BSC GROUP

MEMORANDUM

To:	ResilientMass Metrics Project Management Team	**Date:**	May 1, 2024
From:	Industrial Economics (Jackie Willwerth) on behalf of ResilientMass Metrics Consultant Team	**Proj. No.**	0100583.00
Re:	ResilientMass Metrics Task 1 Summary		
Cc:			

The ResilientMass Metrics effort intends to build on existing efforts within the Commonwealth and draw from relevant experiences in other states to design an effective framework for climate resilience metrics. The purpose of Task 1 was to:

1. Review similar frameworks used in other states, municipalities, and organizations to get a sense for what has been done, what works well, and what can be improved upon for the development of this metrics framework, and
2. Identify existing goals, indicators, and metrics currently used in Massachusetts.

The results of this effort were presented at a kickoff meeting with state agency leads on March 14, 2024, and are summarized in this memo.

1. Review of Existing Frameworks

Our team identified a set of existing frameworks to review to inform the ResilientMass Metrics framework. The review included the following frameworks and programs:

- Resilient Houston
- Minnesota Resilience Metrics
- O'Ahu Resilience Strategy and Annual Sustainability Report
- Maine Won't Wait Plan and Progress Report
- Maine Won't Wait Equity Metrics
- California Climate Adaptation Strategy
- North Caroline Climate Strategy Reports
- Colorado Resiliency Playbook
- Maryland Climate Adaptation and Resilience Framework
- Boston Climate Action Progress
- Keene, New Hampshire Climate Adaptation Action Plan
- NAACP/Brookings Black Progress Index

In reviewing these frameworks, the project team identified six key elements to consider when constructing an effective framework: Development Process, Implementation, Indicator Types, Equity Focus, Baseline and Target Setting, and Visualization and Reporting. While none of the reviewed frameworks represented a perfect template across all these elements, many of the frameworks did include compelling examples of each that will be worth considering as we continue with the framework development for Massachusetts.

Key takeaways for each of the framework design elements are discussed below.

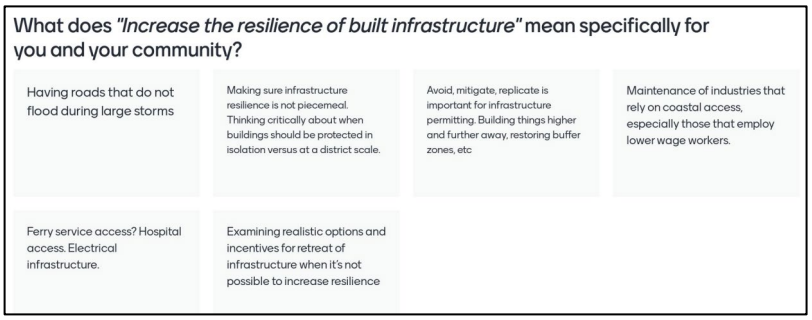
Development Process

Framework development requires grounded goals and a defined target audience. Starting with a clear sense of the framework's purpose and intended user base allows for tailored design of all other components. This also

ensures that the right sets of experts, stakeholders, and users can be engaged throughout the process (see **Figure 1)** and that the selected indicators and metrics will support the overall aims of the framework and its users (see **Figure 2**). Many of the reviewed frameworks included broad goal statements regarding improved resilience. Examples such as the Resilient Houston metrics (shown in **Figure 2**) and the Minnesota Resilience Metrics had clear links to high-level, yet focused goal statements which was a structure that seemed to work well. Involving stakeholders, starting with goal development, allows all potentially affected parties to be involved in defining what success looks like. Our proposed approach involves frequent touchpoints with various stakeholder groups to build buy in and define successful climate resilience.

