



# An Integrated Climate Change Strategy for the Commonwealth

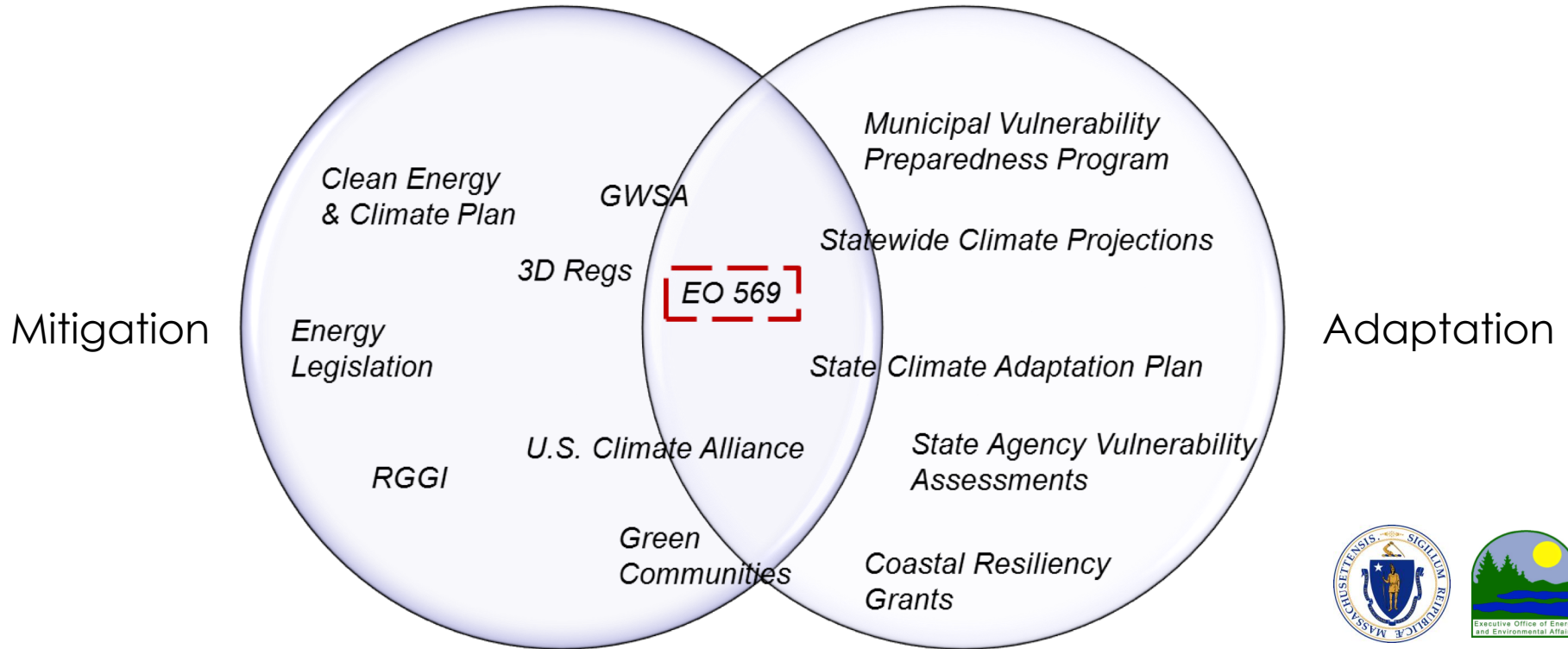


Katie Theoharides, Executive Office of Energy &  
Environmental Affairs,  
April 25, 2018





# Lead the nation in reducing greenhouse gas emissions and safeguarding the Commonwealth from the impacts of climate change



# EXECUTIVE ORDER 569: AN INTEGRATED CLIMATE CHANGE STRATEGY FOR THE COMMONWEALTH



- Reducing greenhouse gas emissions to combat climate change
- Protecting life, property, natural resources and our economy from the impacts of climate change
  - State Plan
  - Agency Vulnerability Assessments
  - Municipal Support
  - Climate Coordinators

# ENVIRONMENTAL BOND BILL, 3.15.18

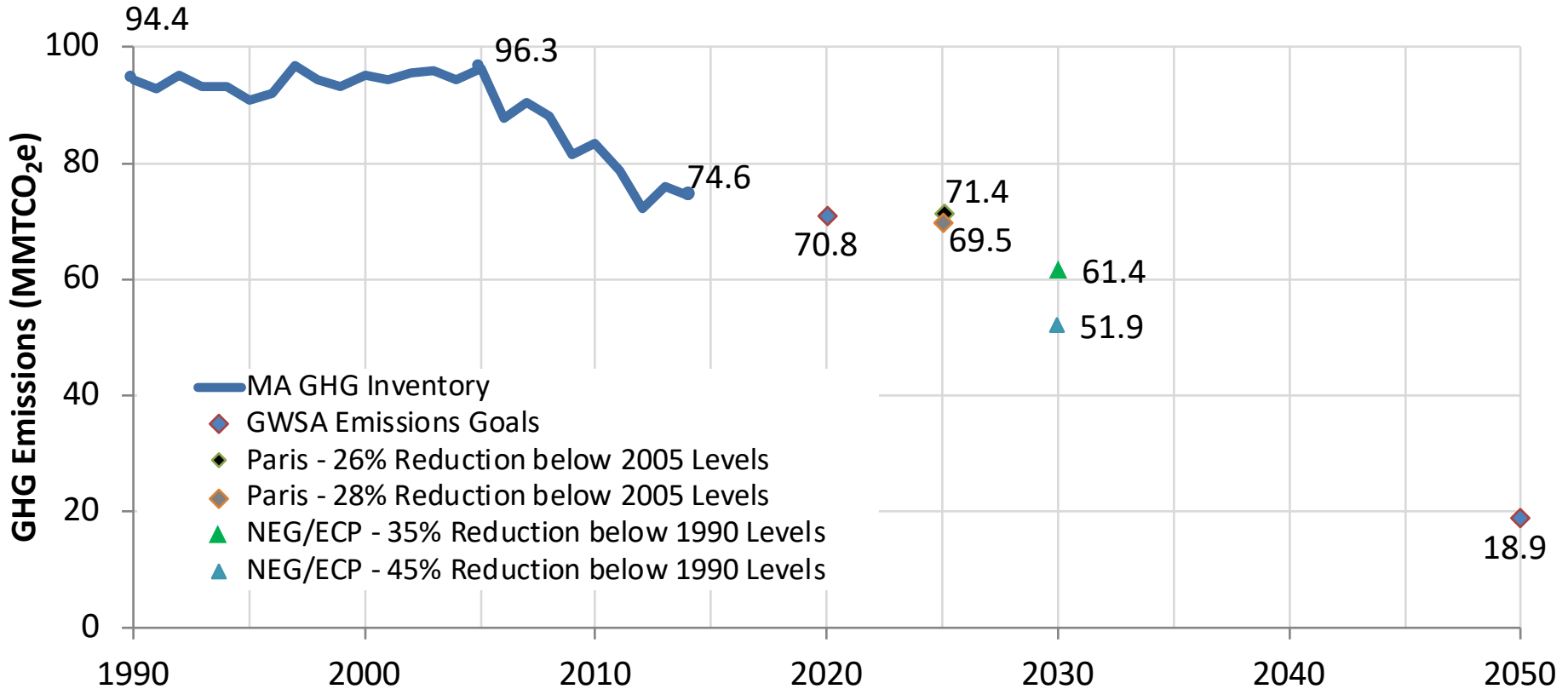


- **\$1.4 billion bond bill with focus on climate change resiliency**
- **\$300 million for climate change adaptation**
- **Codifies EO 569**

