2050 Roadmap: Building Solutions to Address Climate Change in the Commonwealth

Presenters:

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Massachusetts Global Warming Solutions

Executive Office of Energy and Environmental Affairs

Agenda

- Welcome and logistics
- GWSA and Integrated Climate Solutions
- GHG Emissions Inventory
- New Goal: Net-Zero Emissions by 2050
- 2050 Decarbonization Roadmap Study
- 2050 Preview: Decarbonization and Net-Zero Emissions
- Audience Feedback

GWSA and Integrated Climate Solutions

Global Warming Solutions Act (GWSA)

- The GWSA "was passed to address the grave threats that climate change poses to the health, economy, and natural resources of the Commonwealth. The act is designed to make Massachusetts a national, and even international, leader in the efforts to reduce the greenhouse gas emissions that cause climate change." *NEPGA v. DEP* (2018)

- Requires a comprehensive, science-based approach – "evaluate the total potential costs and economic and noneconomic benefits of various reduction measures to the economy, environment and public health, using the best available economic models, emissions estimation techniques and other scientific methods" G.L. c. 21N § 4(d)

Global Warming Solutions Act (GWSA)

- GWSA requires 10-year emissions limits (percentage of 1990 baseline level) together with implementation plans to achieve them:

2020 Emissions Limit: 10%-25%	2030 Emissions Limit	2040 Emissions Limit	2050 Emissions Limit: ≥80%
Set at 25% in 2010	To be set by 2020	To be set by 2030	*EEA Secretary intends to set in 2020*
Plan for 2020, released in 2010	Plan for 2030, to be released by 2020	Plan for 2040, to be released by 2030	Plan for 2050, to be released by 2040

- Emissions limits are legally binding. *Kain v. DEP* (2016)

Integrated Climate Solutions

Executive Order 569	
Section 1	“ensure that efforts to meet greenhouse gas emissions limits are consistent with and supportive of efforts to prepare for and adapt to the impacts of climate change and extreme weather events”

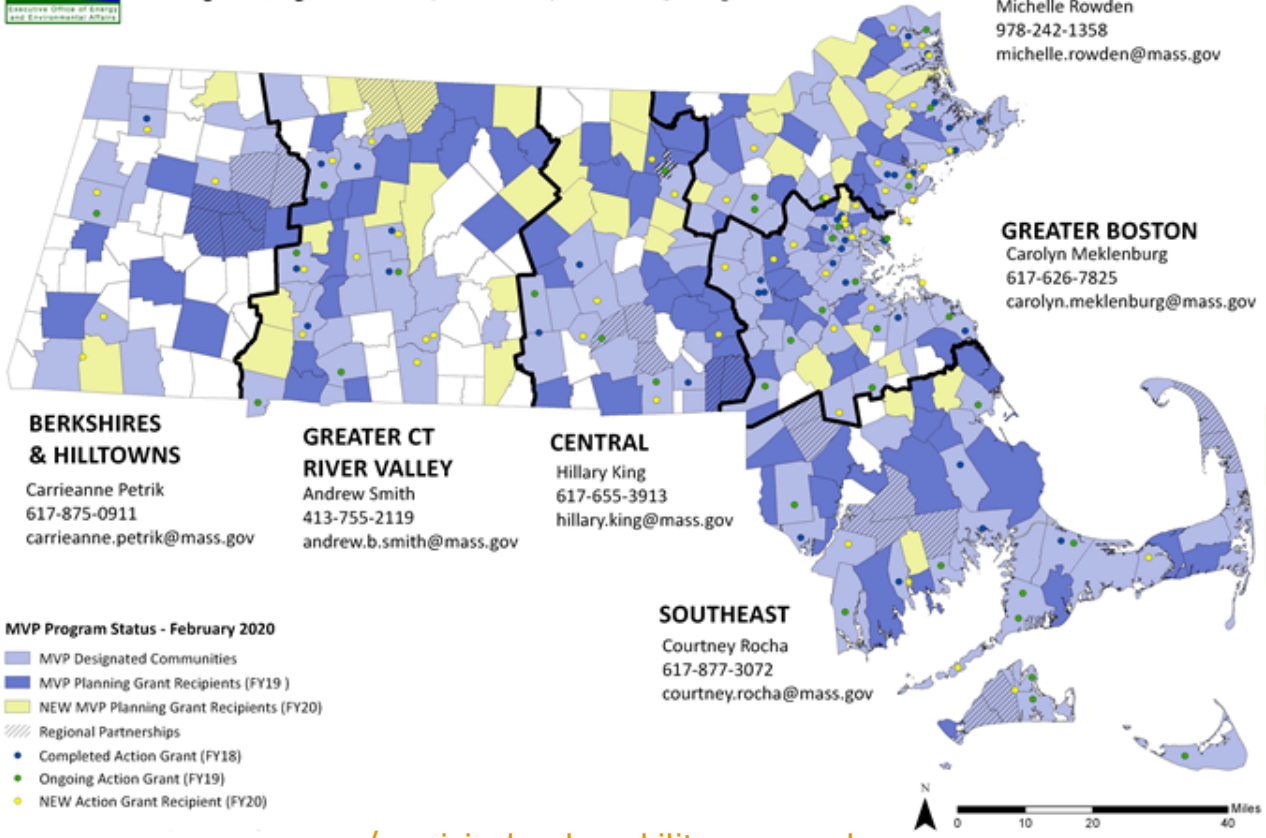
GWSA	
Section 10(a)	"policies and strategies for ensuring that adaptation and resiliency efforts complement and do not conflict with efforts to reduce greenhouse gas emissions and contribute to meeting statewide emission limits" and include "strategies that conserve and sustainably employ the natural resources of the commonwealth."

