



# 2022 Amtrak Climate Resilience Strategic Plan

Amtrak's Northeast Corridor



Prepared by



# TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION	2
State of the Climate	2
Climate Adaptation Planning at Amtrak	3
PURPOSE OF THE PLAN AND UNDERSTANDING AMTRAK'S CLIMATE RISKS AND VULNERABILITIES	4
Purpose	4
Vision for Climate Adaptation	4
Summary of the Vulnerability Assessment Results	5
Planning Process	12
THE ACTION PLAN: MANAGING CLIMATE RISKS	13
Focus Area: People	14
Focus Area: Practices	18
Focus Area: Assets	22
EVALUATING RELEVANT CLIMATE REGULATIONS AND TRENDS	27
SUMMARIZING FUNDING DEPENDENCIES	29
ONGOING PLAN MAINTENANCE AND IMPLEMENTATION	30
CONCLUSION	30
APPENDIX A: ACKNOWLEDGEMENTS	31
APPENDIX B: ACRONYM LIST	32
APPENDIX C: SUMMARY OF PREVIOUS CLIMATE ACTIVITIES	33
APPENDIX D: NON-PRIORITIZED ACTIONS	35

## EXECUTIVE SUMMARY

Climate change is affecting weather patterns globally, resulting in extreme and abnormal events such as record-breaking heat waves, rapidly increasing sea level rise, increased occurrence and duration of drought, and more frequent and intense storms. Changes in the climate exacerbate existing threats and create new risks in communities across the country that are expected to increasingly disrupt critical services and damage infrastructure - including those at Amtrak.

Assets and operations across Amtrak's Northeast Corridor (NEC) are no exception to these weather disturbances. From 2006 to 2019, Amtrak experienced more than 450 disruptions from floods, wildfires, and landslides, among other climatic occurrences. These events tallied up more than \$127 million in lost revenue for Amtrak and resulted in lost ridership of 1.3 million customers. Severe weather disruptions are expected to increase in both frequency and severity, and based on historic totals, Amtrak estimates this increase is projected to cause a \$220 million revenue loss in the coming decade.

Amtrak has recognized the need to act. Since 2015, Amtrak has engaged in climate risk studies and resilience planning efforts along the NEC to understand the climate risks posed to Amtrak assets and potential adaptation options to reduce vulnerability. In 2021, Amtrak developed the following climate commitment to acknowledge the risks posed by current and future climate risks:

*In response to global climate conditions, Amtrak understands that we need to integrate climate change considerations into the current and future planning, design, and construction of our infrastructure and operations. By assessing our risk, understanding our vulnerabilities, and implementing adaptation measures, we will prepare our operations for a sustainable future. Furthermore, by minimizing our contribution to climate change through initiatives that reduce greenhouse gas (GHG) emissions and energy use, we aim to improve operational efficiency while lessening our contribution to climate change. Finally, we commit to working in partnership with key stakeholders to emphasize the energy efficiency of rail as a transport mode and to demonstrate how improving and expanding passenger rail service can be an essential part of the solution to climate change.*

Now, with direction from the Amtrak Board of Directors, this Climate Resilience Strategic Plan has been developed to set a strategy for reducing climate impacts along the NEC. This plan is designed to be actionable, and puts forth select, priority actions.

Climate resilience actions were developed and prioritized using input from a strategic planning team, cross-departmental roundtable discussions, and interviews with key employees. Each action was categorized under one of the plan's three strategic focus areas: People, Practices, and Assets.

Three actions from each focus area were chosen for prioritization beginning in FY2022 and implementation over the next three years. Additional actions were also identified. Every action is assigned to a specific "lead" department to drive accountability and increase the likelihood of implementation. Priority actions are described in the Action Plan section and are summarized in the table on page 13.

Ever-changing regulations, market trends, and funding opportunities will influence the implementation of climate adaptation measures; therefore, this plan is intended to be a living document by evolving to meet the demands of internal and external changes. Regular reviews, updates, and maintenance will foster continued engagement and implementation as Amtrak's climate needs and goals progress.



# INTRODUCTION

## STATE OF THE CLIMATE

Weather disruptions due to climate change are quickly accelerating, causing widespread impacts to the environment, economy, and population patterns. According to the International Panel on Climate Change (IPCC), global surface temperature was 2.0°F higher (converted to °F throughout this plan) in 2011-2020 than in 1850-1900. Notably, global surface temperature rose faster during the last 50 years than any other 50-year period over the last 2,000 years, and global mean sea level has risen faster since 1900 than during any preceding century over the last 3,000 years.<sup>1</sup>

Global surface temperature is anticipated to increase until at least mid-century under all emissions scenarios<sup>2</sup>, with warming expected to exceed 2.7°F during this century. With every increment of warming (e.g., approximately 1°F), increases in climate extremes, including heat waves, droughts, and heavy precipitation, become more pronounced. For example, an extreme heat event that history occurred once per decade would happen four times a decade at 2.7°F of warming, and six times a decade at 3.6°F of warming. Further, 2.7°F of warming would destroy at least 70% of coral reefs, but 3.6°F of warming would destroy 99%.<sup>3</sup>

Increased warming impacts regions across the globe in different ways. In the U.S., changes in temperature and precipitation patterns have been observed and are expected to continue, including:

- **Temperature:** Annual average temperature in the U.S. increased by 1.3°F between 1986–2016 relative to 1901–1960. Increases of about 2.5°F are projected for the period 2021–2050 relative to 1976–2005 in all GHG emissions scenarios. Larger temperature increases are projected by late century with 2.9°– 7.4°F in a lower scenario and 5.8°– 11.9°F in the higher scenario. Current global emissions trends are tracking along the highest GHG emissions scenario used by climate scientists. As a result, heat waves have and will continue to become more frequent and intense, and years with record-setting temperatures may be the norm, rather than the exception, in the coming decades.<sup>4</sup>
- **Precipitation:** Heavy precipitation events in most parts of the U.S. have increased in intensity and frequency since 1901 and are projected to continually increase throughout the century. Projections indicate large declines in snowpack in the western U.S. and shifts to more precipitation falling as rain than snow in the cold season in many parts of the central and eastern U.S. Total precipitation amounts and seasonal differences in precipitation will vary across regions and even micro-locations. Certain precipitation trends, such as increased frequency and intensity of heavy rainfall events, may cause damage or impede access to roads and track due to flooding.

In addition to changes in temperature and precipitation, increased warming interferes with global climate systems to exacerbate other climate stressors, such as hurricanes and sea level rise.

Amtrak continues to experience the impacts of worsening climatic conditions. As previously noted, in the last 13 years hundreds of weather events have caused impacts to assets, operations, ridership, and revenue. Weather disruptions are expected to increase in both frequency and severity, and based on historic totals, Amtrak projects an additional \$220 million in losses in the coming decade. Examples of how these events have impacted Amtrak include:

- Corroded rail and service disruption due to sea level rise;
- Flooded buildings, tunnels, substations, electric traction (ET) equipment and other infrastructure due to extreme precipitation; and,
- Increased workforce health and safety incidents, track buckling, and slow orders due to extreme heat.

<sup>1</sup>IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R.

<sup>2</sup>Climate scientists review a range of GHG emission scenarios to model future climate projections.

Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)). In Press.

<sup>3</sup>Future climate projections carry uncertainty associated with climate models, as well as uncertainties around future global GHG concentrations, which will impact potential outcomes. Deep reductions in GHG emissions would need to occur in the coming decades to not exceed 2°C of warming by the of the century (Source: IPCC, 2021).

<sup>4</sup>Estimated losses include losses due to revenue and ridership and are not inclusive of operational losses. Projections are based on past losses, meaning while these losses are anticipated, they may be incurred through numerous small events or larger events (e.g., Superstorm Sandy).

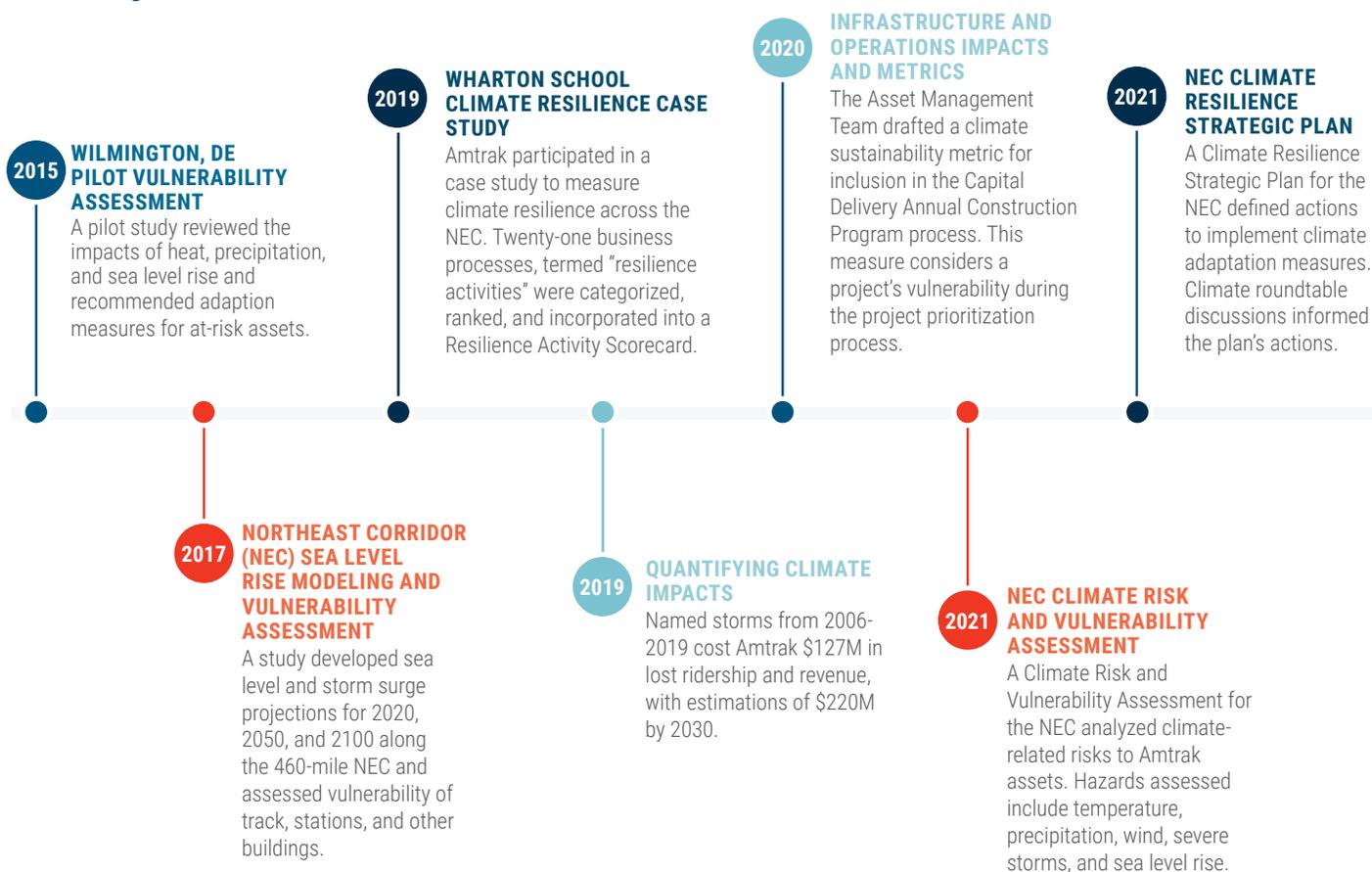


Image captured Pre-Covid-19

## CLIMATE ADAPTATION PLANNING AT AMTRAK

As noted in the Executive Summary, Amtrak has undergone climate vulnerability studies. The timeline below shows a summary of these efforts to date with more detail in Appendix C, followed by the climate commitment statement.

# Amtrak's Climate Journey and Future



Amtrak developed the following climate commitment to acknowledge the risks posed by current and future climate stressors:

*In response to global climate conditions, Amtrak understands that we need to integrate climate change considerations into the current and future planning, design, and construction of our infrastructure and operations. By assessing our risk, understanding our vulnerabilities, and implementing adaptation measures, we will prepare our operations for a sustainable future. Furthermore, by minimizing our contribution to climate change through initiatives that reduce (GHG) emissions and energy use, we aim to improve operational efficiency while lessening our contribution to climate change. Finally, we commit to working in partnership with key stakeholders to emphasize the energy efficiency of rail as a transport mode and to demonstrate how improving and expanding passenger rail service can be an essential part of the solution to climate change.*

Now, with direction from the Amtrak Board of Directors, two major efforts are underway: the Climate Resilience Strategic Plan and the Net Zero Emissions Plan.

**Climate Resilience Strategic Plan:** Climate change adaptation is the process of adjusting to current and projected climate impacts by taking actions to reduce risks from changed and changing conditions. The focus of this plan, set forth in the following sections, is on climate change adaptation for the NEC: setting a strategy to reduce the impacts of climate change to Amtrak.

**Net Zero Emissions Plan:** Climate change mitigation is the reduction of one's contribution to global climate change by reducing GHG emissions. Parallel to the development of the Climate Resilience Strategic Plan, Amtrak is developing a GHG mitigation plan across the organization.

### Climate Definitions

**Climate resilience:** Ability to prepare for and adapt to changing climate conditions, including the ability to withstand, respond to, and recover rapidly from disruptions (Source: US Department of Housing and Urban Development).

**Climate adaptation:** The process of adjusting to actual or expected climate and its impacts (Source: IPCC).

**Climate change mitigation:** Measures taken to reduce or stabilize the levels of GHGs in the atmosphere, typically through reduction of heat-trapping GHG emissions (Source: National Aeronautics and Space Administration).

## PURPOSE OF THE PLAN AND UNDERSTANDING AMTRAK'S CLIMATE RISKS AND VULNERABILITIES

### PURPOSE

Amtrak's mission is to deliver high quality, safe, and on-time passenger rail service that exceeds customer expectations. Impacts from climate change create and exacerbate risk to Amtrak's operations and assets. Without adaptation, impacts from these risks may hinder the ability to fulfill Amtrak's mission, now and into the future.

To fulfill Amtrak's mission statement and climate commitment, this Climate Resilience Strategic Plan was developed to set a pathway for integrating climate resiliency and adaptation measures across Amtrak's functions along the NEC. This plan is designed to be actionable, and it presents priority actions to be accomplished in the next three years.

### VISION FOR CLIMATE ADAPTATION

Amtrak's vision is to become an industry leader in climate adaptation by substantially reducing climate-related losses, disruptions, and health and safety impacts while systematically implementing resiliency into business-wide operations. To achieve this vision, Amtrak will integrate climate adaptation measures, or actions, into three areas identified during the planning process — People, Practices, and Assets. The vision is aligned to Amtrak's Core Values to Excel Together, Put Customers First, and Do the Right Thing.



