Penobscot Climate Action

Executive Summary

JANUARY 2024

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Penobscot Climate Action is a joint effort of local governments, organizations, and residents who live and work in the Greater Bangor region to advance climate goals locally and together as a region.
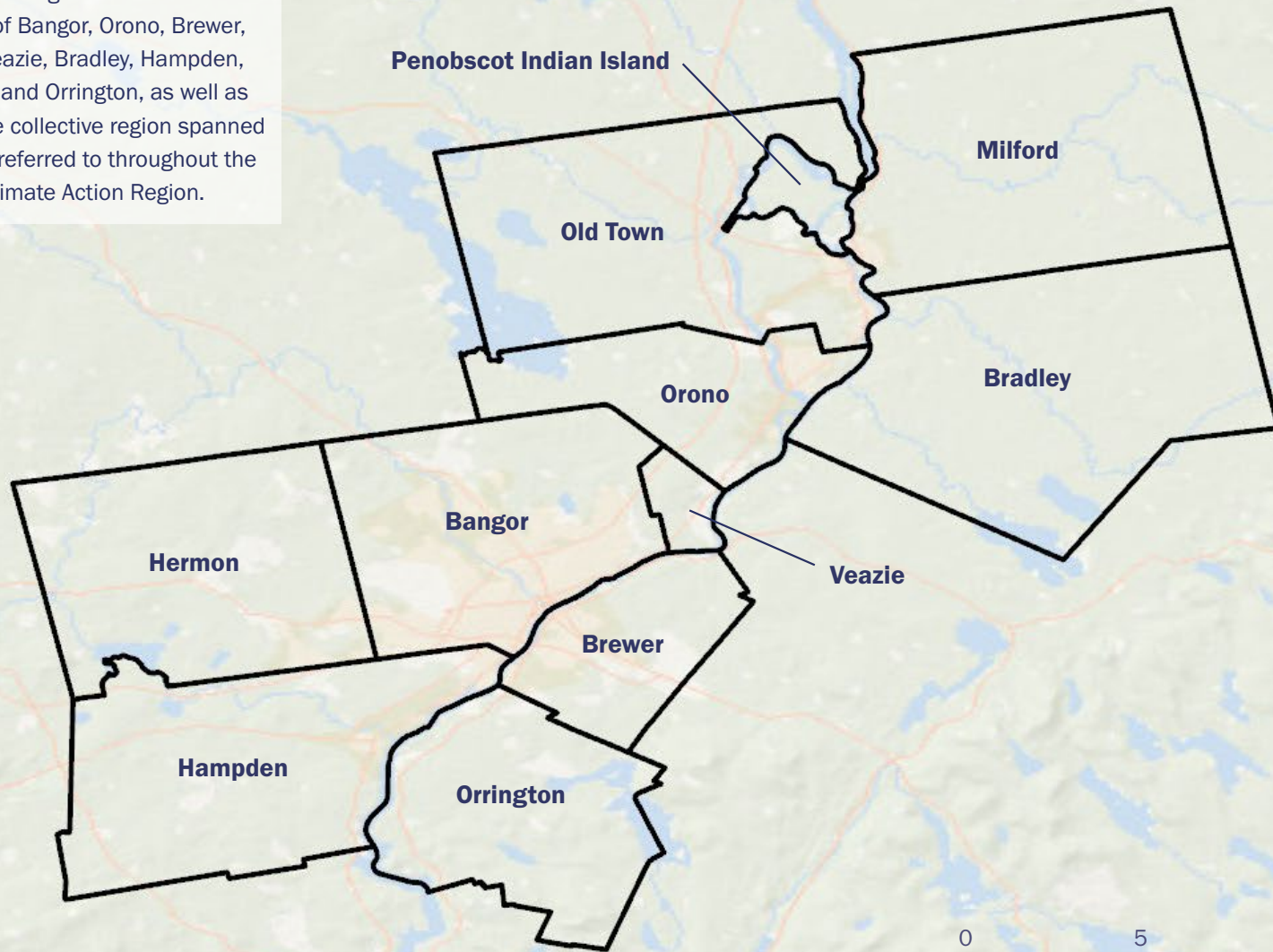
In 2020, the State of Maine launched "Maine Won't Wait," a plan for building climate resilience across Maine and reducing greenhouse gas emissions by 45% by 2030 (from 1990 levels), and 80% by 2050. Penobscot Climate Action is a joint effort of local governments, organizations, and residents who live and work in the Greater Bangor region to advance those goals locally and together as a region. The plan outlines strategies to reduce greenhouse gas emissions, support the local economy, enhance ecosystem health, improve regional infrastructure, and create conditions for communities to respond, adapt, and thrive in the face of a changing climate.

