Climate Change, Extreme Weather & Electric System Reliability

Planning for a Future with Climate Risks

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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

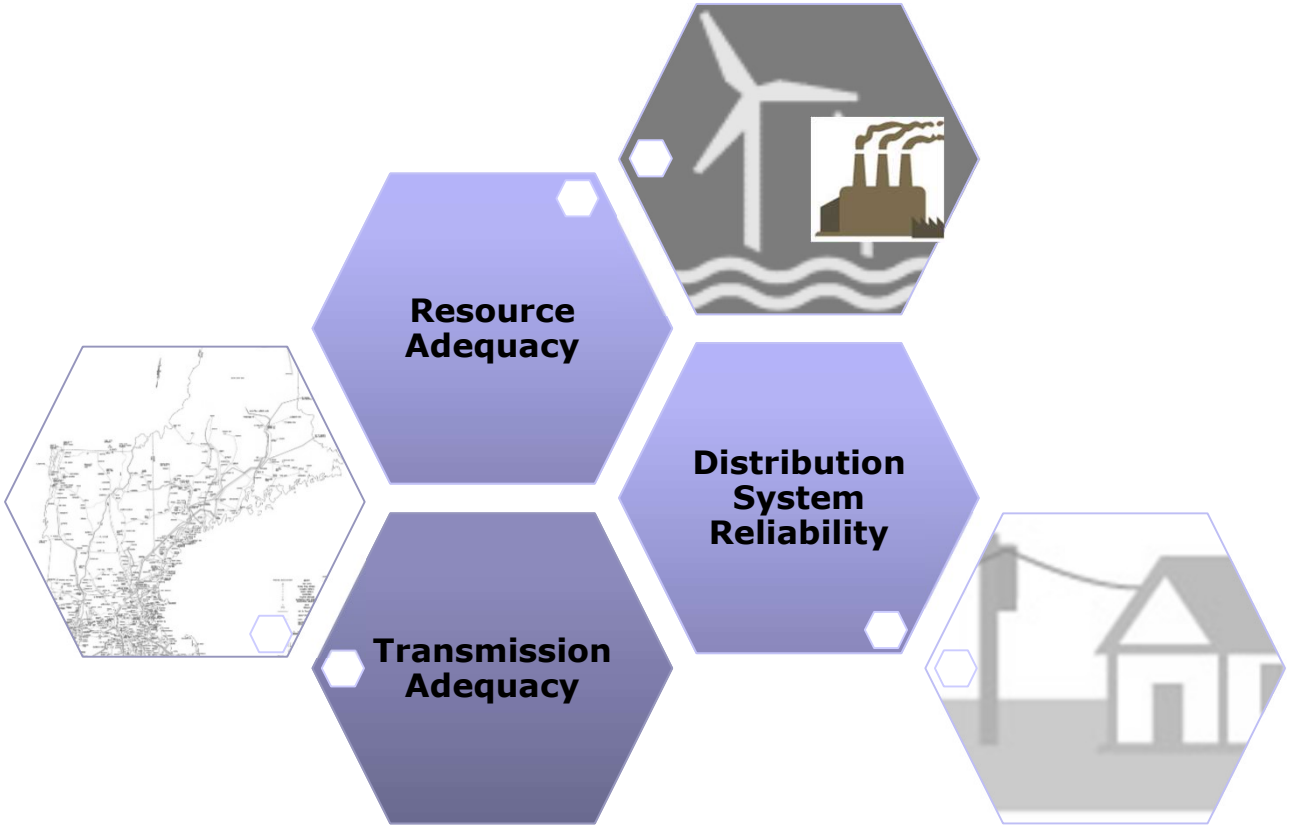
- Increase in frequency and magnitude

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**

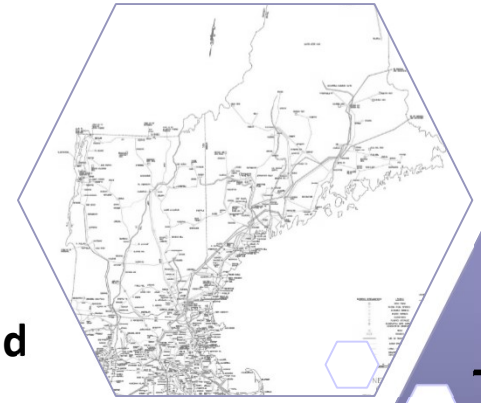


Resource Adequacy

- **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

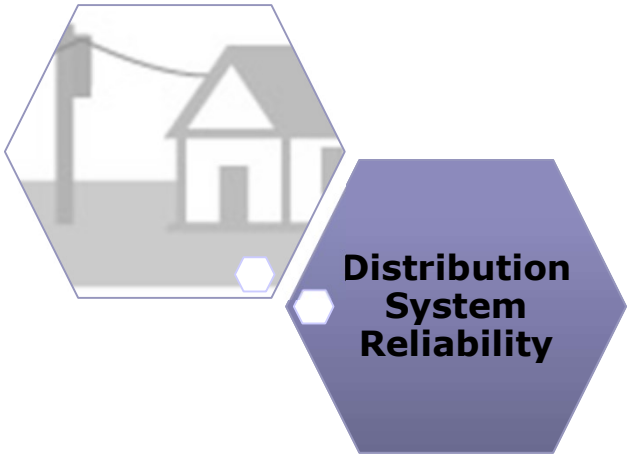
- **Ensure that technological and construction standards are consistent with the best climate forecast and hazard mitigation needs**