Building a Climate-Resilient Commonwealth

Local partnership

Municipal Vulnerability Preparedness (MVP) Program

Program Manager: Kara Runsten, 617-626-7826, kara.runsten@mass.gov



www.mass.gov/municipal-vulnerability-preparedness-program

Leading by Example

RMAT: Resilient MA Action Team

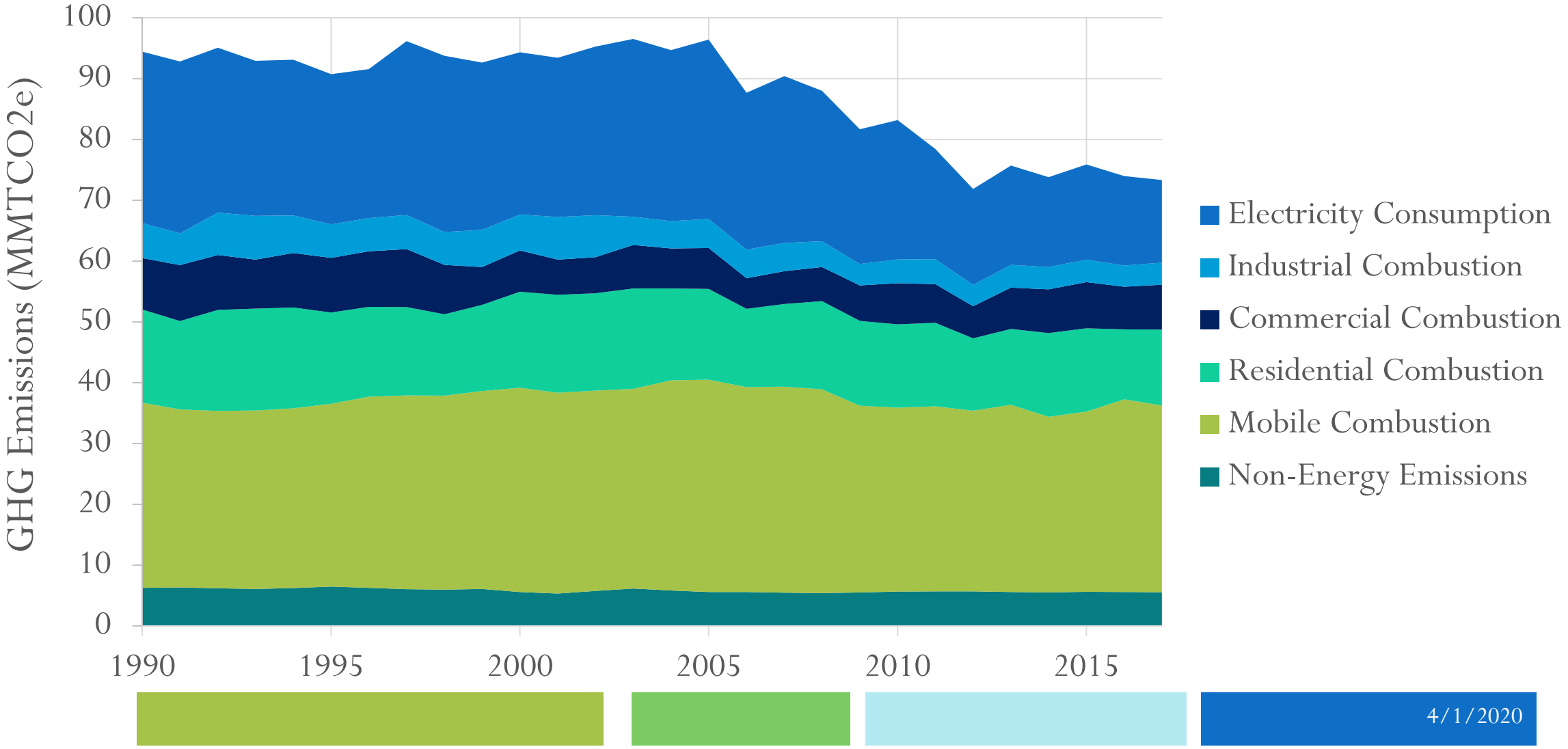
Responsible for the **State Hazard Mitigation and Climate Adaptation Plan (SHMCAP)** implementation, monitoring, and maintenance, with representatives from each Secretariat and key state agencies

