



# Climate Change, Extreme Weather & Electric System Reliability

Planning for a Future with Climate Risks

Judy Chang

Undersecretary of Energy and Climate Solutions

Commonwealth of Massachusetts

October 27, 2021



## The Climate is Changing

*By end of century:*

### RISING TEMPERATURES



- 10.8°F increase in avg annual temp.
- Up to 64 fewer days/year with min. temperatures < 32° F
- Up to 64 more > 90°F days/year

### CHANGES IN PRECIPITATION



- 18% increase in consecutive dry days
- 57% increase in days with > 1 in. rainfall
- 7.3 inches additional annual rainfall

### SEA-LEVEL RISE



- 4- to 10.5-feet along the MA coast

### EXTREME WEATHER



- Increase in frequency and magnitude



## Key Risks by Hazard Type

---



Inland flooding



Tsunami



Severe Winter Storm/Nor'easter



Drought



Average and Extreme Temperatures



Landslide



Wildfire



Tornadoes



Coastal Flooding



Invasive species



Other Severe Weather



Coastal Erosion



Hurricanes/Tropical Storms



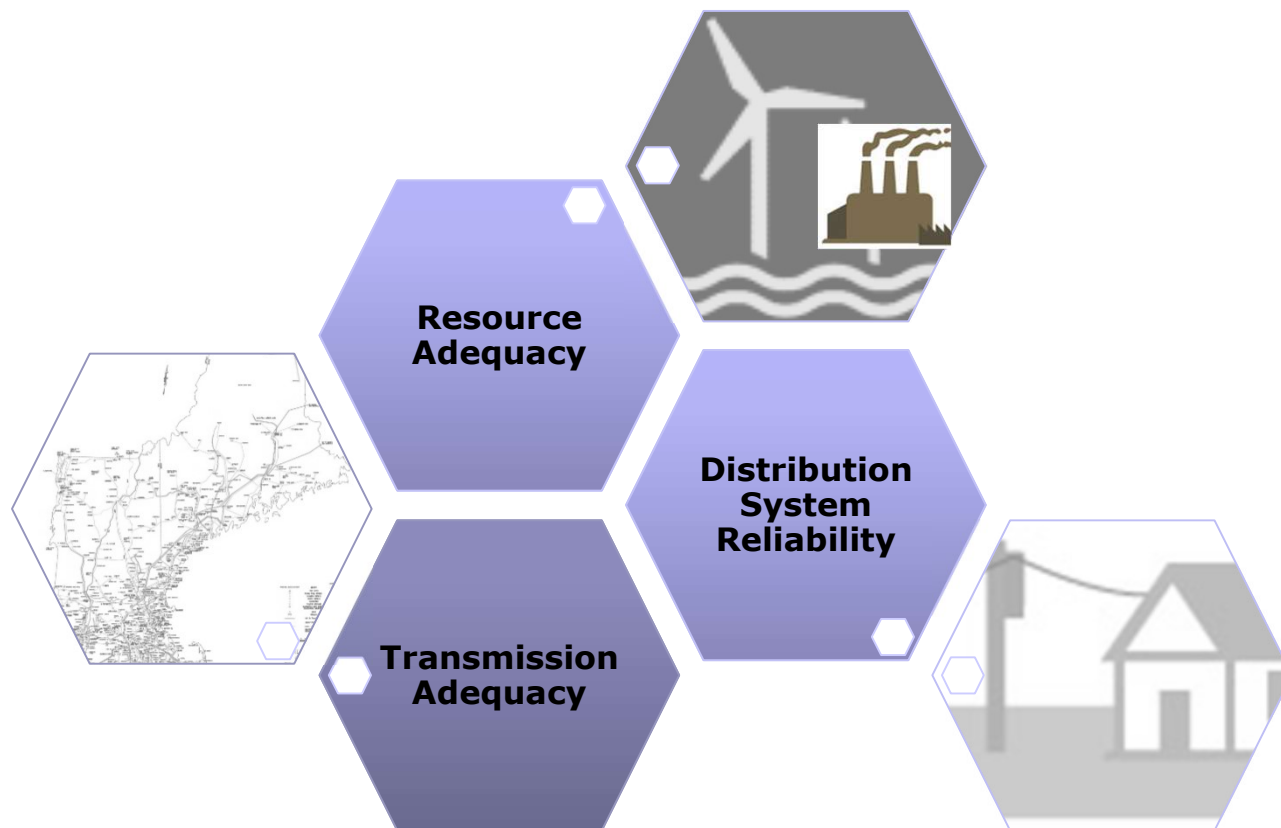
Earthquakes





## Climate Related Risks and Energy System Planning

- Almost all of the hazard types can dramatically affect our energy system
- In the power sector, generation, transmission distribution can all be affected by these hazards