Penobscot Climate Action is data-driven and community-informed. The first phase of the project resulted in the **Climate Vulnerability Assessment** and **Greenhouse Gas (GHG)**
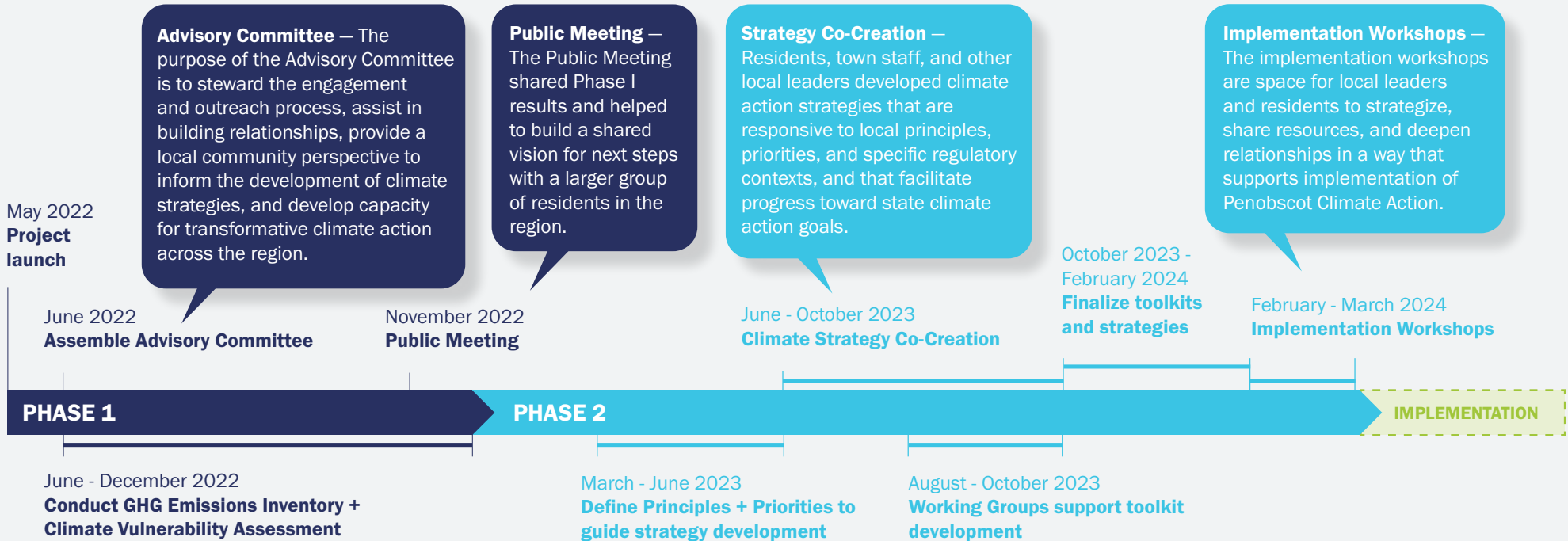
Penobscot River Walkway, Bangor

Penobscot Climate Action Region

Penobscot Climate Action is a regional collaboration between the communities of Bangor, Orono, Brewer, Penobscot Indian Island, Veazie, Bradley, Hampden, Hermon, Milford, Old Town, and Orrington, as well as the University of Maine. The collective region spanned by these communities was referred to throughout the project as the Penobscot Climate Action Region.

