

# Data Driven Climate Action on Cape Cod

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**KRISTY SENATORI**  
EXECUTIVE DIRECTOR  
CAPE COD COMMISSION

2021 ESRI GEODESIGN SUMMIT



CAPE COD  
COMMISSION



## MISSION

...To protect the unique values and quality of life on Cape Cod by coordinating a balanced relationship between environmental protection and economic progress.

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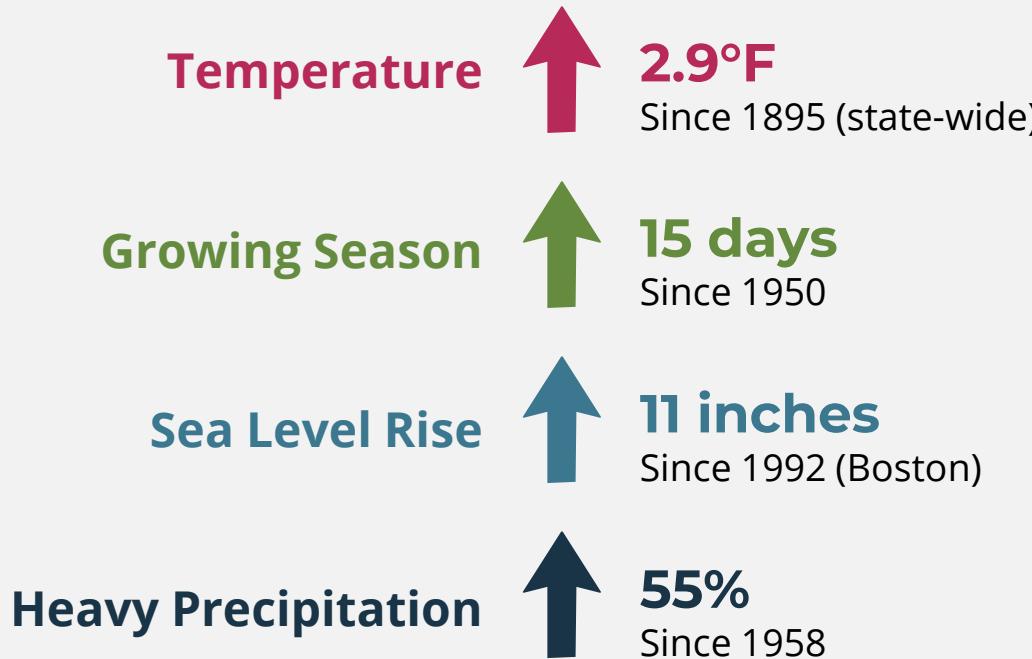
Since its creation 30 years ago, the Cape Cod Commission has been dedicated to  
**keeping a special place special**

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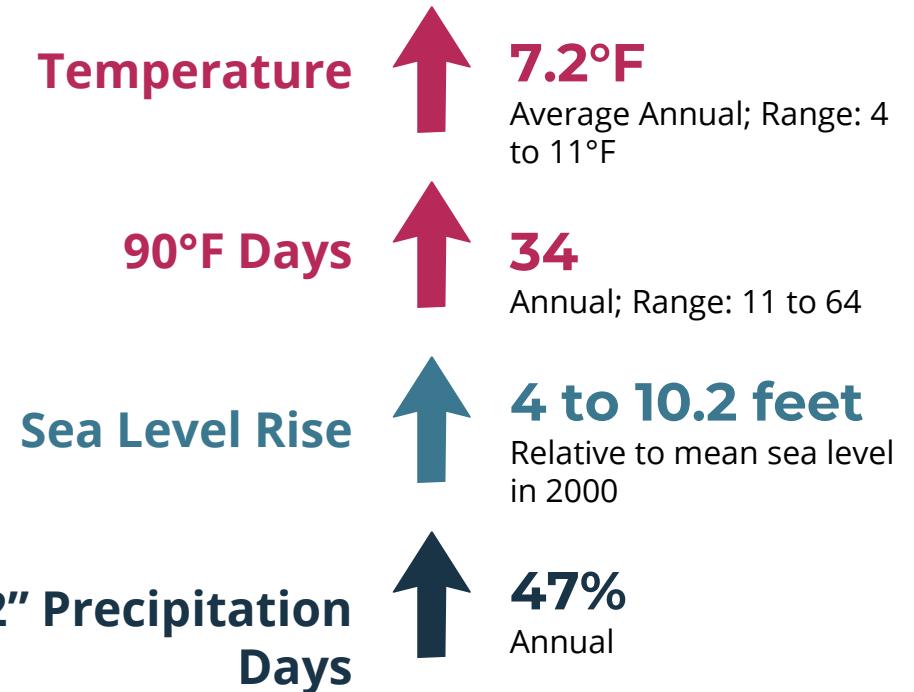
CAPE COD, MASSACHUSETTS

