Planning

Variable	Location	Historical Baseline[31]	2030s	2050s	2080s
Days per year with TV > 86°F[32]	LaGuardia Airport	1	6	15	35
	White Plains (Westchester County)	<1	3	9	25
Days per year with daily average temperature > 86°F	Central Park	3	11	21	45
	White Plains (Westchester County)	<1	3	8	22

[30] Data in the lifecycle tables in this document is drawn from a large database of climate projections developed in support of the Company's Climate Change Vulnerability Study. The data was developed by the Lamont-Doherty Earth Observatory at Columbia University.
[31] The historical baseline value represents an average over the 30-year period between 1976 and 2005. The baseline period ends in 2005 because the global climate models used for this report consider baseline data through 2005.
[32] Con Edison's load forecasts are calculated based on historical data that indicate an average TV of 86°F experienced in the service territory. A future rise in TV will drive higher peak demand and investment activity to meet it.

Incorporating Climate Change into Load Relief Planning

As described in the "Load Forecasting" section, preliminary analysis projects peak demand (experienced in the summer) will increase by 700 MW to 900 MW by 2050.

The Company is assessing the implications of its selected temperature pathway on electrical capacity and equipment ratings. Using the distribution system as an example, preliminary analysis indicates that roughly 1% of distribution network transformers could require action as forecasted load exceeds transformer ratings which may be lowered due to ambient temperature projections beyond 2040.[33] The Company will continue to monitor the potential need for asset derating as a result of ambient temperature increases. Projected decreases in network capacity as a result of derating will be incorporated in the load relief planning process.[34]

Con Edison relies on an extensive set of physical and operational options to continually serve the changing load. Even considering potential reductions in capacity, Con Edison does not expect these physical and operational options to change in a warming climate. The CCVS helped identify where climate dependencies existed across the different load relief options.[35] The options include:

- Physical adaptation measures to increase network capacity, such as adding capacitor banks, energy storage systems, additional transformer cooling, and new substations.
- Operational or program changes, such as transferring the load to an existing substation that has capacity or expanded energy efficiency and demand-side management programs.
- Electric demand reduction measures, such as energy efficiency, demand response, and non-wires solutions (NWS), to offset gradual increases in load.

In addition, new technologies, such as utility-owned energy storage, provide resiliency and load relief. Adaptation benefits and co-benefits developed as part of the CCVS provide a framework for how Con Edison could further incorporate other criteria, such as customer resilience and social costs, in the Company's evaluation of different load relief measures as the climate changes. This longer-term climate view, coupled with a growing spectrum of design tools, might provide for more resilient and cost-effective load relief solutions to address the incremental load relief need as the climate changes.

The 2021 load relief planning cycle will assess future incremental peak loads and potential capacity impacts at a more localized network and substation level. The addition of local temperature data will aid Con Edison in this process.

[33] Transformer derating also will be dependent upon emergency equipment ratings under defined contingency scenarios. Future electrification driven by New York State's CLCPA could impact the number of transformers and which transformers will require derating.
[34] See the "Asset Management" section for more information on how the temperature dependencies on asset ratings potentially impact asset life.
[35] CCVS Appendix 1: Temperature, p. 25.

Reliability Planning for the Sub-Transmission and Distribution Systems

Background

Con Edison is committed to improving electric system safety, reliability, and resilience.[36] Each year, the Company conducts maintenance and investment activities in support of this commitment. Underpinning the Company's activities is a comprehensive reliability planning process for the electric sub-transmission and distribution systems. The process considers the performance of assets, circuits, and whole systems to identify electric system needs, solutions, and priorities. This planning process results in the development of reliability plans.

Summary of Electric System Reliability Updates

- Con Edison will use climate change-adjusted load forecasts and projected increases in heat in its reliability analysis processes.
- Con Edison will continue investing in replacing the remaining paper-insulated, lead-covered cable on its system and will add more sectionalizing switches to help mitigate the anticipated near-term reliability concerns.
- In 2021, Con Edison will undertake a review of best available scientific literature to evaluate projected future changes in wind characteristics in the northeastern United States.

Reliability planning begins with tracking and assessing equipment failures and customer outages. The process culminates in the creation of a plan, each year, for work in subsequent years. In between, detailed engineering assessments and modeling determines potential weak points in the system so that the Company can proactively address them in the reliability plan. But outages do occur. Whether equipment failure results in a customer outage depends on many concurrent factors, including the design of that portion of the system; its configuration at the time of a failure; the magnitude, location, and duration of loads; and other elements. Because there is uncertainty as to how and when future concurrent factors will arise, central elements of Con Edison's reliability planning employ probabilistic methods of analysis.