#### PEOPLE

Empower and educate Amtrak staff and partners to build a culture of climate resilience.



#### PRACTICES

Amend, develop, and transform business practices to reduce the impacts of climate change including but not limited to: operations, policies, capital planning, and design standards.



#### ASSETS

Adapt existing assets and mindfully design new infrastructure to reduce the impacts of a changed climate.



## PLANNING PROCESS

In FY2021, Amtrak hired Stantec, a consulting firm with climate expertise, to assist in developing this plan and VA. This effort was led by the Sustainability and Climate Group within the Safety & Security Department. Developing this plan included co-facilitation of cross-departmental roundtable discussions, staff interviews, and drafting the plan.

Climate roundtable discussions were organized to evaluate opportunities for climate resilience integration into departmental workflows and processes. Twenty-five participants representing ten different departments, including but not limited to Emergency Preparedness, Risk Management, Finance, Capital Delivery, and Planning made up these roundtable groups. See Appendix A for a full list of roundtable participants. Roundtables were also leveraged to collect data needed for the VA. The roundtables were set up into three topics:

- Identifying Vulnerable Assets;
- Project Scope, Workflow and Processes; and,
- Capital Funding.

Over the course of four months, Amtrak convened eight meetings with the Identifying Vulnerable Assets and Project Scope, Workflow and Processes groups and held one meeting with the Capital Funding group. In addition, over a dozen staff interviews were conducted to dive deeper into specific topics. The purposes of these meetings were to:

- Understand what actions various departments were taking to mitigate climate risks;
- Collect salient data points, replacement values, and operating thresholds for the development of the vulnerability assessment; and,
- Explore opportunities for climate integration into existing and new business processes.

Examples of actions discussed during roundtables include:

- Several design specifications should be updated to reflect future conditions (and reduce impacts) related to soil compaction, culvert design, and slope stabilization in Amtrak's Engineering and Design standards.
- GIS files on climate projections for heat, wind, flooding, and precipitation should be included in bid packages when Amtrak designs new infrastructure and stations.
- Capital projects should be entered into a portal for tracking and review by Finance. The portal should be used to collect climate-related project information, including information about how proposed solutions will mitigate climate risk.

Ideas generated in these meetings have shaped the actions, recommendations, and lessons learned within this Climate Resilience Strategic Plan.

## SUMMARY OF THE VULNERABILITY ASSESSMENT RESULTS

Understanding climate risk and vulnerability across the NEC is a necessity for identifying and prioritizing climate adaptation actions. The Climate Vulnerability Assessment (VA) was developed to inform development of Amtrak's Climate Resilience Strategic Plan. The VA was developed specific to the NEC, as Amtrak is the owner of most assets within the corridor. The Harrisburg Line and a segment of the Hudson Line were also included. The VA study area is shown in Figure 1 below. Assets considered essential to operations were selected for inclusion in the VA such as: rail, buildings (including stations), tunnels, substations, catenary systems, and signals.<sup>5</sup> Four climate stressors<sup>6</sup>, which are climate variability conditions or trends that exacerbate hazards, were included in the VA.<sup>7</sup> These climate stressors include:

- sea level rise, including storm surge;
- precipitation;
- temperature; and
- wind.

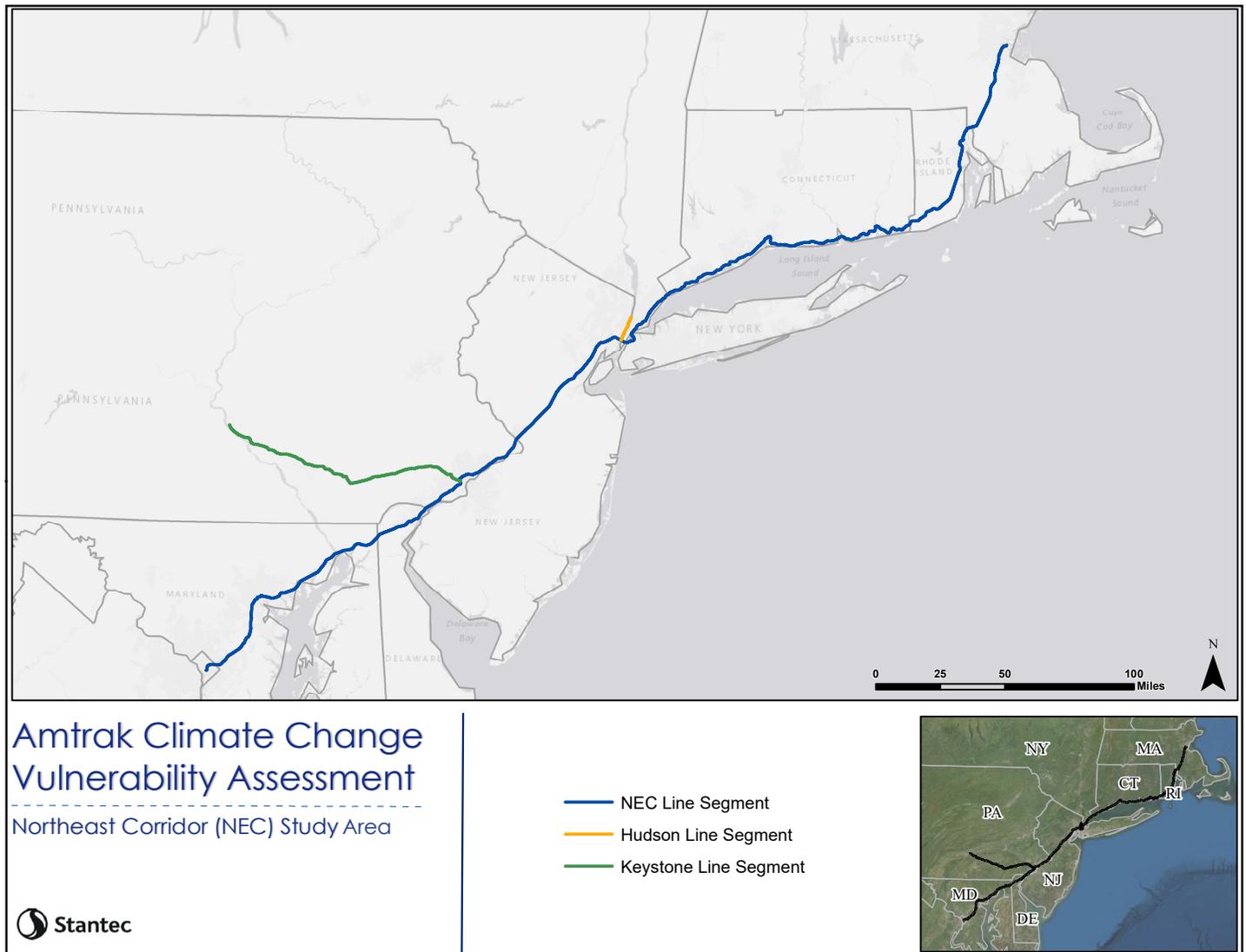


Figure 1. NEC VA Study Area

<sup>5</sup>The assets assessed may be expanded in future vulnerability studies.

<sup>6</sup>Hurricanes and tropical storms also impact the NEC. Understanding of trends and changes in hurricane and tropical storm behavior are difficult to establish due to the lack of a long-term dataset for event occurrences and analysis. It is believed that under a warming climate, it is likely that cyclone wind speeds and precipitation rates will increase while the overall frequency of tropical cyclones is much more unclear. See the VA Report for more information.

<sup>7</sup>U.S. Climate Resiliency Toolkit. Glossary. Retrieved from [Glossary | U.S. Climate Resilience Toolkit](#)

The four stressors evaluated in the VA were selected considering previous efforts, available data, and imminent threats to Amtrak operations, which are projected to worsen in coming years. The VA utilized an exposure, sensitivity, and adaptive capacity analysis that resulted in asset-level vulnerability scoring for each stressor. This information is intended to enable decision makers, project managers, and engineers to evaluate and understand climate vulnerability in conjunction with asset lifespan and operational considerations. Further, asset-level vulnerability scoring allows Amtrak to address climate vulnerabilities through capital improvement projects, state-of-good repairs, business practices, and long-term planning, as detailed through actions presented in the Action Plan section of this plan.

Amtrak set the VA planning horizons to 2050 and 2100, while accounting for asset lifespan and vulnerability. Two emissions scenarios, or representative concentration pathways (RCPs), were utilized in the VA to develop projections for climate stressors: RCP4.5, the “intermediate emissions” scenario, and RCP8.5, the “business as usual” high emission scenario. Current GHG emissions trends are on track to follow the RCP8.5 high emissions scenario.

### What are RCPs?

**Representative Concentration Pathways (RCPs)** are pathways, or scenarios, used by the climate modelling community for GHG concentrations in the atmosphere. RCPs are characterized by the radiative forcing produced by 2100. Radiative forcing is the extra heat the atmosphere will retain as a result of additional GHGs. There are four RCPs:

**RCP8.5:** High Emissions Scenario, GHG concentrations are still rising by 2100

**RCP6:** GHG concentrations stabilize after 2100 (higher emissions than RCP4.5)

**RCP4.5:** GHG concentrations stabilize after 2100 (lower emissions than RCP6)

**RCP2.6:** GHG concentrations peak before 2100, then decline





↑ .1 to 19 ft by 2100

**Sea Level Rise:** According to the U.S. Climate Resiliency Toolkit, over the past three decades, the coastline extending from Massachusetts to Virginia has experienced a sea level rise increase of 0.08 to 0.14 inches per year, more than three times the global average. By the year 2100, sea level rise (with storm surge) depths along the NEC are projected to vary from 0.1 to 19 feet.



↑ 5-9°F by 2100

**Temperature:** The annual average temperature across the NEC has increased by nearly 1.5°F in the last 50 years. Projected changes for the NEC range between 4 to 5°F for the year 2050 and 5 to 9°F for 2100, dependent on greenhouse gas emissions scenarios and their respective climate impact.



↑ 57 -110 mph by 2100

**Wind:** Increases to wind speed for RCP4.5 were 10% and 15% for the 2050 and 2100 time horizons, respectively. Similarly, wind speed increases for RCP8.5 were 10% and 20% for the 2050 and 2100 time horizons, respectively. Further, 100-year peak wind gusts within the NEC are projected to range from approximately 57 to 110 mph for the year 2100 under RCP8.5



↑ 5 -15% by 2100

**Precipitation:** Annual total precipitation amounts in the NEC have increased by 5 to 15% when compared to the first half of the last century. A similar rate of increase is anticipated by the mid-21st century, which includes increases in the frequency and intensity of extreme precipitation events.

### Climate Trends along the NEC

The VA provided detailed results to identify asset-level and geographic-level (e.g., hot spots) vulnerability to the four climate stressors. Key takeaways for each stressor are presented below, along with maps showing vulnerability for the high emissions scenario in the year 2100<sup>8</sup>. Detailed information regarding the VA, such as the VA methodology and results, can be referenced in the VA Summary Report.



<sup>8</sup>Results for additional scenarios and/or timescales are available from the Asset Management Group



**VA Results: Sea Level Rise**

- Track showed the highest vulnerability to sea level rise, particularly in “hot spot” locations.
- Wilmington, DE, New York City, New Haven, CT, New London, CT, Providence, RI, and Boston, MA were notable vulnerability hot spots for increased sea level rise. Figure 2, below, shows track vulnerability to sea level rise in New York City, one of the identified hot spots.

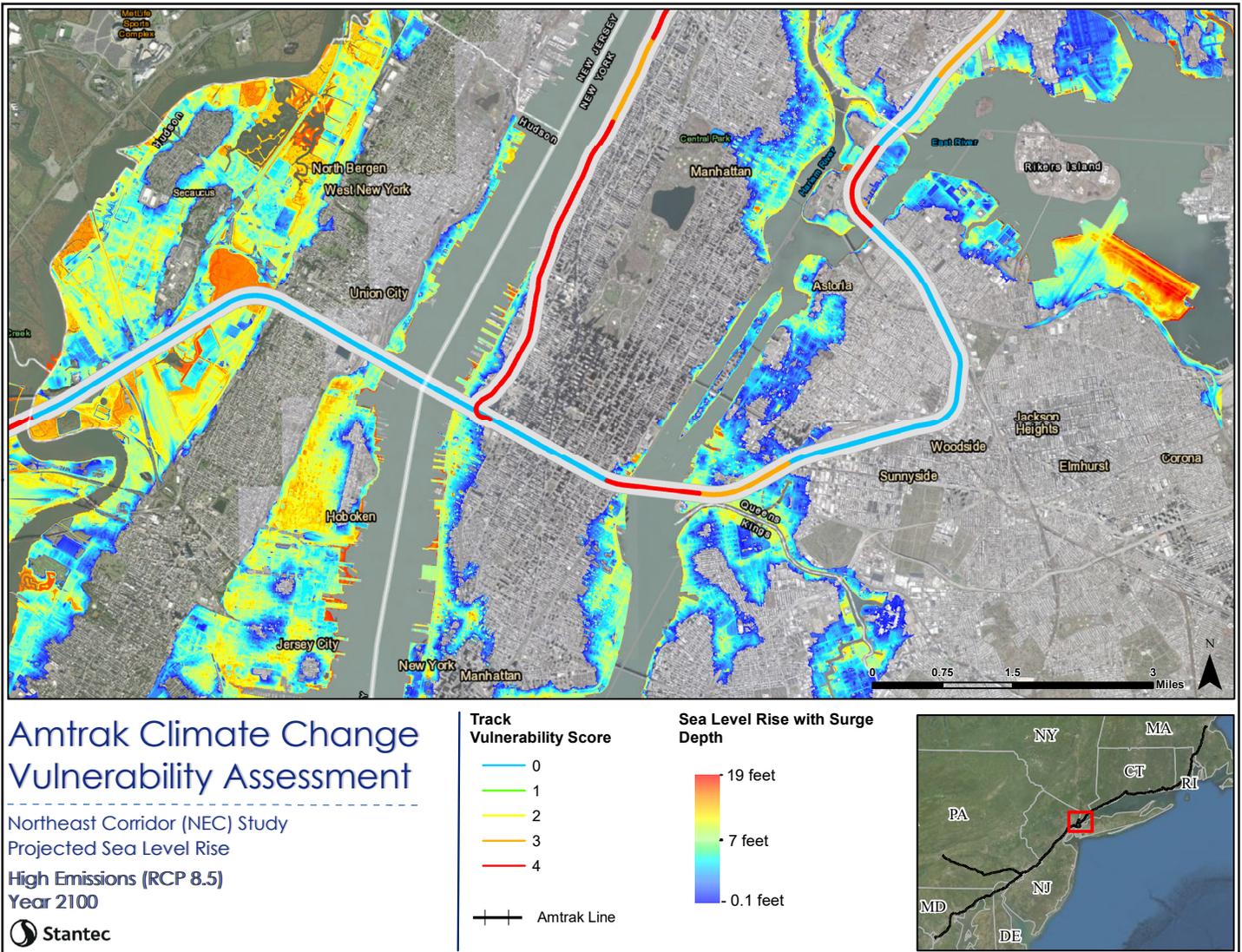


Figure 2. Amtrak Track Vulnerability to Sea Level Rise in New York City, Year 2100 (High Emissions Scenario, RCP8.5, from the VA)



**VA Results: Heat**

- Catenary scored highest for extreme heat vulnerability across all scenarios when compared with other assets. Vulnerability was highest in areas south of New York where there is not a tension system in place to prevent sagging or tightening of lines during temperature changes. These areas are shown in Figure 3, below.
- Other assets with elevated vulnerability to extreme heat were signals' instrument houses, particularly under the high emissions scenario, as well as track where there is limited tree cover to provide shade (assumed to be areas outside of the New England Division and Lancaster, PA to Harrisburg, PA).
- New York City was a notable vulnerability "hot spot" for increased change in temperature.