Penobscot Indian Island

Milford

Old Town

Bradley

Orono

Bangor

Hermon

Veazie

Brewer

Hampden

Orrington

0   5   10 miles

CHS, Esri, Garmin, NaturalVue, CHS, NOAA, OCS, Esri, Garmin

PROJECT TIMELINE

Advisory Committee — The purpose of the Advisory Committee is to steward the engagement and outreach process, assist in building relationships, provide a local community perspective to inform the development of climate strategies, and develop capacity for transformative climate action across the region.

Public Meeting — The Public Meeting shared Phase I results and helped to build a shared vision for next steps with a larger group of residents in the region.

Strategy Co-Creation — Residents, town staff, and other local leaders developed climate action strategies that are responsive to local principles, priorities, and specific regulatory contexts, and that facilitate progress toward state climate action goals.

Implementation Workshops — The implementation workshops are space for local leaders and residents to strategize, share resources, and deepen relationships in a way that supports implementation of Penobscot Climate Action.

May 2022
Project launch

June 2022
Assemble Advisory Committee

November 2022
Public Meeting

June - October 2023
Climate Strategy Co-Creation

October 2023 - February 2024
Finalize toolkits and strategies

February - March 2024
Implementation Workshops

PHASE 1   **PHASE 2**   **IMPLEMENTATION**

June - December 2022
Conduct GHG Emissions Inventory + Climate Vulnerability Assessment

March - June 2023
Define Principles + Priorities to guide strategy development

August - October 2023
Working Groups support toolkit development

Emissions Inventory. Using GIS-based mapping, a review of relevant climate science and projections, and interviews with residents and town staff, the **Climate Vulnerability Assessment** and **GHG Emissions Inventory** provide a baseline assessment of current and future climate risks for the region. These data served as the foundation for decision making and action planning that took place during the second phase of the project.

Creating a healthy and vibrant future where we have the capacity to bounce back stronger after new stresses requires that all residents have equitable access to meaningful economic opportunity, resources for health and wellbeing, as well as respect and dignity. During the second phase of the project, residents, town staff, and other local leaders identified a set of principles and priority focus areas that guided the

**PROJECT
PRINCIPLES**

development of the plan. The principles that guided the project
include:

⭐ **Equity and Environmental Justice**

⭐ **Environmental Health**

⭐ **Community Resilience**

⭐ **Regional Collaboration**

Strategies were developed to explicitly intersect with needs and
goals of the following regional priority focus areas:

**PROJECT
FOCUS AREAS**

⭐ **Housing**

⭐ **Transportation**

⭐ **Environment and Quality of Life**

⭐ **Local Economies and Livelihoods**

⭐ **Health**

Drawing on insight from community conversations and surveys,
community members and town staff then worked to identify,
develop, and prioritize climate actions. This process resulted in
identifying ten high-priority and high-impact strategies for the
region, and developing "climate action toolkits'' that package
resources and information that would make it easier to put
these strategies into action. See the ten climate action toolkits
on the following page.

While the toolkits provide specific information and resources
to kick-start implementation of ten individual high-priority,
high-impact actions, the toolkits are part of a larger suite of
mitigation and adaptation strategies. **Appendix A** serves as a
broader list of distinct actions that can be taken independently,
or in conjunction with the actions spelled out in the toolkits.
Together, these documents act as a comprehensive suite of
climate strategies that are meant to be easily accessible and
support implementation, achieve goals identified by community
members throughout the process, and facilitate progress toward
climate action goals as articulated in "Maine Won't Wait."

You can find additional information on the community-driven
solution co-creation process in **Appendix B** and the technical
GHG emissions methodology in **Appendix C**.
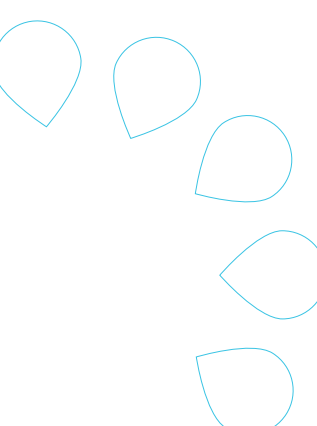
The Ten Penobscot Climate Action Toolkits

The toolkits include ten high-priority and high-impact strategies for the region, with resources and information to put these strategies into action.