Probabilistic elements of Con Edison's reliability planning include:

- Distribution system: Network Reliability Index (NRI)[37]
- Sub-transmission system: Transmission Probabilistic Reliability Assessment (TPRA)

Con Edison develops the NRI and TPRA through modeling that simulates equipment failures and possible states of electric system operations, considering loads, switching, climate, and other factors. The Company updates climate inputs annually based on typical historical weather patterns. These modeling processes estimate the potential for customer outages due

[36] Equally, Con Edison is committed to the safety and reliability of its gas and steam systems. Among other activities, the Company seeks to enhance the reliability of its gas system through the gas main replacement program. This program is discussed in the "Asset Management" section.

[37] The term "network" refers to a type of distribution system design. Most of Con Edison's electric customers, approximately 86%, are served by one of 64 underground network systems. The remaining electric customers are predominantly served by overhead lines in 19 non-network load areas.

to equipment failures. For the distribution system, equipment may include spans of cable, transformers, and other components. For the sub-transmission system, equipment may include transformers, circuit breakers, spans of cable, and other equipment. The modeling prioritizes system areas and assets by how likely they are to contribute to outages. Reliability plans for the distribution and sub-transmission systems address the priority areas and assets.[38] Reliability plans look out over different periods, depending on the system and lead time required for procuring and installing equipment.

Climate Dependencies in Reliability Planning

Reliability planning seeks to enhance the reliability of the electric system under all operating conditions, including heat, rain, wind, snow, ice, and other weather. It also includes system conditions such as customer demand at specific locations and circuit configuration.

In considering the selected climate pathways, a potential concern arises regarding temperature. Sample climate variables relevant to reliability planning are included in Table 5.

Table 5: Sample TV and Temperature Projections Relevant to Reliability Planning

Variable	Location	Historical Baseline	2030s	2050s	2080s
Number of 3-day heat waves > 86°F TV	LaGuardia Airport	0	1	3	8
	White Plains (Westchester County)	0	0	1	5
Longest number of consecutive days in summer > 86°F TV	LaGuardia Airport	<1	3	6	12
	White Plains (Westchester County)	<1	2	4	8
Number of 3-day heat waves with daily average temperature > 86°F	Central Park	<1	2	4	10
	White Plains (Westchester County)	0	<1	1	4

As shown above, Con Edison's temperature pathway indicates the electric system will encounter higher temperatures and longer periods of prolonged heat. Heat increases customers' need for air conditioning and places more demand on Con Edison's electric-delivery system. Distribution equipment failure rates rise with demand (particularly at the beginning of the summer). Therefore, future heat conditions are a consideration in reliability planning processes.

In addition, storms, particularly high winds causing tree contact with power lines, drive equipment failures on Con Edison's overhead distribution system. The scientific community does not yet have localized projections of changes in wind speeds and direction due to climate

[38] Con Edison has an NRI threshold of 1 per unit. Investment and maintenance activities are undertaken to help prevent networks from exceeding this threshold. TPRA does not include a similar singular threshold for triggering reliability investments because TPRA modeling is used to prioritize activities. These activities include purchasing spare inventory for key long lead time equipment and undertaking new projects and system upgrades.

change. But studies suggest that extreme events will continue to increase in frequency and intensity as a result of a warming climate. Future storms are thus an additional consideration in reliability planning for the overhead distribution system.

Incorporating Climate Change into Reliability Planning

Con Edison will need to make additional investments in its distribution network in order to maintain the current standard of reliability by 2030 as measured by NRI.[39]

Heat-related concerns for the networked portion of the Company's electric distribution system will be captured in future NRI modeling, predominantly through increased peak demand forecasts, projected increases in TV, and projected increases in the severity and duration of heat waves. The Company has revised its 20-year electric system peak demand forecast, which reflects a heat-related increase in load beginning in 2030. This forecast and the projected increases in TV and heat waves will be input into the NRI modeling, non-network reliability analysis, and TPRA reliability analysis processes. Future annual five-year sub-transmission and one-year distribution system reliability plans will include these considerations.