- **Set planning standards for a "different" kind of redundancy**
- **Use the best technologies to monitor and operate the system with anticipated impact from climate hazards**



Transmission Adequacy

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

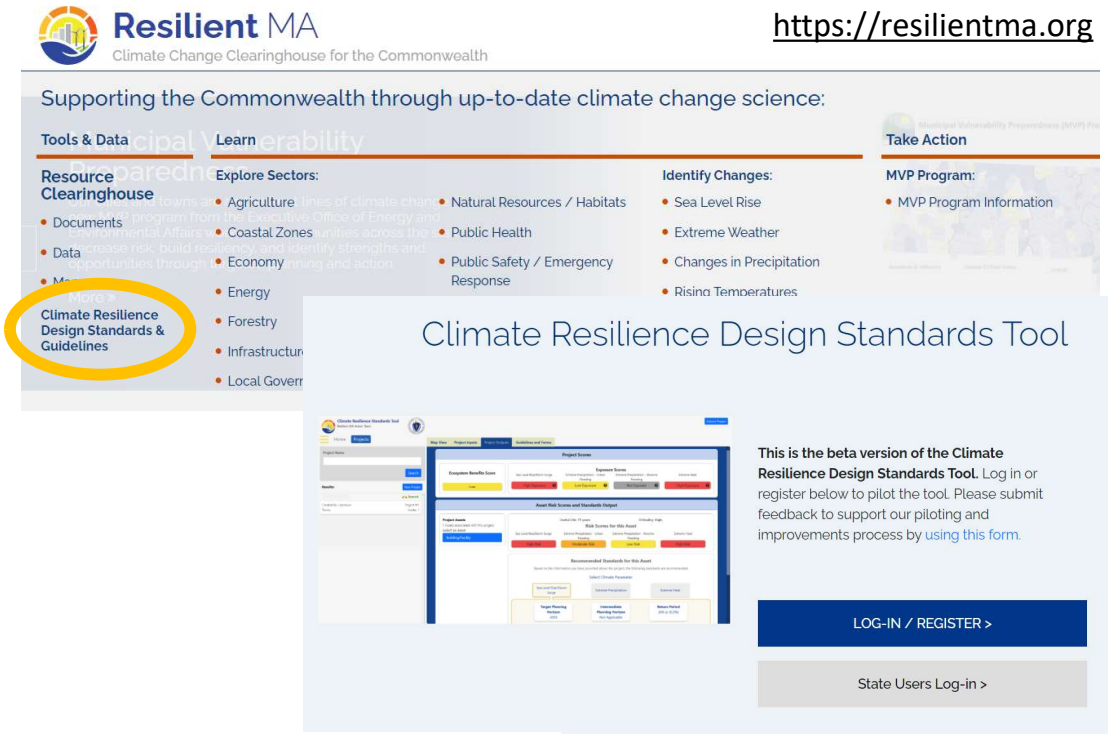
- **Acquiring the best data that climate science can provide us about future climate**
- **Conducting a climate risk assessment:**
  - Risks to Human, Infrastructure, Natural Environment, Economy, and Governance
  - Across three time periods: present (2030); near-term (2030-2050); and long-term (2050-2070)
- **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