Figure 1. Stakeholder Engagement in Indicator Development Process

O'Ahu Resilience Strategy



Massachusetts ResilientCoasts

Figure 2. Targets Connected to Broader Goals

Resilient Houston

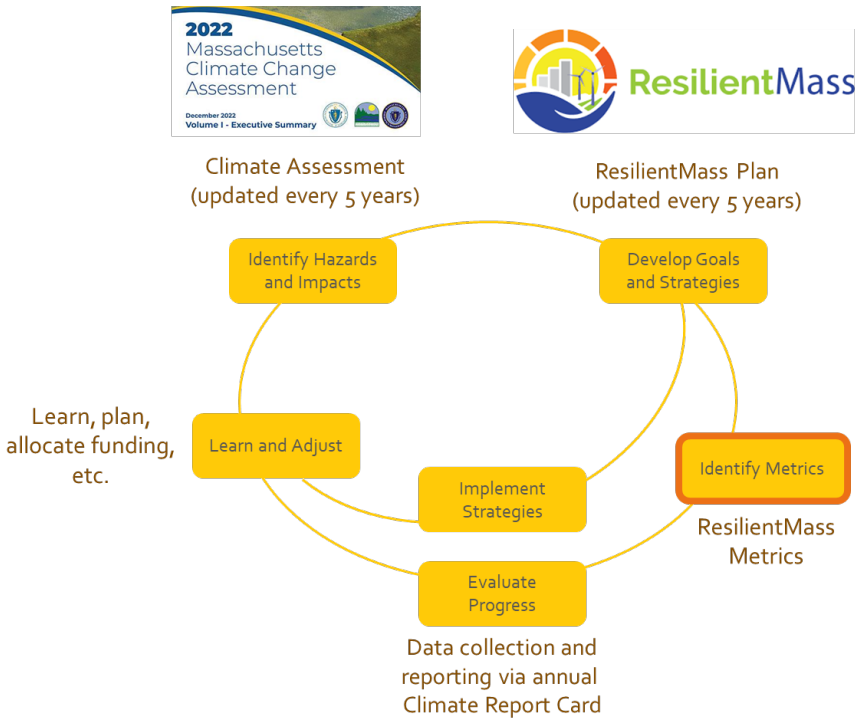
Implementation

Metrics are only effective when backed up by a concrete implementation plan. This includes specifying who is responsible for collecting and reporting relevant data, defining a schedule for updating and releasing data, and periodically reviewing and adjusting the framework to ensure that the reported metrics continue to be accurate and useful. Identifying funding mechanisms to support these ongoing processes is vital to the continued functioning of metrics frameworks.

While the details of the implementation plan for ResilientMass Metrics will be developed later in the process, **Figure 3** demonstrates how the ResilientMass Metrics fit into the broader set of climate adaptation and resilience efforts occurring in Massachusetts. Communicating an understanding of this context will allow

stakeholders to understand the use and purpose of the metrics while contributing to the framework development. This figure also demonstrates the process by which metrics can be evaluated and adjusted over time to ensure the metrics measure the "right things" and measure "things right" – that is, the metrics adequately and accurately capture resilience success.

Figure 3. ResilientMass Metrics as a part of a series of statewide efforts

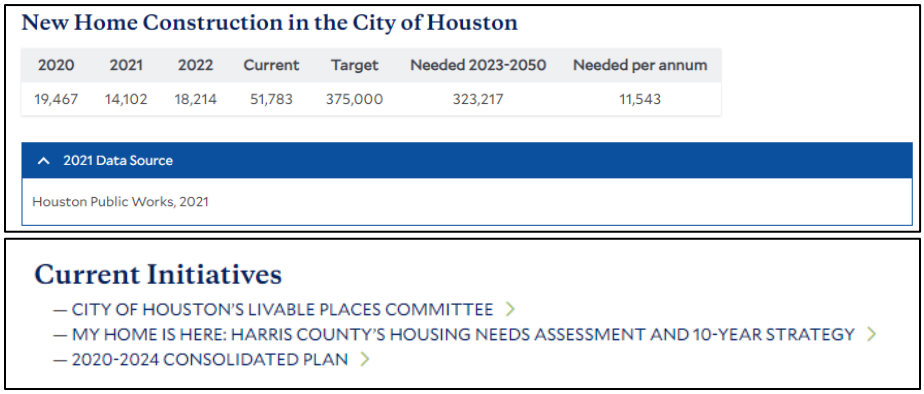


Indicator Types

At minimum, metrics need to be feasible and sustainable to measure and report, but the best metrics are scalable, comparable, and aggregable so that they can be readily used to make decisions and set priorities across time and space. Metrics that are tied to strategies allow for better understanding of how ongoing actions influence the metric (rather than outside factors). The example in **Figure 4** shows a feasibly quantified metric, with a stated data source, and clear links to ongoing initiatives that are expected to influence the metric.[1]

[1] Note the examples shown in this memo are not suggested as perfect metrics across all considerations. The particular metric in this example could pose issues of unintended consequences such as sprawl and/or loss of open space but it provides a good example of the data transparency and connection to strategies discussed in this section.