Update Zoning and New Development Standards for Low-Carbon Resilience — 1.

Retrofit Existing Housing Stock — 2.

Create a Capacity Building Strategy for Public Transit — 3.

Partnerships to Promote Active and Public Transit — 4.

Foster Complete and Walkable Neighborhoods — 5.

Strengthen Local and Regional Food Resilience — 10.

Expand Community Hubs for Resilience — 9.

Strengthening the Green Trades Pipeline — 8.

Develop a Climate-Ready Business Resource — 7.

Adapt Land Management Practices to Support Resilience — 6.

A Regional Approach

Regional climate planning allows towns in the Penobscot Climate Action region to address challenges in coordination, leveraging limited financial resources and staff time while respecting the unique circumstances of individual communities.

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Regional Collaboration and Action

The impacts of climate change are felt across town boundaries, and holistic solutions require collaboration across jurisdictions. Regional climate action planning allows municipalities to address the impacts of a changing climate in a way that responds to regional scale-issues while respecting unique jurisdictional boundaries and leveraging limited financial resources and staff time. Proactive and well-coordinated adaptation extends beyond boundaries to efficiently share best practices, resources, and information, in a way that effectively fosters resilience across an entire region.

Penobscot Climate Action is a regional collaboration of eleven towns, led by the Bangor Area Comprehensive Transportation System (BACTS), the City of Bangor, and the Town of Orono. This plan provides a framework to strategically guide local action in a way that supports the well-being of the entire Greater Bangor region. While it is a regional plan, this comprehensive set of strategies can be tailored to meet local community needs and priorities, and to increase regional collaboration and capacity building over time.

Actions to Get Started

The following steps are recommendations that each municipality, regardless of size, can take to get started on taking action to support Penobscot Climate Action:

⭐ **Participate in the Climate Action Committee –** Identify a municipal staff person or member of Tribal government to join the Climate Action Committee, a committee hosted by Bangor Area Comprehensive Transportation System (BACTS) focused on coordinating and overseeing the implementation of Penobscot Climate Action.

⭐ **Identify a local game plan –** Convene a group of municipal staff, members of Tribal governments, and community volunteers, to review the toolkits and **Appendix A** and to select a set of actions that are most pressing and/or feasible for the community to prioritize and implement in the next one-to-two years. Highlight "second tier" actions that the community will pursue next.

⭐ **Adopt a resolution committing to climate action –** Work with the Town Council or Tribal members to adopt a resolution that commits the community to taking climate action, in line with the recommended actions laid out in Penobscot Climate Action. The City of Bangor adopted a Resolve in 2021, which could be adapted for other communities in the region.

Energy and Emissions Modeling

One of the primary goals of Penobscot Climate Action is to reduce greenhouse gas emissions in the region. To analyze options toward advancing that goal, the project team developed a Community Energy and Emissions Planning (CEEP) model to inform and model strategies to reduce all quantified sources of GHG emissions in the region.

The CEEP model is built on and aligned with the 2019 GHG emissions inventory that was completed as part of Phase 1 of the project. The project team used the model to estimate future