Notably, projected increases in TV, coupled with projected increases in the frequency and number of heat waves, will negatively impact NRI performance in the coming decades if no adaptation measures are taken. The climate change adaptation measures to reduce any impacts on NRI are consistent with the Company's existing measures aimed at reducing the frequency, length, and impact of outages. Con Edison will add more sectionalizing switches/interrupters to mitigate any additional anticipated near-term reliability concerns as a result of projected increases in TV and its subsequent negative impact on NRI. As the Company approaches mid-century, additional adaptation measures may be more frequently required to offset any adverse impacts of climate change on NRI.

Con Edison also is planning to work with stakeholders to gain a better understanding of wind characteristics in the Northeast, for potential use in reliability planning. The Company will seek to learn about the state of the science by reviewing information in public resources and research. To the extent feasible, the review shall inform any additional studies Con Edison performs.

[39] Con Edison's CCVS, which evaluated a variety of climate pathways, found that parts of Con Edison's distribution system, absent adaptation, may not maintain the current standard of reliability by 2030 as measured by NRI. Climate Change Vulnerability Study, p. 41. This conclusion, based on the projected increase in the frequency and duration of heat waves, still holds, considering Con Edison's selection of the RCP 8.5 75th percentile pathways for temperature, temperature variable, and precipitation. Con Edison's selected climate pathway does not indicate significant heat-related reliability concerns with either the non-network distribution system or the sub-transmission system.

Asset Management

Background

Con Edison's asset management program consists of processes, procedures, specifications, and protocols for the operation, maintenance, and replacement of equipment across its three systems:

- Electric system: Includes 39 transmission substations, 62 area substations, 135,000 miles of cable, 95,000 transformers, and other equipment.
- Gas system: Includes 4,300 miles of gas mains and other equipment.
- Steam system: Includes 105 miles of main and other equipment.

Asset management supports preventive maintenance and investments in reliability and includes processes for evaluating the condition and performance of assets.

The Company will incorporate the selected climate change pathways into its asset management program to consider the potential impact on asset life and performance.

Summary of Asset Management Updates

- Con Edison processes will assess the extent to which temperature changes will impact equipment ratings. This information will be incorporated into the load relief planning process.
- Con Edison has updated its flood design standard for new sites to add 2 feet of freeboard plus a sea level rise increment based on the sea level rise pathway and the useful life of the site to FEMA's 1% annual chance base flood elevation.
- As climate information is updated, Con Edison will review affected existing assets and identify any changes necessary due to changes in design flood elevation.

Climate Dependencies in Asset Management

Con Edison's climate change pathways indicate future increases in temperature, TV, and sea level.[40] Increases in temperature and sea level will directly affect the Company's asset management program.[41] Table 6 provides sample lifecycle data relevant to asset management.

[40] The Company has reviewed the selected pathway projections for precipitation. While the projections show an increase in annual precipitation, the science is inconclusive regarding how that translates to deluge-type events that have more relevance to Con Edison's system. This is something the Company will continue to monitor going forward.
[41] Assets also are impacted by extreme events. Research suggests that extreme events will increase in frequency and intensity as a result of a warming climate. See the "Emergency Response Activations" section for more information on Con Edison's emergency preparedness activities.

Table 6: Sample Life Cycle Data Relevant to Asset Management

Variable	Location	Historical Baseline	2030s	2050s	2080s
Median daily summer ambient temperature (°F)	Central Park	75.2	78.7	81.3	85.2
	LaGuardia Airport	75.6	79	81.6	85.5
	White Plains (Westchester County)	71.5	74.9	77.5	81.5
Highest daily average ambient summer temperature (°F)	Central Park	87.3	91	93.5	97.4
	LaGuardia Airport	87.6	91.3	93.8	97.6
	White Plains (Westchester County)	83.6	87.4	90	93.8
Sea level rise (inches)	Manhattan Battery	0	9	16	28

Sea Level Rise

Sea level rise poses risks to the electric, gas, and steam systems. Coastal flooding is projected to increase, meaning more frequent and severe flooding of equipment in the 100-year floodplain. Assets that are not currently in the 100-year floodplain could also face future flooding risks as sea level rise expands the footprint of the 100-year floodplain through time.

Con Edison currently designs assets to protect against the 100-year floodplain based on Federal Emergency Management Agency (FEMA) flood insurance rate map base flood elevations, plus two feet of freeboard and one foot of sea level rise (i.e., FEMA +3'). Con Edison's climate change pathway indicates that the current design criterion of one foot of sea level rise will be exceeded by 2040.