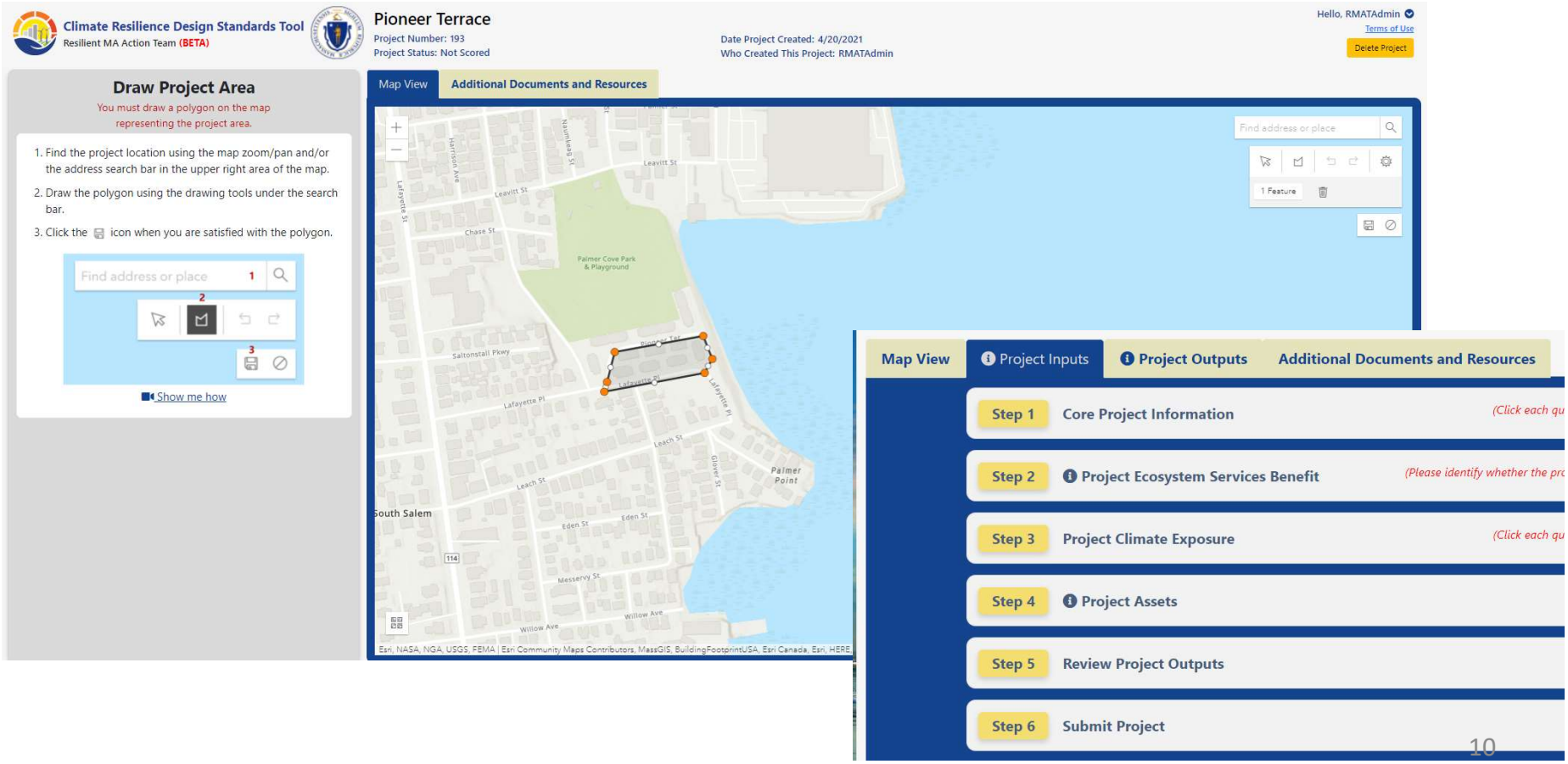
Goals:

- **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

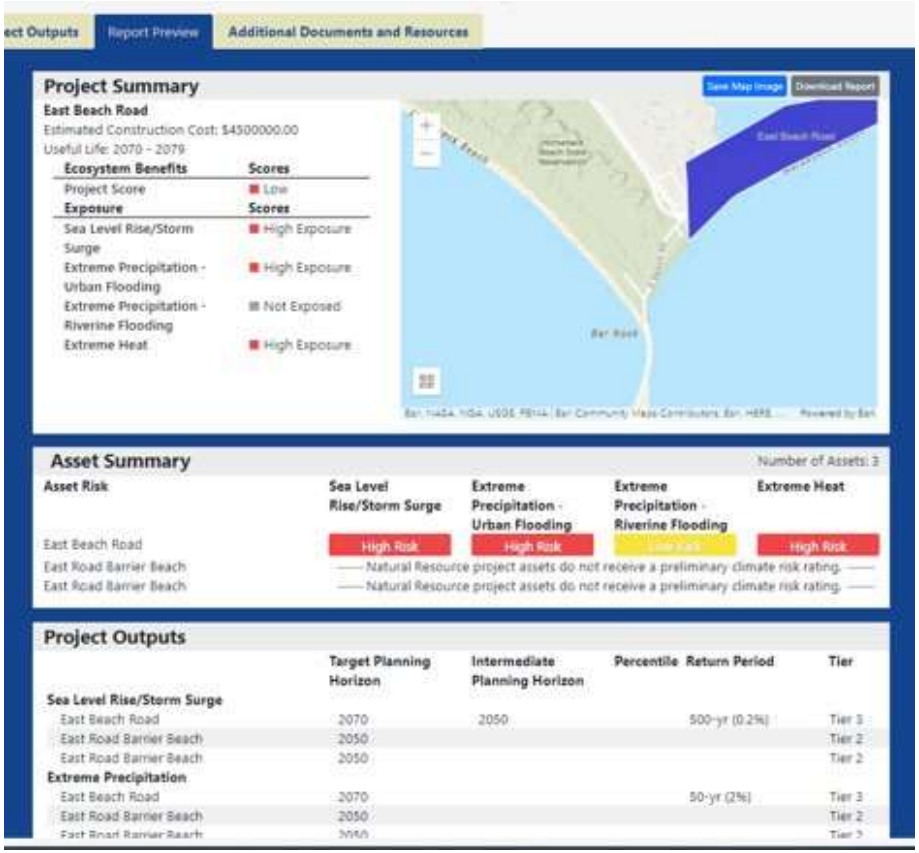


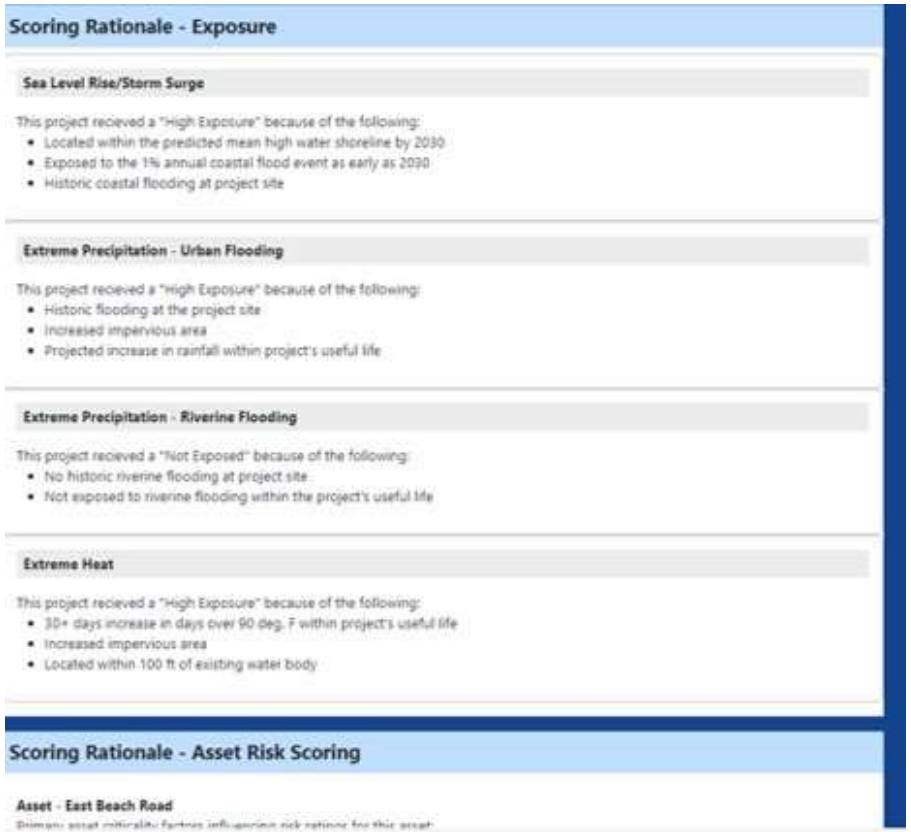
https://resilientma.org/rmat_home/designstandards/

Project Inputs



Tool Outputs





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