# GHG REDUCTION GOALS

- **Global Warming Solutions Act of 2008**
  - **Reduce greenhouse gas emissions in MA by:**
    - 25% below 1990 baseline level by 2020
    - 80% below 1990 baseline level by 2050
  - **Establish statewide emission limits for 2030 and 2040**
- **Currently setting a target for emission reduction as directed by EO 569**
  - **Establish statewide emission limits for 2030 by the end of 2020.**
  - **Establish statewide emission limits for 2040 by the end of 2030.**

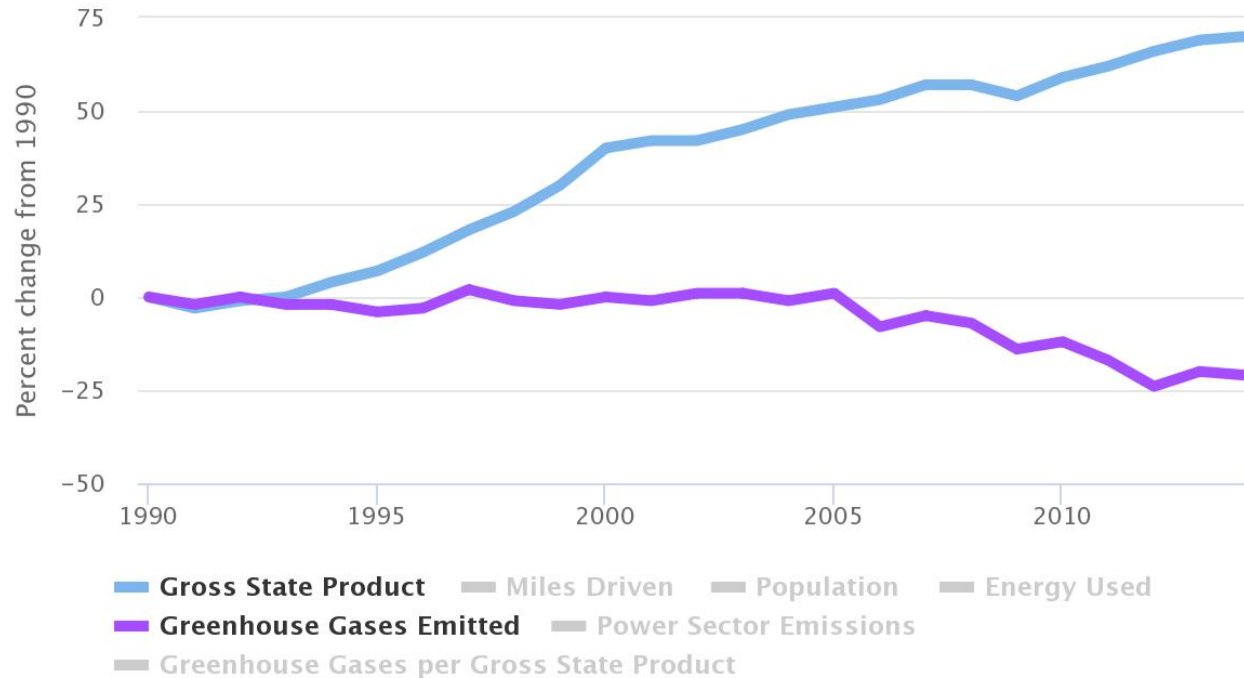
# MA GHG Emissions & Reduction Goals





# Climate goals and a growing economy

Source: MassDEP





# Regional Efforts

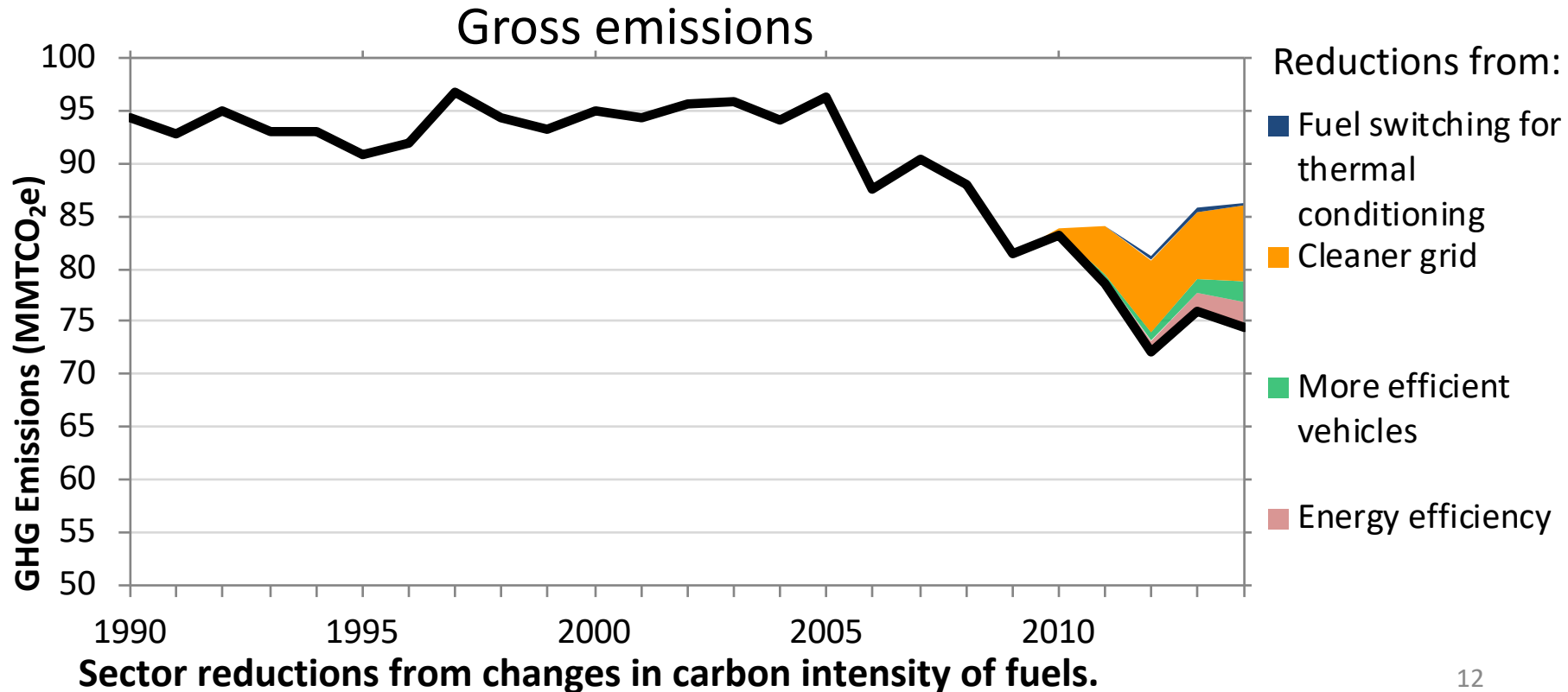
- **RGGI:** Strong bi-partisan group kept all 9 states in while agreeing to new cap, program review shows \$1.4 billion in economic benefits across the 9 RGGI states with regional economic growth of 30%, while emissions from this sector have dropped 51 percent, prices have come down over 6 percent for consumers, and more than \$400 million has been generated in MA
- **Transportation Climate Initiative (TCI):** At COP 23, 7 Northeastern states announced joint effort to work on transportation regionally
- **NEC-ECP:** Passed 3 new resolutions in 2017 on a climate action plan update, transportation and emergency management for climate change
- **US Climate Alliance:** 16 States representing the 4<sup>th</sup> largest world economy have joined together to meet goals of the Paris Climate Agreement