## Resource Adequacy

---

- Continued improvements in ensuring that resource requirements are consistent of the best hazard mitigation standards
- Continued analyses and monitoring of the capabilities of our generation and demand side resources under extreme conditions
- Clear standards for operations under extreme conditions

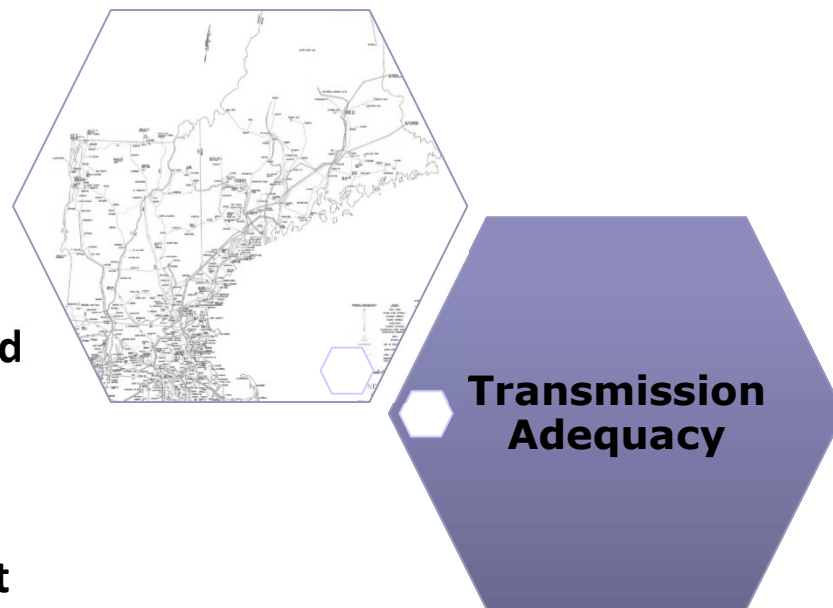




## Transmission Adequacy

---

- Ensure that technological and construction standards are consistent with the best climate forecast and hazard mitigation needs
- Set planning standards for a “different” kind of redundancy
- Use the best technologies to monitor and operate the system with anticipated impact from climate hazards





## Distribution Reliability

---

- Siting requirements need to be consistent with the best climate and hazard mitigation data
- Use the best available monitoring and control technologies to operate the system
- Ensure that our buildings are most energy efficient and resilient under extreme conditions
- Quantitatively assess the disproportionality in climate risks among socially vulnerable populations





## Massachusetts' Efforts to Understand and Mitigate Impact of Climate Change

---

- **Acquiring the best data that climate science can provide us about future climate**
- **Conducting a climate risk assessment:**
  - Risks to Human, Infrastructure, Natural Environment, Economy, and Governance
  - Across three time periods: present (2030); near-term (2030-2050); and long-term (2050-2070)
- **Rolling out Climate Resilience Standards Tool**
  - Have invited utilities to participate in providing feedback



# Resilient MA Action Team (RMAT): Beta Climate Resilience Standards Tool

An **interactive web-based tool** that automates the Commonwealth's available climate change data and provides a **preliminary climate risk screening and planning recommendations** for projects

## Goals:

- **Makes preliminary climate resilience analysis** more broadly accessible
- **Inform “climate smart” capital planning** by providing recommendations for the consistent use of state’s climate data in the planning and designing of physical assets
- **Provides an easy to use planning and design support tool** for agencies and municipalities



<https://resilientma.org>

Supporting the Commonwealth through up-to-date climate change science:

Tools & Data	Learn	Take Action
<b>Resource Clearinghouse</b> <ul style="list-style-type: none"> <li>Documents</li> <li>Data</li> <li>More</li> <li><b>Climate Resilience Design Standards &amp; Guidelines</b></li> </ul>	<b>Explore Sectors:</b> <ul style="list-style-type: none"> <li>Agriculture</li> <li>Coastal Zones</li> <li>Economy</li> <li>Energy</li> <li>Forestry</li> <li>Infrastructure</li> <li>Local Govern</li> </ul>	<b>Identify Changes:</b> <ul style="list-style-type: none"> <li>Natural Resources / Habitats</li> <li>Public Health</li> <li>Public Safety / Emergency Response</li> <li>Sea Level Rise</li> <li>Extreme Weather</li> <li>Changes in Precipitation</li> <li>Rising Temperatures</li> </ul>

**Climate Resilience Design Standards Tool**

This is the beta version of the **Climate Resilience Design Standards Tool**. Log in or register below to pilot the tool. Please submit feedback to support our piloting and improvements process by [using this form](#).


**LOG-IN / REGISTER >**

State Users Log-in >


[https://resilientma.org/rmat\\_home/designstandards/](https://resilientma.org/rmat_home/designstandards/)




# Project Inputs



**Climate Resilience Design Standards Tool**  
Resilient MA Action Team (BETA)




**Pioneer Terrace**  
Project Number: 193  
Project Status: Not Scored

Hello, RMATAdmin   
[Terms of Use](#)  
Delete Project

### Draw Project Area

You must draw a polygon on the map representing the project area.

1. Find the project location using the map zoom/pan and/or the address search bar in the upper right area of the map.
2. Draw the polygon using the drawing tools under the search bar.
3. Click the  icon when you are satisfied with the polygon.

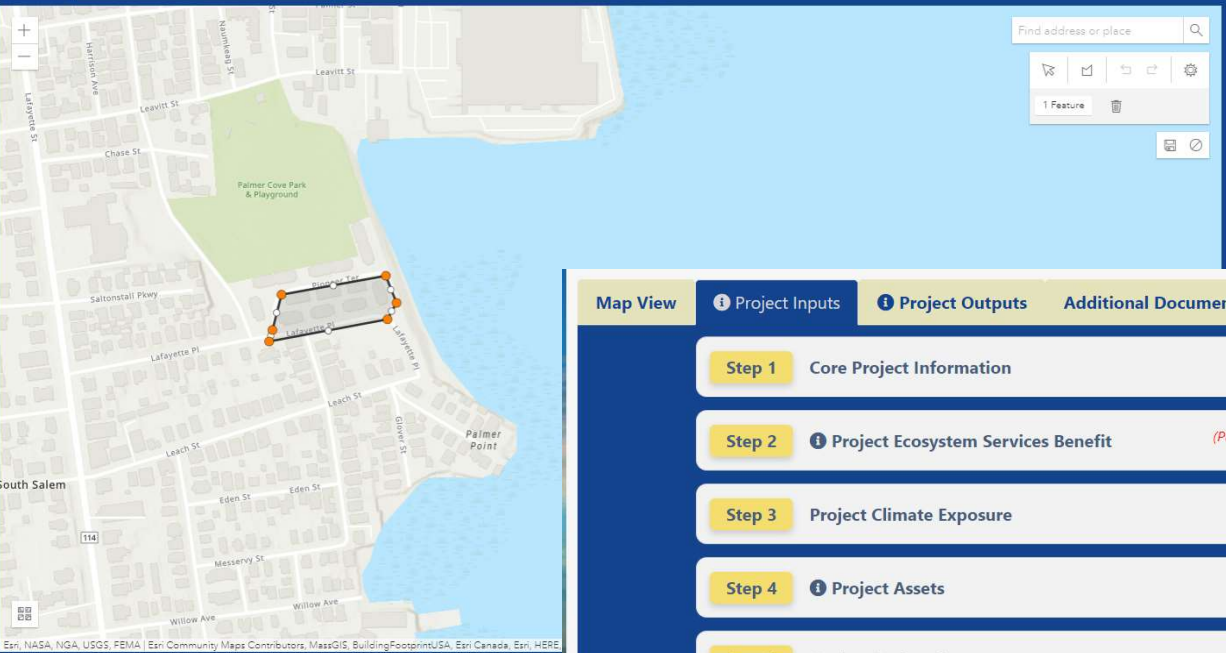
Find address or place
1
🔍



📍
2
↶
↷

📄
3
🗑️


[Show me how](#)