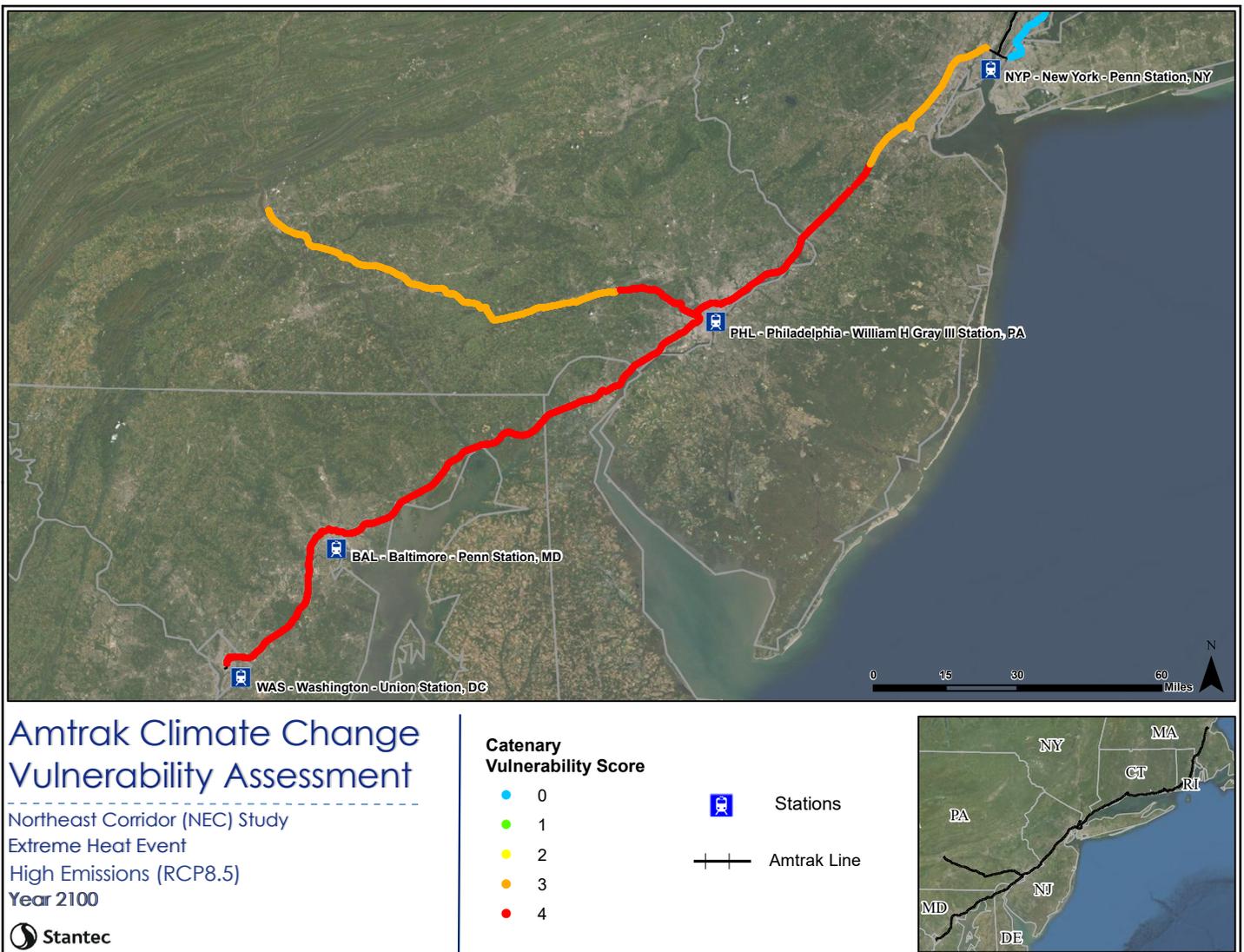


Figure 3. Amtrak Catenary Vulnerability to Extreme Heat from Washington, DC to New York City Year 2100 (High Emissions Scenario, RCP8.5, from the VA)



**VA Results: Precipitation**

- Track and interlockings scored highest for vulnerability to precipitation events across all scenarios when compared to other asset categories. Vulnerability scores for interlockings across the NEC are presented in Figure 4, below.
- Buildings had low vulnerability across all scenarios though this may be a result of data limitation (limited building characteristic data) and higher ability to mitigate risk (i.e., adaptive capacity) with temporary and permanent measures.
- New York City was a notable vulnerability “hot spot” for increased precipitation.

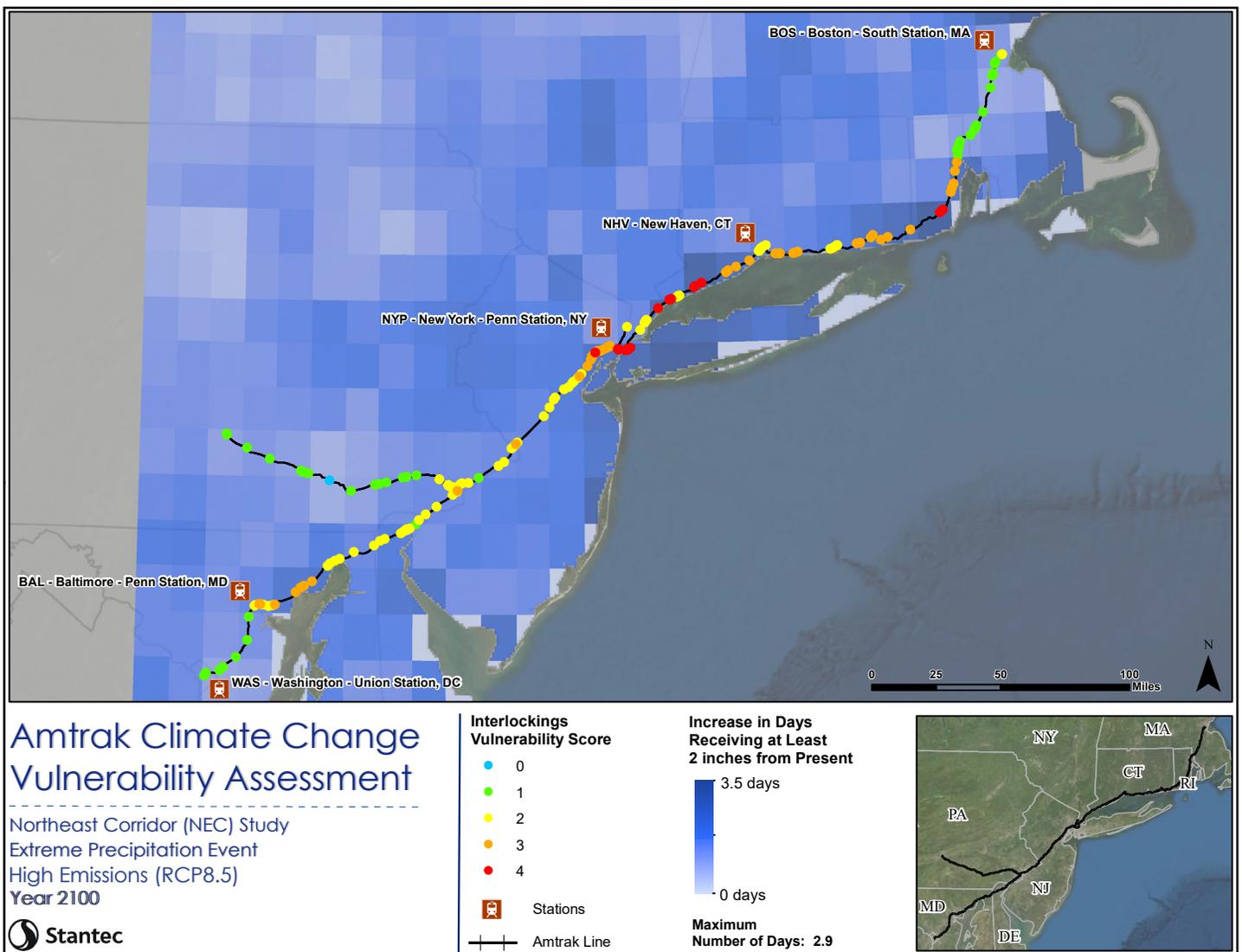


Figure 4. Amtrak Interlockings Vulnerability to Extreme Precipitation Year 2100 (High Emissions Scenario, RCP8.5, from the VA)



**VA Results: Wind**

- Vulnerability to wind was consistent across asset types, though known asset data limitations (e.g., age, condition) may skew results.
- Boston, MA to Philadelphia, PA were notable vulnerability “hot spots” for increased wind when compared with the more southern portions of the corridor. Vulnerability to wind within this area is presented in Figure 5, below.

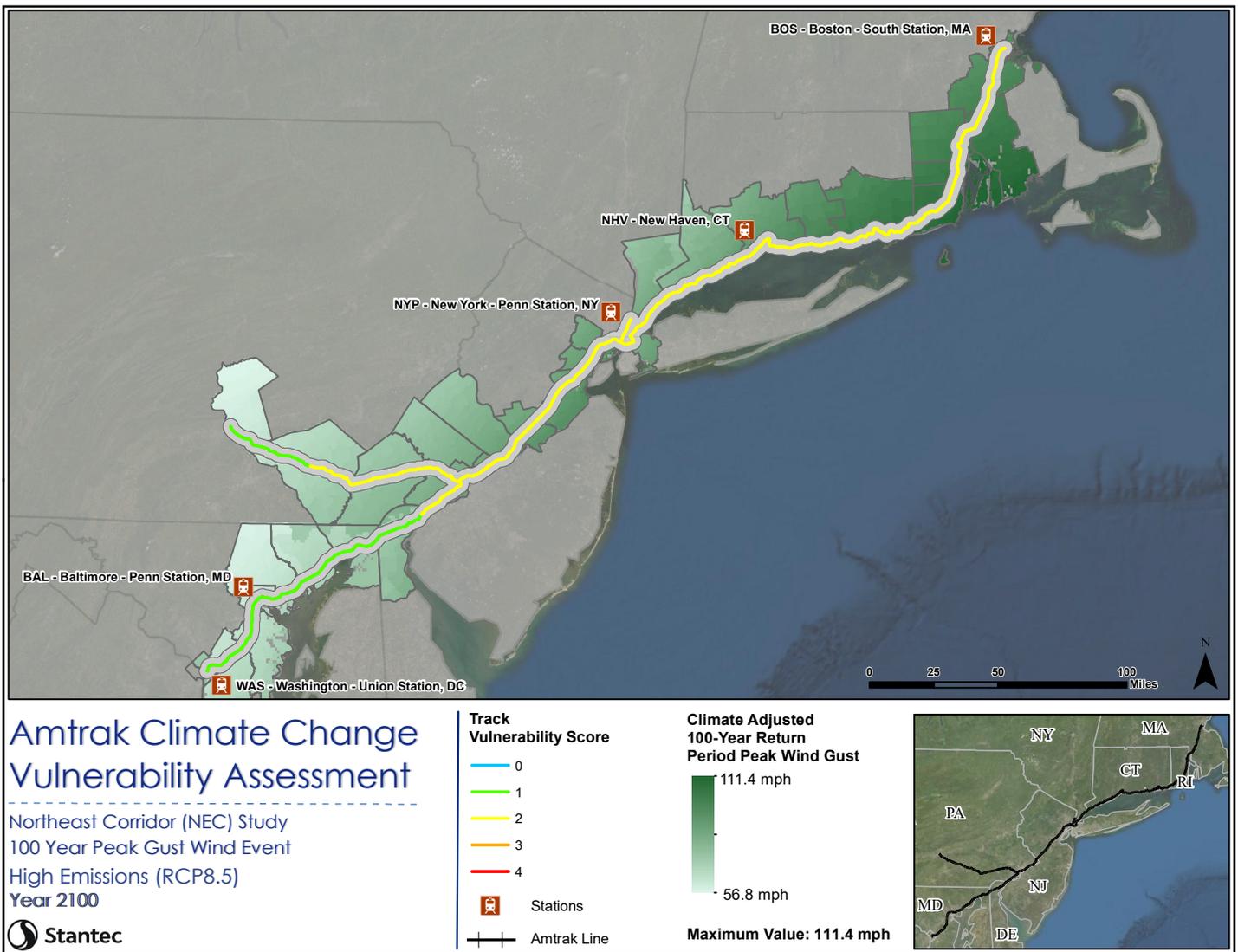


Figure 5. Amtrak Vulnerability to Wind Gusts from Philadelphia to Boston Year 2100 ( High Emissions Scenario, RCP8.5, from the VA)

# THE ACTION PLAN: MANAGING CLIMATE RISKS

Climate resilience actions were developed and prioritized using input from the strategic planning team, roundtable discussions, and interviews with key employees. Each action was categorized under one of the plan's three strategic focus areas: People, Practices, and Assets (as described in the Vision section). Three actions from each focus area were chosen for prioritization in FY2023 and implementation over the next three years. Additional actions were also identified, though not for immediate implementation. These non-prioritized actions are listed in Appendix D and will be evaluated for implementation by the end of FY2023. A total of 29 actions were developed, which collectively make up the Action Plan.

Throughout the planning process, opportunities for integrating climate resilience into workflows were identified. These opportunities are presented in the sections below by focus area as "Lessons Learned." Lessons Learned for each focus area are followed by prioritized climate resilience actions.