Temperature

Electric equipment ratings are sensitive to increases in temperature. For example, asset ratings for transformers, cable, busbar, and connections on the sub-transmission and distribution systems are all sensitive to temperature. As ambient temperatures increase, an asset's ability to dissipate heat decreases. To maintain the asset's useful life, Con Edison may need to lower (i.e., "de-rate") the normal and emergency ratings.

Precipitation

Precipitation-based hazards present flooding and water infiltration risks to Con Edison's gas, steam, and electric systems.

Incorporating Climate Change into Asset Management

Con Edison has identified its internal processes, procedures, specifications, and protocols requiring updates for the incorporation of climate change into asset management. The Company has updated key processes and plans to complete remaining updates over the 2021 through 2022 timeframe. Con Edison has established a Guideline (see "Climate Change Planning and Design Guideline" section for additional information) to inform the updating of internal documentation and practices. A summary of key asset management updates is as follows.

Sea Level Rise

The Company is adopting a sea level rise-adjusted flood protection approach to address projected sea level rise and expansion of the 100-year floodplain. The criterion for flood design will include the FEMA Base Flood Elevation, two feet of freeboard, plus an additional sea level rise increment based on projections defined by the Company's climate change pathway. Con Edison will consider an expansion of flooding extent and elevation as part of this process. Table 7 illustrates the guideline for determining the design flood elevation for assets.

Table 7: Guideline for Determining Design Flood Elevation

Useful Life	FEMA Base Flood Elevation (BFE)	+ Sea Level Rise Pathway Projection	+ Freeboard	= Design Flood Elevation (DFE)
Through 2039	FEMA 1% (Preliminary Flood Insurance Rate Maps [PFIRM])	12" (current standard)	24"	FEMA 1% BFE + 36"
2040–2069	FEMA 1% (PFIRM)	16"	24"	FEMA 1% BFE + 40"
2070–2099	FEMA 1% (PFIRM)	28"	24"	FEMA 1% BFE + 52"
2100+	FEMA 1% (PFIRM)	36"	24"	FEMA 1% BFE + 60"

Design standards will incorporate this information, and the Company will consider flooding projections when building new assets. The Company will complete the update of its design specifications before the next five-year review cycle. Con Edison will consider flooding projections when building new assets.

As design standards are updated, Con Edison will review its impacted existing infrastructure and determine whether it needs to build in new protections due to changes in design flood elevation. The Company will complete its next assessment referencing newly available FEMA +3', +4', and +5' maps that consider expansion of flooding extent due to sea level rise as part of its next five-year review cycle, or sooner. Based on the selected climate change pathway, the Company determined that existing coastal flooding protection built to the current design standard is sufficient through 2039. The Company will implement adaptation measures to upgrade existing infrastructure, identified in the FEMA +4' and FEMA +5' maps, to mitigate coastal flood risks before 2039, as necessary.

Temperature

Based on the Company's preliminary assessment, some assets may require de-rating before 2050 (Table 8).

Table 8: Key Takeaways for Con Edison's Asset Ratings

	Asset	Note
Distribution	Overhead Wire (Primary Feeder, Secondary Main, and Secondary Service)	Derating is not expected to be required.
	Overhead Transformer	Derating is not expected to be required.
	Network Transformer	Derating may be required in some instances before 2050.
	Underground Cable (Primary Feeder)	Derating is not expected to be required.
	Underground Cable (Secondary Main)	Derating is not expected to be required.
	Underground Cable (Secondary Vault Tie)	Derating is not expected to be required.
Transmission/ Sub-Transmission	Overhead Transmission Conductor	Derating may be required in some instances before 2050.
	Underground Transmission Line	Derating is not expected to be required.
Substation	Power Transformer	Derating may be required in some instances between 2040 and 2050.
	Bus Conductor (Indoor and Outdoor)	Derating is not expected to be required.

Con Edison will consider the selected climate change pathway in its ratings of power equipment.

Precipitation

Con Edison's design basis for historical heavy rainfall will account for historical heavy rainfall return periods[42] using up-to-date industry datasets. This includes using National Oceanic and Atmospheric Administration (NOAA) Atlas-14 datasets,[43] as well as those in the New York City and New York State building codes. In addition, the Company will be considering projected changes in heavy rainfall return periods[44] to complement information provided in the Company's climate change pathways.

