

How Is the Impact of Energy Policy on Energy Reliability Analyzed?

Summary of the 2018 Massachusetts Comprehensive Energy Plan

**ANS Northeastern Local Section Remote Meeting
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**Joanne Morin
Deputy Commissioner**

Comprehensive Energy Plan (CEP) Overview

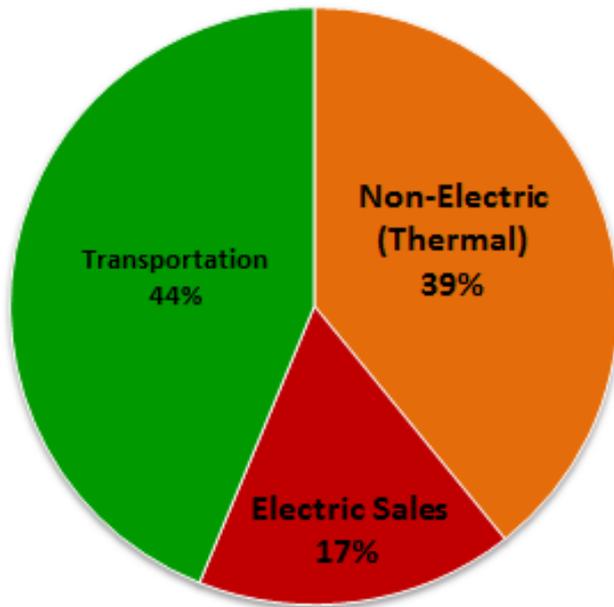
- Executive Order No. 569, *Establishing an Integrated Climate Change Strategy for the Commonwealth*, directed a **Comprehensive Energy Plan (CEP)** that includes:
 - Projections for energy demands for **electricity, transportation and thermal conditioning**
 - Strategies for meeting these demands in a regional context
 - Prioritizes meeting energy demand through conservation, energy efficiency, and other demand-reduction strategies
- CEP Modeling and Analysis
 - Examine impacts of policies to reduce GHG emissions on cost and reliability from now to 2030
 - Modeled under average conditions and extended cold weather conditions
- Provide policy guidance on which strategies will best balance costs, emissions and reliability

Thermal & Transportation Sectors account for Largest Energy Use

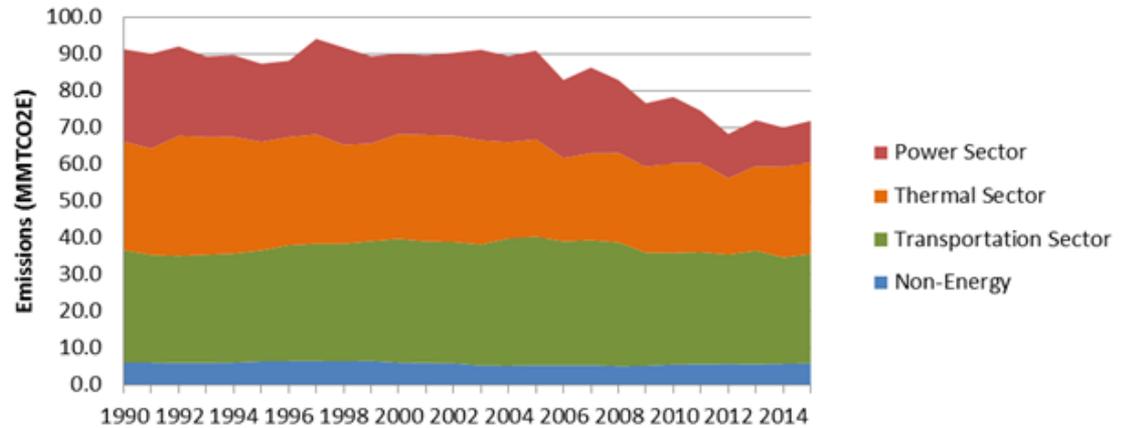
Necessary to Shift Focus from Electric Sector for Future GHG Reductions