# OVERARCHING STRATEGIES TO 2020 AND 2050

- Reduce:
  - energy use in all sectors
  - use and leakage of potent GHG gases (e.g. CH<sub>4</sub>, SF<sub>6</sub>, HFCs)
- Electrify:
  - space heating in the Building Sector
  - fleets and infrastructure in Transportation Sector
- Decarbonize:
  - energy sources for electric grid

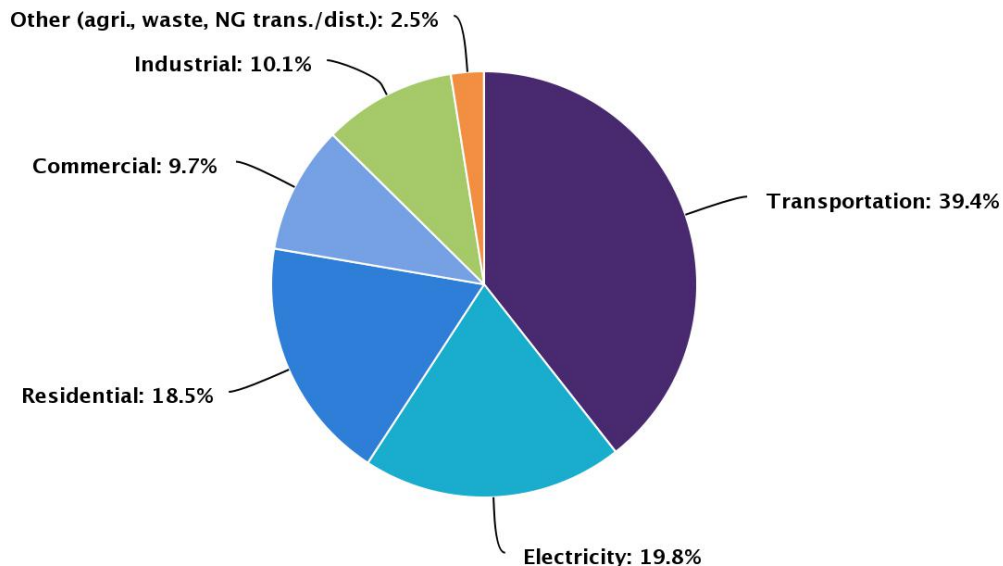
# Massachusetts GHG Emissions and Reductions – Sector "MPG"



# Sector-Based Opportunities & Challenges

2014 MA GHG Emissions by Sector

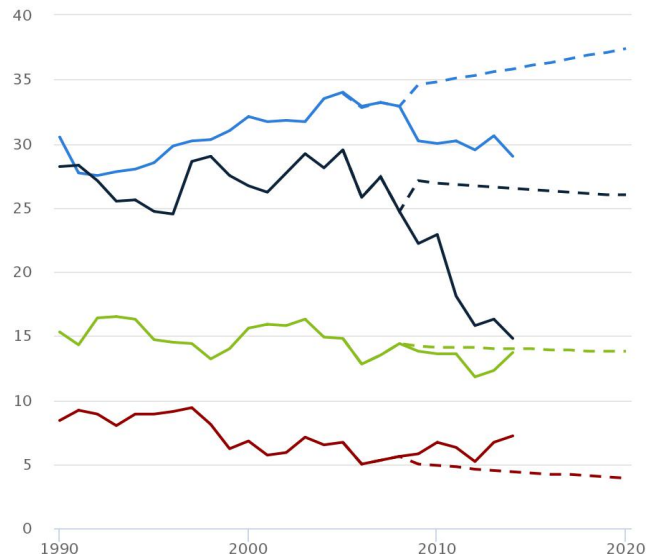
74.5 MMTCO<sub>2</sub>e



Electricity counted as its own sector.

MA GHG Emissions and Business-As-Usual (BAU) Projections for Major Sectors, 1990-2020

source: MassDEP (2017). Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990 through 2014