It should be noted that this plan, including the actions within, is a living document. The actions presented are specific to the 2021 Climate Resilience Strategic Plan. The Sustainability and Climate Group will lead future plan updates as actions are implemented and new ones are discovered. See the Ongoing Plan Maintenance and Implementation section for more information related to implementation processes and planned updates.

The table below presents a summary of prioritized actions with additional details.

Priority Action Name	Focus Area	Page Number
1. Increase the availability of Climate Subject Matter Experts (SMEs) across the organization through new hires.	People 	15
2. Develop a climate task force to spearhead climate resilience efforts.	People 	16
3. Hold a climate and sustainability town hall meeting.	People 	17
4. Update Engineering specifications and practices to include design standards that boost resiliency.	Practices 	19
5. Integrate climate resilience planning efforts into planning efforts led by the Executive Leadership Team.	Practices 	20
6. Develop a mechanism to geotag climate hazard events.	Practices 	21
7. Utilize climate stressor data to develop climate resilience targets for assets.	Assets 	23
8. Develop criteria for prioritizing asset upgrades, relocation, and adaptation measures.	Assets 	24
9. Develop resiliency targets for all real estate, stations and facilities served by Amtrak, and integrate into building design standards.	Assets 	25

## Action Key

The following is a key for information presented for prioritized actions.

Action statement and background information	Action type(s):	Lead department	Benefits	Estimated Cost
	Capital Planning	<b>Supporting departments and groups</b>	Direct Losses Avoided 	 up to \$50,000
	Communications		Environment 	  \$50,001 - \$500,000
	Design Standards		External Partners 	   \$500,001 - \$10M
	Operations		Operations 	    greater than \$10M
	Policy		People 	
			Reputation 	

## FOCUS AREA: PEOPLE

People at Amtrak include all employees, including those in the field, project managers, operations and maintenance personnel, the Executive Leadership Team, and the Board, as well external partners such as vendors, those occupying Amtrak property, and those managing host rail utilized by Amtrak. People-focused actions aim to empower and educate Amtrak staff and partners to build a culture of climate resilience.

### Roundtable Discussions: Lessons Learned

#### Increase Internal Buy-In and Culture of Climate Adaptation

Internal adoption and accountability are critical for climate adaptation strategies to be successful. Currently, opportunities exist for Amtrak executive and departmental leadership to integrate climate adaptation solutions, resulting in untapped potential to build a culture of climate resilience. For example, climate adaptation considerations could be integrated into core strategic planning efforts across the company including the annual operating plans and budgets or five-year departmental plans. Support for climate adaptation within these plans would establish an expectation to account for climate impacts related to fleet, infrastructure, operations, financial, and strategic business plans. A resilience culture that extends from the top down (Board to Executive Leadership Team to management) and across the organization (throughout the workforce) is necessary for climate initiatives to be successful. Without directives and accountability from executive leadership and senior management, the culture shift will be slow and sporadic.

While the implications are not yet realized, the absence of priority on resilience may result in cascading impacts such as the ability to attract top talent, reputational risks amongst customers, and limited access to financing.



#### Grow Climate Literacy in Our Workforce and Close the Climate Resilience Knowledge Gap

It was acknowledged during project roundtables that additional expertise and knowledge in climate science and adaptation is needed amongst Amtrak staff. Expanding climate resilience capacities and capabilities within the Amtrak workforce is necessary to develop climate resistant design and scopes of work, review project proposals, screen and interview potential new candidates, and track changing climate trends and vulnerabilities.

A climate adaptation knowledge gap amongst current Amtrak employees will impact how effectively new climate adaptation practices and policies are implemented. Without understanding why adaption practices are in place or how to implement them, employees are less empowered to successfully integrate climate solutions. Employees in the field may not have an adequate understanding of how to leverage climate data or collect impact data. A knowledge gap may also hinder effective communication in making adaptation decisions, communicating needs, selecting capable vendors, and developing projects with climate considerations. Training existing staff or adding in processes to ensure climate considerations are implemented into operations can help close the climate resilience knowledge gap.

#### Political Support for Adaptation Measures and Regulations Requiring Climate Adaptation Spur Action

Political support, including incentives (i.e., funding) and regulatory requirements for climate adaptation, play a significant role in the implementation of climate adaptation measures. Likewise, a lack of political support, at either the Federal or state levels, can diminish climate adaption progress. If adaptation is not required, justifying adaptation measures becomes more challenging, especially if combined with limited internal accountability and culture change. Frequent rotations in state and/or Federal level administrations and legislative bodies and conflicting political pressures (e.g., lobbying interests) also present inconsistencies in support for climate adaptation over time. More information regarding regulatory requirements for climate resilience can be found in the Evaluating Relevant Climate Regulations and Trends section.



## 1

**INCREASE THE AVAILABILITY OF CLIMATE SUBJECT MATTER EXPERTS (SMES) ACROSS THE ORGANIZATION THROUGH NEW HIRES.**

Human Resources, with assistance from the Sustainability & Climate Group, will develop position descriptions for climate specialists and augment existing position descriptions to reflect desired qualifications for resiliency and climate adaptation skillsets.

Opportunities to increase climate science and adaptation expertise within its workforce would allow Amtrak to successfully implement climate adaptation practices and policies. Expanding climate resilience capacity (e.g., through climate SMEs and climate specialists) is necessary for a range of functions such as: developing climate resilient designs and scopes of work, reviewing project proposals, screening vendors, and tracking climate trends and vulnerabilities.

While hiring managers may recognize the need to hire candidates with climate expertise, they may not have the climate proficiency to effectively describe desired climate skills within new hire position descriptions or evaluate strategic hires for these skills.

This action has been prioritized for this fiscal year (FY2022), amid growing support for climate adaptation and an anticipated increase in opportunities to fund positions.

As the department in charge of hiring processes at Amtrak, this effort should be led by Human Resources. The Sustainability & Climate Group, which leads corporate efforts to advance climate adaptation, will support Human Resources. The Sustainability & Climate Group is not resourced to meet all climate expertise needs across departments, which require specific skillsets (e.g., design of projects for future conditions); therefore two approaches are outlined to support this action:

**Approach 1:** Hire climate specialists within technical departments such as Capital Delivery (Structures, Facilities, Track). Climate specialists will be a full-time dedicated employee hired to review projects and advance climate considerations within Capital Delivery projects or other identified technical areas.

**Approach 2:** Hire talent with knowledge of and experience addressing climate change. These climate generalists will add capacity throughout various disciplines across the company.

Employee training opportunities were identified as another method to enhance Amtrak's climate knowledge base; climate trainings are addressed through Action 10.

**BENEFITS:**

-  Operations
-  Reputation
-  People

**ESTIMATED COST:****TIMELINE:**

FY2022

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

Human Resources

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group  
Key Departments: Capital Delivery, Procurement, others as appropriate

**STEPS:**

1. Human Resources works with the Sustainability & Climate Group to identify departments that should have a dedicated climate specialist(s) and develops climate specialist position descriptions specific to each department (Approach 1).
2. Human Resources works with the Sustainability & Climate Group to augment existing position descriptions to reflect desired qualifications in climate knowledge (Approach 2).
3. The Sustainability & Climate Group supports hiring manager for interviews of strategic hires.

**MEASURING SUCCESS:**

- Position descriptions are developed for climate specialists specific to a department.
- Each identified department successfully hires a climate specialist.
- Climate expertise is integrated in key departments thereby increasing Amtrak's overall climate capabilities.

## 2

## DEVELOP A CLIMATE TASK FORCE TO SPEARHEAD CLIMATE RESILIENCE EFFORTS.

A climate task force will be developed to promote and advance climate efforts across Amtrak. Members will be tasked with spearheading climate resilience initiatives and progress reporting for their respective department or group.

As Amtrak increases its climate expertise capacity, a formal mechanism will be developed to organize department-level and organization-wide climate efforts. Given alignment with ESMS Steering Committee, a specific climate task force will be initiated.

This task force will be responsible for promoting implementation of climate resilience actions, tracking action progress, and identifying new actions and climate resilience needs as they arise. Such governance mechanisms are essential to the success of the climate resilience strategic plan.

As the department leading corporate efforts to advance climate adaptation, the Sustainability and Climate Group will lead this effort to form the climate task force. Members would be identified from each department for representation, such as new climate specialist and generalist hires. Individual task force members will be tasked with leading the implementation of climate resilience actions for which their department or group is identified as the "Lead Department" within this strategic plan.

### ACTION TYPE:

Policy, Communications

### LEAD DEPARTMENT:

Strategy & Planning - Sustainability & Climate Group

### SUPPORTING DEPARTMENTS:

Key Departments: Capital Delivery, Strategy and Planning, Government Affairs, Executive Leadership, Procurement, others as appropriate

### STEPS:

1. The Sustainability & Climate Oversight Committee approves the development of the task force and identifies key personnel to represent their department.
2. The Sustainability & Climate Group develops a task force charter to clarify purpose, roles, and responsibilities, including meeting cadence (e.g., engaging staff, leading implementation of adaptation measures, tracking and reporting progress, and identifying departmental roadblocks and resource needs).
3. The climate task force meets at a determined frequency

### BENEFITS:

 Operations

 Direct Losses Avoided

### ESTIMATED COST:

**TIMELINE:**  
FY2022

throughout the year.

4. Climate task force membership is reviewed annually to consider changes (i.e., new staff and staff turnover) and time commitments to ensure key departments are properly represented and engaged.

### MEASURING SUCCESS:

- Required approval to form the task force are obtained.
- A climate task force member has been identified from each key department or group and task force has been formed.
- Climate task force meets regularly, with members engaged and fulfilling roles and responsibilities.
- Climate task force progress reports are shared at the quarterly Sustainability & Climate Oversight Committee meetings.

## 3

**HOLD A CLIMATE AND SUSTAINABILITY TOWN HALL MEETING.**

The Sustainability & Climate Group will plan and facilitate an annual Climate & Sustainability Town Hall Meeting. The initial event will kick off the Climate Resilience Strategic Plan, while subsequent annual Town Halls will showcase current and upcoming climate and sustainability efforts at Amtrak. All staff will be invited to a virtual session.

A Climate & Sustainability Town Hall meeting will serve as an information forum for Amtrak employees. The initial Town Hall will kick off the Climate Resilience Strategic Plan. Subsequent, annual events may be in-person or virtual but maintain a voluntary, all employee informational component. Hosting an “all-hands” event gives employees not typically involved in climate and sustainability efforts an opportunity to learn more about ongoing climate efforts, including the priority actions with the Climate Resilience Strategic Plan. The Town Hall events should be coordinated around Earth Day (April), UN Climate Week (late October/November), or COP meetings (November).

**ACTION TYPE:**

Communications

**LEAD DEPARTMENT:**

Strategy & Planning - Sustainability & Climate Group

**SUPPORTING DEPARTMENTS:**

Communications

**STEPS:**

1. The Sustainability & Climate Group works with Corporate Communications to schedule a Town Hall meeting (e.g., date, time, virtual and in-person options, announcement language).
2. The Sustainability & Climate Group plans a Town Hall meeting content (e.g., presentation, speakers, activities).
3. Corporate Communications distributes Town Hall meeting invites and markets the event internally (including an email flyer to all Employee Resource Groups [Notch 8, etc.]).
4. The Town Hall meeting is held.

**MEASURING SUCCESS:**

- Annual Town Hall meeting is held.
- Amtrak receives questions from employees afterward, related to these topics.

**BENEFITS:**

-  People
-  Operations

**ESTIMATED COST:****TIMELINE:**

FY2022

## FOCUS AREA: PRACTICES

Practices at Amtrak are the business and operational procedures, policies, plans, funding mechanisms, and institutional knowledge that guide workflows at Amtrak. Practice-focused actions aim to amend, develop, and transform business practices to reduce climate impacts including but not limited to operations, policies, capital planning, and design standards.

### Roundtable Discussions: Lessons Learned

#### Update Existing Design Standards with Future Climate in Mind

Existing Amtrak design standards, such as those in engineering practices or specifications, do not directly address climate risk reduction and resilience. Amtrak typically operates by meeting standards defined by local, state, or Federal entities, such as the US Army Corps of Engineers or local floodplain management ordinances, which often do not include requirements for climate adaptation. Without inclusion of future conditions into design standards, opportunities to incorporate climate risk reduction solutions may be cut from projects or passed over altogether. Future climate conditions carry a degree of uncertainty, as the many variables that contribute to climate change, such as GHG concentrations in the atmosphere, carbon sinks, and earth's dynamic processes, are difficult to predict. For this reason, design standards should be revisited iteratively to incorporate new information relating to climate and vulnerability.

Image captured Pre-Covid-19

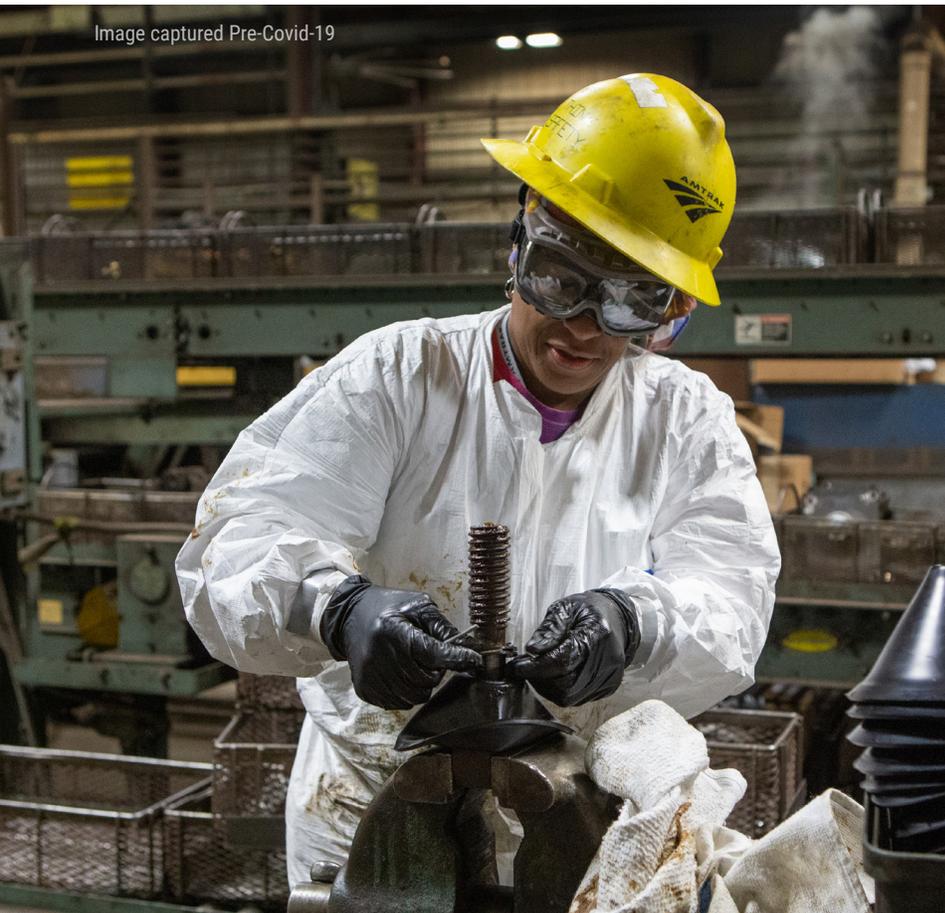


Image captured Pre-Covid-19



#### Enhance and Standardize Data Collection and Consolidation for Climate Events

Limited data on previous climate impacts hinders the development and implementation of climate adaptation solutions. Currently, Amtrak does not have a standardized process for compiling and consolidating data on past climate events, nor does Amtrak have a mechanism for tracking impacts across departments. Rather, data, when collected, is on an ad hoc basis by individual departments or employees. Collecting and centralizing impact data from climate stressor events, such as flood depths (e.g., high water marks, rail buckles, staff deployments, damages) is essential for quantifying losses (e.g., repair/replacement costs, ridership losses, on-time performance impacts), and capturing trends. This information can be used to justify climate risk reduction measures and measure return on investment (e.g., losses avoided) – thus making an informed decision based on high quality information.