## Massachusetts Observed Climate Changes



Source: Climate Science Special Report, 2017; NOAA NCEI nClimDiv; NOAA Ocean Service

## Massachusetts Climate Changes Projected by the 2090s



Source: Northeast Climate Adaptation Science Center

# Resilient Cape Cod

*Three-year, \$780,000  
National Oceanographic  
and Atmospheric  
Administration Regional  
Coastal Resilience Grant  
awarded to the Cape Cod  
Commission and  
partners*



**Objective** - Develop a tool and public outreach program to investigate the environmental and socio-economic effects of local and regional coastal resiliency strategies

## Communicate Vulnerabilities



Erosion



Storm Surge



Sea Level Rise



CAPE COD  
COMMISSION



WAQUOIT BAY  
NATIONAL  
ESTUARINE  
RESEARCH  
RESERVE



APCC  
Association to  
Preserve Cape Cod



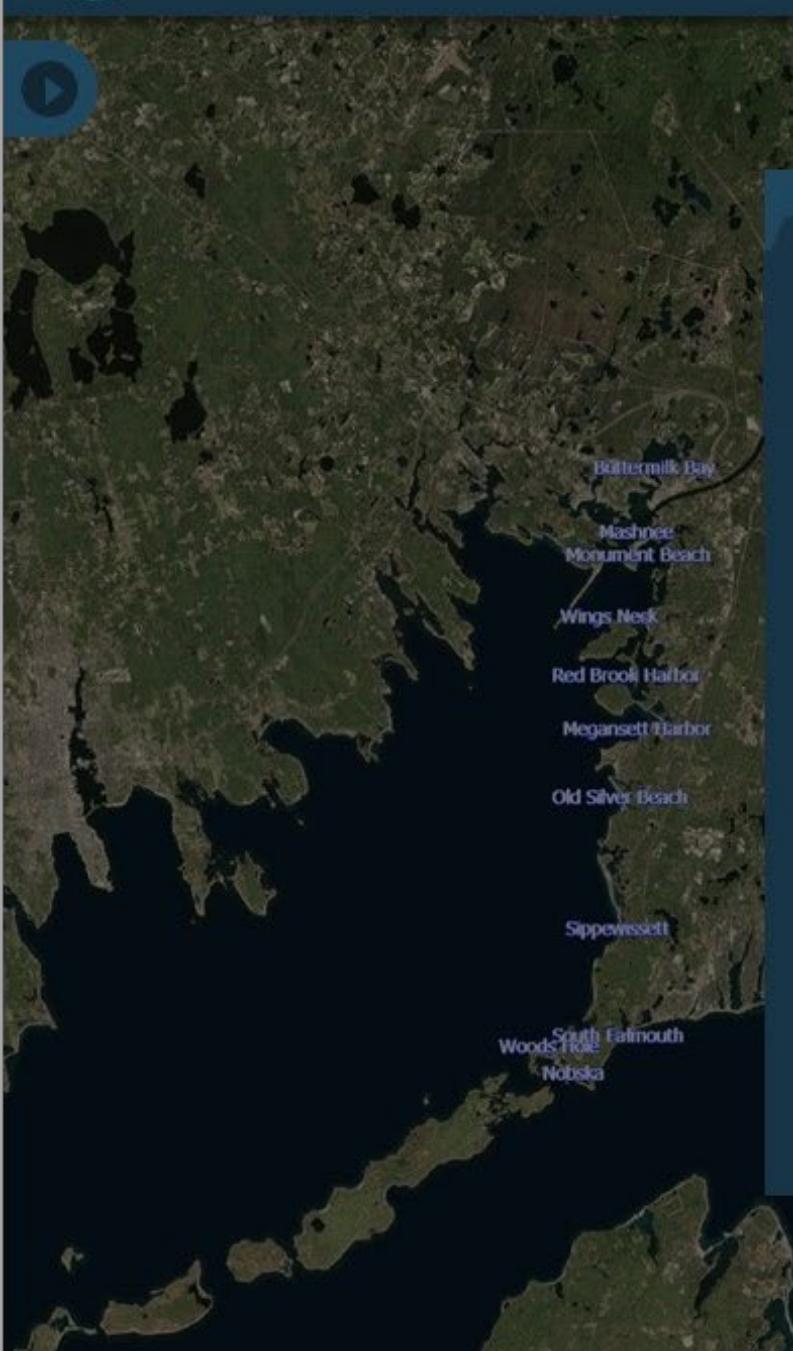
PROVINCETOWN  
CENTER FOR COASTAL STUDIES