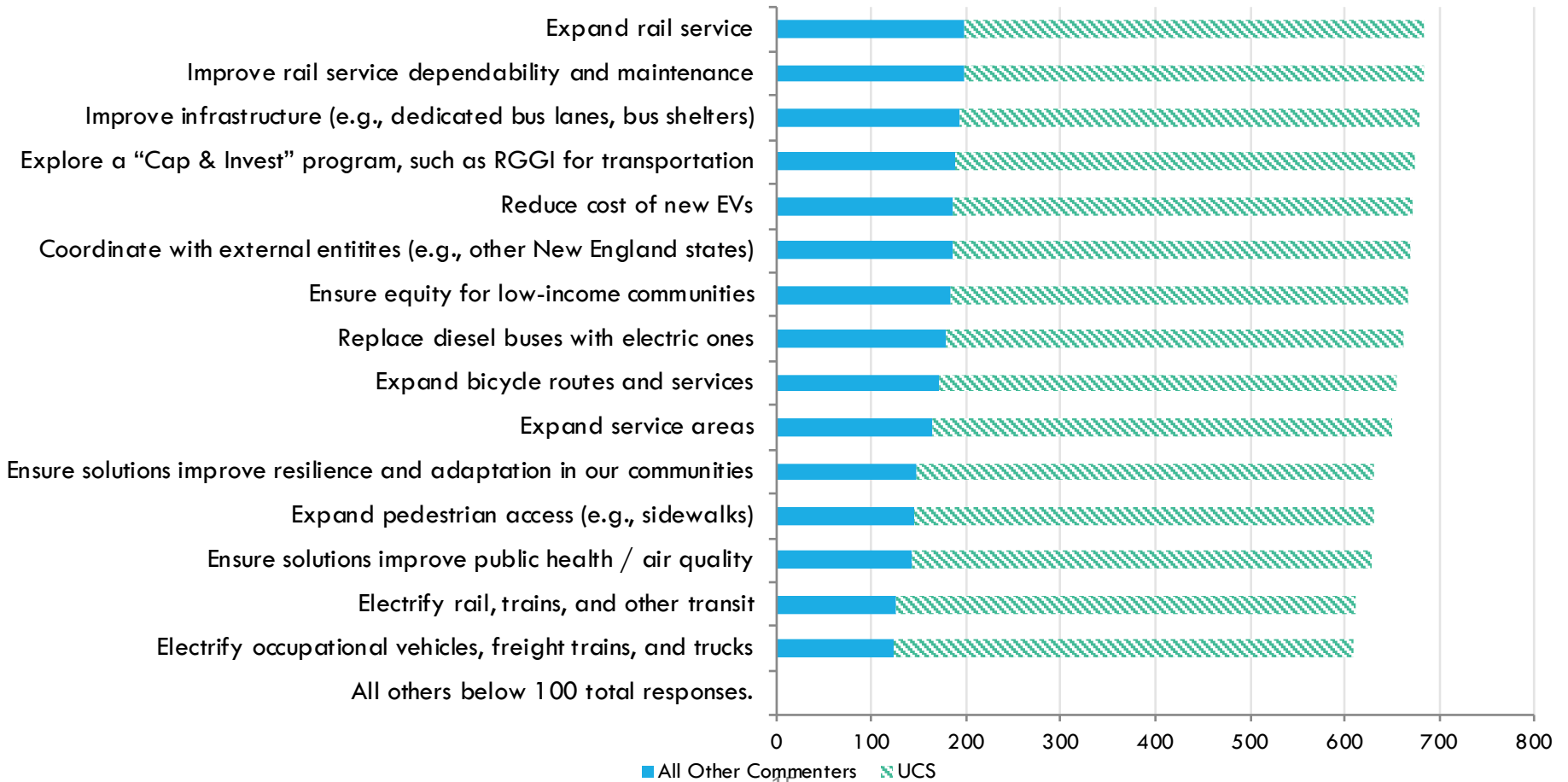


— Transportation   
 - - - Projected Transportation   
 — Electricity Consumption   
 - - - Projected Electricity Consumption   
 — Residential   
 - - - Projected Residential   
 — Commercial   
 - - - Projected Commercial   
 — Industrial (Fuel)

# Transportation Policy Highlights

- **VW Settlement:** \$75 million mitigation funds directed toward electrification of non-passenger vehicles and light-duty EV infrastructure in MA
- **EV Rebates & Grants:** >\$10 million in consumer rebates issued since 2014
- **EV Charging Network in MA:** 520 public EV charging stations
- **Housing Choice Initiative:** \$10 million/year for sustainable housing
- **Complete Streets:** >50% of MA cities and towns have a Complete Streets Policy which facilitates better travel for all users
- **Transportation listening sessions**
  - **Goal:** Capture ideas & policy solutions to combat climate change and air pollution generated by the transportation sector while also supporting a resilient, equitable transportation network for MA.
  - Over 200 attendees
  - Over 1000 comments submitted
- **Commission of the Future of Transportation**
  - Climate and resiliency
  - Electrification
  - Autonomous
  - Transit and Mobility
  - Land Use and Demographics

# Most Frequently Supported Issues

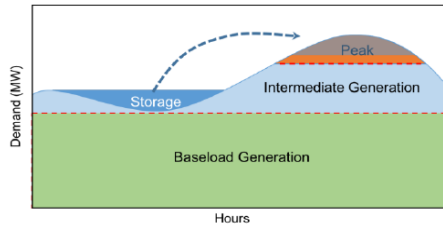


# Energy Program Highlights



## Expanding Clean Energy.

- **Hydropower and Clean Electricity.** Bids have been reviewed and selected clean energy procurement of hydro-power.
- **SMART.** Regulations for reformed solar incentives designed to maintain growth and reduce cost for additional 1600MW have been filed. DPU reviews and tentative schedule for tariff approval is June/July 2018.
- **Thermal Energy.** Revising incentives to broaden eligibility for residential and commercial renewable thermal energy, including biomass. Rules were finalized in December.
- **Offshore Wind.** RFP has been issued for 400-800MW of capacity. Bids are due on December 20, 2018.

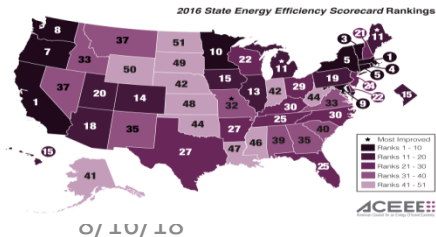


## Accelerating Innovation

- **Storage.** Prioritized research, development, and commercialization of electric storage technology. \$20 million released in December.
- **Grid Modernization.** Reviewing cost-effective deployment of smart meters, time-of use rates, storage, and electric vehicle infrastructure in pending cases at DPU.
- **Energy Resiliency:** \$40 million initiative that helps cities and towns use clean energy technologies to protect citizens from service interruption caused by severe weather due to climate change.

## Maintaining Leadership on Energy Efficiency

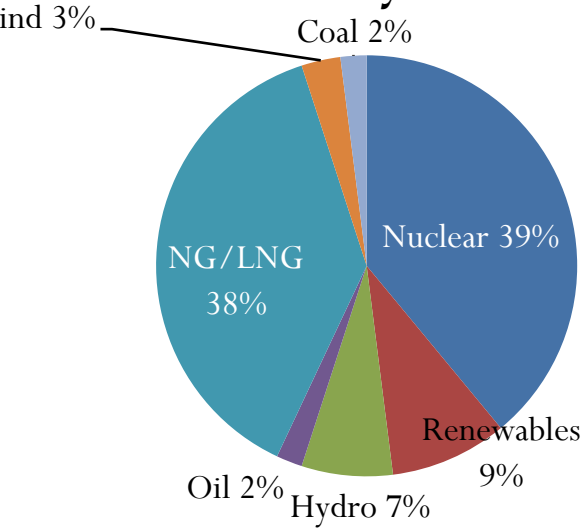
- **Number one.** Mass ranked #1 in the nation for 7 years running.
- **Three-year Plan.** Initiating review for opportunities for energy efficiency savings with lighting having been significantly addressed.