Figure 4. Example of Feasible Metrics with Clear Data Sources and Links to Strategies



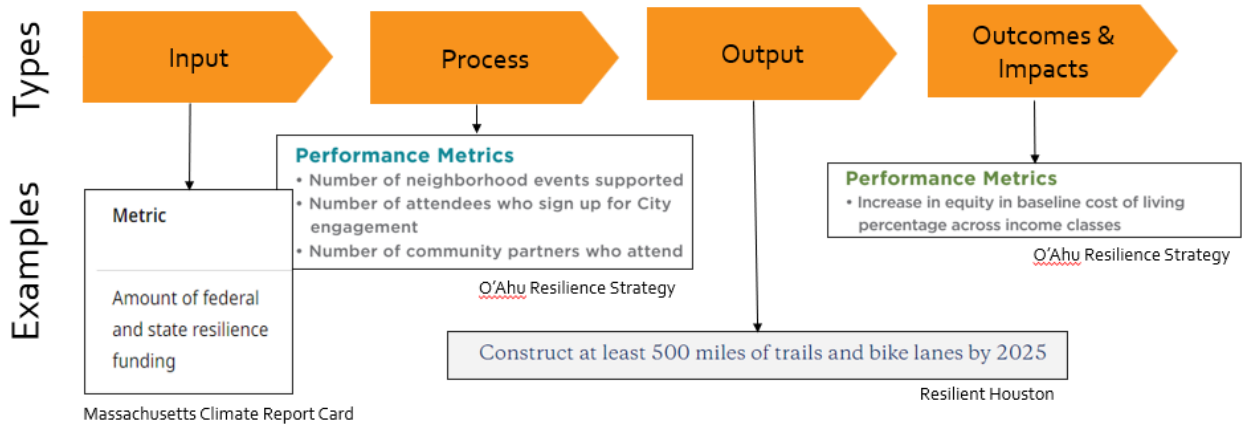
Resilient Houston

Frameworks can and should include a mix of qualitative and quantitative indicators of the following types:

- **Inputs**: measures of enabling conditions for adaptation
- **Process**: measures of quality and effectiveness of methods
- **Outputs**: measures of concrete products, services, or actions
- **Outcomes/Impacts**: measures of long-term primary or secondary effects of interventions

Examples are shown in **Figure 5**. While concrete inputs and outputs like funding provided or acres of habitat protected are easiest to track, they give less insight into the impact and effectiveness of actions than outcome- or impact-based metrics. Input and output metrics are still important, however, because they are more directly connected to resilience actions and therefore progress can be attributed to action taken rather than outside factors. Process metrics also serve an important process in making sure *how* resilience is built meets stated objectives and allows for all voices to be heard, ultimately resulting in outcomes that best serve all stakeholders.

Figure 5. Types of Indicators and Metrics



Although the set of metrics included in the ResilientMass Metrics framework will be determined later in this process, we intend to include metrics from across this spectrum to track both long-term outcomes and short-term progress.

Equity Focus

An equity-focused framework is one whose indicators elevate climate resilience concerns that are relevant and meaningful to clearly defined priority populations across sectors. The foundation for an equity focus lies in meaningful involvement during the development process, as described above, to understand what the most important concerns are.