Woods Hole  
Sea Grant



Massachusetts Office of  
Coastal Zone Management



**CAPE COD**  
**COASTAL PLANNER**

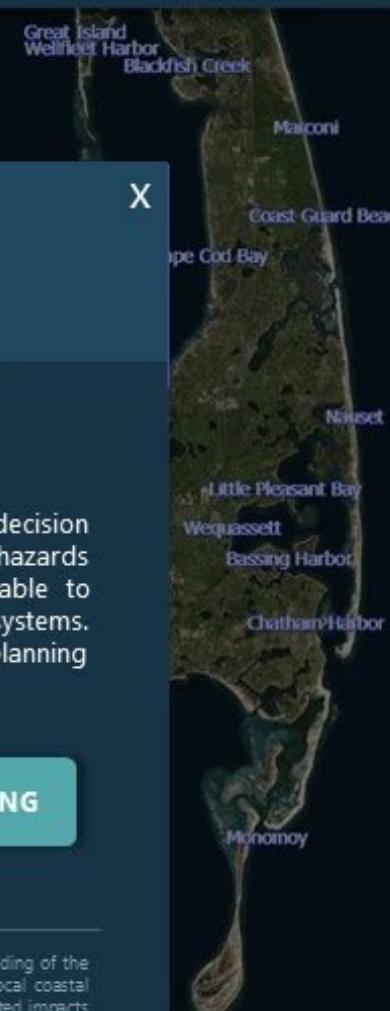
**Welcome!** The Cape Cod Coastal Planner is a communication and decision support tool intended to educate users on the climate change hazards impacting Cape Cod's coastline, the adaptation strategies available to address them, and implications for local infrastructure and ecosystems. Choose your location and zone of impact to begin planning. View planning layers and test adaptation strategies for three coastal hazards.

**SELECT A SHORELINE LOCATION TO START PLANNING**

First time user? Follow the [tutorial wizard](#) first.

**Disclaimer:** The Cape Cod Commission developed the Cape Cod Coastal Planner to improve understanding of the coastal hazards facing Cape Cod, including erosion, sea level rise, and storm surge, and to aid in local coastal planning processes. The application is an informational resource intended to provide high-level anticipated impacts for planning purposes. The output panel provides estimates of change to the shoreline location, and are not intended to be used in an engineering context or to indicate support for any particular Adaptation Strategy.

Funded by a NOAA Coastal Resilience Grant awarded to the Cape Cod Commission and its partner agencies. Learn more at [capecodcommission.org/resilientcapecod](http://capecodcommission.org/resilientcapecod)