Map View
Additional Documents and Resources




Map View
 Project Inputs
 Project Outputs
Additional Documents and Resources

Step 1
Core Project Information
(Click each qu

Step 2
 Project Ecosystem Services Benefit
(Please identify whether the pr

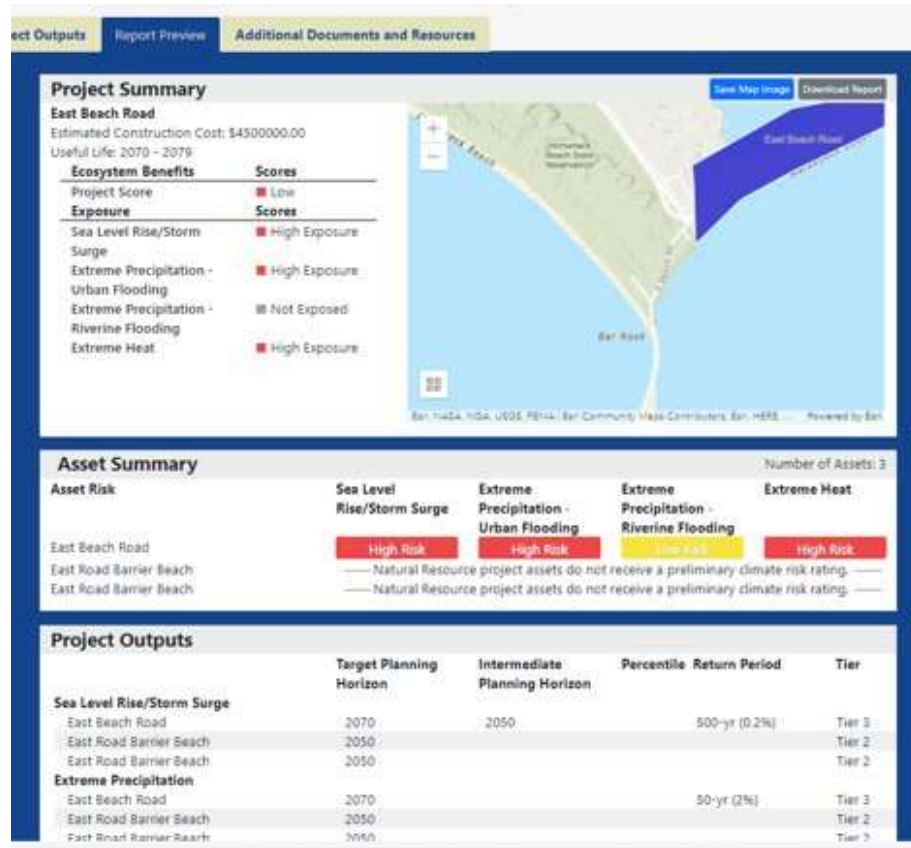
Step 3
Project Climate Exposure
(Click each qu

Step 4
 Project Assets

Step 5
Review Project Outputs

Step 6
Submit Project

# Tool Outputs



## Scoring Rationale - Exposure

### Sea Level Rise/Storm Surge

- This project received a "High Exposure" because of the following:
- Located within the predicted mean high water shoreline by 2030
  - Exposed to the 1% annual coastal flood event as early as 2030
  - Historic coastal flooding at project site

### Extreme Precipitation - Urban Flooding

- This project received a "High Exposure" because of the following:
- Historic flooding at the project site
  - Increased impervious area
  - Projected increase in rainfall within project's useful life

### Extreme Precipitation - Riverine Flooding

- This project received a "Not Exposed" because of the following:
- No historic riverine flooding at project site
  - Not exposed to riverine flooding within the project's useful life

### Extreme Heat

- This project received a "High Exposure" because of the following:
- 30+ days increase in days over 90 deg. F within project's useful life
  - Increased impervious area
  - Located within 100 ft of existing water body

## Scoring Rationale - Asset Risk Scoring

### Asset - East Beach Road

Primary asset criticality factors influencing risk ratings for this asset:



**Judy.Chang@mass.gov**  
<https://www.mass.gov/mvp>  
<https://www.mass.gov/rmat>