energy and emissions under both a Business-as-Usual (BAU) scenario and a Policy Scenario which quantifies the potential impact of future actions on different sectors (e.g., buildings, transportation, waste) out to 2050. The Policy Scenario includes baseline assumptions such as population growth and new development in the region, the relevant policy actions included in the plan's toolkits and additional strategies, any relevant federal and state-wide policies such as fuel economy standards and Maine's renewable portfolio standard (RPS), and additional assumptions outside of policy (e.g., retrofit rates)
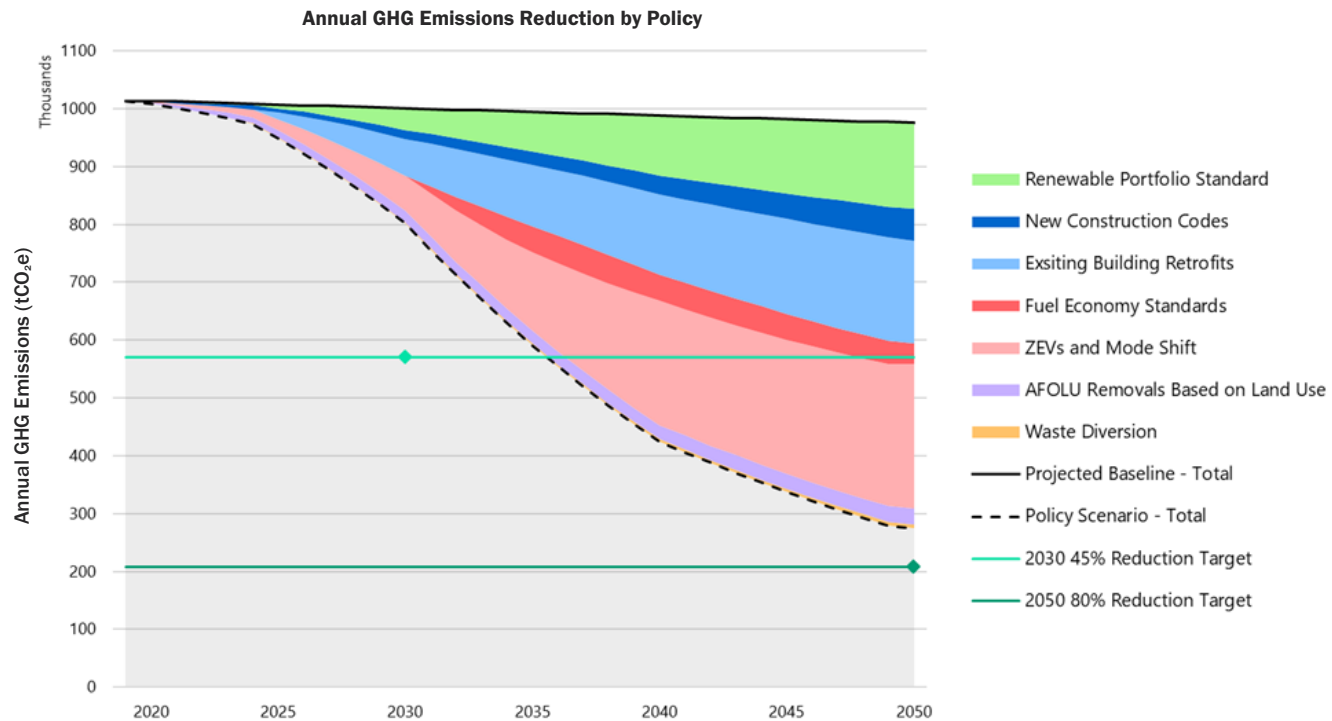

Figure 1. GHG emissions reduction in the PCA region under the Policy Scenario

that are based on best practice and are made to reflect the scale of action needed to reasonably achieve GHG reductions across sectors.

Figure 1 demonstrates how specific policy areas, represented by the colored "wedges" in the chart, can contribute to GHG emissions reductions in the region between the 2019 baseline year and 2050. Each wedge is made up of a group of related strategies at the federal, state, and regional level, including many in the plan. For example:

⭐ **Building and energy strategies** such as new development standards and building retrofits are reflected in the new construction codes and existing building retrofits wedges;

⭐ **Transportation system strategies** such as vehicle electrification and additional mobility options are reflected in the ZEVs (zero emissions vehicles) and mode shift wedge;

⭐ **Environment, water, and waste system strategies** such as land management practices and zero waste initiatives are reflected in the AFOLU (agriculture forestry and other land use) removals and waste diversion wedges;

⭐ **Local economies and livelihood strategies** do not directly contribute to GHG emissions reductions, but help advance many of the above policy areas.

Based on the policies and other assumptions modeled above, GHG emissions in the region are projected to decrease by about 73% by 2050 relative to the 2019 baseline. The areas with the most significant potential for GHG emissions reductions are

due to transportation policies that contribute to ZEV adoption and mode shift, existing building retrofits, and the State's renewable portfolio standard (RPS), or greening of the grid.