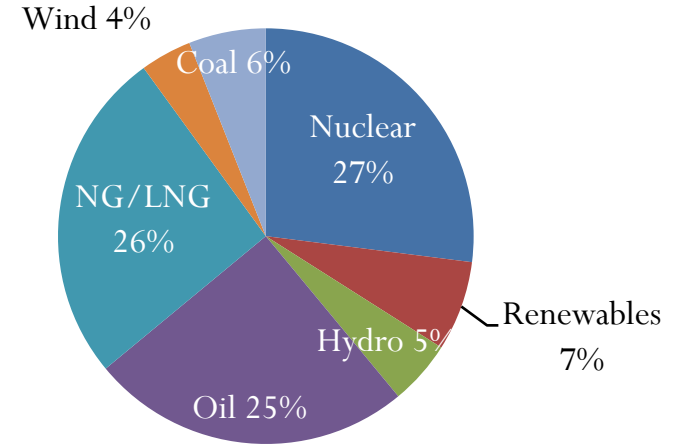


# 2017-2018 Arctic outbreak led to significant reliance on oil

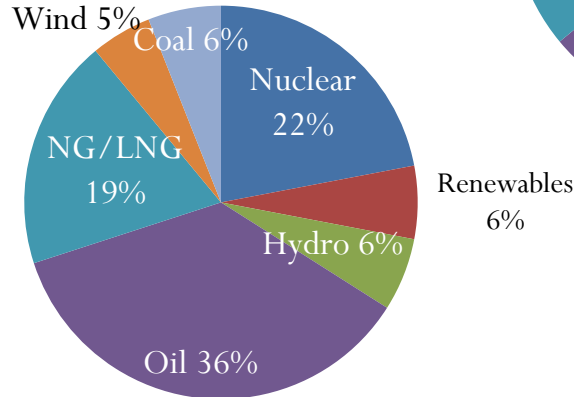
**Fuel Diversity 12/24/17**



**Fuel Diversity 1/8/18**

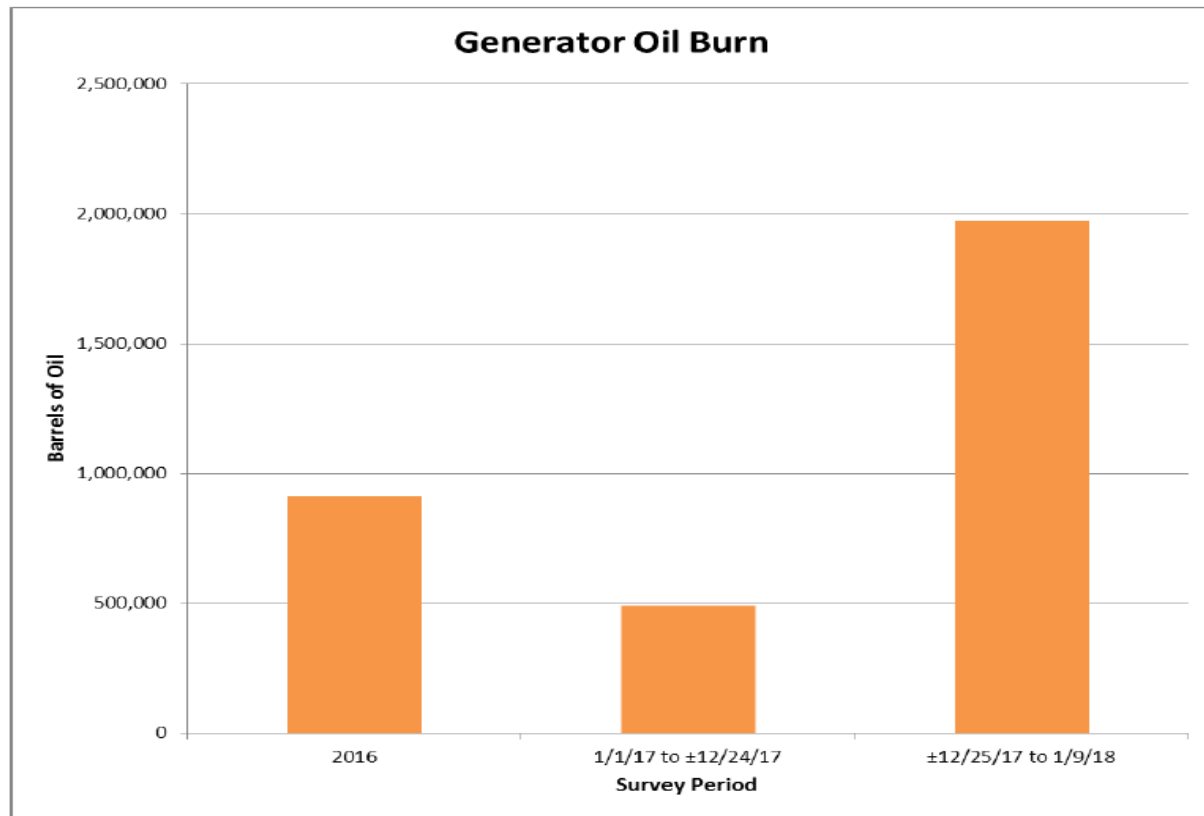


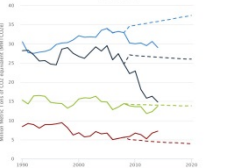
**Fuel Diversity 1/6/18**



Source: ISO New England,  
January 2018

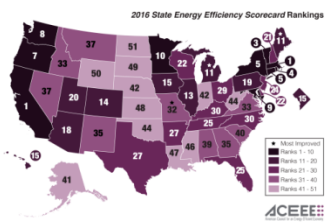
We estimate that in 15 days the amount of additional oil burned was equivalent to 5% of total emission reductions needed between 2014 and 2020 to be GWSA compliant





— Transportation — Projected Transportation — Electricity Consumption  
— Residential — Projected Residential  
— Commercial — Projected Commercial

# Building Policy Highlights

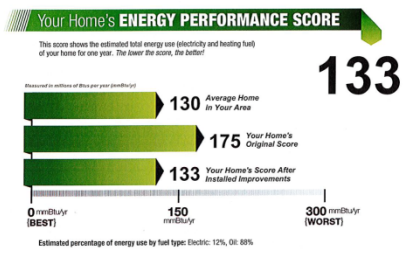


## • Maintaining Leadership on Energy Efficiency

- **Number one.** Mass ranked #1 in the nation for 7 years running.
- **Three-year Plan.** Exploring opportunities for strategic electrification.

## • Home Energy Scorecard

- Legislation introduced to ensure homeowners and prospective homebuyers have access to information about a home's anticipated energy efficiency characteristics and recommended cost-effective energy efficiency improvements.