## 4

## UPDATE ENGINEERING SPECIFICATIONS AND PRACTICES TO INCLUDE DESIGN STANDARDS THAT BOOST RESILIENCY.

The Capital Delivery Department will update specifications and practices to include design standards that boost the climate resiliency of Amtrak's facilities and assets. The Sustainability & Climate Group will support Capital Delivery during this effort.

Engineering specifications are documents to guide internal and external personnel on what is required in design or construction of Amtrak's infrastructure. For example, this may include how to proceed with sizing culverts to properly convey storm water or define the necessary siting of infrastructure above flood water elevations. Engineering practices are internal directions for Capital Delivery department personnel on how to perform a task. For example, they may identify the responsible parties for ensuring adherence to Engineering specifications.

With regard to current practices to consider climate impacts, Amtrak adheres to standards defined by Federal entities, such as the US Army Corps of Engineers or FEMA floodplain management ordinances, which often do not include requirements for climate adaptation or future conditions. Without a requirement to consider and evaluate future conditions into design standards, risk reduction solutions may be omitted from project design or passed over altogether.

Existing data should be leveraged in updating Engineering specifications and practices. Potential data sources include:

- The NEC VA;
- Other Amtrak risk and vulnerability assessments; and,
- Local risk and vulnerability assessments.

Action 7 addresses the selection of climate stressor data; data sources and climate scenarios selected through Action 7 should be leveraged for this effort.

Engineering practices identified to date, through roundtable discussions, for potential climate resiliency updates include:

- EP 3002: Bridge Inspection
- EP 3005: Soil Pressure/Saturation
- EP 3016: Stormwater Drainage
- Specification 63 – Track design
- Specification 150 – Stormwater Management

### ACTION TYPE:

Policy, Design Standard

### LEAD DEPARTMENT:

Capital Delivery

### BENEFITS:



Direct Losses Avoided

### ESTIMATED COST:



### TIMELINE:

FY2022

### SUPPORTING DEPARTMENTS:

Strategy & Planning - Sustainability & Climate Group, Procurement

### STEPS:

1. Create an Capital Delivery Resiliency Task Force within Capital Delivery to lead the review and update of Engineering specifications and practices. This Task Force should be led by AVP Capital Delivery Design with representation from each Capital Delivery discipline.
2. Identify Engineering specifications and practices that would benefit from incorporating resilient design strategies, along with the appropriate person to lead the update within each Engineering discipline. Determine if any new Engineering specifications or practices are needed to address climate risk reduction.
3. Update and/or develop identified specifications and practices. Collaborate with appropriate stakeholders such as the Sustainability and Climate Group and crews working in the field, as needed.
4. Pilot updated/new specification prior to final approval (e.g., gather feedback from design and field staff for further refinement and adjustments).
5. Seek and obtain approval for changes to Engineering specifications.
6. Continue to identify areas within practices, specifications, and policies that can be amended to boost climate resiliency. Design standards and practices are revisited iteratively through the Resiliency Task Force to incorporate new information relating to climate and vulnerability.

### MEASURING SUCCESS:

- Capital Delivery Resiliency Task Force has been created to lead Engineering specifications and practices updates.
- Engineering specifications and practices have been identified for updates.
- Updated/new specifications and practices have been piloted and stakeholder feedback has been incorporated.
- Specifications and practices have received approval.
- Updated specifications and practices are being utilized in the design of new projects and retrofits.

## 5

## INTEGRATE CLIMATE RESILIENCE PLANNING EFFORTS INTO PLANNING EFFORTS LED BY THE EXECUTIVE LEADERSHIP TEAM.

The Executive Leadership Team (ELT) will integrate climate resilience into planning efforts (e.g., Annual Operations Plan, annual budget request, Operations Transformation Plan, Emergency Preparedness Plans, Amtrak Connects US, fleet, and real estate plans).

An opportunity exists to enhance climate resilience culture and direction from Amtrak executive leadership by fostering the integration of climate adaptation solutions. For example, climate adaptation considerations could be integrated into core strategic planning efforts across the company, including annual departmental plans, budgets, or longer-term operational strategies.

Support within ELT-led planning efforts for climate adaptation would establish an expectation to account for climate impacts related to fleet, infrastructure, operations, financial, and strategic business plans. A resilience culture that extends from the ELT to management across the organization, and then throughout the workforce is necessary for climate initiatives to be successful. Without directives and accountability from executive leadership and senior management, the culture shift will be slow and sporadic.

This action can be implemented in conjunction with Action 1 (hiring climate SMEs) and Action 2 (developing a Climate Task Force) in which SMEs, through the Climate Task Force, can develop mechanisms for integrating climate resilience efforts that can be reviewed, approved, and supported by the ELT.

The Sustainability and Climate Group will support this effort as the team leading corporate efforts to advance climate adaptation.

### ACTION TYPE:

Policy, Capital Planning

### LEAD DEPARTMENT:

Executive Leadership

### SUPPORTING DEPARTMENTS:

Strategy & Planning - Sustainability & Climate Group

### STEPS:

1. Identify ELT-led planning efforts that would benefit from incorporating climate resilience, along with the appropriate group to lead the update.
2. Through the Climate Task Force, provide opportunities to inform and educate senior management regarding climate resilience updates to planning and strategy documents.

### BENEFITS:

-  Operations
-  Reputation
-  People

### ESTIMATED COST:



### TIMELINE:

FY2022

3. Collaborate with the Sustainability & Climate Group and the Climate Task Force ahead of the planning cycle or season.
4. Establish an annual review timeline for the ELT and the Climate Task Force to meet ahead of future planning cycles. Plans and budgets should be revisited iteratively to incorporate new information relating to climate, vulnerability, and adaptation.

### MEASURING SUCCESS:

- ELT-led plans have been identified for climate resilience updates.
- Identified plans have incorporated climate resilience considerations.
- Information has been provided to senior management regarding plan updates.
- An annual review timeline is developed to meet ahead of future planning cycles.

## 6

## DEVELOP A MECHANISM TO GEOTAG CLIMATE HAZARD EVENTS.

The Capital Delivery, Transportation, and Asset Management Departments will develop a mechanism to geotag climate hazard events (e.g., freeze/thaw, flooding, heat wave, landslide, wildfire, and heavy precipitation events). Geotagged events should be linked to an appropriate WBS number.

Amtrak, led by the Asset Management Group, will develop a clear data collection process for weather disruptions. By geotagging events, additional information can be collected and attributed to events such financial impacts, operational impacts, and severity of the event. These data collection enhancements will allow for the development and implementation of tailored climate adaptation solutions.

Currently, Amtrak does not have a standardized process for compiling and consolidating data on hazard events, nor does Amtrak have a mechanism for tracking impacts across departments. Rather, data is collected on an ad hoc basis by each department or individual based on their specific needs. Impact data from climatic stressors, such as depth of flooding, rail buckles, disruption duration, and workforce deployment, is essential for quantifying losses (e.g., repair/replacement costs, ridership losses, on-time performance impacts), and capturing trends. Enhancing our data collections practices will permit greater decision support based on higher-quality information. For example, event information can be used to justify implementation of climate risk reduction measures, modify engineering specifications and practices for future projects, measure return on investment, and prioritize allocation of resources to the most vulnerable locations.

Geotagging climate hazard events and tying them to a WBS number is a crucial first step to holistically understanding climate risk and developing risk-informed solutions. Action 20 provides further steps for recording and centralizing data on climate hazard impacts. Ultimately, the mechanism should be easily queried to draw summary results (number of events per year, cost, location, etc.) from a centralized, internal platform.

**ACTION TYPE:**

Operations

**LEAD DEPARTMENT:**

Capital Delivery, Transportation, Asset Management

**SUPPORTING DEPARTMENTS:**

Operations Desk, Strategy &amp; Planning - Sustainability &amp; Climate Group, Safety &amp; Security – Emergency Management Group, Information Technology

**BENEFITS:**

Operations

**ESTIMATED COST:****TIMELINE:**

FY2022

**STEPS:**

1. Stand up a cross-department sprint team to determine and collect requirements to geotag climate hazard events with input from field and office staff.
2. Develop technology-based mechanism to geotag climate hazard events that can be tied to WBS numbers.
3. Evaluate use of technologies such as ArcGIS Online application to collect field data via tablet (or a comparable technology already used by staff).
4. Determine key criteria necessary to track with each event (assets impacts, costs, length of disruption, pictures, event summary, etc.).
5. Develop a policy/procedure for utilizing geotagging mechanism (e.g., who, when, how).
6. Provide training to appropriate staff for utilizing geotagging tool (e.g., field staff, operations).

**MEASURING SUCCESS:**

- Geotagging mechanism has been developed.
- Geotagged events are linked to WBS numbers.
- Geotagged events can be easily queried and exported by appropriate staff to gain trends (see Action 20).
- Training has been provided to appropriate staff on when and how to use geotagging mechanism. An annual review timeline is developed to meet ahead of future planning cycles.



## FOCUS AREA: ASSETS

Assets are the physical infrastructure, systems, and facilities that allow Amtrak services to operate. Assets at Amtrak include rolling stock, track, electric traction infrastructure, signals and fiber, buildings (e.g., stations, maintenance facilities, yards), and railroad infrastructure. Asset-focused actions aim to adapt existing assets and mindfully design new infrastructure to reduce the impacts of climate trends on their performance and reliability.

### Roundtable Discussions: Lessons Learned

#### Collaborate with Partners to Enhance Resilience of Externally-Owned and Shared Assets

Amtrak has many external partners including host rail entities and organizations that utilize Amtrak-owned rail for a fee. While Amtrak owns much of the rail network that makes up the NEC, the national network includes large proportions of host rail. External partners may not have the same requirements or preferences for sustainability and resilience as Amtrak. Value engineered systems (those that provide necessary functions at the lowest cost), may be preferred by some partners, but could be more costly to manage over time and more vulnerable to climate stressors, for example. Amtrak has limited ability to implement climate adaptation measures on host rail, such as Metro North and non-Amtrak owned infrastructure. Collaboration with partners, as well as the ability to communicate the financial benefit of resilient infrastructure through estimating losses avoided over time, is essential for managing use of externally-owned and shared assets.

In spaces where Amtrak is a tenant, there are limited opportunities to mitigate climate risks within the leased space. Tenant contracts or supplier contracts where Amtrak is a tenant are not always within Amtrak's power to require climate and sustainability measures and may not consider climate adaptation. In cases where costs are shared between Amtrak and external partners, Amtrak must be prepared to provide and uphold resilience standards, even at an increased cost to both parties.

#### Increase Adaptive Capacity

There is potential that physical or geographic constraints may impede Amtrak's ability to adapt certain assets to future climate conditions. For instance, there may not be room to upsize a culvert or move assets out of recognized hazard areas. Development near vulnerable assets, such as increased impervious cover near assets at risk to flooding, may increase vulnerability.



Image captured Pre-Covid-19

## 7

## UTILIZE CLIMATE STRESSOR DATA TO DEVELOP CLIMATE RESILIENCE TARGETS FOR ASSETS.

The Capital Delivery Department will select and utilize climate stressor data for sea level rise, extreme flood, precipitation, and extreme heat to:

1. select a guiding data source for each climate stressor; and,
2. determine appropriate resilience targets or design adjustments.

With the passage of the 2021 Infrastructure and Jobs Act (IIJA) and Amtrak's Board of Directors corporate goals for strategically reducing climate risk, an opportunity exists to adapt existing and future assets to withstand the projected impacts of a changing climate. First, a data source for each climate stressor must be selected to use as a consistent guiding source for understanding vulnerability, setting resiliency targets, and project prioritization. Climate data sources are available from Federal, state, local, and private sources. As a starting point, the recently completed a Climate VA for the NEC has data and information that can be leveraged for planning purposes to advance this action.

Once data source(s) are selected, appropriate resiliency targets or design specifications will need to be developed for specific assets (e.g., structure to be elevated above projected flood levels for a defined time horizon or threshold). These targets can then be integrated into the planning and design of new assets (such as Action 4 - Engineering specifications and practices), as well as the retrofitting or upgrading of existing assets. Assets to be considered include but are not limited to:

- Rolling stock;
- Track;
- ET infrastructure;
- C&S;
- Buildings (e.g., maintenance facilities, yards, major stations);
- Bridges; and
- Tunnels.

Action 9 addresses setting resiliency targets for stations, real estate, and facilities. Action 4 addresses resilience-related amendments to Engineering design specifications and practices.

Additionally, a project prioritization process is necessary to strategically allocate resources to reduce climate impacts over time. Developing a project prioritization method is addressed through Action 8. Further, this information – climate stressor data, resiliency targets, and prioritization mechanisms - will be integrated into Amtrak policies or systems for consistent, organization-wide adoption.