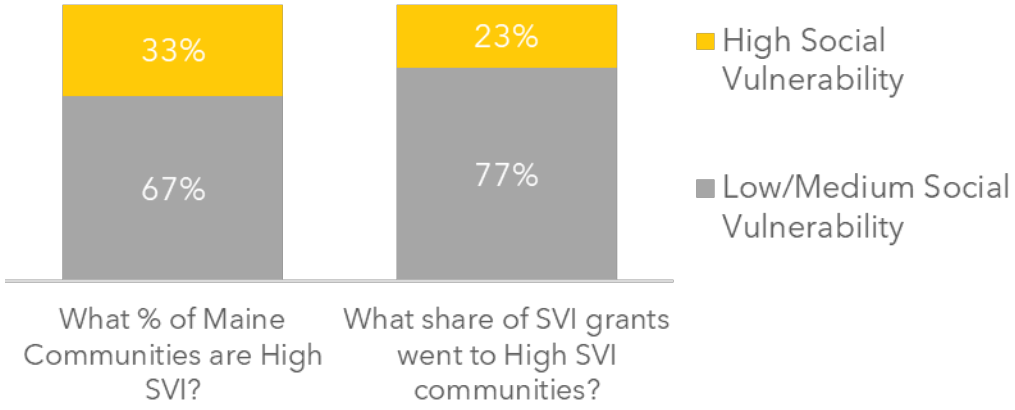
Metrics that focus equity can manifest in several ways. The two examples in **Figure 6** and **Figure 7** show how the distribution of resilience actions can be tracked specifically for priority populations. **Figure 7** in particular shows the importance of presenting distributional metrics in context. In this example, if the display only included the share of grants to priority communities it would not be clear if the percentage was high or low in comparison to the share of communities defined as priority. It is also important to note that in order to report metrics for specific priority populations, the data need to be collected at a fine enough resolution to support that differentiation.

Figure 6. Example of Parallel Equity and Statewide Metrics

Statewide Indicator	Equity Outcome Metrics
Significant critical adaption infrastructure projects completed	Distribution of climate-ready infrastructure projects by priority community and geography[36]

Maine Won't Wait Equity Metrics

Figure 7. Example of Equity Metric Shown in Context



Maine Won't Wait Equity Metrics

Integrating an equity focus throughout the framework involves more than designing equity-focused metrics. All metrics should be considered through an equity lens to confirm there are no unintended consequences promoted through the selected metrics and that the selected metrics do not rely on data sources with reporting biases or other issues that may result in priority population concerns not being accurately accounted for in the framework. Consideration of non-traditional data sources is one way of potentially countering biases in traditional data sources.

Equity will be an important focus of ResilientMass Metrics through the designation of specific equity goals and metrics, focus on impacts to environmental justice and other priority populations, and meaningful involvement of stakeholders through mechanisms such as the Equity Advisory Group.

Baseline and Target Setting

Assessing baseline conditions is vital to setting achievable goals. When possible, targets should be set relative to these dynamic baseline conditions such that targets remain meaningful as baseline conditions change. For example, a preferred metric for reduction in flood risk might track the proportion of vulnerable homes elevated rather than the absolute count such that changes in the housing stock and in the expansion of flood zones are accounted for in the measurement. Integration with existing plans and strategies can also facilitate appropriate target setting.

For this effort, we will rely on existing initiatives and data sources wherever possible to define baseline conditions. In some cases, where the data are not readily available, we may identify a data gap that will need to be filled before tracking can begin on a particular metric or setting a definitive target.