## PLANNING LAYERS

CLEAR

## Vulnerability Ribbon

● Low ● Medium ● High

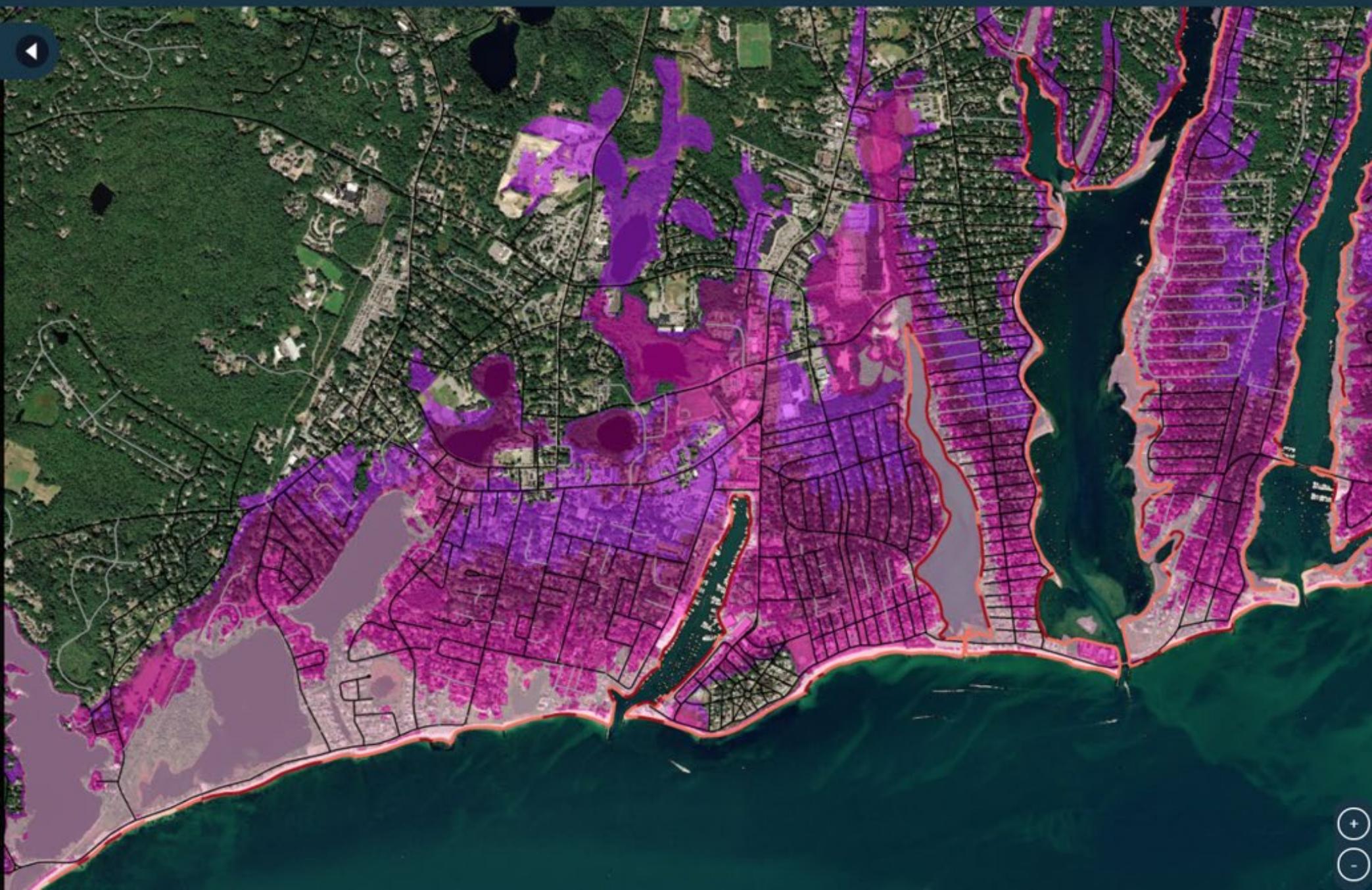
## Sea Level Rise

## Infrastructure

✓ Municipal Properties✓ Public and Private Roads● Private ● Public✓ Sewered Parcels✓ Coastal Defense Structures✓ Structures✓ Historic Districts✓ Historic Places