Energy Use in 2016

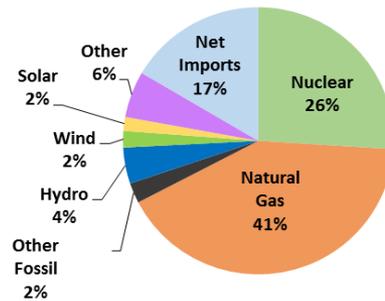
Total: 1,074 Trillion BTU in 2016



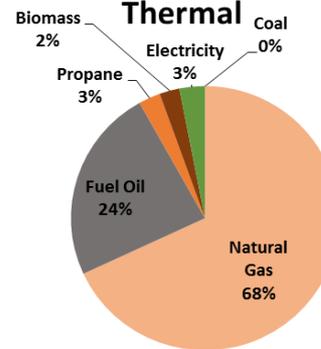
Massachusetts Greenhouse Gas Inventory



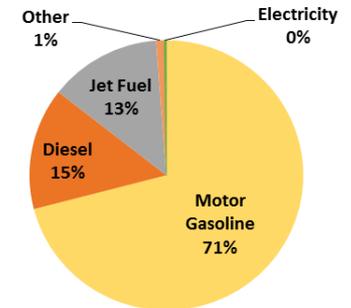
Electric - ISO-NE



Thermal



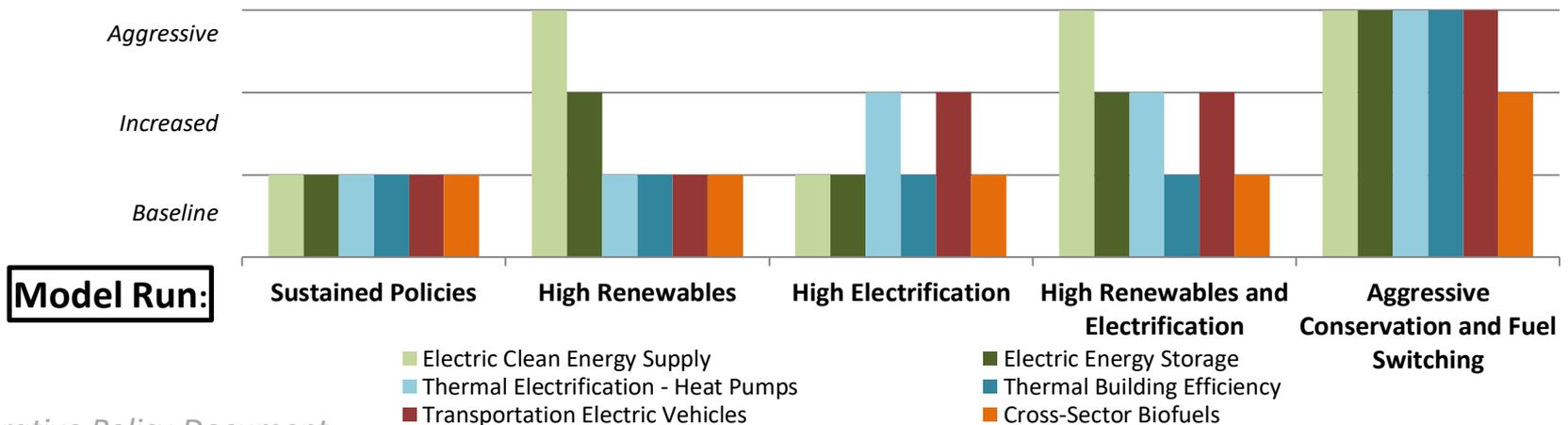
Transportation



Modeling Analysis

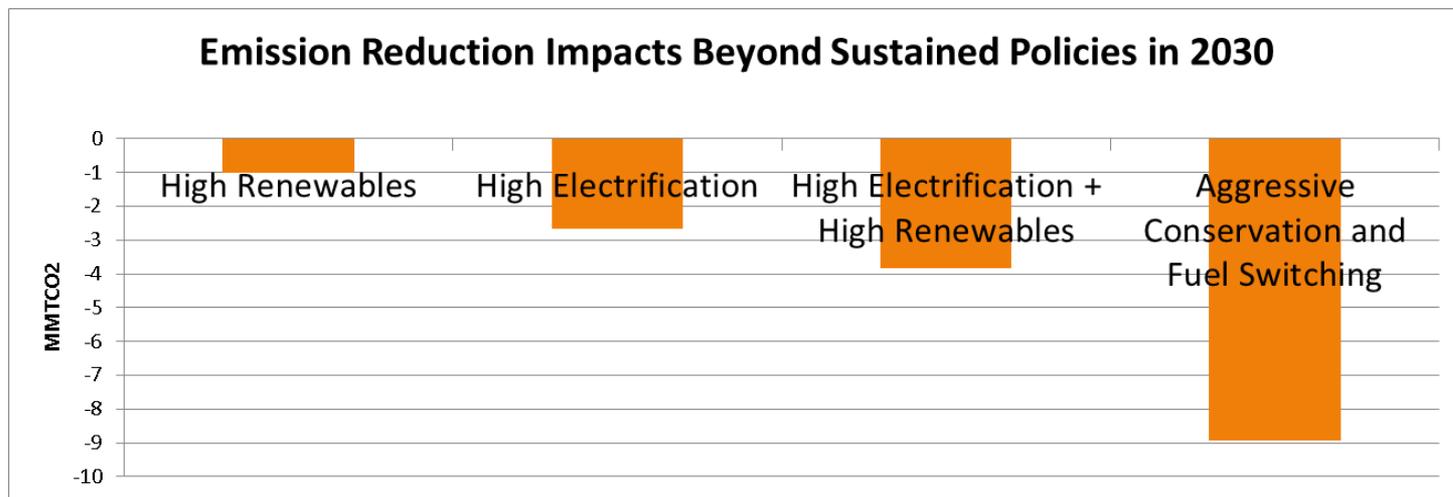
Modeled various hypothetical amounts of clean energy and demand between now and 2030 to see impact on cost, emissions and reliability:

Scenarios	Modeling Assumptions by 2030
Sustained Policies	<i>Assumption of what outcomes will be achieved by 2030 as a result of current policies (Pre-2018 Legislation) 45% clean retail electricity; 500 MWh storage; 1.2 million EVs</i>
High Renewables	<i>Sustained Policies with additional clean electricity: + 16 TWh of Clean Electricity (4,000 – 7,000 MW), 65% clean electricity + 3x amount of energy storage (1800 MWh)</i>
High Electrification	<i>Sustained Policies with increased electrification of Thermal and Transportation Sectors + Accelerated growth in EVs (1.7 million LDV (36%) - by 2030) + 25% of oil-heated and 10% of gas-heated buildings switch to ASHP</i>
High Renewables + Electrification	<i>Combine the High Renewables and High Electrification assumptions</i>
Aggressive Conservation + Fuel Switching	<i>High Renewables + Electrification scenario with: + More aggressive fuel switching in the Thermal and Transportation sectors + 3x increase in pace of weatherization and building efficiency + 2 GW peak demand reduction</i>