Visualization and Reporting

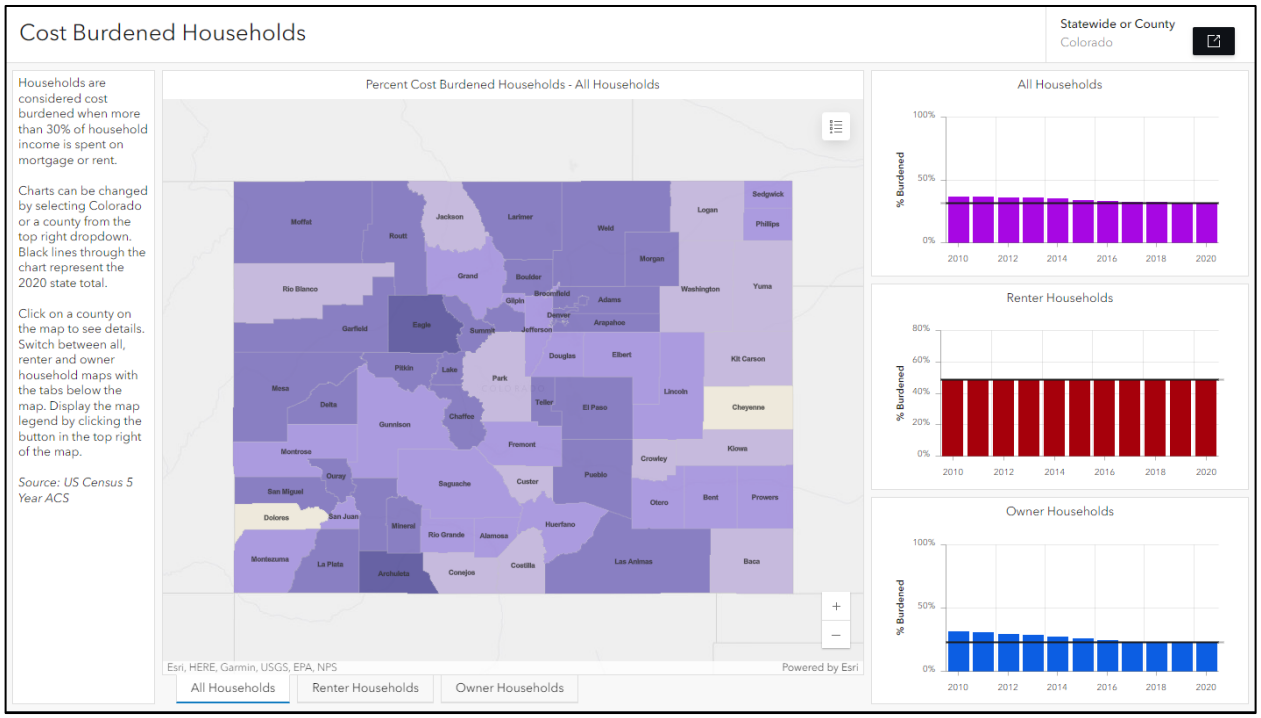
Reporting of data should be succinct, easily understandable, and accessible to all, with additional detail available to those who are interested. The example in **Figure 8** shows one high-level goal ("Healthy & Connected Bayous") with three targets nested beneath displaying key facts about the target (% complete, target statement, status, and recent accomplishments). The dashboard allows users to click on each target to learn more (shown in the second panel). This allows users to get a high-level picture of how progress on the major goals is progressing in one screen and provides more details for those interested.

Figure 8. Example of Nested Information with Simple Overview

Resilient Houston

Reporting metrics by geography and by priority population in dashboards and other visuals allows users to engage with the data in ways that best suit their needs and enables identification of patterns and exploration of equity. For a state-level framework, providing stratified and spatially resolved data (as shown in **Figure 9)** is particularly useful because for facilitating use of data in regional and local efforts and promoting coordination across geographies. An interactive dashboard, as shown in this example, may allow users to explore dimensions of the data that are most relevant to them. Dashboards should be accompanied by guidance and/or summary documents so the main message is clear among all of the potential cuts of data.

Figure 9. Example of Spatially Resolved Data Reporting



Colorado Resiliency Playbook

2. Existing goals, indicators, and metrics currently used in Massachusetts

As part of Task 1, the consultant team reviewed current Massachusetts agency plans and initiatives to inventory existing climate resilience metrics, goals, and targets that could be incorporated into ResilientMass Metrics. Our review included the initiative listed in **Table 1**.