## Renewable Thermal Incentives

- >800 solar hot water systems subsidized by MassCEC rebates.
- ~3% of MA homes in 2015 have air source heat pumps for cooling and/or heating.

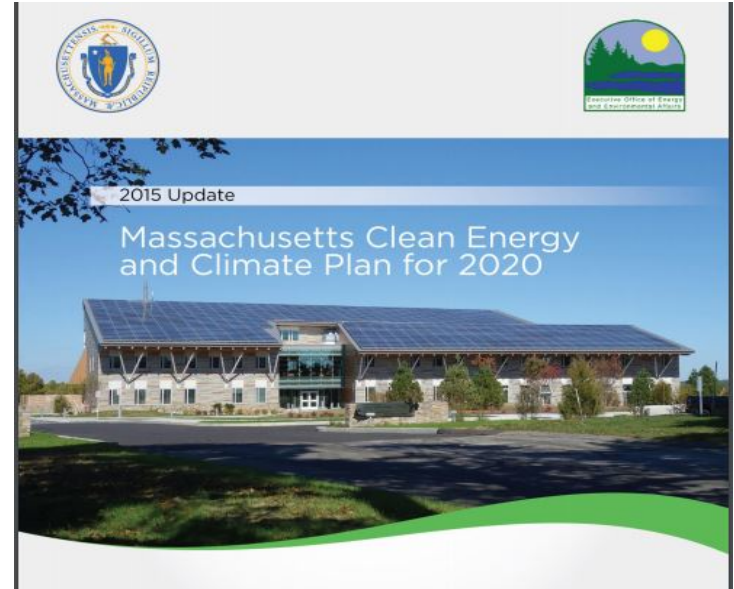
## • Greening the Gateway Cities Program

- >10,000 trees planted in Environmental Justice neighborhoods of 13 Gateway Cities.
- \$8 million/year commitment by the Baker-Polito Administration.



# Planning for 2030

- Comprehensive Energy Plan, due September 2018
- 2030 emissions limit, set by 2020
- Clean Energy and Climate Plan for 2030, due 2020
- GWSA Implementation Advisory Committee (IAC)
  - Meeting at least every other month
  - Work plan developed for 2018
  - 4 technical subcommittees
    - Buildings
    - Transportation
    - Electric Generation
    - Natural Systems, including land use



# Approach to setting the 2030 emissions limit

- **Overall Approach**
  - Pathway & scenario analysis to 2050 in LEAP modeling tool.
    - Incorporates inputs from analyses for the Comprehensive Energy Plan and scenario development for the Commission on Future of Transportation.
  - Cost study to estimate costs associated with potential policies or strategies.
  - Results from pathway & scenario analysis and cost study will inform EEA Secretary of feasible range for 2030 emissions limit that will position MA to meet the 2050 emissions limit.
- **Major Components of Pathway & Scenario Analysis**
  - Reference Case: scenario consisting of only existing policies
  - Policies Scenarios: various pathways that represent expansion of existing policies/strategies or addition of new policies/strategies.

State	U.S. Climate Alliance	Reduction Baseline	GHG Reduction Goal/Target from Baseline						
			2020	2025	2030	2035	2040	2045	2050
Arizona		2000	0%				50%		
California	Yes	1990	0%		40%				80%
Colorado	Yes	2005		26%					
Connecticut	Yes	1990/2001	10%						80%
Delaware	Yes	2005		Paris*					
Florida		1990		0%					80%
Hawaii	Yes	1990/2005	0%**	Paris*					
Illinois		1990	0%						60%
Maryland		2006	25%		40%				
Maine		1990	10%				75-80% below 2003 levels in the long term		
Massachusetts	Yes	1990	25%						80%
Michigan		2005		20%					80%
Minnesota	Yes	2005		30%					80%
New Jersey		1990/2006	0%						80%
New Hampshire		1990	10%	20%					80%
New Mexico		2000	10%						75%
New York	Yes	1990			40%				80%
North Carolina	Yes	2005		Paris*					
Oregon	Yes	1990	10%						75%
Puerto Rico	Yes	2005		Paris*					
Rhode Island	Yes	1990	10%			50%			85%
Virginia	Yes	2005/2020		Paris*	30%**				
Vermont	Yes	1990	25% by 2012		50% by 2028				
Washington	Yes	1990	0%			25%			50%

\* U.S. Climate Alliance (Paris Accord) Target: 26-28% below 2005 emissions levels by 2025.

\*\* Regulations pending.



# resilient MA

Climate Change Clearinghouse for the Commonwealth

Explore Sectors

Identify Changes

Take Action

Maps

Data

Documents

Search for resources...

QSearch

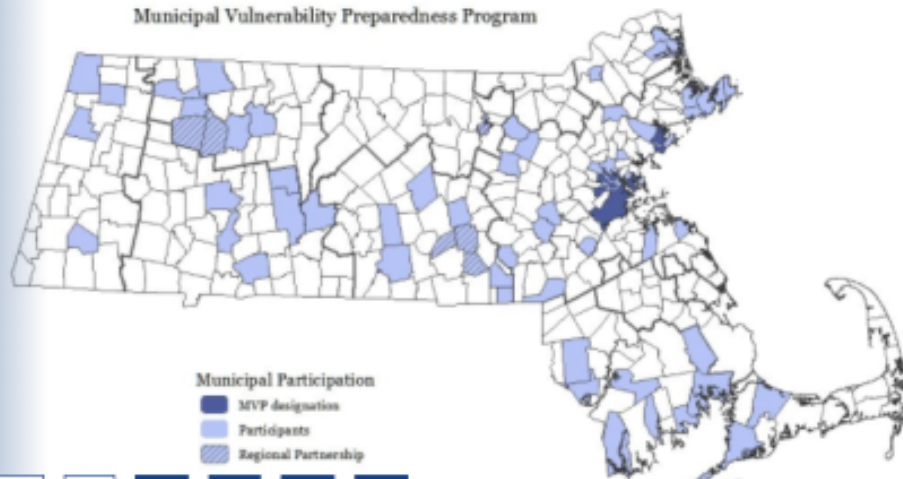
Providing the most up-to-date climate change science and decision-support tools for the Commonwealth. [More »](#)