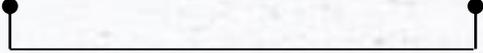
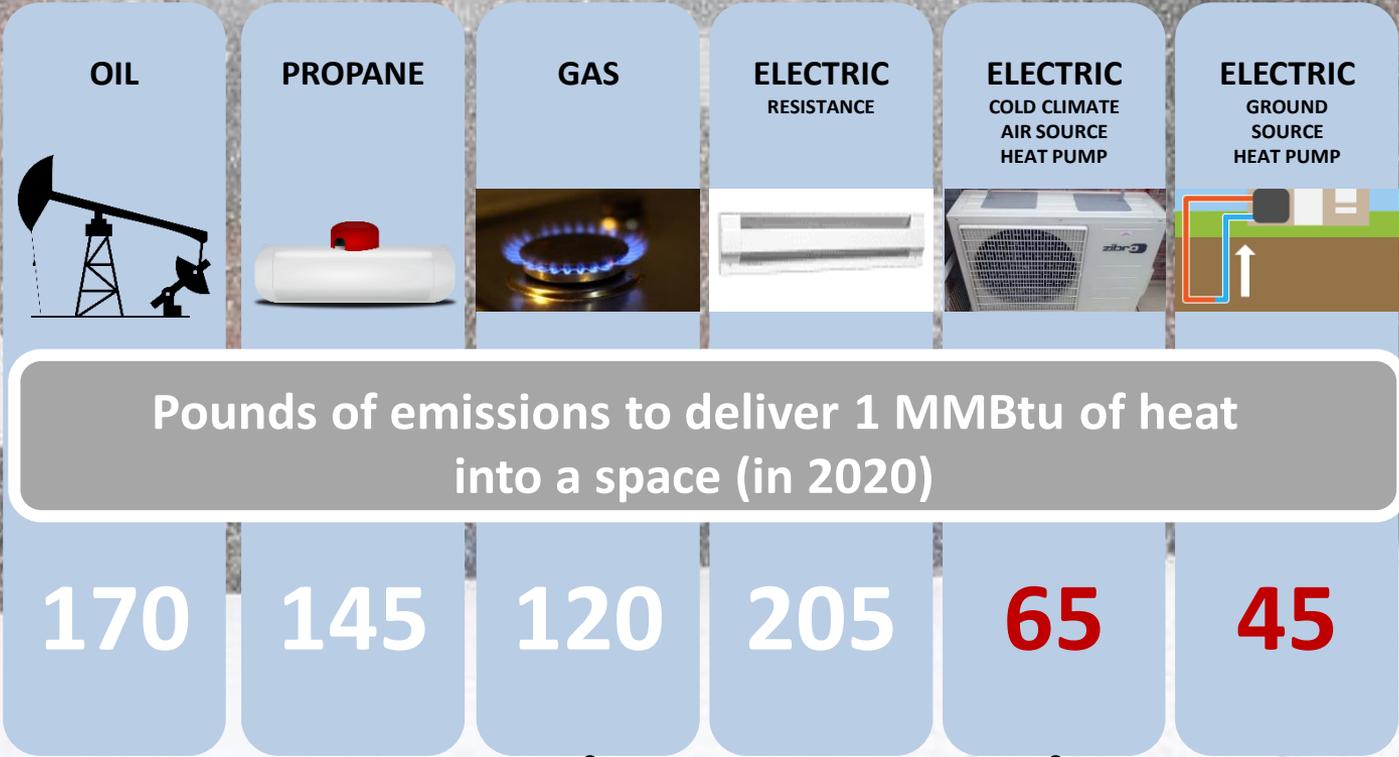


Greatest GHG Reductions Achieved by Conservation and Fuel Switching

Focusing Primarily on Electric Sector has Diminishing Returns



- With current policies, Massachusetts estimated to achieve 35% emission reduction from 1990 levels by 2030 (~61 MMTCO₂)
- Electrifying the thermal and transportation sector leverages investments made in a cleaner electric grid
- Conservation and peak demand reduction important as use of electricity for heating and transportation grows
- Improving building efficiency is important to achieving reduced emissions in thermal sector
- Alternative fuels, such as biofuels, can assist in transition to cleaner heating and transportation

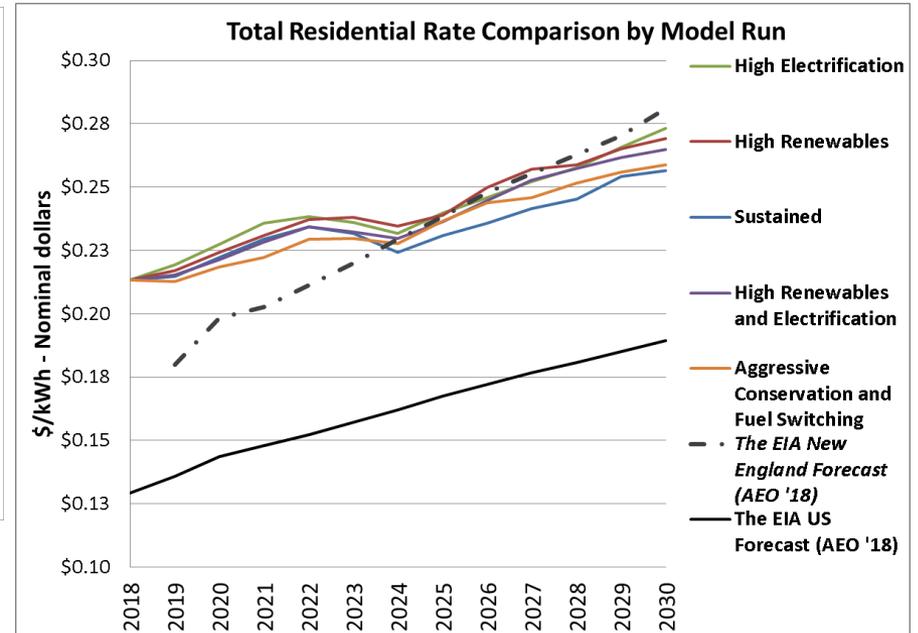
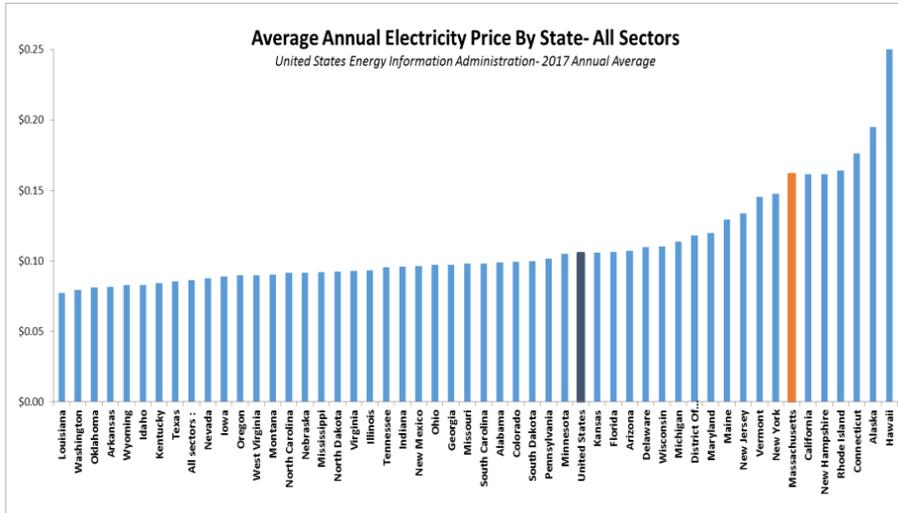