[42] A return period is the estimated average time between events, such as flood events. For example, the 100-year rainfall return period represents rainfall associated with a rain event that occurs once every 100 years, on average.
[43] NOAA Atlas-14 is developed by the NOAA Hydrometeorological Design Studies Center based on up-to-date historical weather records.
[44] Projections were developed in partnership between the Northeast Regional Climate Center and the New York State Energy Research and Development Authority, and are available through Cornell University at http://ny-idf-projections.nrcc.cornell.edu/index.html

Facility Energy System Planning

Background

Con Edison operates buildings that use heating, ventilation, and air conditioning (HVAC) systems for indoor temperature/climate control. These systems require periodic evaluation of operating performance and replacement as they reach the end of their useful lives.

Con Edison is incorporating the selected climate change pathways and an asset's expected useful life into its process for periodic replacement and new installation of HVAC systems.

Summary of Facility Energy System Planning Updates

- Con Edison will pursue flexible design strategies to allow for the installation of future additional HVAC cooling capability.
- Con Edison will continue its energy efficiency investments in facilities to reduce thermal loads.

Climate Dependencies in Facility Energy System Planning

Con Edison's facility energy systems are designed to maintain indoor climate within acceptable limits under a range of outdoor temperatures. In accordance with American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standards,[45] Con Edison's HVAC equipment is designed for the top percentile temperature experienced in a year. Sample temperature pathway data relevant to facility energy system planning is included in Table 9.

Table 9: Sample HVAC-Relevant Climate Change Projections

Variable	Units	Location	Historical Baseline	2030s	2050s	2080s
Design temperature occurring in the hottest 1% of hours in a year	°F (dry bulb)	LaGuardia Airport	88.7	92.5	95.2	99.0
		White Plains (Westchester County)	86.0	89.6	92.5	96.3

The selected climate change temperature pathway indicates a warming trend that is relevant to the design of the cooling portions of facility HVAC systems.

Incorporating Climate Change into Facility Energy System Planning

Con Edison has evaluated its HVAC design practices against the selected climate change temperature pathway, which suggests that facility cooling requirements will increase in the coming years. For example, the information in Table 9 suggests that, all else being equal, the size of the cooling equipment in Con Edison's facilities in New York City may require an increase of up to 40

[45] ASHRAE is a nonprofit professional association that publishes technical standards, among other activities. Relevant standards include ASHRAE Standard 163-2013, Climatic Data for Building Design Standards.

percent by 2040.[46] This would require a significant increase in energy use and system costs. The design life of HVAC systems is short compared with that of other Con Edison assets, and climate may not change sufficiently within the lifetime of existing HVAC systems to merit retrofitting measures. New HVAC systems, however, will require additional consideration and action.

Anticipating that increases in cooling capacity may become necessary, Con Edison will allow for flexibility in project designs to enable future expansion in the new HVAC systems it installs. For example, this could include evaluating the physical space for additional future HVAC equipment, and allowing for additional space, as needed. It also could include measures such as adding electrical conduits or switchgear or larger ventilation ducts. In certain cases, Con Edison may install additional HVAC cooling capacity in anticipation of future needs.[47] Con Edison will continue monitoring the hottest hours of each year and will install additional HVAC equipment as necessary.

In addition, Con Edison will continue to monitor and reduce building thermal loads (e.g., improve building envelope, use more efficient lighting, and employ green design elements) and adhere to related local laws (i.e., LL84, LL87, LL88, and LL97). These include lighting retrofits to improve lighting and energy efficiency, Level 2 energy audits, retro-commissioning to identify energy conservation measures, collecting energy use data, and ensuring that the Company meets LL97 carbon emission goals for 2025, 2030, and 2050. These measures will help mitigate the increased demand placed on HVAC systems from a changing climate.

Emergency Response Activations

Background

Con Edison's Emergency Preparedness group helps other Company departments prepare and respond to storms and other emergencies. The Company maintains an Electric Emergency Response Plan for wind, rain, snow, heat, and other weather events. Con Edison has a Corporate Coastal Storm Plan covering all Company departments for severe flooding events. In addition, Con Edison has preparation and response plans for emergencies that are specific to the electric, gas, or steam systems. The Company reviews these plans to determine whether it should make changes based on lessons learned from prior events. Finally, the Company regularly conducts drills and exercises to practice and prepare for real-life events.

Summary of Emergency Response Activation Updates

- Con Edison will continue assessing how to incorporate heat, flooding, and precipitation projections into weather and impact forecast models.
- The Company will plan and conduct drills and exercises based on projected pathway criteria.