While Penobscot Climate Action does not include any formal GHG emissions reductions targets, the modeling was completed in an effort to align with the 2030 and 2050 targets set in the State's "Maine Won't Wait" plan. As currently modeled, the region may fall short of these targets, though it should be noted that this is not a definitive analysis; many of the assumptions in the model are conservative and greater reductions may be possible with additional state and federal support. Nevertheless, more action is likely needed, particularly in the areas of existing buildings and new construction, and it is recommended that the region adopts formal GHG targets and completes further analysis as specific strategies are implemented.

The regional inventory of GHG emissions, completed during Phase I of the project, is included in the Regional Inventory of 2019 Greenhouse Gas Emissions report. A full technical methodology memo for the GHG emissions modeling is included in **Appendix C**.

Strategies for Action

Buildings and Energy

Buildings are a key component of both mitigation and adaptation in the region. As identified in Phase I by the **Climate Vulnerability Assessment**, the region's critical infrastructure (such as homes, public buildings, and energy systems), and vulnerable groups (such as seniors and people with disabilities), face significant vulnerabilities related to increases in flooding, extreme weather, and extreme heat.

Over 60% of the region's GHG emissions footprint is attributable to energy use in buildings. As such, all of the strategies related to buildings and energy have some of the greatest opportunities to influence emissions reductions. Emissions in the building sector result from the burning of fossil fuels (mostly natural gas and fuel oil) and electricity use. By improving the energy efficiency of the existing building stock, supporting the transition away from fossil fuels, and expanding renewable energy generation for a cleaner electric grid, strategies related to buildings and energy use represent a critical component of climate action in the region.

In addition to significant potential for GHG emissions reductions, actions related to buildings and energy pose significant potential for community safety, health, and resilience. Access to safe housing that can withstand the impacts of extreme weather is critical for all residents of the region, especially seniors and people with disabilities, for whom access to heating in the winter, cooling in the summer, and electricity for specific devices can be life or death.

Downtown Bangor • Photo by Matthew Dewitt

Housing support and service programs for those experiencing housing insecurity also need to be reinforced so services aren't interrupted during extreme weather events. See the following toolkits, which outline steps for implementation and resources for the region to take action towards those goals:

⭐ **Toolkit #1 -** Update Zoning and New Development Standards for Low-Carbon Resilience

⭐ **Toolkit #2 -** Retrofit Existing Housing Stock

Beyond these key strategies, see **Appendix A** for more actions that provide additional ways communities in the Penobscot Climate Action Region can make progress towards the region's climate goals.

Transportation Systems

Transportation systems have the potential to build community resilience by ensuring access to jobs, education, healthcare, and food. When transportation systems are interrupted by extreme weather events, residents could experience negative impacts such as lack of ability to access food, medicine, or economic opportunities. Creating a more accessible, sustainable, and resilient transportation system will make it easier for residents to get around, reduce GHG emissions and improve air quality, and make transportation infrastructure more resilient to the impacts of climate change, which also reduces the financial impact on municipalities.

Transportation is responsible for approximately one third of the region's GHG footprint. Climate action strategies geared toward transportation systems can significantly reduce GHG emissions by encouraging a shift in travel modes away from driving passenger vehicles and reducing vehicle miles traveled (VMT) in the region. The electrification of public transit and municipal fleets, along with expanded electric vehicle (EV) charging infrastructure to support the EV transition, will further reduce emissions associated with vehicles using fossil fuels.

Making it easier, safer, and more accessible to take public transportation, walk, ride a bike, or travel by other modes of active transportation was a top priority for working group members based on its ability to simultaneously support equity, climate justice, community resilience, carbon mitigation, and regional collaboration goals. See the following toolkits, which outline steps for implementation and resources for the region to take action towards those goals:

Buses stop off at the Bangor Area Transit Center • Photo by the Community Connector

Toolkit #3 - Create a Capacity Building Strategy for Public Transit

Toolkit #4 - Partnerships to Promote Active and Public Transit

Toolkit #5 - Foster Complete and Walkable Neighborhoods

Beyond these key strategies, see **Appendix A** for more actions that provide additional ways communities in the Penobscot Climate Action Region can make progress towards the region's climate goals.