45% Less

Focus on Decreasing Demand & Peak Yield Greatest Rate Reductions

Conservation Can Offset Policy Costs

Comparison of Current Massachusetts Electric Rates with projections for 2030



- All scenarios show lower retail electric rates in 2030 than projections by the U.S. Energy Information Agency (EIA), primarily due to large-scale hydro and off-shore wind procurements
- However, all other scenarios besides Sustained Policies show that additional policies aimed at the electric sector raises rates
- Finding low cost sources of clean electricity that can deliver in winter improves costs

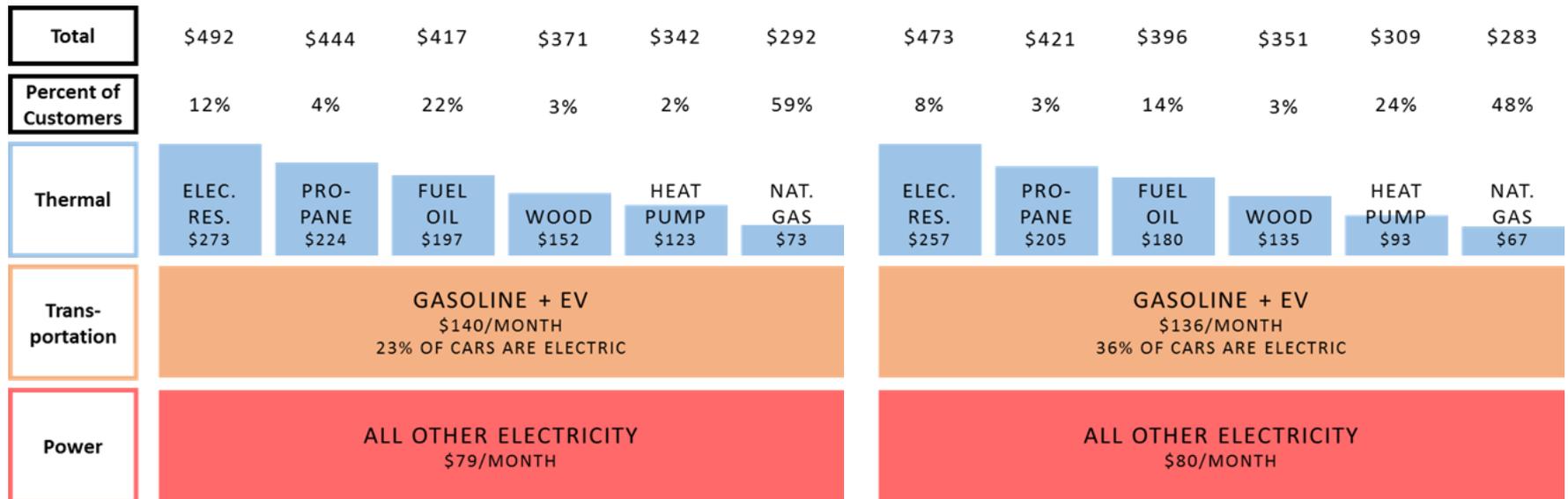
Fuel Switching Lowers Consumers' Spending

Sustained Policies

Average Monthly Expenditures in 2030* = **\$351**

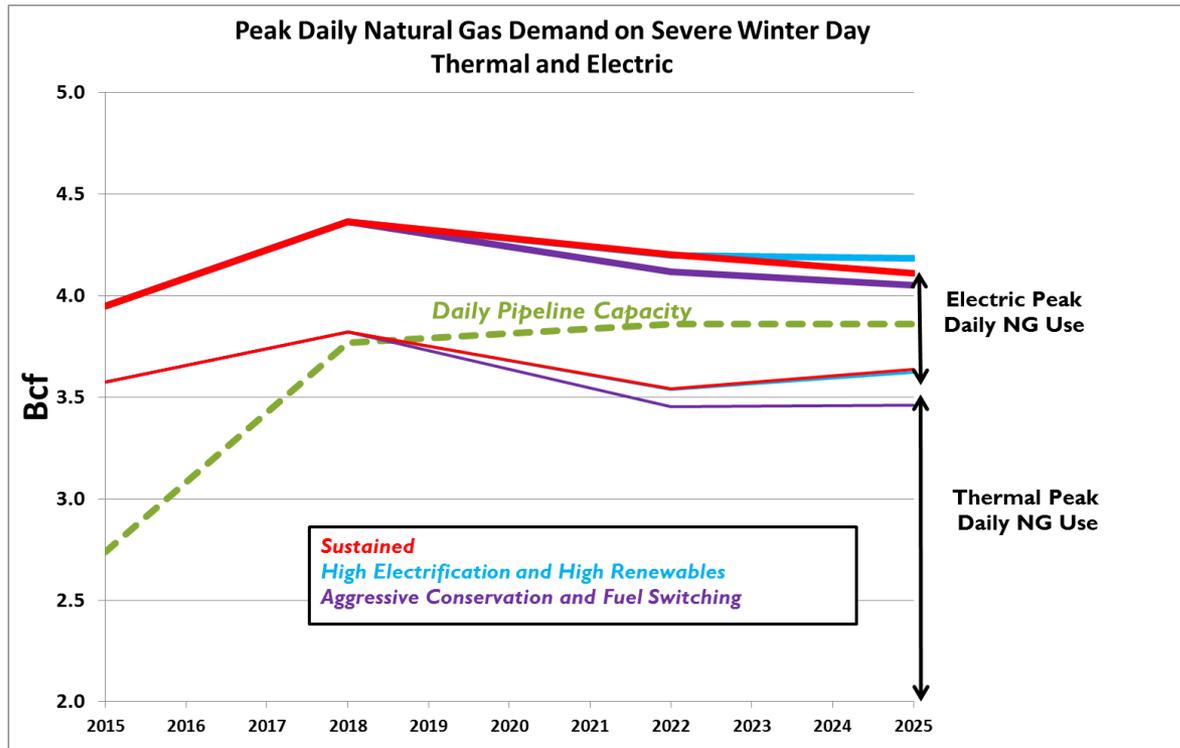
Aggressive Conservation and Fuel Switching