### BENEFITS:

-  Operations
-  Direct Losses Avoided
-  Reputation

### ESTIMATED COST:



**TIMELINE:**  
FY2022

### ACTION TYPE:

Policy, Design Standard, Capital Planning

### LEAD DEPARTMENT:

Capital Delivery – Project Delivery

### SUPPORTING DEPARTMENTS:

Capital Delivery, Executive Leadership Team, Strategy & Planning - Sustainability & Climate Group, Safety & Security– Emergency Management, Strategy & Planning – Real Estate Stations, Facilities, Properties & Accessibility, Commercial Planning

### STEPS:

1. Review available climate stressor data sources and select a guiding data source for each climate threat. Strive for consistency in selected data (e.g., source, emissions scenario(s) or planning horizons (e.g., mid-century, end-of-century))
2. Use selected data source(s) and industry guiding practices to develop appropriate resiliency targets for asset types, recognizing that final designs will need to account for site-specific conditions (e.g., drainage studies and freeboard for sea level rise).
3. Integrate resiliency targets into Engineering specifications and practices, as appropriate (see Action 4).
4. Periodically review (e.g., every 3 years) available climate data to incorporate new information relating to climate science and uncertainty. Update resiliency targets

### MEASURING SUCCESS:

- Data sources have been selected to guide planning and design decisions for each climate stressor.
- Resiliency targets have been developed for different asset types for appropriate climate stressors.
- Targets have been integrated into Engineering specifications and practices.

## 8

## DEVELOP CRITERIA FOR PRIORITIZING ASSET UPGRADES, RELOCATION, AND ADAPTATION MEASURES.

The Capital Delivery Department will develop and apply prioritization criteria for asset upgrades, relocation, and adaptation.

The passage of the 2021 IJA and Amtrak's Board of Directors corporate goals for strategically reducing climate risk created an opportunity to adapt existing and future assets to withstand the projected conditions of a future climate. Action 7 addresses selecting climate data sources and developing resiliency targets for assets.

Once targets are set, existing assets should be evaluated to determine potential modifications necessary to address risk. New projects will also incorporate this information. A project prioritization mechanism is necessary to effectively reduce impacts across Amtrak while strategically allocate resources over time. Prioritization mechanisms could be integrated into Amtrak policies and systems (e.g., capital improvement planning, AIMS, and business case reviews).

### ACTION TYPE:

Policy, Design Standard, Capital Planning

### LEAD DEPARTMENT:

Capital Delivery – Project Delivery

### SUPPORTING DEPARTMENTS:

Capital Delivery, Executive Leadership Team, Strategy & Planning - Sustainability & Climate Group, Safety & Security – Emergency Management, Strategy & Planning – Real Estate Stations, Facilities, Properties & Accessibility, Finance

### STEPS:

1. Develop criteria for prioritizing adaptation measures for new capital projects as well as retrofitting/upgrading for existing assets. Prioritization will include considerations such as project size, risk reduction potential, asset lifecycle, cost, benefits, and return on investment, among other factors.
2. Pilot prioritization criteria with a select group of assets (including a range of new design/construction and asset upgrades) to evaluate feasibility and necessary refinements.
3. Determine the appropriate policy or system for integration into planning and operational decisions, as well as consistent, organization-wide adoption.

### BENEFITS:

-  Operations
-  Direct Losses Avoided
-  Reputation

### ESTIMATED COST:



**TIMELINE:**  
FY2022

### MEASURING SUCCESS:

- Criteria has been developed for prioritizing adaption projects.
- A pilot program has been established to apply criteria to select assets.
- Lessons learned from pilot program have been leveraged to
- refine and finalized criteria.

## 9

## DEVELOP RESILIENCY TARGETS FOR ALL REAL ESTATE, STATIONS, AND FACILITIES SERVED BY AMTRAK, AND INTEGRATE INTO BUILDING DESIGN STANDARDS.

Existing guidelines will need to be amended and new guidelines may need to be developed requiring resiliency targets for all real estate, stations, and facilities served by Amtrak, including third parties who occupy or build on Amtrak property.

Major Stations will develop resiliency targets for major stations that are slated for new construction or undergoing significant renovation. Parallel to this, the Strategy & Planning Department will work with external partners to develop resiliency targets for other Amtrak stations (current and future), real estate, and facilities, including third parties who occupy or build on Amtrak property.

Building design standards will be updated to incorporate resiliency targets.

An opportunity exists to adapt current and future stations and facilities served by Amtrak to withstand projected impacts from a changing climate. First, Amtrak must set resiliency targets and determine appropriate climate stressor data (i.e., sea level rise, precipitation, flood, heat). This data can then be applied as a consistent guiding source for decision support for various users. Action 7 provides guidance for selecting climate stressor data. Data from the NEC Vulnerability Assessment, other Amtrak risk and vulnerability assessments, or local condition data should be leveraged.

Once data source(s) are selected, appropriate resiliency targets must be developed and integrated into existing building design standards, which can then be applied to the design of stations, real estate, and facilities undergoing construction or significant renovation. Without a requirement to consider and evaluate future conditions into design standards, risk reduction solutions may be omitted from project design or passed over altogether.

Further, Amtrak will need to develop an effective strategy to convey resiliency targets with external partners (i.e. third parties building on Amtrak property, vendors, and possibly suppliers).

Actions 4 and 7 address resiliency updates to Engineering specifications and practices and resiliency targets for other types of Amtrak assets.

### ACTION TYPE:

Policy, Design Standard, Capital Planning

### LEAD DEPARTMENT:

Program Delivery  
Major Stations  
Strategy & Planning – Stations & Facilities Group

### SUPPORTING DEPARTMENTS:

#### BENEFITS:

 Operations

 Direct Losses Avoided

 Reputation

#### ESTIMATED COST:

#### TIMELINE:

FY2022

Strategy & Planning - Sustainability & Climate Group, Real Estate, Corporate Planning, ICT, Safety and Security – Emergency Management

#### STEPS:

1. Create a resiliency task force with representatives from lead departments to lead the development of resiliency targets for buildings, facilities, and real estate, as well as the update of building design standards.
2. Identify building and facility design standards and guidance that would improve from incorporating resilient design strategies, along with the appropriate person to lead the update. Identify potential new guidelines needed to address climate risk reduction.
3. Update and/or develop identified design standards and guidance. Collaborate with appropriate stakeholders such as the Sustainability & Climate Group and crews working in the field, as needed.
4. Utilize climate data sources consistent with other Amtrak resiliency efforts. See Action 7. Use industry guiding practices to develop appropriate resiliency targets, recognizing that final designs will need to account for site- specific conditions.
5. Pilot updated/new specification (e.g., gather feedback from staff and stakeholders).
6. Apply targets to new stations or those undergoing significant renovations. Communicate with external partners occupying or building on Amtrak property to convey resiliency requirements.
7. Establish a policy or procedure for communicating and reviewing projects with external partners to ensure consistent adoption.

*Continued on next page*

8. Periodically review (e.g., every 3 years) available climate data

## 9

Continued

**DEVELOP RESILIENCY TARGETS FOR ALL REAL ESTATE, STATIONS, AND FACILITIES SERVED BY AMTRAK, AND INTEGRATE INTO BUILDING DESIGN STANDARDS.**

to incorporate new information relating to climate science and uncertainty, as well as industry best practices. Update resiliency targets and building design standards in accordance with new data

**MEASURING SUCCESS:**

- Resiliency task force has been created.
- Resiliency targets have been developed for different asset types for appropriate climate stressors.
- Building design standards and guidance have been identified for updates.
- Identified design standards and guidance have been updated and received approval.
- A pilot project has been completed.
- Design standards have been refined and are being utilized in the design of new projects and retrofits.
- Resiliency targets have been developed and disseminated to third parties.



## EVALUATING RELEVANT CLIMATE REGULATIONS AND TRENDS

Implementation success of the aforementioned actions will depend not just on Amtrak, but on government regulations, trends, and funding. Regulations and market trends influence the adoption and implementation of climate resilience strategies at all levels – from corporations to nations. Currently, no regulations have been identified that require Amtrak to adopt climate adaptation measures at Federal or state levels. However, this will likely change in the future as climate impacts and costs are realized and the United States moves forward on climate action at the state and Federal levels.

While climate adaptation mandates to Amtrak are not currently in place, trends show increasing support for climate resilience across all sectors, including transportation. The US Department of Transportation (DOT), as well as some state DOTs, have implemented both climate resilience and GHG emissions reduction mandates and/or guidance. Additionally, Congress and state legislatures are increasingly making funding available for climate resilience initiatives. To date, notable climate resilience policies and funding opportunities that will likely impact Amtrak include:

- USDOT Climate Action Plan – USDOT has asked Amtrak to draft a climate challenge, in which Amtrak sets a deadline for announcing net zero carbon emissions and establishing a climate resilience program. While participation in the climate challenge is voluntary, participation provides the potential to advocate for Federal support of Amtrak's climate goals (e.g., become eligible for special funding) and to foster partnerships.
- California Air Resources Board (CARB) – CARB has passed emissions regulations for diesel operation beginning in 2022, which would require Amtrak's diesel locomotives to pay into a fund for emissions reductions programs. By 2030, CARB regulations have the potential to effect operations, as Amtrak will not be allowed to operate diesel locomotives in the state of California.
- Transportation Climate Initiative (TCI) – The TCI is a regional collaboration of 13 Northeast and Mid-Atlantic states, plus the District of Columbia, that seeks to reduce carbon emissions from the transportation sector. Through initiatives aimed at collecting funds from gas stations, there is potential to fund rail and other transit projects.
- Infrastructure Investment and Jobs Act (IIJA) – the IIJA authorizes the appropriation of just under \$19.4 billion in grants to Amtrak for a range of enhancements and required reforms, including:
  - \$12.65 billion for activities associated with the National Network, including use for State-Supported Route Committee, Northeast Corridor Commission, Interstate Rail Compacts, and financing capital projects to upgrade the accessibility of the national rail passenger transportation;
  - \$6.57 billion for activities associated with the Northeast Corridor; and,
  - \$137.5 million to the Office of Inspector General of Amtrak.

Transit agencies across the country, including those with passenger rail such as LA Metro in Los Angeles and Boston's Massachusetts Bay Transportation Authority, have instated climate resilience programs to reduce climate risks. An increasing number of cities, such as New York City, Washington, DC and Boston, MA, are also adopting climate resilience design guidance for capital projects and infrastructure. Further, commuter rail agencies that run along the NEC, such as NJT, SEPTA, MARC, and DelDot, are engaging in efforts to decrease GHG emissions and increase climate resilience – 100% of NEC commuter agencies plan to source more clean energy (renewables) and build more resilient rail to combat the effects of climate change.

Aside from climate adaptation trends within the passenger rail sector, general market trends show growing support for climate adaption measures across industries. This support is indicated by growing funding opportunities to plan for and implement climate resilience strategies, such as Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT), FEMA's Building Resilient Infrastructure and Cities (BRIC) grant program, and Congressional funding. With regard to PROTECT, this funding source allocates \$1.4B+ annually for the next five years to help states make transportation infrastructure more resilient to future climate impacts. Additionally, there are financial market indicators that private funding opportunities, credit underwriting, and insurance premiums may be more explicitly tied to climate risk and resilience in the future. This is demonstrated by climate-related financial stress testing within the insurance industry and Moody's assessment of climate exposure in assessing municipal credit risk. Another example is the Securities and Exchange Commission (SEC), which regulates financial markets, and has recently requested public to on climate disclosure. If adopted (anticipated by year-end 2022), public companies would need to provide information on how it has assessed and prioritized climate risks, GHG metrics, and financial metrics to inform investors of the impacts of climate events on the company's financial health. Additionally, some underwriting entities have begun to require climate information to better inform investors.

Significant regulation changes in the future may prompt an update to this plan to align to industry requirements; however, until those mandates are enacted, Amtrak will continue monitor evolving legislation.



## SUMMARIZING FUNDING DEPENDENCIES

Similar to regulations, the availability of funding may serve to catalyze or stall climate adaptation efforts. Funding of potential climate resilience initiatives is dynamic and must be reviewed frequently. There are many different sources of funding, each tied to its own conditions, requirements, and timelines. Current and potential sources of funding potentially available to Amtrak include:

- Congressional allocations, which are the primary source of Amtrak funding (e.g., Fixing America's Surface Transportation (FAST) Act), where funding comes with the understanding that Amtrak will operate and adhere to Federal regulations and guidelines;
- External partners, such as state transit agencies, may contribute to Amtrak funding through cost shares for capital projects, operating agreements, maintenance agreements for rights-of-way, and lease agreements;<sup>9</sup>
- Loans and financing, including green financing (e.g., revolving loan programs or mission-driven private loan programs that provide low interest rates for sustainable projects);
- Post-storm funding includes insurance proceeds for damage to assets and business interruption and disaster recovery funding. Commercial insurance market conditions limit insurance available for major weather-related events leading Amtrak to retain significant risk and limit the amount of purchased insurance. Amtrak is not an eligible entity for disaster funds through FEMA;
- Climate resilience grants administered by the Federal Rail Administration (FRA);
- Catastrophe bonds, resilience bonds, and/or parametric insurance;
- Funding available from other entities, such as the National Academy of Sciences. Grants from private organizations may also be a future source of climate resilience funding.



<sup>9</sup>State-supported funding does not typically require Amtrak to follow state regulations.

## ONGOING PLAN MAINTENANCE AND IMPLEMENTATION

As noted above, this plan is intended to be a living document. Its regular review, update and maintenance will help foster continued engagement and progressive implementation as Amtrak's needs and goals evolve.

The entire organization plays a role in successfully implementing the Climate Resilience Strategic Plan. Each Amtrak department is responsible for implementing specific climate resilience actions as detailed in the Action Plan section. Every proposed action in this section is assigned to a specific "lead" department to assign accountability and increase the likelihood of subsequent implementation. A target fiscal year of FY2023 has been assigned to priority actions aid with timely and deliberate implementation.

**Climate Task Force** – The Climate Task Force (a subset of the ESMS Steering Committee) will include members from each lead department who will serve as a conduit for their department. Member roles including attending in regular team meetings, supporting action progress reporting, and participating in plan updates.

**Semi-Annual Action Updates and Progress Reporting** – The Sustainability & Climate Group will receive quarterly action updates through Sustainability and Climate Oversight Committee meetings. The lead department listed for an action will be responsible for providing the updates (with assistance from supporting departments as necessary). The Sustainability & Climate Group will provide progress updates to the Executive Leadership Team and updates to the Governance Committee at the Board of Directors meetings.

**Annual Climate Resiliency Workshop** – An annual workshop (approximately two days) will be held to celebrate success, plan for the coming year, and provide training on industry happenings. Workshop attendees will include the Climate Resiliency Task Force members, staff engaged in climate resiliency and adaptation, and Amtrak leadership. Outside speakers and external partners (e.g., local transit authorities, local emergency management, National Oceanic and Atmospheric Administration) are envisioned to provide renewed perspective and commitment to reducing the impacts of climate across Amtrak.