Table 1. Recent and Ongoing Massachusetts Agency Climate Resilience Initiatives

Name	Lead	Date
Massachusetts Clean Energy and Climate Metrics	Executive Office of Energy and Environmental Affairs (EEA)	June 2022
Massachusetts Clean Energy and Climate Plan for 2050	EEA	December 2022

Name	Lead	Date
Massachusetts Climate Change Assessment	EEA	December 2022
ResilientMass Plan/Action Tracker	ResilientMass Action Team (RMAT)	September 2023, updates ongoing
Recommendations of the Climate Chief	The Office of Climate Innovation and Resilience	October 2023
Massachusetts Climate Report Card	The Office of Climate Innovation and Resilience / EEA	December 2023
Municipal Vulnerability Preparedness Program	EEA	MVP 2.0 developed in 2023
Massachusetts Environmental Justice Strategy	EEA	February 2024
Forests as Climate Solutions	Climate Forestry Committee appointed by EEA	2023
Beyond Mobility	MassDOT	March 2024
Biodiversity Goals in the Commonwealth	EEA Department of Fish and Game	Initiated by Executive Order No. 618 in September 2023
ResilientCoasts Initiative	EEA Office of Coastal Zone Management	Ongoing/Forthcoming
No Net Loss of Carbon	Massachusetts Department of Environmental Protection Bureau of Water Resources, Wetlands Program	Ongoing/Forthcoming
Resilience Playbook	EEA and the Metropolitan Area Planning Council (MAPC)	Ongoing/Forthcoming

Table 2 summarizes the indicators and metrics from the reviewed initiatives that are most relevant for the purposes of climate resilience. Note that several initiatives are underway concurrently with this effort (e.g. the last three initiatives in the table above). Metrics and indicators from these initiatives will be incorporated as they become available.

The EEA Environmental Justice Strategy includes metrics from a number of Agency departments related to environmental justice and equity. These metrics are listed in **Table 3.**

These existing indicators and metrics provide us with a base set of metrics to consider when building out the ResilientMass Metrics framework.

Table 2. Indicators/Metrics from Massachusetts Agency Initiatives

Sector	Indicator/Metric	Baseline	Target	Source
General	Amount of federal and state resilience funding	State resilience-related funding: • >$90 million in FY24 Federal resilience-related funding: • $26.5 million in FEMA funding for natural hazard mitigation and resilience from CY19-23 • $198 million through ARPA, BIL/IIJA, and other federal funding sources to support resilience-related projects and programs, awarded from FY19-23	-	2023 MA Climate Report Card
General	Number of state agencies with climate vulnerability assessments of assets and operations	88 of 92 agencies (96%) identified through the 2023 ResilientMass Plan update process have developed climate vulnerability assessments.	100% of relevant state agencies should have climate vulnerability assessments of assets and operations by 2026.	2023 MA Climate Report Card
General	Number of communities with updated MVP 2.0 or Hazard Mitigation Plans (HMPs)	MVP 2.0: • 33 communities (10%) are updating their MVP plans in the 2023 pilot round of the 2.0 program; this includes one 6-community regional project • 349 (99%) of communities completed MVP 1.0 plans by 2023 • 1 tribe Hazard Mitigation Plans: • 211 (60%) communities with FEMA approved hazard mitigation plans	Incorporate lessons learned from pilot into MVP 2.0 and have 100% of communities and Regional Planning Agencies participating in MVP 2.0 and/or having updated Hazard Mitigation Plans by 2030.	2023 MA Climate Report Card
General	Percent of 2023 ResilientMass Plan actions in progress	69% of 2023 ResilientMass Plan actions are either in progress or in development (preparing for implementation) 11 of 15 cross-governmental actions 87 of 127 agency-specific actions	100% of 2023 ResilientMass Plan actions should be in progress by 2026	2023 MA Climate Report Card