Average Monthly Expenditures in 2030* = **\$326**



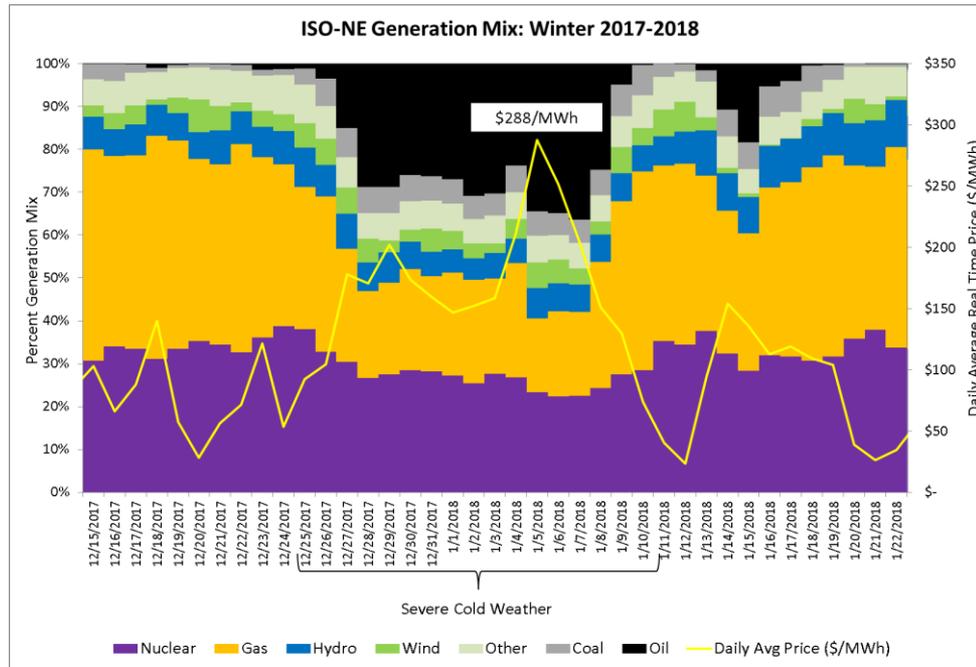
- Fuel switching from expensive fuels for heating such as electric resistance heat, propane and fuel oil to lower cost fuels, such as electric air source heat pumps and biofuels, can lower an average consumer's monthly energy bills
- Even with higher electric rates, monthly expenditures for energy are lower

Risk Remains for Price Spikes and Emission Increases During Extended Cold Periods



- In all scenarios modeled, the region will continue to rely on higher cost stored fuels such as liquefied natural gas (LNG) and high emission fuel oil.
- State policies that reduce natural gas demand, such as increasing clean energy supply and reducing thermal sector demand, reduces but does not eliminate reliance on oil and LNG

Mitigating NG Constraints & Lessening Reliance on Oil Generation Reduces Cost and Emission Impacts From Extended Cold Periods



- The added costs from a winter event **increase retail rates in subsequent years** across all classes of ratepayers
- The **combination** of the current large-scale **procurements** (83D and 83C) and **mitigating natural gas constraints** reduces reliance on stored fuels in a winter event, which could save 2 cents/kWh in all hours, or approximately \$900 million annually if extended cold weather occurs
- **Mitigating natural gas constraints could decrease emissions** during a winter event
- **Reducing demand in the thermal sector** (heating and cooling) reduces cost and emissions for consumers, while improving winter reliability

Policy Priorities and Strategies

for a clean, affordable, resilient energy future

Thermal Sector

- Leverage investments made in the clean energy sector through **electrification**
- **Promote fuel switching** in the thermal sector from more expensive, higher carbon intensive fuels to lower cost, lower carbon fuels such as electric air source heat pumps and biofuels
 - Reduce use of expensive and high emission heating fuels such as fuel oil, propane, and electric resistance heat
- Reduce thermal sector consumption
 - Explore possible ways to strengthen **building codes** to drive additional efficiency in new construction
 - Increase **weatherization** measures to improve building shell efficiencies and targeted **winter gas savings** through the MassSave efficiency programs
 - Promote high efficiency building construction, such as **passive houses**, to further reduce energy demand from the thermal sector
- Drive market/consumer demand for energy efficiency measures and fuel switching
 - Educate consumers about the benefits of energy efficiency and create a market **incentive for consumers to invest** in energy efficiency improvements through a “**Home Energy Scorecard**”
 - Address the **split incentive** between landlords and renters for investments in energy efficiency
- Invest in R&D for **clean heating fuels**, such as renewable gas and biofuels, that can utilize investments already made in heating infrastructure