**Plan Reviews and Updates** - Plan reviews and updates should be conducted a minimum every three years and will be led by the Sustainability and Climate Group. More frequent plan updates may be required to account for significant changes in climate- related regulations or funding opportunities.

**Ongoing Stakeholder Engagement** - In addition to activities noted above, stakeholders should be continually engaged. For example, actions have been identified for engaging stakeholders including climate adaptation professional development opportunities for staff, as well as publicizing plan implementation successes for both internal and external stakeholders.

All of the above-mentioned activities will promote implementation and maintenance of this plan.

## CONCLUSION

Amtrak is committed to reducing impacts from current and future climate stressors along the NEC. Amtrak already experiences climate impacts, such as service disruptions and damages to assets, along the corridor, and without adaptation, these impacts are expected to continue or worsen in the future. Since 2015, Amtrak has taken steps to reduce its climate impact and understand risks posed by climate change along the NEC. This strategic plan is the next step in Amtrak's climate resilience journey, as it lays out a series of implementable, measurable actions related to Amtrak's People, Practices, and Assets aimed at reducing climate risk by integrating resilience measures throughout the organization.



## APPENDIX A: ACKNOWLEDGEMENTS

The Climate Resilience Strategic Plan was made possible by the time, consideration, and input contributed by dedicated Amtrak staff. Amtrak would like to thank the following participants for their involvement in developing the Climate Resilience Strategic Plan.

The Climate Resilience Strategic Planning Team (Sustainability and Climate Group):

Name	Position
Beth Termini	Assistant Vice President, Health & Environment
Kara Oldhouser	Director, Sustainability
Joanne Maxwell	Senior Director Environmental
Laura Fotiou	Sustainability & Climate Resilience Manager
Nicole Farthing	Environmental Specialist
TJ Osborne	Sustainability Intern

Climate Resilience Roundtable Participants

Name	Position	Roundtable Group
Amanda Kessler	Manager Engineering Reference Surface	Project Scope, Flow & Process
Bob Giorgio	Director Rail Ops & Emer Mgmt	Vulnerability Assessment
Bruce Williams	Senior Director Demand Forecast	Vulnerability Assessment
Chris Forrest	Director Engineering	Vulnerability Assessment
Evan Whatley	Manager Engineering	Project Scope, Flow & Process
Greg Miller	Director Portfolio Management	Project Scope, Flow & Process
Gretchen Kostura	Sr. Dir. Coordination & Special Projects	Project Scope, Flow & Process
Jill Angelone	Director Industrial & Systems Engineering	Vulnerability Assessment
Kyle Barnard	Manager Work Planning	Vulnerability Assessment
Mary Carlson-Bis	Senior Director Preparedness	Project Scope, Flow & Process
Phil Balderston	Director Risk Management	Project Scope, Flow & Process
Rene Asuncion	Director Engineering Structures	Vulnerability Assessment
Rob Kane	Sr. Manager Capital Delivery, Electric Traction	Vulnerability Assessment
Ronnie Dillman	Director Stations Design	Project Scope, Flow & Process
Shirley Craun	AVP Strategic Procurement	Project Scope, Flow & Process
John Rhodes	Infrastructure Planning Manager	Vulnerability Assessment

## APPENDIX B: ACRONYM LIST

BRIC	Building Resilient Infrastructure and Cities
C&S	Communications & Signals
CNOC	Consolidate National Operations Center
DelDot	Delaware Department of Transportation
DHS	Department of Homeland Security
DOT(s)	Department(s) of Transportation
ELT	Executive Leadership Team
ELT	Extract, load, and transform processes within a data pipeline
EPMO	Enterprise Program Management Office
ESMS	Environment & Sustainability Management System
ET	Electric Traction
FRA	Federal Rail Administration
GHG	Greenhouse Gas
ICT	Intercity Trainsets
IIJA	Infrastructure Investment and Jobs Act
IPCC	International Panel on Climate Change
IT	Information Technology
MARC	Maryland Area Regional Commuter
NEC	Amtrak's Northeast Corridor
NEPA	National Environmental Policy Act
NJT	New Jersey Transit Corporation
PSSA	President's Service and Safety Award
RCP(s)	Representative Concentration Pathway(s)
RFP(s)	Request(s) for Proposal
SEC	Securities and Exchange Commission
SEPTA	Southeastern Pennsylvania Transportation Authority
SFPA	Stations, Facilities, Properties, and Accessibility
SHPA	State Historic Preservation Act
SME(s)	Subject Matter Expert(s)
SOW(s)	Scope(s) of Work
STI	Short-Term Incentive
FAST	Fixing America's Surface Transportation
TCI	Transportation Climate Initiative
VA	Climate Vulnerability Assessment
WBS	Work Breakdown Structure

## APPENDIX C: SUMMARY OF PREVIOUS CLIMATE ACTIVITIES

Year	Effort Name	Description
NA	Internal Reports	A series of internal reports began with a review of existing climate change research findings and vulnerability assessment methodologies related to transportation assets.
2015	Wilmington, DE Vulnerability Assessment	A detailed vulnerability assessment of Amtrak's infrastructure and facilities along a 10-mile track segment in Wilmington, Delaware, and an analysis of adaptation measures that could be implemented for the vulnerable assets in the study area, as well as for similar assets along Amtrak's Northeast Corridor (NEC).
2017	NEC Sea Level Rise and Storm Surge	This climate study included the development of inundation maps for the entire NEC, projecting storm surge and sea level rise conditions in three scenarios (2020, 2050, and 2100).
2019	Wharton School Climate Resilience Case Study	Working with researchers from the University of Pennsylvania's Wharton School in 2019, Amtrak participated in a case study to measure the company's resilience to climate risk within our Northeast Corridor. An inter-departmental group developed and ranked a list of 21 business processes affecting Amtrak's short and long-term resilience. These metrics, termed "resilience activities", were categorized by technical resilience, organizational preparedness, and leadership and were incorporated into a Resilience Activity Scorecard. The endeavor helped Amtrak begin to understand the breadth of vulnerabilities across numerous functions of the organization and to identify opportunities for resiliency planning. In FY20, we revisited the 21 activities, and nearly half of the actions are applicable in Amtrak's current state of operations as well as the company's level of climate exposure.
2020	Coordination with Partners and Climate SMEs	<p>Amtrak interviewed SMEs as potential climate experts to guide the organization. External climate strategies and climate risk reports were reviewed, and Amtrak staff had discussions with organizations with advanced climate strategies in action, such as AT&amp;T, the Miami-Dade Office of Resilience, the Argonne Laboratory, and the Army Corps of Engineers.</p> <p>Miami-Dade was sought out as a leader in climate resilience. Amtrak spoke with their climate consultant and connected with their GIS trainers at NOAA. As a result of this conversation, Amtrak secured inundation and flood mapping training resources from NOAA for GIS users at Amtrak. As described in the strategy section of this plan, training will occur when it is safe for in-person instruction.</p> <p>The Northeast Corridor Commission (NECC) is a key partner organization with a shared interest in planning the future of rail along America's densest corridor. Amtrak met with the NECC to solicit support and build awareness of Amtrak's development and implementation of a climate resilience strategic plan to inform NECC's planning work.</p>
2020	Design Standards Review	Capital Delivery and the Climate Group reviewed design standards used by Capital Delivery disciplines to determine if and how climate risks and resilient solutions are addressed. Design standards include the SP4000 design guideline, bridge and tunnel references to Army Corps of Engineers (COE) standards, and the International Green Construction Code (IGCC) for facilities and stations. References to IGCC and COE are included in Amtrak's design standards.
2020	Design Standards Review	Capital Delivery and the Climate Group reviewed design standards used by Engineering disciplines to determine if and how climate risks and resilient solutions are addressed. Design standards include the SP4000 design guideline, bridge and tunnel references to Army Corps of Engineers (COE) standards, and the International Green Construction Code (IGCC) for facilities and stations. References to IGCC and COE are included in Amtrak's design standards.

Year	Effort Name	Description
2020	Infrastructure and Operations Impacts and Metrics	<p>The Asset Management team drafted a climate sustainability metric for inclusion in the Capital Delivery Annual Construction Program process. This measure considers a project's vulnerability during the project prioritization process, which will ensure that higher risk locations or assets will be addressed sooner.</p> <p>Capital Delivery evaluated the existing asset condition assessment framework with the goal of including a climate impact criticality factor in Capital Delivery's asset management system. The definition of a climate impact factor, as well as a corresponding rating scale, will aid in future state of good repair assessments of infrastructure assets. In addition to the condition assessment, tools such as GIS mapping of floodplains are being developed to assist in identification of at-risk assets and locations.</p> <p>Amtrak quantified the financial impact to ridership and revenue due to named storms and severe weather events, since 2006. This is one of the first areas within the business where Amtrak can point to financial risks directly resulting from climate impacts.</p>
2021	Climate Resilience Strategic Plan	<p>A preliminary Climate Resilience Strategic Plan was developed in-house to guide the development of the comprehensive Climate Resilience Strategic Plan (current effort).</p> <p>Amtrak elevated awareness of risks and climate resilience plan development through groups like the ESMS Committee, ESOC, ELT, and through cross-disciplinary outreach, promoting integration of resiliency considerations into Amtrak's routine business practices and procedures.</p>
2021	Amtrak Climate Vulnerability Assessment	<p>The 2021 Amtrak Climate Vulnerability Assessment for the NEC analyzed climate-related risks to Amtrak assets along the Northeast Corridor. Hazards assessed include temperature, precipitation, wind, severe storms, and sea level rise. Asset vulnerability was determined using an exposure, sensitivity, and adaptive capacity approach. Previous Amtrak climate vulnerability assessments, including sea level rise mapping, were leveraged for this assessment.</p>
2021	Climate Resilience Roundtables	<p>Climate Resilience Roundtables were conducted internally to promote leadership and staff participation in the Climate Resilience Strategic Planning process. Up to four roundtable meetings were held for the following groups: Asset Vulnerability, Project Management and Capital Delivery, Capital Improvements/Financing.</p>

## APPENDIX D: NON-PRIORITIZED ACTIONS

PEOPLE

NON-PRIORITIZED ACTIONS

# 10

### PROVIDE CLIMATE RESILIENCE TRAINING TO CURRENT AND FUTURE EMPLOYEES.

The Sustainability & Climate Group, with assistance from Human Resources, will develop and provide climate resiliency trainings to Amtrak staff. Two types of trainings will be provided:

1. Advanced, specialized climate resiliency training for key employees (e.g., project managers, hiring managers); and,
2. A basic level of resiliency training to all Amtrak employees (e.g., new employee training, performance metrics). Consider integrating with Sustainability Awareness Training.

These trainings are a crucial step in developing the human resources needed at Amtrak to enable the implementation of climate resilience actions. Trainings will also help build a culture of resilience at Amtrak. Another key step to achieving this is hiring climate resilience subject matter experts, which is addressed in Action 1. The frequency of training will be determined during the implementation phase but is assumed to be at least annual.

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

Strategy & Planning - Sustainability & Climate Group

**SUPPORTING DEPARTMENTS:**

Human Resources – Training Group

**BENEFITS:**

-  Operations
-  Reputation
-  People

**ESTIMATED COST:**



# 11

### SHOWCASE RESILIENCE ACHIEVEMENTS TO CONGRESSIONAL STAKEHOLDERS.

Government Affairs will provide climate resiliency achievement highlights in updates to Congressional Stakeholders

Showcasing Amtrak's climate resiliency achievements during regular conversations on the Hill will enhance Amtrak's positioning for future funding and advance Amtrak's reputation for climate adaptation.

**ACTION TYPE:**

Communications

**LEAD DEPARTMENT:**

Government Affairs

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group

**BENEFITS:**

-  Reputation

**ESTIMATED COST:**



## 12

**BUILD INTERNAL CAPACITY FOR INTEGRATION OF CLIMATE RESILIENCE.**

The Sustainability & Climate Group, with assistance from Corporate Communications, will build internal capacity for integration of resiliency and climate change adaptation. Strategies identified for building capacity internally include:

- Information dissemination through the Climate Resilience Task Force (see Action 2);
- One-on-one meetings with representatives from departments that have a significant responsibility to promote climate-centric integration; and,
- Showcasing and celebrating resiliency success stories or initiatives via the company website, announcements (e.g., quarterly), and social media.

Building internal capacity to integrate climate resilience is essential to build a culture of resilience at Amtrak. Hiring (Action 1) and resiliency-focused training opportunities (Action 10) will complement this action in building capacity. Incorporation of resilience into ELT-led planning efforts will also have a key role in building capacity to integrate climate resilience internally, addressed through Action 5.

**ACTION TYPE:**

Communications

**LEAD DEPARTMENT:**

Strategy &amp; Planning - Sustainability &amp; Climate Group

**SUPPORTING DEPARTMENTS:**

Corporate Communications

Key Departments & Groups: Capital Delivery, Strategy and Planning, Transportation, Major Stations, Procurement

**BENEFITS:**

Reputation



People

**ESTIMATED COST:**

## 13

**RECOGNIZE RESILIENCY AND CLIMATE ADAPTATION PROGRESS.**

The Sustainability & Climate Group, with assistance from Corporate Communications, will recognize resiliency and climate adaptation progress within the organization by leveraging the President's Service & Safety Award (PSSA) program.

Recognizing those who go above and beyond to integrate climate resilience into their regular duties will enhance Amtrak's culture of resilience. The PSSA is the highest recognition given to Amtrak employees. The Sustainability & Climate Group, who leads corporate climate resiliency efforts within Amtrak, will partner with Corporate Communications, who administers the PSSA, to recognize those making strides in climate resiliency.

**ACTION TYPE:**

Communications

**LEAD DEPARTMENT:**

Strategy &amp; Planning - Sustainability &amp; Climate Group

**SUPPORTING DEPARTMENTS:**

Corporate Communications

**BENEFITS:**

Reputation



People

**ESTIMATED COST:**

# 14

## INTERNALLY AND EXTERNALLY COMMUNICATE INCURRED CLIMATE IMPACTS AND SHOWCASE AVOIDED CLIMATE IMPACTS.

The Sustainability and ClimateGroup, with assistance from Corporate Communications, will internally and externally communicate experienced climate impacts, as well as highlight avoided impacts from storm events to emphasize successful adaptation. To achieve this, the Sustainability and Climate Group, with support from other departments, will:

- Identify and quantify damages and operational impacts from major climate events to showcase the need for adaptation.
- Where adaptation measures have been implemented, identify and quantify avoided damages and operational impacts from major climate events to highlight the benefits of adaptation, including return on investment.
- Use internal and external platforms (e.g., company webpage, email, staff meetings, extract-load-transform updates, social media, communications, quarterly meetings with partners).