## Erosion

## Inundation

✓ Flood Zone✓ SLOSH● CAT1 ● CAT2 ● CAT3 ● CAT4

C A P E C O D

**REGIONAL**

P O L I C Y P L A N

F R A M I N G T H E F U T U R E

CAPE COD COMMISSION | 2018

# Regional Policy Plan Climate Change Actions



## GREENHOUSE GAS EMISSIONS INVENTORY

Regional baseline of greenhouse gas emissions



## EV CHARGING STATION SITING ANALYSIS

Potential electric vehicle charging station locations

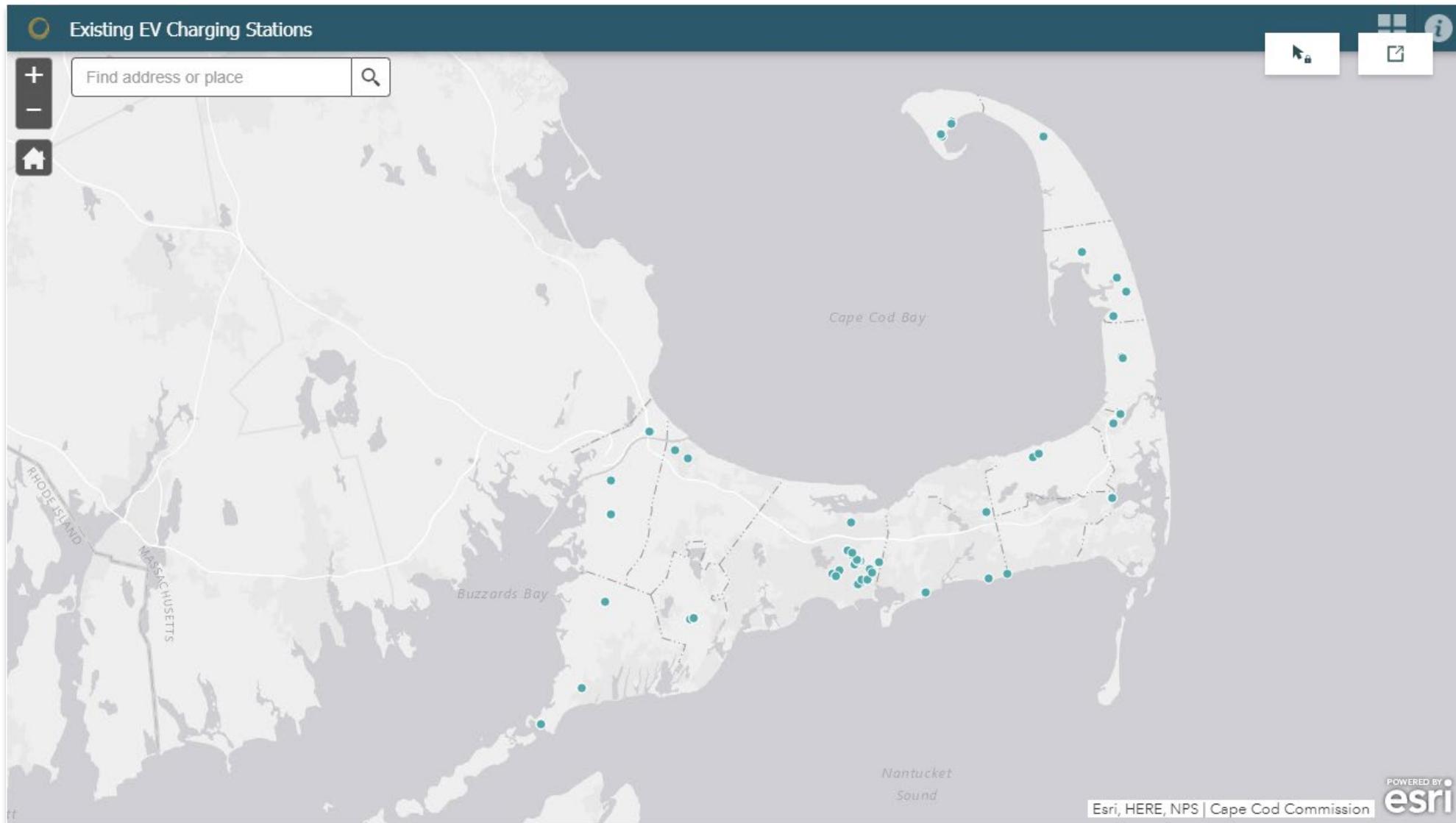


## SOLAR SCREENING TOOL

Sites for utility scale solar or energy storage



# EV CHARGING STATION SITING ANALYSIS



# SOLAR SCREENING TOOL

**Large-Scale Solar Screening Tool**  
a Cape Cod Commission application

Find address or place

Zoom to

**Parcel Screening**

This parcel has **Low** Built Features and **Moderate** Natural Features.

The following **Built Features** on this parcel may be appropriate for solar PV installations  
Industrial Activity Center

Solar development should avoid impacting the following **Natural Features** on this parcel  
Unprotected Forest/Shrubland  
Wellhead Protection Area

-70.281 41.685 Degrees elev 24.40 Meters eye alt 2.74 Kilometers

Esri, HERE, Source: USGS, NGA, NASA, CGIAR, GERCQ, N Robinson, NCEAS, NLS, OS, NMA, GeodataStrelzen and the GIS User Community | MassGIS | Rolta, MassGIS <http://www.mass.gov/afn/rese...> Powered by Esri

# Climate Action Plan



## RESPONDING TO CLIMATE CHANGE INVOLVES TWO APPROACHES



### ADAPTATION

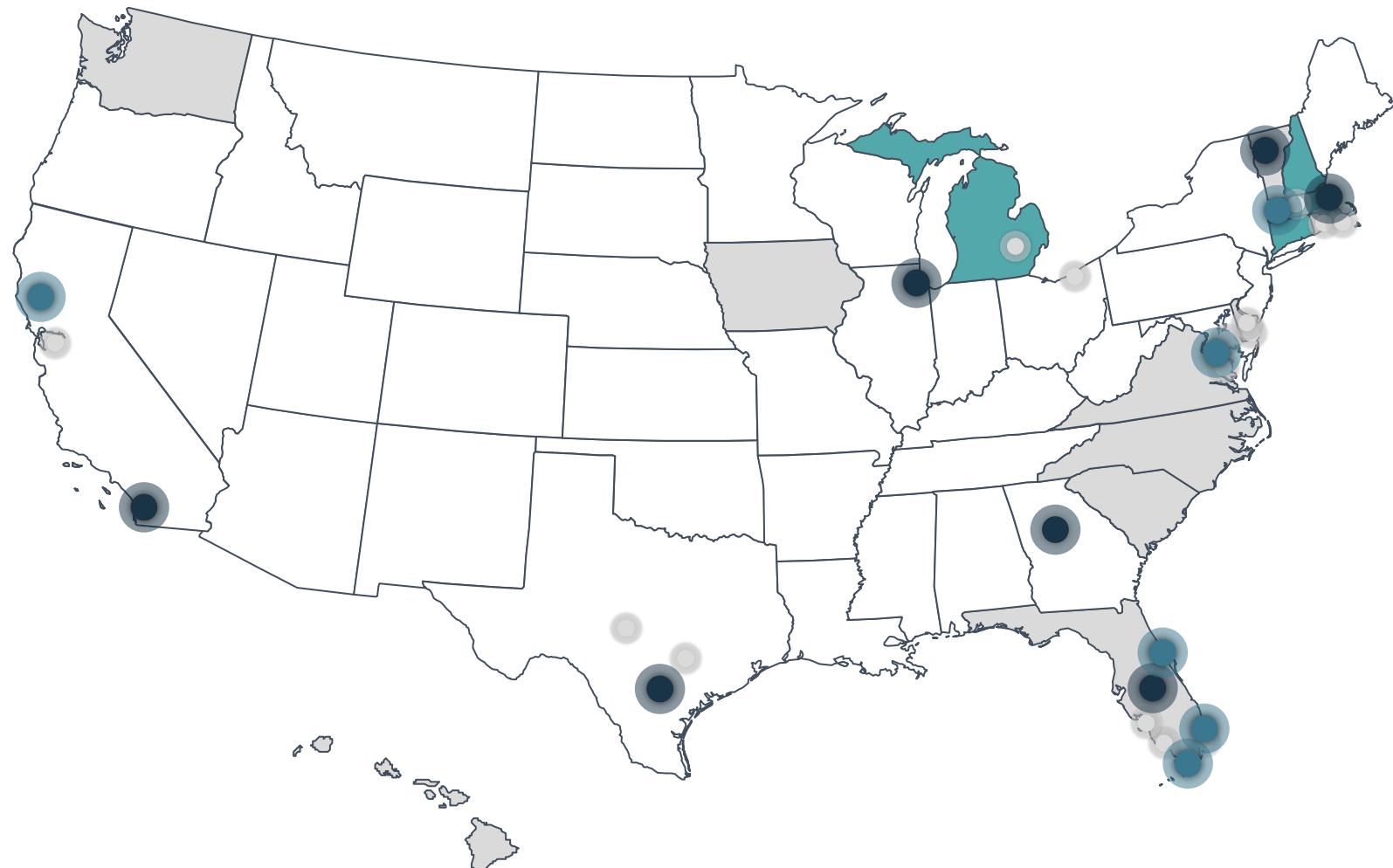
Adjustments in human and natural systems that moderate harm or take advantage of beneficial opportunities