Policy Priorities and Strategies

for a clean, affordable, resilient energy future

Electric Sector

- Prioritize electric energy efficiency and peak demand reductions
 - Implement policies and programs, including the **Clean Peak Standard**, that incentivize energy conservation during peak periods.
 - Develop policies to **align new demand** from the charging of EVs and heating/cooling with the production of clean, low-cost energy.
 - Include cost-effective **demand reduction** and **additional energy efficiency initiatives** in our nation-leading energy efficiency programs and plans
 - Utilize our successful **Green Communities** programs and **Leading By Example** programs to continue to make state and municipal infrastructure clean and efficient
- Continue to increase cost-effective renewable energy supply
 - Investigate policies and programs that support **cost-effective clean resources** that are **available in winter** to provide both cost and emission benefits to customers
 - Evaluate or expand **continued policies to support distributed resources**, including distributed solar and storage development in the Commonwealth after the SMART program concludes, to continue lowering costs while providing benefits to ratepayers

Policy Priorities and Strategies

for a clean, affordable, resilient energy future

Electric Sector

- Support grid modernization and advanced technologies
 - Promote cost effective **microgrids** to provide greater overall grid resiliency and reduce transmission and distribution costs from building out the grid to meet new demand
 - Review existing and possible new policies to **support new technologies**, including energy storage, that can **align supply and demand** and provide grid flexibility
- Examine potential strategies to lower the price of natural gas and **mitigate natural gas constraints**
 - Encourage **contracting with LNG supply ahead of the winter** to ensure LNG supplies are available to be used by gas-fired generation
 - Work with federal officials to explore modifying the **Jones Act** to facilitate shipping of LNG from domestic sources
 - **Reduce thermal and electric sector demand** to reduce the region's demand for natural gas

Policy Priorities and Strategies

Transportation Sector

- Increase the **deployment of EVs** and charging infrastructure.
- Support development of **liquid renewable fuels** to provide alternative transportation fuels.
- Further recommendations were published by the Commission on the Future of Transportation 12/14/18

<https://www.mass.gov/orgs/commission-on-the-future-of-transportation>

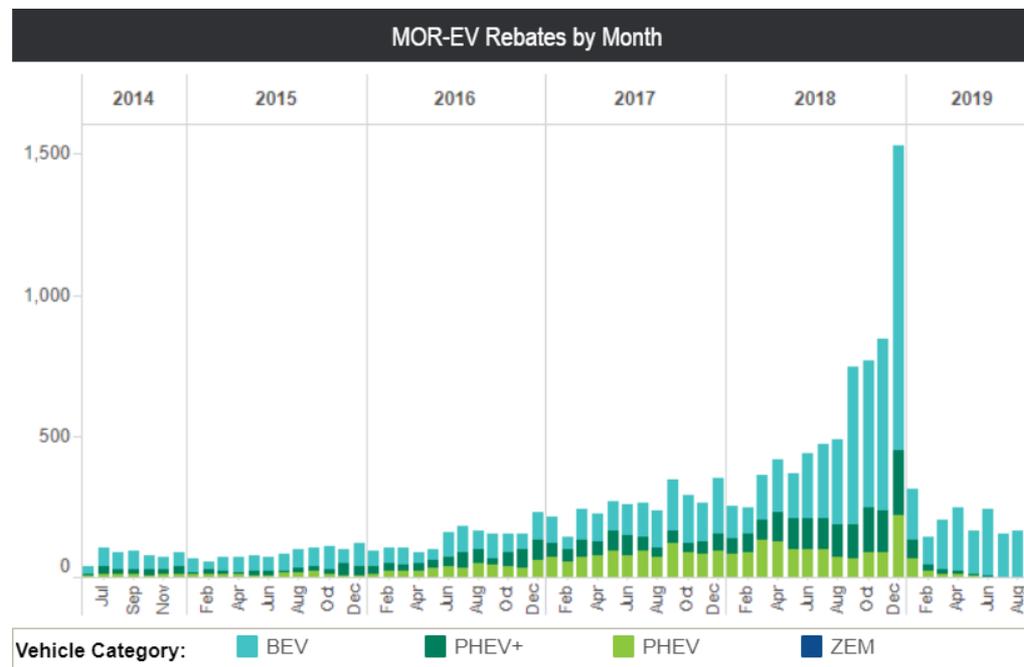
Transportation and Climate Initiative (TCI): Regional Opportunity

- TCI is a regional collaboration of 12 Northeast and Mid-Atlantic states and DC
 - 72 Million People
 - 52 Million Vehicles
 - \$5.3 Trillion GDP
- The program could deliver at least \$1.4-\$5.6 billion annually
 - In comparison, the first 10 years of RGGI generated a total of \$3.3 billion.
- Transportation-related CO₂ emissions from on-road sources in the TCI region (254 MMT) is nearly twice as large as in California (151 MMT)
- A cap on emissions under TCI would be nearly three times the size of the RGGI cap (including NJ & VA), in 2020 (102 MMT)



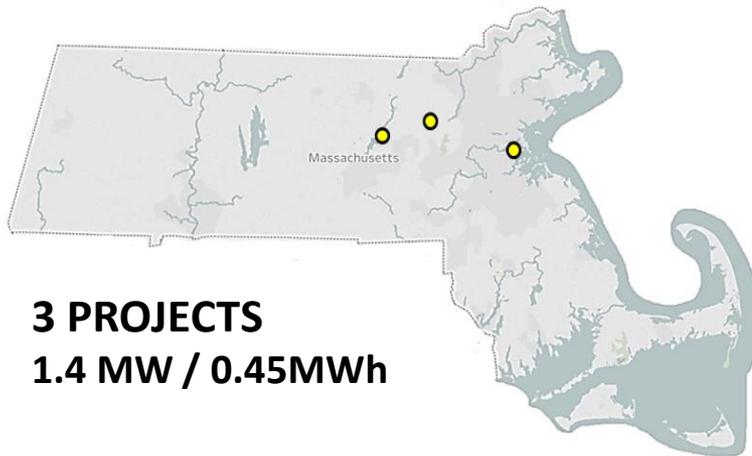
MOR-EV

- The Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) program aims to provide air pollution emission reductions by increasing the use of electric vehicles
- MOR-EV provides rebates of up to \$2,500 for the purchase or lease of battery electric vehicles and fuel-cell electric vehicles and up to \$1,500 for plug-in hybrid electric vehicles
- Since 2014, Massachusetts has dedicated over \$31 million in this effort by incentivizing the purchase of over 15,000 electric vehicles