[46] Increasing design temperature is directly proportional to the size of the cooling equipment in accordance with the formula *Heat Transfer = mCp * delta T*, with an indoor target air temperature of 76°F. Utilizing the baseline and 2040 LaGuardia values in Table 9 indicates a *delta T* of (88.7°F – 76°F) currently versus a *delta T* of (93.7°F – 76°F) in 2040, or an approximate 40% increase in the size of the cooling equipment.

[47] One such case would be when new HVAC equipment is upsized to meet a marginal increase in projected climate need that is only a few years out in the future.

Many of the Company's emergency response plans have triggers for storm preparation and staffing requirements based on the weather forecast and, for storms impacting the electric system, customer outage forecasts. For example, predicted coastal storms trigger companywide conference calls, beginning five days before the storm arrives, to plan mobilization and response. For overhead events, weather and impact forecasts provide lead time to electric operations departments to plan staffing and reach out to mutual assistance workers. For heat, the Company activates its Corporate Emergency Response Center (CERC)[48] in anticipation of any two-day interval during which temperatures, at any hour within the period, are likely to exceed an 86°F TV.

Con Edison employs meteorologists who monitor the weather, provide daily weather forecasts, provide system impact forecasts (i.e., expected number of outage jobs), and participate in all Company pre-storm mobilization meetings.

Climate Change Pathway Implications

Con Edison has selected climate change pathways with forward-looking data related to heat, precipitation, and flooding. The Company's response activations and emergency response triggers are based on current weather forecasts, historical storm impacts, and outage data from prior storms.

Con Edison's selected pathways indicate additional future hot weather days, precipitation, and the potential for flooding, as shown in Table 10.

Table 10: Sample Climate Change Projections Relevant to Emergency Response

Variable	Location	Historical Baseline	2030s	2050s	2080s
Days per year with maximum daily temperatures over 95°F	LaGuardia Airport	4	10	21	44
	White Plains (Westchester County)	1	6	11	27
Days per summer (June/July/August) with electric TV greater than 86°F	LaGuardia Airport	1	6	15	35
	White Plains (Westchester County)	<1	3	9	25
Days per year with > 0.75 inch of precipitation[49]	LaGuardia Airport	17	17	18	18
	White Plains (Westchester County)	21	22	22	22
Sea level rise (inches)	Manhattan Battery	0	9	16	28

[48] CERC is responsible for the safe and reliable operation of the Company's systems during an emergency event. Its activities include dispatching and directing crews to address system problems and identifying/initiating contingency plans. CERC coordinates emergency response efforts and implements the Incident Command System. It also is responsible for notifying and receiving information from appropriate federal, state, and local agencies, including first responders, regarding system status.

[49] "Days per year with greater than 0.75 inch of precipitation" represents a proxy for "rain event triggers" featuring 0.75 inch of precipitation in 3 hours.

Incorporating Climate Change into Emergency Response

Based on initial reviews, Con Edison has determined that the selected pathways will primarily impact weather and customer outage forecasts, updating of emergency response plans, and emergency response training.

Weather and Impact Forecasting

The pathways Con Edison selected demonstrate increased heat, precipitation, and flooding impacts in the service territory over decades. The Company will continue to monitor and adapt to these and other climate change impacts[50] for emergency response.

While the pathway data provide specific information for application to design criteria (e.g., higher and stronger walls to respond to increased flooding), the Company's use of the data to evaluate the next weather event requires additional review and planning. The Company plans to review this data to provide a weighting for heat, precipitation, and flooding into the weather and system impact forecasts. The Company plans to use internal resources and outside experts[51] for this evaluation.

Emergency Response Plans

The Company conducts periodic reviews of emergency response plans. The Company will be including the climate change data from the selected pathways to adapt the emergency response plans to the new conditions where applicable.

For example, an increase in sea level rise will increase flooding and the impact on Company facilities. An increase in heat will impact power equipment and may require derating of equipment or additional cooling processes for transformers. An increase in precipitation could increase the number of storms where the steam system can be impacted by "rain event triggers."[52] Similarly, as the Company incorporates design criteria in response to the new climate data, some impacts could decrease. For example, higher and stronger walls will reduce impacts from sea level rise. By including climate data related to heat, precipitation, and flooding in periodic emergency response plan reviews, the Company can adjust the response activations to these new conditions.