Sector	Indicator/Metric	Baseline	Target	Source
Infrastructure / General	Amount of federal relief funding Massachusetts has received as a result of natural hazards or declared disaster events	-	[n/a]	Beyond Mobility
Infrastructure	Number of CIP projects that address locations found (through a statewide flood risk assessment) to be vulnerable or at high risk for flooding and other natural hazards	-	Increase (no numerical target set)	Beyond Mobility
Infrastructure	Travel time reliability in Greater Boston	-	Increase (no numerical target set)	Beyond Mobility
Infrastructure	Travel time reliability and day-of-week variation	-	Increase (no numerical target set)	Beyond Mobility
Equity & Environmental Justice	Number of Federal grants pursued and awarded relevant to environmental justice populations. Ensure grant proposals include meaningful input from the Justice40 Working Group to result in a robust and competitive grant scope, allocate grant budget equitably, and meet the Justice40 Initiative targets.	Tracking is under development.	There are no current targets for this metric at this time.	2023 MA Climate Report Card
Equity & Environmental Justice	Number of public engagement and training for external community organizations and partners, and the number of internal trainings for EEA agencies.	Tracking is under development.	There are no current targets for this metric at this time.	2023 MA Climate Report Card
Equity & Environmental Justice / Human Health & Welfare	Creation, preservation and access to open spaces and healthy affordable foods in environmental justice communities.	Tracking is under development.	There are no current targets for this metric at this time.	2023 MA Climate Report Card
Human Health & Welfare	Ozone precursor pollutants (e.g., particulate matter, nitrogen oxides, volatile organic compounds, etc.) and other emissions from transportation sources broken down by EJ vs. non-EJ communities	-	Decrease (no numerical target set)	Beyond Mobility
Natural Environment	Natural and working lands conserved, expressed as area and percent of MA	27% of the state (1.395 million acres) was permanently protected in 2022.	Increase permanent conservation to at least 28% by 2025, at least 30% by 2030, and at least 40% by 2050.	2023 MA Climate Report Card, CECP Metrics, Forests as Climate Solutions

Sector	Indicator/Metric	Baseline	Target	Source
Natural Environment	% of MA area classified as Natural and Working Lands	88.1% in 2021	-	CECP Metrics
Natural Environment	Forest land conserved	Currently 35% of forest land is protected	-	Forests as Climate Solutions
Natural Environment	% of MA area classified as forest	55.8% in 2021 (2.899 million acres)	-	2023 MA Climate Report Card/CECP Metrics
Natural Environment	Forest land conversion rate	4,000 acres per year	2,000 acres by 2030	Forests as Climate Solutions
Natural Environment	Forest land in reserve status	Currently <4% of the state is in reserve status	-	Forests as Climate Solutions
Natural Environment	Natural and working land area	NWL accounted for 88% of the state (or 4.576 million acres) in 2021	-.	2023 MA Climate Report Card

Table 3. Environmental Justice & Equity Metrics from the 2024 Environmental Justice Strategy

Office/Department	Metrics
Office of the Secretary	No specific metrics listed.
CZM	No specific metrics listed.
Office of Law Enforcement and MA Environmental Police	• Budget spent on language services • How many documents translated • Social media postings • How many instances of interpreters used • Trainings hosted internally • Trainings hosted by MEP on MEP topics in EJ communities • MEP Staff attendance at EJ Trainings • Hiring demographic numbers

Office/Department	Metrics
Massachusetts Environmental Policy Act Office	• Number of MEPA projects located within 1 mile and 5 miles of EJ populations, together with breakdown of "ENF" and "mandatory EIR" projects • Number of MEPA projects utilizing best practices for community engagement • Number of MEPA projects providing mitigation for EJ impacts • Number of MEPA projects providing language services • Number and types of documents generated by the MEPA Office for which language translation is provided • Number of EJ trainings held for staff • Number of public trainings or recorded seminars held or produced regarding MEPA review procedures and ways to participate in MEPA reviews
Massachusetts Office of Technical Assistance	• Percent of site visits conducted in or within one mile of EJ neighborhoods. • Funding decisions, such as TURI grants awarded to businesses and organizations serving EJ populations and/or located in or within one mile of an EJ neighborhood, and to municipalities with one or more EJ neighborhoods. • Number of referrals OTA has received from other Agencies such as DEP, Local Boards of Health, or Fire Departments in or within one mile of EJ neighborhoods. • Number of trainings delivered to stakeholders and/or businesses and manufacturers regarding EJ. • Any cumulative impact analysis tools, outreach, education, or guidance developed that pertain to reducing the use of toxic chemicals impacting EJ populations. • Should sufficient data make it feasible, OTA will attempt to also track the pounds of chemicals, including VOCs and toxics, reduced in or within one mile of EJ neighborhoods, and water and energy conservation achievements in or within one mile of EJ neighborhoods.
Massachusetts Department of Agricultural Resources	• Tracking of translation requests and fulfillment • Number of new applicants for grant programs from EJ Communities and BIPOC Farmers • Number of documents translated • Trainings hosted internally for staff by EEA or NGO • Number of new, non-English media outlets to disseminate information in EJ Communities
Massachusetts Department of Conservation and Recreation	No specific metrics listed.
Massachusetts Department of Environmental Protection	• Grants ▪ Total amount (dollars) of grants awarded.