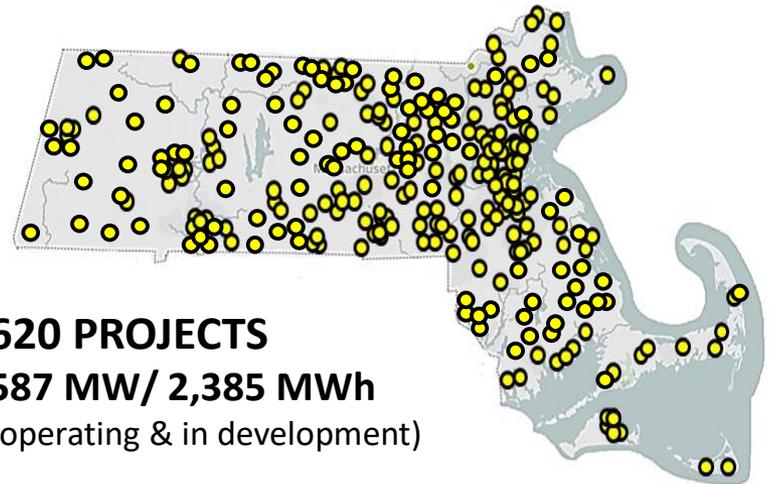
Massachusetts' Energy Storage Success

2015



3 PROJECTS
1.4 MW / 0.45MWh

2019*



620 PROJECTS
587 MW / 2,385 MWh
(operating & in development)

Energy Storage is a game changer for meeting peak, aligning supply and demand, creating flexibility and increasing resiliency

**As of end of 2019.*

Clean Peak Standard

Background

- 2018 legislation tasked DOER with establishing a Clean Peak Standard (CPS)
- Market incentive for clean energy to be used – storage, renewables, demand response – during times when costs and emissions are at their highest
- Creates an annual requirement on all electricity suppliers to purchase a certain amount of Clean Peak Energy Certificates (CPECs)

Implementation

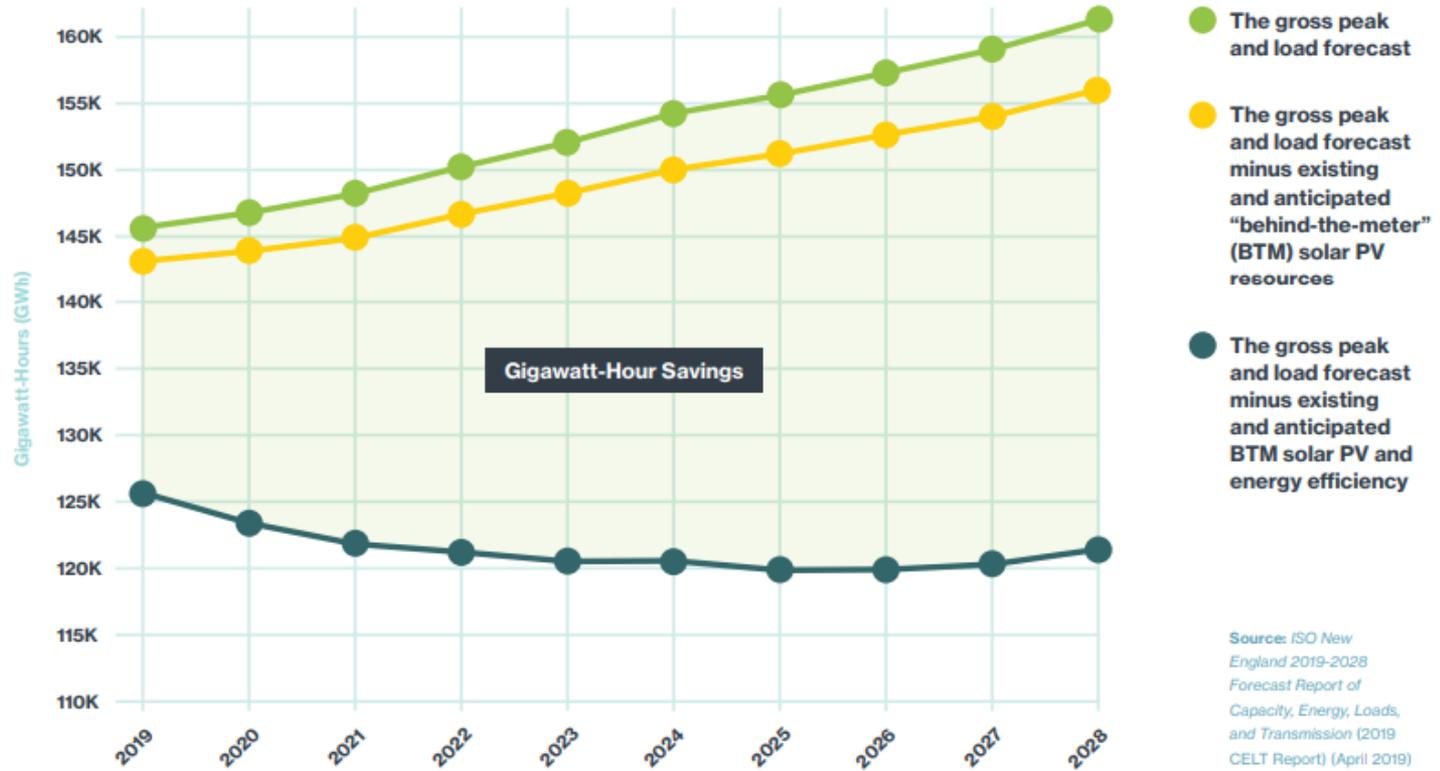
- 2019
 - Engaged stakeholders, developed and presented a straw proposal, issued draft regulations, and held public hearings
 - Currently reviewing public comments received on draft regulations
 - Technical Bulletin will be issued to set 2020 obligation
- Anticipated in Q1 2020
 - Final regulations filed