### MITIGATION

Limiting or preventing greenhouse gas emissions and enhancing activities that remove these gases from the atmosphere

# CLIMATE ACTION PLAN LITERATURE REVIEW



## Plans Reviewed



### City/Town

Atlanta, GA  
Boston, MA  
Burlington, VT  
Chicago, IL  
Orlando, FL  
San Antonio, TX  
San Diego, CA



### Regional

Metropolitan Washington (DC)  
Monroe Co., FL  
Pioneer Valley, MA  
Sonoma Co., CA  
Southeast FL  
Volusia Co., FL



### State

Connecticut  
Massachusetts  
Michigan  
New Hampshire



## Additional Plans Collected

City/Town - 11  
Regional - 3  
State - 10  
Other - 5

# Planning for Climate Action on Cape Cod



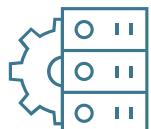
GHG Emissions  
Inventory



Cape-wide Survey



Student Climate  
Ambassador  
Program



Mitigation and  
Adaptation Strategies



Legal and  
Jurisdictional  
Analysis



Economic and Fiscal  
Impacts Analysis



Stakeholder  
Engagement

# Cape Cod Climate Action Plan

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## PURPOSE STATEMENT

To identify, study and monitor the causes and consequences of climate change on Cape Cod as a basis to guide and develop science-based policies, strategies and actions that governments, businesses, organizations, and individuals can pursue to:

- improve the region's resilience to climate hazards; and
- mitigate climate change on Cape Cod through reducing net regional greenhouse gas emissions in support of the framework and targets established by the Commonwealth.

The background of the slide is a high-angle aerial photograph of a river system. The river, appearing in shades of blue and teal, meanders through a vast expanse of vibrant green vegetation, likely a tropical forest. The surrounding terrain is a mix of different shades of green, indicating various types of vegetation or soil. The overall scene is one of natural beauty and environmental complexity.

# Setting a Baseline for Mitigation

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Regional Greenhouse Gas  
Inventory



## What is a Greenhouse Gas Inventory?

a comprehensive  
accounting of total  
greenhouse gas  
emissions for all man-  
made sources.

# Cape Cod Greenhouse Gas Inventory

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**Calculate a greenhouse gas inventory that provides a complete picture of greenhouse gas emissions from Cape Cod**

Establish an accounting method that is comparable and reproducible so we can measure emissions going forward