[50] Following Tropical Storm Isaias, the Company committed to review its outage impact models, including investigating using a higher weighting to account for high winds and evaluating adding a variable for overall tree health (Matter 20-01633, *Consolidated Edison Company of New York Inc. Report on Preparation and System Restoration, Tropical Storm Isaias, August 2020*, pp. 34–36, October 13, 2020).

[51] For example, in cooperation with the State University of New York at Albany (SUNY Albany), the Company recently installed weather data sensors at various Con Edison facilities in New York City. These sensors will collect data that SUNY Albany will use in its statewide Mesonet project, a statewide network of weather stations that measures temperature, humidity, pressure, solar radiation, snow depth, soil, wind speed, and wind direction. Con Edison will explore ways to further develop its relationship with SUNY Albany, or other research organizations/universities, to consider potential changes to its outage model.

[52] During storms with rainfall exceeding 0.75 inch in a consecutive 3-hour period, steam employees will actively monitor areas that are prone to flooding.

Emergency Response Training

Along with increased heat, rain, and flooding, the Company's preliminary review demonstrates an increase in the frequency of heat waves, extreme heat days, and days with heavy rain. The Company will include increased heat, rain, and flooding in future emergency response drills, including the increased frequency of these events. For example, a drill with back-to-back heat or rain events could improve the Company's ability to respond to rapidly occurring, distinct events.

Worker Safety Protocols

Background

Con Edison maintains specifications and procedures to protect worker safety, environment, and health. These range from overarching corporate environmental, health, and safety procedures to general environmental, health, and safety instructions, along with many others. For example, as a standard safety protocol, the Company provides and requires employees to wear fire-retardant (FR) clothing when working in areas with a potential for flame or electric arc. Once at a work location, workers review site-specific safety, environment, and health protocols. The requirements include weather-related worker safety protocols, including measures to avoid heat stress and exhaustion. Con Edison's heat stress and overheating protections are based on recommendations from the National Institute for Occupational Safety and Health (NIOSH).

Summary of Worker Safety Updates

- Con Edison will continue to participate in heat stress mitigation pilot studies and benchmarking efforts with peer utilities.
- Con Edison will monitor climate change for impacts on worker safety. The Company will evaluate whether additional heat stress protocols for climate change adaptation are warranted in 2022.

Con Edison has an annual heat stress training that is based on NIOSH guidelines and industry standard practices. Internal and external stakeholders receive heat stress advisory communications periodically and prior to forecasted heat waves. The Company focuses on job planning and execution to put effective controls are in place to keep Con Edison workers safe. The Company continuously monitors internal safety metrics, employee observations, field presence, and other indicators to determine how it can improve worker safety.

Climate Dependencies in Worker Safety Protocols

Con Edison employees work to provide reliable energy to our customers in virtually all types of weather conditions, including heat. A heat index quantifies the combined effect of air temperature and relative humidity. The Company uses the index to assess health risks for employees working in the heat. Although temperature is a key threshold, the humidity component affects how workers feel and how easily the human body can cool. The Occupational Safety and Health Administration (OSHA) defines the threshold between moderate and high heat index as 103°F. According to OSHA, a moderate risk level would be experienced between 91°F and 103°F. Table 11 shows relevant projections for increases in the heat index.

Climate projections show a potential increase in moderate heat stress risk levels as defined by the OSHA 91°F threshold.[53]

Table 11: Sample Heat Index Projections Relevant to Worker Safety Protocols

Variable	Location	Historical Baseline	2030s	2050s	2080s
Days per year with a heat index > 88°F	LaGuardia Airport	<1	4	11	30
	White Plains (Westchester County)	<1	2	6	17
Days per year with a heat index > 90°F	LaGuardia Airport	<1	2	5	19
	White Plains (Westchester County)	0	<1	3	11
Days per year with a heat index > 103°F	LaGuardia Airport	0	0	0	0
	White Plains (Westchester County)	0	0	0	0

Incorporating Climate Change into Worker Safety

Con Edison has evaluated its worker safety protocols and has determined that existing worker safety protocols and procedures are appropriate and effective for the near-term projections of climate change for the selected pathways. By including new climate projections for heat, precipitation, and sea level rise in future examinations of worker safety protocols, the Company plans, together with union safety leadership, to continue to develop procedures and provide equipment to employees to conduct operations safely. As data becomes available on other climate change impacts (e.g., wind impacts, extreme events), Con Edison will be including those new factors in its ongoing examination of worker safety protocols.