MA will be first in the nation to implement a Clean Peak Standard

Energy Efficiency and Behind-the-Meter Solar Forecast

Energy Efficiency and Behind-the-Meter Solar Are Forecasted to Significantly Reduce Grid Electricity Use Over the Next 10 Years

Projected Annual Energy Use (GWh) With and Without EE and PV Savings



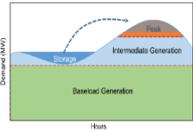
Source: ISO New England 2019-2028 Forecast Report of Capacity, Energy, Loads, and Transmission (2019 CELT Report) (April 2019)

3 Year Energy Efficiency Plan: 2019 – 2021

Summary of New Initiatives



Fuel Switching: customers will be provided information on cleaner fuel options for heating with new incentives for customers to fuel switch to air source heat pumps and other renewable heating options.



Active Demand Reduction: Programs that help offset the most expensive hours of the year through load reduction and active dispatch including energy storage.



Passive House – training and rebates achieve greater energy efficiency in new construction



Home Energy Scorecards: through in-home energy audits, providing information to customers on the benefits of energy efficiency upgrades

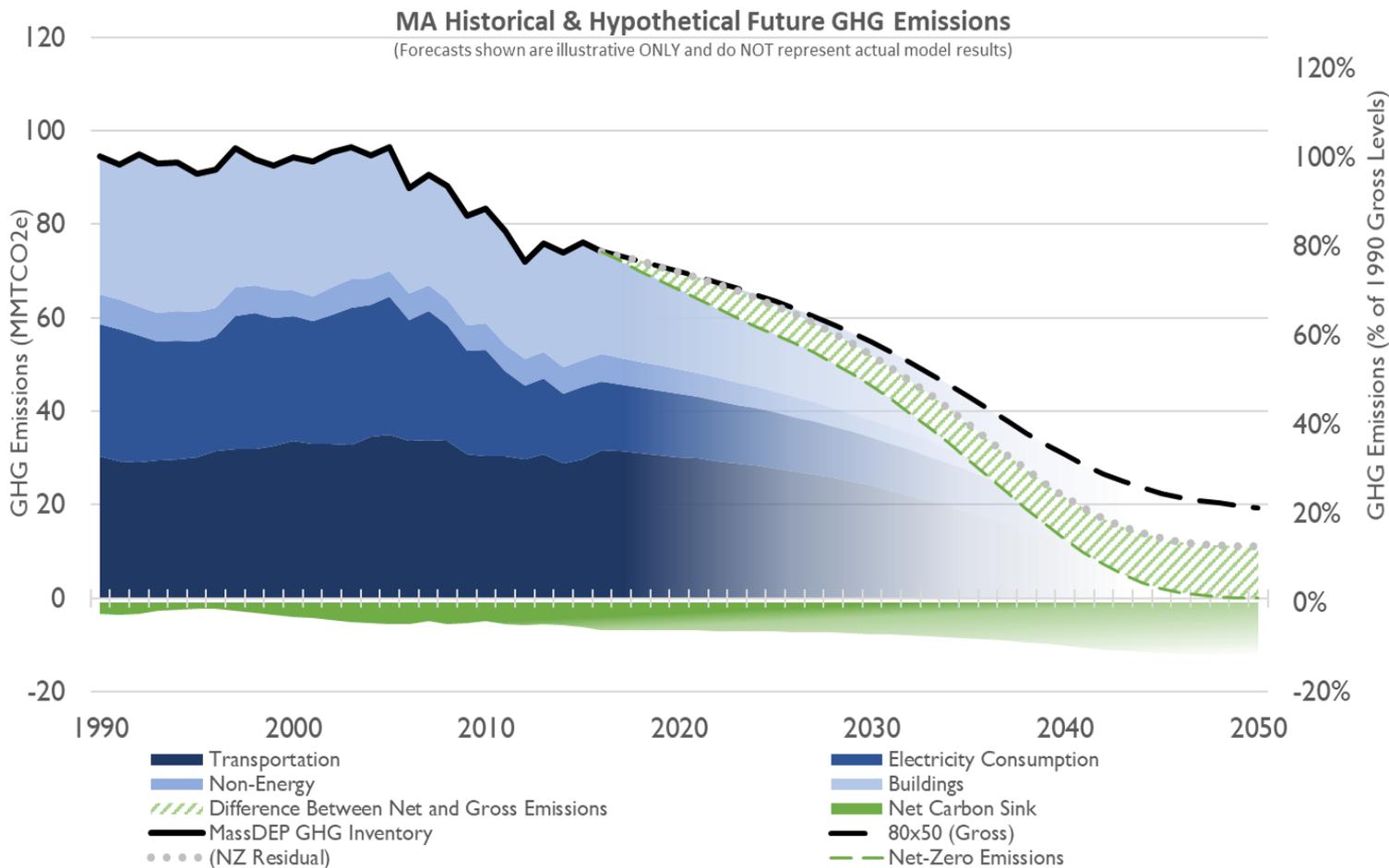


Improved Outreach: Enhanced strategies and community outreach efforts targeting increased participation and savings for renters, moderate income customers and non-English speaking customers, and small businesses

Current Planning

- Governor Baker announced and set a new legal limit of **net-zero carbon emissions by 2050**. *A level of statewide greenhouse gas emissions that is equal in quantity to the amount of carbon dioxide or its equivalent that is removed from the atmosphere and stored annually by, or attributable to, the Commonwealth; provided, however, that in no event shall the level of emissions be greater than a level that is 85 percent below the 1990 level.*
- **MA Decarbonization Roadmap**
<https://www.mass.gov/info-details/ma-decarbonization-roadmap#2050-emissions-limit:-letter-of-determination->
Report by end of year

What is Net Zero?



QUESTIONS?