Identify high emissions sectors

Develop detailed inventory specific to our region

TOTAL NET EMISSIONS

**3,224,300**

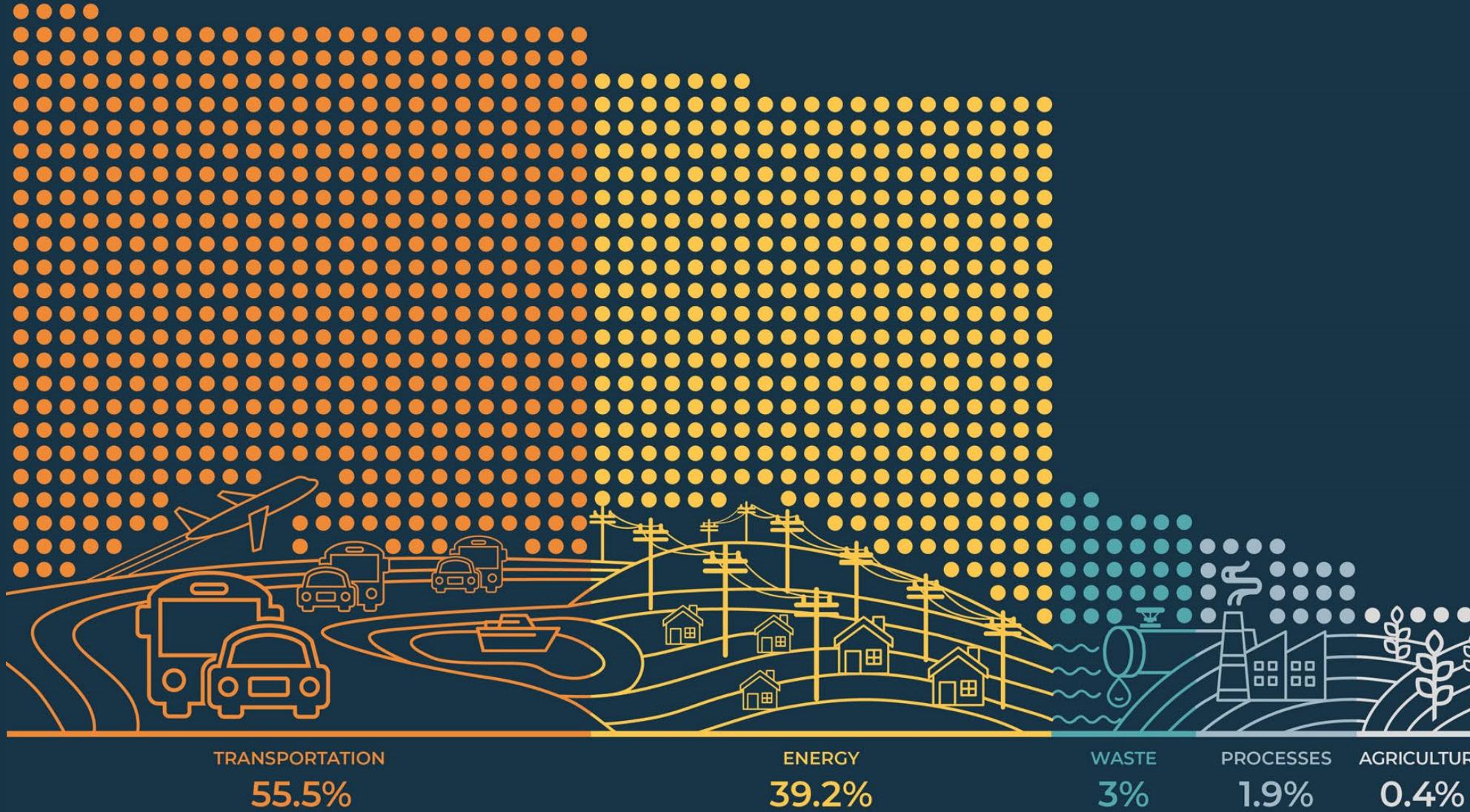
MTCO<sub>2</sub>E

TOTAL EMISSIONS (↑)

**3,564,900**

MTCO<sub>2</sub>E

TOTAL  
SEQUESTRATION (↓)  
**340,600**  
MTCO<sub>2</sub>E



## GHG INVENTORY

# Sector Ranking

Highest to Lowest Emissions



## STATE



STATIONARY ENERGY



TRANSPORTATION



INDUSTRIAL PROCESSES & PRODUCT USE



WASTE



AGRICULTURE



## CAPE COD



TRANSPORTATION



STATIONARY ENERGY



WASTE



INDUSTRIAL PROCESSES & PRODUCT USE



AGRICULTURE

The background of the slide is a high-angle aerial photograph of a river system. The river, appearing in shades of blue and teal, meanders through a dense, textured landscape of green vegetation. The surrounding terrain is a mix of bright and dark green, suggesting different types of vegetation or soil. The overall scene is a natural, undisturbed environment.

# Engaging Stakeholders

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Sector-Specific Working Groups



# Cape Cod Climate Action Plan

## STAKEHOLDER WORKING GROUPS

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to participate in a region-wide effort to identify strategies and contribute to the Cape Cod Climate Action Plan



### Transportation



### Energy



### Housing & Development



### Natural Resources & Working Lands





# Working Group Meeting Series

MEETING 1

—  
O C T O B E R

Understanding  
Problems

MEETING 2

—  
N O V E M B E R

Identifying  
Solutions

MEETING 3

—  
D E C E M B E R

Taking  
Action





# Developing Solutions

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Sector-Specific Actions for Cape  
Cod