Office/Department	Metrics
	▪ Total amount (dollars) awarded to municipalities with EJ populations. ▪ Percentage of total grant funding directed to entities in municipalities with EJ populations. ▪ Total number of awards and amount (dollars) awarded to community-based organizations. • Hiring ▪ Number of paid internships offered annually. • Public Engagement/Comments/Response ▪ Develop and use survey that asks: • Were your concerns heard? • Were you listened to? • Did MassDEP explain how concerns were considered in its decision? • How can MassDEP do better? • Enforcement Metrics ▪ Analysis of distribution of higher-level enforcement (HLE); Create a GIS map showing HLE actions: • HLE issued for violations within EJ populations /municipalities. • HLE issued for violations in municipalities without EJ populations. • Number of administrative penalties and total dollar amounts assessed in municipalities with EJ populations. • Permitting metrics: ▪ Number of public involvement plans developed for permit proceedings.
Massachusetts Department of Fish and Game	• Goal 1 Indicators: ▪ DFG EJ Coordinator recruited and hired by May 2024. ▪ DFG EJ team operationalized by July 2024. ▪ One DFG-wide EJ training for all staff completed by September 2024. ▪ Key Division staff identified and trained in EJ issues and skills tailored to Division-specific needs by December 2024. • Goal 2 Indicators: ▪ Meet requirements of A&F Bulletin #16 (Language Access Policy) by July 2024. ▪ DFG EJ web page publicly available by July 2024.

Office/Department	Metrics
	▪ Create catalogue of EJ populations, communities, and organizations that intersect with Division programs and projects and identify suggested communication and outreach strategies for identified EJ populations, communities, and organizations by December 2024. ▪ Processes and procedures tailored to each Division to handle EJ concerns and requests are in place by December 2024. • Goal 3 Indicators: ▪ Processes and procedures tailored to each Division to ensure improved communication with and access by EJ communities to DFG regulatory processes are in place by October 2024. ▪ Processes and procedures tailored to each Division to assess and strengthen grant administration and award processes, educational programing, restoration programs, and conservation and recreation projects through the integration and application of EJ principles and considerations are in place by October 2024. ▪ Annual funding for projects within and programs that serve or impact EJ communities is tracked across Divisions with FY24 as the baseline year.
Massachusetts Department of Energy Resources	• Energy burden; • Funds awarded or provided to EJ neighborhoods; • Number of grants awarded to facilities in EJ neighborhoods; • Number or size of clean energy generating facilities in EJ and non-EJ neighborhoods; • Public hearings/listening sessions hosted in EJ neighborhoods; • Percentage or number of DOER public facing materials that are translated into community relevant languages; • Percentage or number of DOER public meetings that are offered in community relevant languages; and • Electric vehicle rebates issued to residents in EJ neighborhoods.
Massachusetts Department of Public Utilities	• Participation in public hearings; • EJ webpage statistics; • Requests for interpretation by a participant at a public hearing; • Percent of requests for interpretation fulfilled; and • Number of proceedings that specifically impact an EJ neighborhood, and how notice was provided in each instance.
Commonwealth of Massachusetts Energy Facilities Siting Board	• Number of interpretation and translation requests, including languages requested and accommodated • Number of hearing and visual accommodation assistance requests and those granted • Funds expended by the Siting Board and project applicants for interpretation and translation services • Number of positive/negative comments received regarding quality of translation/interpretation

Office/Department	Metrics
	• Percentage of staff who attended environmental justice-focused trainings • Percentage of agency public meetings that were conducted with language services
Massachusetts Clean Energy Center	No specific metrics listed.
Massachusetts Water Resources Authority	No specific metrics listed.