Additionally, Con Edison continues to place a priority on leveraging the latest research and technologies to adapt to climate change and promote worker health and safety and is contributing to several heat stress studies that will be the foundation for initiatives for future worker safety protocols.

[53] In addition to standard risks, such as heat stress, Con Edison is considering worker safety in the face of extreme climate-based events (e.g., a hurricane followed by a nor'easter, long-duration heat waves).

Next Steps

Con Edison recognizes that its recent efforts represent a significant step in planning for climate change impacts; however, it certainly is not the last step. The Company will continue its comprehensive and coordinated efforts on climate change resilience and has established the governance structure to do so. Moving forward, Con Edison will continue to learn more about climate change and monitor climate indicators, advance its adaptation work, and review new and emerging issues in the field. More specifically, some examples of the types of work Con Edison is planning for the next few years include:

- **Climate resilience strategy:** Con Edison is planning to develop a climate resilience strategy as part of its long-range plans to further specify investment needs and align its investment strategy with broader, long-range planning and storm resilience planning goals. The specifics of future resilience investments will be determined as part of its rate case filings before making its way into work plans. Moving forward, climate change impacts will be incorporated into the rate case white papers to provide justification for investments in resilience, as appropriate.
- **Storm resilience:** In addition to modifying plans and processes to account for gradual changes in climate, Con Edison's resilience framework includes investing in system hardening, capacity to absorb extreme event impacts, recovery capabilities, and advancing resilience efforts after storms (e.g., building back stronger). As described in Con Edison's Part 105 Report on Preparation and System Response to Tropical Storm Isaias, Con Edison is organizing discussions with stakeholders concerning undergrounding power lines and what actions state and local governments can take to help. Con Edison will continue to support its customers' resilience efforts through customer programs and the support of stakeholder applications for funding for resilience initiatives.
- **Specification, method, and resource updates:** In addition to the specific process and design updates outlined in this Summary of 2020 Activities, Con Edison continues to update specifications climate change could impact. These updates reference the Climate Change Planning and Design Guideline as the source of climate change projections for the Company. In addition, the Company will refine specific engineering and planning methods and resources (e.g., reliability planning, geographic information system resources for determining design flood elevations), as needed.
- **Climate science studies:** Con Edison will expand its understanding of climate change beyond the current pathways for precipitation, temperature, and sea level rise. The Company is exploring the need for additional studies into changes in wind impacts and deluge rain. As the Company saw during Tropical Storm Isaias, wind impacts are becoming

more severe and unpredictable. A better understanding of extreme events and their future behavior will help the Company prepare for storms and other emergencies, such as through improvement of the Company's storm response forecasting model.

- **Climate change monitoring:** Con Edison will annually review triggers identified in the "Climate Change Pathway Updates" section to determine whether it needs to update the climate change pathways. In addition, the Company will leverage data from new weather stations to monitor climate change and weather events in the service territory in support of decision making and adaptation efforts.
- **Continued change management:** Con Edison will continue to advance its change management efforts within the Company. For example, this may be accomplished through employee training and awareness, refinement of planning and implementation tools, quality control reviews of new projects to determine how the engineers have accounted for climate change, and so forth.
- **Long-range planning:** The Company will integrate climate change resilience considerations into the commodity long-range plans. Due to the long-time horizons in the plans, programs to invest in upgrading or retrofitting existing infrastructure to increase resilience may be identified. From there, the programs would make their way into rate cases and eventually work plans. Con Edison will also use the long-range plans to identify opportunities or conflicts among the various Company initiatives and climate change adaptation.
- **Coordination with external stakeholders:** Con Edison will continue to learn from, engage, and share with its peer utilities, state and regional entities studying climate change, and stakeholders in the working group. For example, as regional and state assessments of climate change become available, like those being conducted by New York Independent System Operator and NYSERDA, Con Edison will evaluate and leverage this information as it plans for and operates its system. In addition, Con Edison has limited authority to address certain vulnerabilities, such as the capacity of New York City's stormwater system, so coordination on adaptation investments is necessary.

Con Edison will meet with the working group twice in 2021 and 2022 to discuss progress on implementation of its plan and the areas above. These meetings will allow Con Edison to keep stakeholders apprised of the Company's adaptation and implementation efforts, and receive feedback.

conEdison

In Partnership with:

ICF