## SECTOR GOALS AND STRATEGIES DATABASE



LITERATURE REVIEW

▪ STAKEHOLDER INPUT

▪ LOCAL EFFORTS



## Housing & Development



## Energy



## Transportation



## Natural Resources



## Community

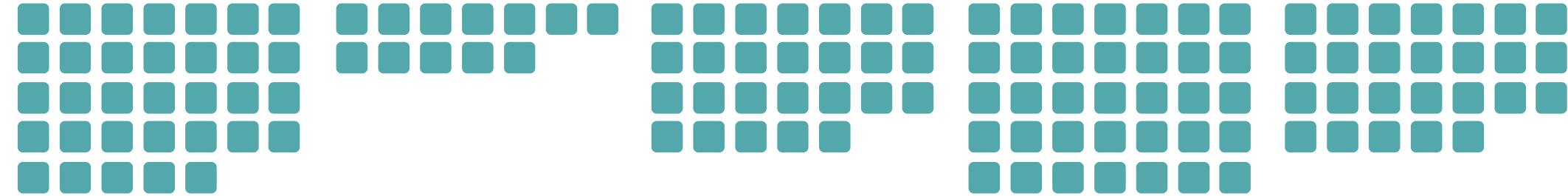
### GOALS



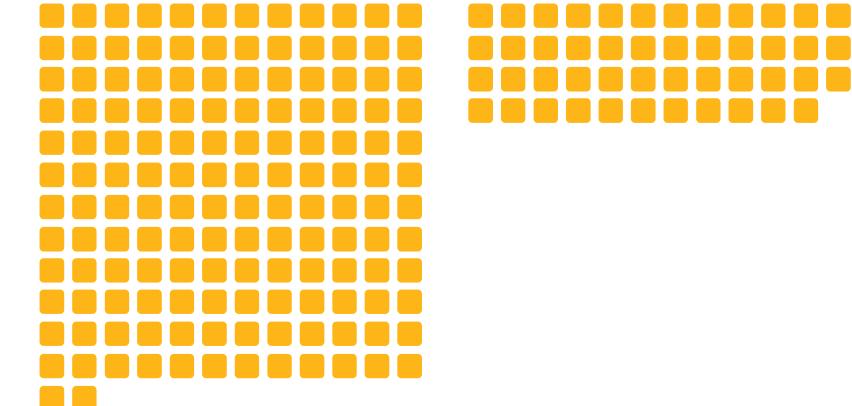
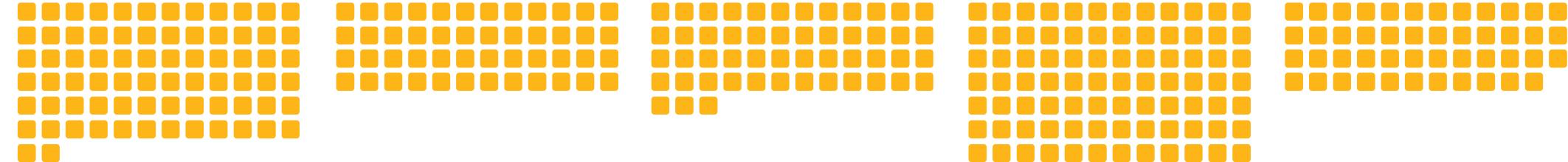
### STRATEGIES



### ACTIONS



### STEPS





## 1. GOAL: REDUCE GHG EMISSIONS FROM THE BUILT ENVIRONMENT

### 1.2. Strategy: Strive towards Net Zero Energy Buildings; reduce energy consumption in residential buildings

ACTION	STEPS
1.2.1. Retrofit existing residential buildings/houses <i>State, County, Towns, Energy Efficiency Program Organizations, Businesses, Individuals</i>	<ul style="list-style-type: none"><li>■ Promote incentives, rebates, and Mass Save® to weatherize and improve energy efficiency of residential buildings <i>[Mass Save®, PACE]</i></li><li>■ Incentivize replacement of oil, propane, and gas energy systems with electric ground source and air source heat pumps</li><li>■ Accelerate rate of home energy efficiency improvements (prioritize retrofits and upgrades)</li><li>■ Address unique considerations of historic homes, including the ability to electrify and weatherize</li><li>■ Address community character concerns associated with renewable energy installations, including engaging historic commissions</li></ul>

# Quantifying Impacts

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Economic and Fiscal Impact  
Analysis



# | ECONOMIC AND FISCAL IMPACT ANALYSIS

## ECONOMIC IMPACTS OF CLIMATE HAZARDS

*Fiscal impacts of what the region might face due to climate change*

 Business Interruptions

 Damage To Buildings

 Public Health Impacts

## MITIGATION SCENARIOS

*Four scenarios for comparison*

 Technology Changes

 Demographic Changes

 Regulatory Changes

## MITIGATION SCENARIOS METRICS

*Comparison of mitigation scenarios*

 Emissions Comparisons

 Economic Impacts

 Other Metrics

## ECONOMIC IMPACTS OF CLIMATE ACTION STRATEGIES

*Potential costs and benefits and cost-effectiveness of climate action strategies*

 Adaptation Strategies  
*Cost-benefit*

 Mitigation Strategies  
*Cost-effectiveness*

 Cost of Doing Nothing

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