## Municipal Vulnerability Preparedness

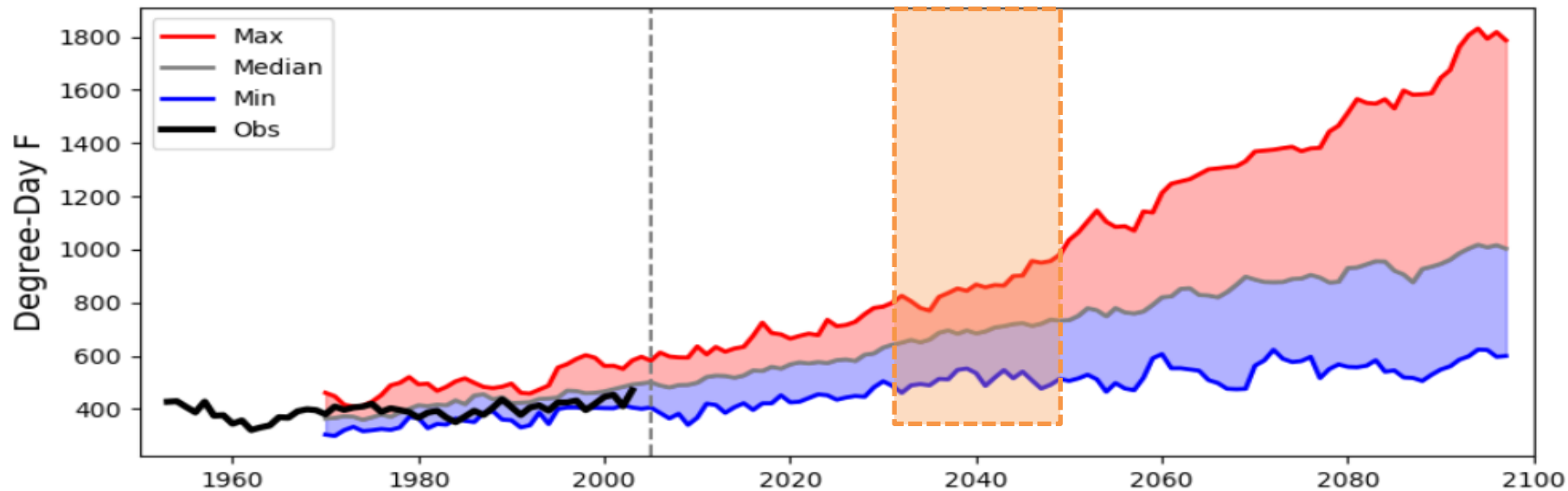
Our cities and towns are on the front lines of climate change. The new MVP program from the Executive Office of Energy and Environmental Affairs works with communities across the state to decrease risk, build resiliency, and identify strengths and opportunities through targeted planning and action.

[More »](#)

Municipal Vulnerability Preparedness Program



# Expected Climate Changes: Cooling Degree-Days (Summer)



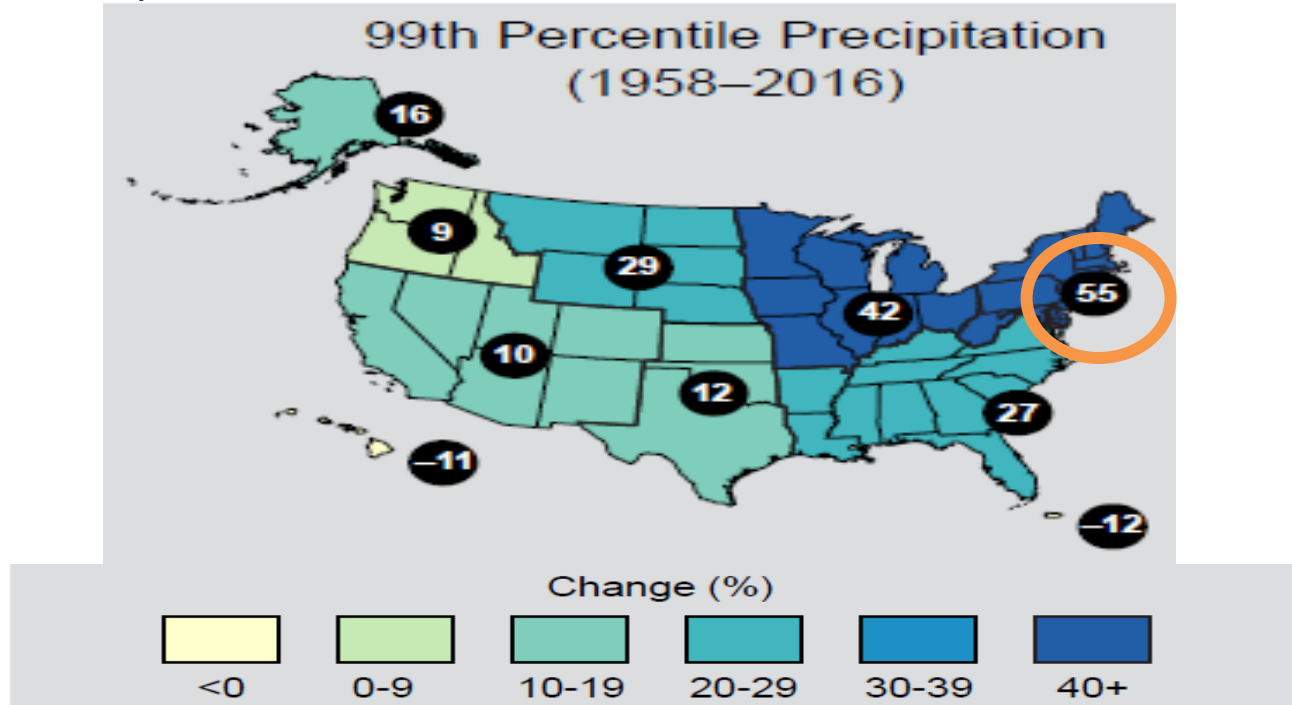
Summer cooling degree-days increasing

- ❖ Increase by 37-78% for 2030s
- ❖ Increase by 46-131% for 2050s
- ❖ Increase by 77-310% for 2100