Communicating both climate adaptation gaps and successes is important to conveying the benefits of adaptation. Adaptation gaps – quantified damages, life safety impacts, and/or operational

impacts resulting from climate stressors – demonstrate the need for adaptation. Conversely, quantifying avoided impacts – those impacts that do not occur because an adaptation measure was implemented – are important to demonstrate the return on investment generated by adaptation.

**ACTION TYPE:**

Communications

**LEAD DEPARTMENT:**

Strategy & Planning - Sustainability & Climate Group

**SUPPORTING DEPARTMENTS:**

Corporate Communications

**BENEFITS:**

-  Reputation
-  People

**ESTIMATED COST:**



# 15

## DEVELOP CLIMATE-BASED HEALTH AND SAFETY PRACTICES.

The Emergency Management Group, with assistance from the Sustainability & Climate Group, will develop and integrate climate-based health and safety practices for:

1. Employees in the field - practices may be added to project safety work plans and JSAs; and,
2. Customers - develop a policy or list of supplies to keep on trains. Encourage ICT and work equipment operators to have emergency resources (e.g., inflatable ramps, solutions for HVAC if trains get caught in heat wave or roll through wildfire smoke).

Changing climate conditions bring about new challenges for protecting employee and customer health and safety. Developing policies to prepare for anticipated climate stressors on health and safety will minimize impacts during climate events such as floods, heat waves, and wildfires.

**ACTION TYPE:**

Policy, Operations

**LEAD DEPARTMENT:**

Strategy & Planning - Sustainability & Climate Group

**SUPPORTING DEPARTMENTS:**

Safety, Health & Environment - Sustainability & Climate Group  
ICTs

**BENEFITS:**

-  Operations
-  Reputation
-  People

**ESTIMATED COST:**



## 16

## DEVELOP A CHANNEL TO SHARE CLIMATE RISK AND VULNERABILITY INFORMATION AND ADAPTATION NEEDS WITH EXTERNAL PARTNERS.

Corporate planning, with assistance from the Sustainability & Climate Group, will develop a channel to share climate risk and vulnerability information and adaptation needs with external partners (e.g., host rail, state partners). Ideally, this channel will be integrated with existing channels (e.g., regular meetings).

An opportunity exists to share and receive climate risk and vulnerability information with external partners. Ultimately, enhanced collaboration with external partners will lead to better-informed climate-related decision making.

**ACTION TYPE:**

Communications

**LEAD DEPARTMENT:**

Corporate Planning

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group

**BENEFITS:**

-  Reputation
-  People
-  External Partners

**ESTIMATED COST:**


## 17

## EXPAND CUSTOMER SURVEYS TO GATHER INFORMATION ON CUSTOMER ATTITUDES TOWARDS CLIMATE RISKS AND RESILIENCE.

The Marketing Research Team, with support from the Sustainability & Climate Group, will develop and administer a customer survey(s) to gather information on customer attitudes towards climate risks and resilience (e.g., impacts to ridership, fees, etc.). Survey questions could be integrated into existing customer experience surveys.

Impacts to riders from climate stressors (e.g., delays, cancellations, slow orders, air quality) have the potential to impact customer attitudes toward using Amtrak as a mode of transportation. Administering a survey will help Amtrak understand how changing climate conditions are impacting customer attitudes across different regions.

**ACTION TYPE:**

Policy, Operations

**LEAD DEPARTMENT:**

Marketing Research

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group

**BENEFITS:**

-  Reputation
-  People

**ESTIMATED COST:**


## 18

**INCLUDE LANGUAGE IN CONGRESSIONAL REAUTHORIZATIONS TO SUPPORT CLIMATE CHANGE RESILIENCE INITIATIVES.**

Government Affairs, with support from the Sustainability & Climate Group, will include language in congressional reauthorizations to support climate change resilience initiatives.

There is an opportunity to foster the implementation of climate resilience measures at Amtrak, while building a culture of resilience, by adding language that supports climate resilience initiatives to congressional reauthorizations.

**ACTION TYPE:**

Policy, Communications

**LEAD DEPARTMENT:**

Government Affairs

**SUPPORTING DEPARTMENTS:**

Safety, Health & Environment - Sustainability & Climate Group

**BENEFITS:**

Reputation



External Partners

**ESTIMATED COST:**

## 19

**DEVELOP A MECHANISM TO TRACK RISK REDUCTION MEASURES AS THEY ARE IMPLEMENTED.**

The Sustainability & Climate Group will identify opportunities to track risk reduction measures and lead the development of a process to track risk reduction measures as they are implemented.

The Sustainability & Climate will develop a process or mechanism to track the implementation of climate resilience measures, leveraging the Climate Resilience Task Force (see Action 2). Individual departments will be responsible for using this process to track and report departmental progress in implementing risk reduction measures.

**ACTION TYPE:**

Policy, Capital Planning

**LEAD DEPARTMENT:**

Safety, Health & Environment - Sustainability & Climate Group

**SUPPORTING DEPARTMENTS:**

Safety, Health & Environment – Risk Management Group

Key Departments: Capital Delivery, Strategy and Planning, Government Affairs, Executive Leadership, Procurement, others as appropriate

**BENEFITS:**

Reputation

**ESTIMATED COST:**

## 20

## DEVELOP A STANDARDIZED MECHANISM TO DOCUMENT POST-EVENT INFORMATION THAT IS EASILY SEARCHABLE ACROSS DEPARTMENTS.

IT, with support from other departments and groups, will develop a standardized mechanism or tool for documenting post-event information that is easily searchable across departments (e.g., utilizing drop-down lists in Maximo instead of fill-in options). Post-event data to compile should include impacts on factors such as:

- Labor;
- Materials;
- Asset damage and repair costs;
- On-time performance;
- Lost revenue; and,
- Ridership.

While impact data from storm and climate events is collected at Amtrak, it is often done on an ad hoc basis that is not standardized across departments. A standardized tool for recording and storing post-event information is important to inform climate-related decision making. Further, post-event information that is easy to search and access aid in requesting and obtaining funding.

### ACTION TYPE:

Operations, Capital Planning

### LEAD DEPARTMENT:

IT

### SUPPORTING DEPARTMENTS:

Strategy & Planning - Sustainability & Climate Group  
 Safety, Health & Environment – Emergency Management Group  
 Asset Management  
 Operations Desk  
 CNOC

### BENEFITS:



Operations

### ESTIMATED COST:



## 21

## EXPLORE ENGINEERING STRATEGIES TO MINIMIZE LOSSES FROM CLIMATE STRESSORS.

Capital Delivery will explore strategies that will minimize future losses due to climate stressors, including extreme heat, extreme precipitation and flooding, sea level rise, named storms, and wildfires. To date, identified measures to be explored include:

- Heat mitigation strategies for rail (e.g., painting tracks white, adjusting neutral rail temperatures on the NEC);
- Updating the Rockfall Hazard Rating System Scoring Sheet climate section to utilize location-specific precipitation projections;
- Elevating or moving signals based on flood depth and sea level rise data; and,
- Developing a process for identifying and prioritizing areas for site-specific future conditions assessment.

As climate data becomes more accessible (e.g., the NEC Climate Vulnerability Assessment), there is an opportunity for the Capital Delivery Department to identify strategies to reduce future losses from climate stressors. Losses associated with climate stressors include track buckling, service disruptions, on-time performance impacts, slow orders, and asset damages. The NEC Climate Vulnerability Assessment, along with other available climate data, can be utilized in identifying and prioritizing areas for

implementation of risk reduction strategies.

As strategies are identified, explored, and ultimately implemented, they may be integrated with Engineering Practices or Specs (see Action 4) or other guiding documents. Implementation progress should be reported through participation on the Climate Resilience Steering Committee (see Action 2).

### ACTION TYPE:

Capital Planning, Operations, Design Standards

### LEAD DEPARTMENT:

Capital Delivery

### SUPPORTING DEPARTMENTS:

Strategy & Planning - Sustainability & Climate Group

### BENEFITS:



Operations



Direct Losses  
Avoided

### ESTIMATED COST:



## 22

## ADD CLIMATE ELEMENT OR TAB TO THE AIMS SYSTEM.

The EPMO Group, supported by IT and the Sustainability and Climate Group, will add a climate element or tab to the AIMS system (e.g. emulate Section 106 tab).

An opportunity exists to require all projects going through the AIMS system to consider climate resilience by adding a climate tab. Projects are planned for and reviewed through the AIMS system. This will ensure that projects will be assessed for climate resilience at a basic level as certain types of projects can be required to meet climate goals in AIMS before funding requests can be submitted.

**ACTION TYPE:**

Policy, Capital Planning

**LEAD DEPARTMENT:**

Enterprise Program Management Office (EPMO) Group

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group,  
IT

**BENEFITS:**

Operations



Direct Losses  
Avoided

**ESTIMATED COST:**

## 23

## ADD A CLIMATE CHANGE SECTION TO PROJECT CHARTER TEMPLATES.

The EPMO Group, supported by the Sustainability & Climate Group, will add a climate change section to project charter templates.

There is an opportunity to foster the implementation of climate resilience by adding a climate change section to project charter templates. Once this measure is accomplished, any project that requires a project charter will be required to address climate resiliency.

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

EPMO Group

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group

**BENEFITS:**

Direct Losses  
Avoided

**ESTIMATED COST:**

## 24

## ADOPT CLIMATE AND RESILIENCY REQUIREMENTS FOR PROJECT SCOPES OF WORK, REQUESTS FOR PROPOSALS, AND TERMS AND CONDITIONS.

Procurement will adopt climate and resiliency requirements for project Scopes of Work, Requests for Proposals, and terms and conditions.

There is an opportunity to foster the implementation of climate resilience through requirements to project Scopes of Work (SOWs), Requests for Proposals (RFPs), and project terms and conditions. In RFPs, a percentage of scoring could be devoted to climate considerations, for example.

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

Procurement

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group

Key Departments: Capital Delivery, Transportation, Strategy & Planning

**BENEFITS:**

Direct Losses  
Avoided

**ESTIMATED COST:**

## 25

## DEVELOP VENDOR REQUIREMENTS FOR CLIMATE RESILIENCE.

The Capital Delivery Department will develop vendor requirements for climate resilience and work with Procurement to incorporate them into evaluation requirements and scoring (e.g., corporate values, technical expertise).

There is an opportunity to expand existing vendor requirements to include climate resilience. Existing sustainability requirements for vendors can be used a guide/resource for incorporating climate resilience into vendor evaluation requirements and scoring. As the group that leads corporate climate resilience efforts at Amtrak, the Sustainability and Climate Group can support the Capital Delivery and Procurement in developing requirements and scoring criteria.

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

Capital Delivery  
Procurement

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group

**BENEFITS:**

Direct Losses  
Avoided



External partners

**ESTIMATED COST:**

## 26

**DEVELOP A MANDATORY RESILIENCY FORM TO BE COMPLETED AT APPROPRIATE TIMES DURING THE DESIGN PROCESS.**

The Capital Delivery Department's Project Delivery Group will develop a mandatory resiliency form (e.g., an environmental review form) to be completed at appropriate times during the design process (e.g., 15%, 30% design).

There is an opportunity to build resiliency into the design process through a mandatory resilience design form that must be completed at during specific milestones in the design process. This form would be similar to existing State Historic Preservation Act (SHPA), National Environmental Policy Act, and Environmental Clearance forms. Of note, capacity may need to be expanded within the Project Delivery team in order to have a climate subject matter expert (SME) tasked with reviewing resiliency forms (see Action 1 – Climate SMEs).

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

Capital Delivery – Project Delivery Group

**SUPPORTING DEPARTMENTS:**

Strategy &amp; Planning - Sustainability &amp; Climate Group

**BENEFITS:**Direct Losses  
Avoided**ESTIMATED COST:**

## 27

**INCORPORATE MINIMUM RESILIENCY STANDARDS INTO ENVIRONMENTAL RISK REVIEWS REQUIRED FOR 3RD PARTY ENGAGEMENT ON AMTRAK PROPERTY.**

The Strategy and Planning Department will incorporate minimum resiliency standards into environmental risk reviews (via the EOC form) that are required for 3rd party engagement on Amtrak property. Threshold criteria determining when resiliency standards must be applied (e.g., Amtrak maintenance is required, potential to impact Amtrak operations) will be developed as part of this action.

Third parties (e.g., third parties who build on or occupy Amtrak property) have the potential to impact the resilience of Amtrak's assets, systems, and operations. However, regulating third parties presents different challenges than implementing resiliency measures for Amtrak-owned assets and facilities. There is an opportunity to require minimum resiliency standards for third parties engaging on Amtrak property the environmental risk review process.

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

Strategy &amp; Planning – Real Estate

**SUPPORTING DEPARTMENTS:**

Strategy &amp; Planning - Sustainability &amp; Climate Group

**BENEFITS:**Direct Losses  
Avoided

External partners

**ESTIMATED COST:**

## 28

**EXPAND STI STRUCTURE TO INCLUDE ACHIEVEMENT OF CLIMATE RESILIENCE MEASURES ACROSS BUSINESS FUNCTIONS AND PERFORMANCE.**

The Executive Leadership Team will expand the Short-Term Incentive (STI) structure to include achievement of climate resilience measures across business functions and performance.

As opportunities to incorporate climate resilience measures grow and the Climate Resilience Strategic Plan is adopted, recognition and incentives for those who champion resilience and adaptation can be a driving force for implementation. Expanding the STI structure to include climate resilience achievements is a powerful tool for incentivizing senior management to achieve resilience goals.

**ACTION TYPE:**

Policy

**LEAD DEPARTMENT:**

Executive Leadership Team

**SUPPORTING DEPARTMENTS:**

Strategy & Planning - Sustainability & Climate Group

**BENEFITS:**

-  Reputation
-  People

**ESTIMATED COST:**

## 29

**LEVERAGE GEOMETRY CAR CAPABILITIES TO INCLUDE ARTIFICIAL INTELLIGENCE AND/OR DATA ANALYTICS.**

The Capital Delivery Department, with support from the Information Technology Department (IT), will leverage geometry car capabilities to include artificial intelligence and/or data analytics.

There is an opportunity to improve climate data collection and sharing by leveraging geometry car capabilities. A geometry car can collect data such as condition of tracks and track height relative to sea level. Using these capabilities, geometry car data could be used to track rail impacts from changing climate conditions (e.g., locations experiencing above expected sea level rise).

**ACTION TYPE:**

Capital Planning, Operations

**LEAD DEPARTMENT:**

Capital Delivery

**SUPPORTING DEPARTMENTS:**

IT

**BENEFITS:**

Operations

**ESTIMATED COST:**