Environment, Water, and Waste Systems

Data from the **Climate Vulnerability Assessment** highlight the vital role that the region's lands and natural areas play in providing flood mitigation, clean drinking water, cooling for neighborhoods in hot weather, carbon sequestration, and more. The region's forests, which comprise 50% of the region's land cover, are threatened by rising temperatures, which lead to reduced plant, tree, and animal health, and impact services like canopy cover, erosion, flooding, and biodiversity. These consequences will affect agriculture, recreation, and residents' enjoyment of outdoor benefits. Regenerating soil health, managing invasive species, and promoting biodiversity contribute to ecosystem resilience, and in turn, support community health, well-being, and the local economy. The following toolkit outlines steps for implementation, and resources for the region, to take action towards adapting land management practices that support regeneration and resilience:

⭐ **Toolkit #6 -** Adapt Land Management and Conservation Practices to Support Resilience

Additionally, local waterways, including the Penobscot River, are crucial for the region's culture and well-being, and are facing threats like increased surface water temperatures and contamination from stormwater runoff and sewage overflows. The strategies outlined in **Appendix A** identify opportunities for storm and wastewater upgrades to address water quality and contamination. These strategies can reduce damage to critical infrastructure, and therefore, reduce financial burdens on municipalities. (Note: Maine is increasing opportunities to

Old Town Park and the Penobscot River • Photo by Matthew Dewitt

fund storm and wastewater upgrades. See MaineDOT Municipal Stream Crossing Program as an example.)

While the waste sector is only responsible for approximately 1.6% of the region's GHG footprint, the strategies in **Appendix A** still present an opportunity to reduce emissions associated with both solid waste disposal and wastewater, as well as improve ecosystem health and well-being. By supporting waste reduction and diversion from landfills, along with increased wastewater efficiency, communities can continue to advance net zero goals while ensuring that the emissions associated with waste do not increase proportionally over time.

Local Economies and Livelihoods

The **Climate Vulnerability Assessment** found that while small businesses are a major asset to the region, and contribute to the local economy, small businesses are experiencing many pressures due to the impacts of COVID-19, inflation, and supply chain disruptions. Extreme weather and climate-related disasters will continue to strain the ability of local businesses to thrive, and could dampen the local economy. The most commercially developed area of Bangor, for example, is also one of the most vulnerable areas to flooding.

The strategies geared toward the local economy and livelihoods do not directly reduce GHG emissions in the region but do contribute to the advancement of other actions that can be highly impactful. By supporting businesses to advance their own sustainability efforts, and by growing the local workforce in the green trades, these strategies will support the uptake of energy efficiency improvements, building retrofits, and renewable energy systems in the region. See the following toolkits, which outline steps for implementation and resources for the region to take action towards those goals:

⭐ **Toolkit #7 -** Develop a Climate-Ready Business Resource

⭐ **Toolkit #8 -** Strengthen the Green Trades Pipeline

For more actions related to supporting small businesses and the local economy, and additional ways for communities in the Penobscot Climate Action Region can make progress towards the region's climate goals, see **Appendix A**.

Solar panel installation • Photo by Stephen Yang

Health

Climate impacts such as extreme heat, poor water and air quality, and interruptions to transportation or energy systems, can lead to serious health risks, especially for vulnerable populations in the region. According to the **Climate Vulnerability Assessment**, seniors – who make up almost 20% of the region's population – are exceptionally vulnerable to the impacts of climate change. Seniors are at higher risk of illness or death related to extreme temperatures, or loss of power or access to medical care caused by extreme weather events. Other vulnerable populations, such as people with disabilities, people with chronic health conditions, and people living in poverty, are also at greater risk due to challenges in accessing the healthcare they need. Making it easier to access healthcare services before and during an extreme weather event will support the overall well-being and resilience of the region. See the following toolkits, which outline steps for implementation and resources for the region to take action towards those goals:

⭐ **Toolkit #9 -** Expand Community Hubs for Resilience

⭐ **Toolkit #10 -** Strengthen Local and Regional Food Resilience

Photo by Anna Ackerman