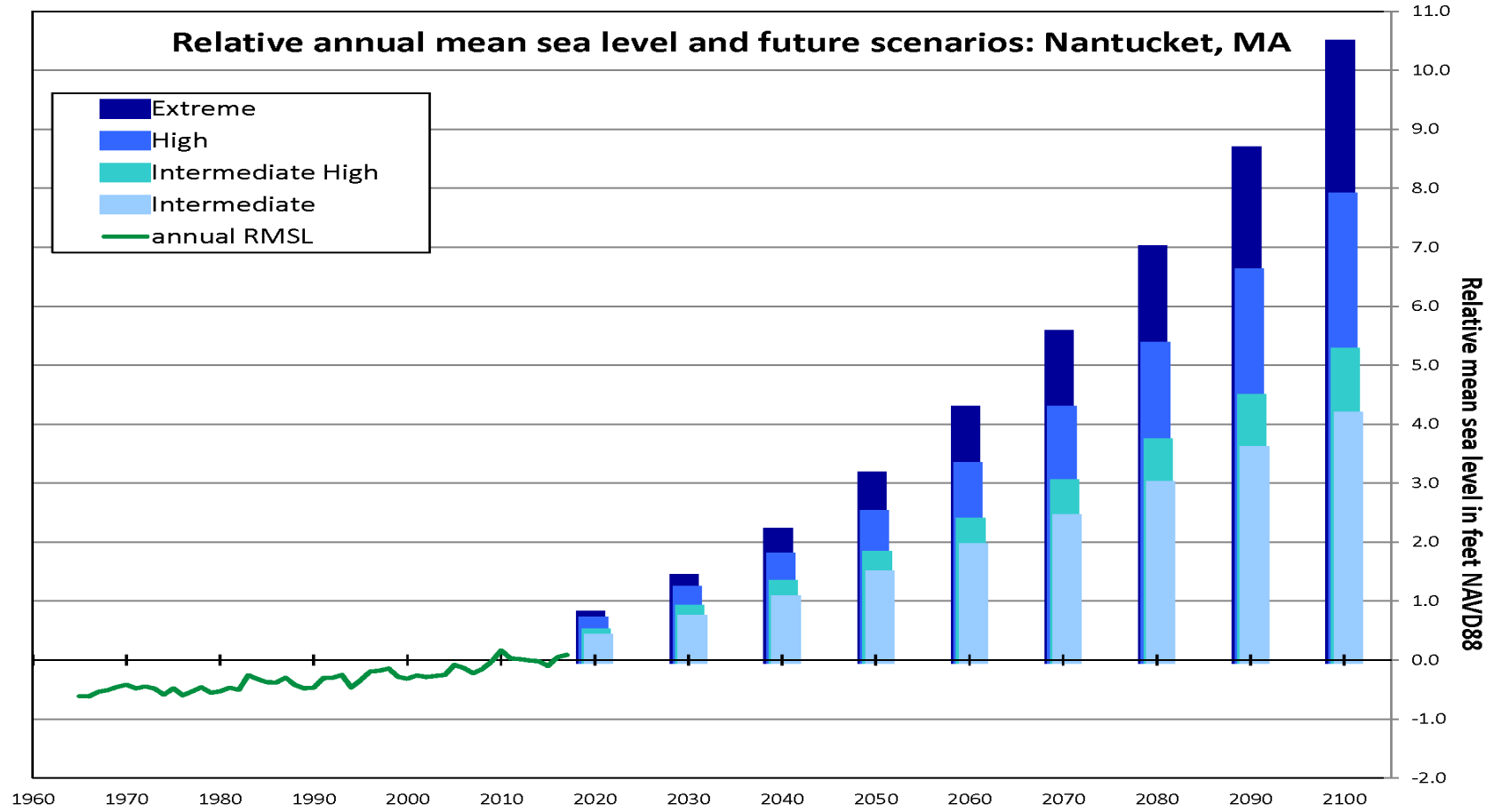
# Observed Changes: Extreme Precipitation

Northeast saw a 55% increase in heavy precipitation (top 1% of all non-zero precipitation days) from 1958-2016



Northeast expected to see >25% increase in heavy precipitation (top 5% of all non-zero precipitation days)

# Expected Climate Changes for 2040: Sea Level Rise



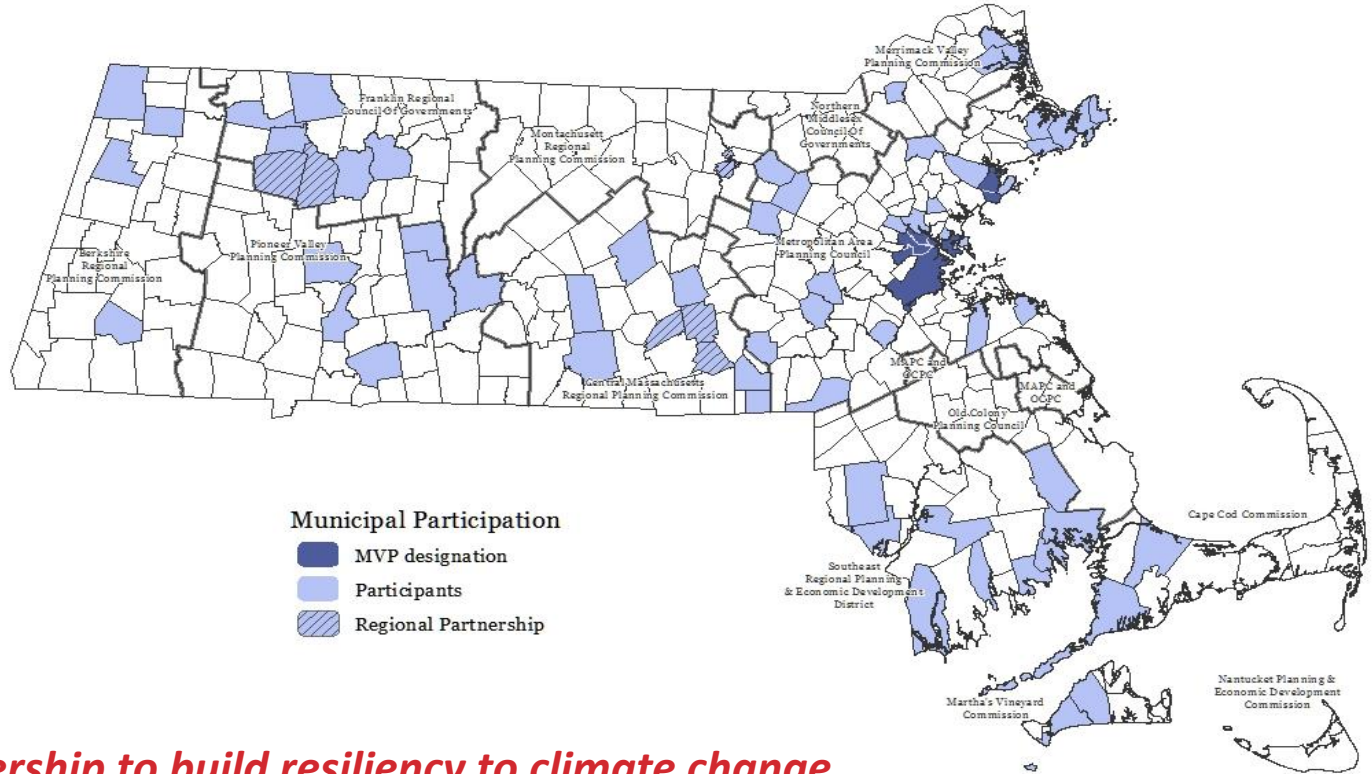


# Massachusetts State Hazard Mitigation and Climate Adaptation Plan

- [www.resilientma.com](http://www.resilientma.com)
- **Integrated Plan:** First in the nation Climate Adaptation and Hazard Mitigation plan
- **Mainstreaming climate change:** Incorporating climate change into current planning, budgeting, and policy frameworks

# Municipal Vulnerability Preparedness (MVP)

2017-2018



**State and local partnership to build resiliency to climate change**