First year initiatives

- State Hazard Mitigation and Climate Adaptation Plan Action Tracker (*www.resilientma.org*)
- Development of climate resilience standards and capital planning evaluation tools for agencies

Greenhouse Gas (GHG) Emissions Inventory

Historical GHG Emissions in MA by Major Sectors



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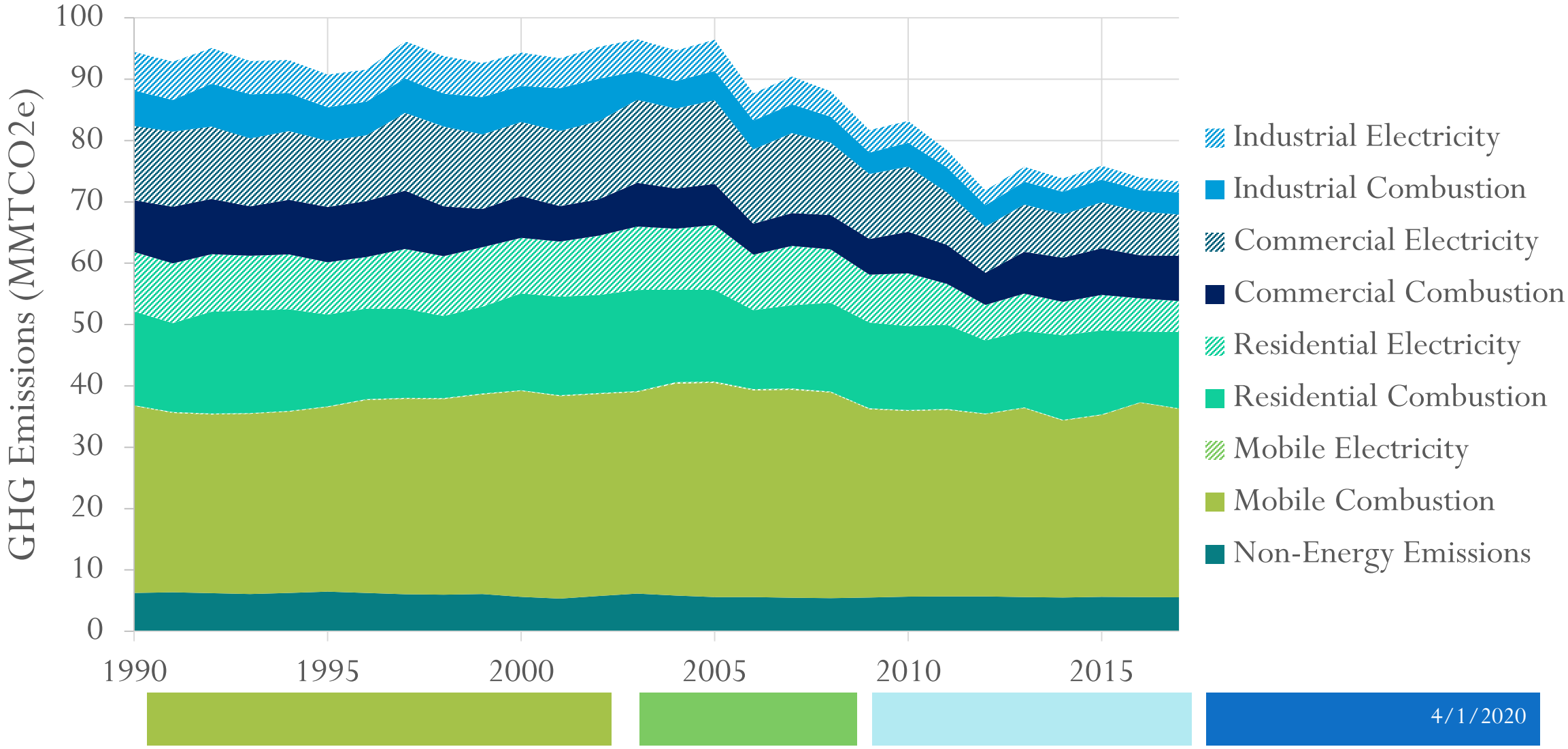
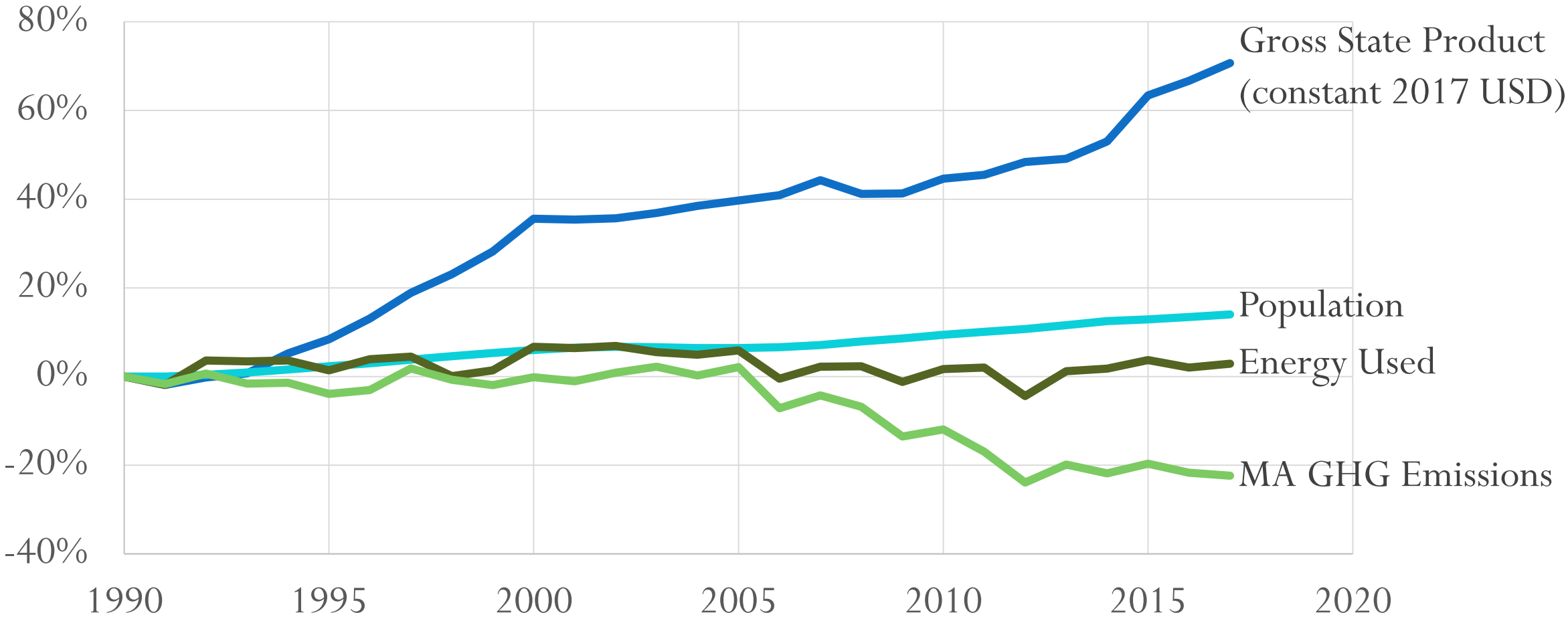
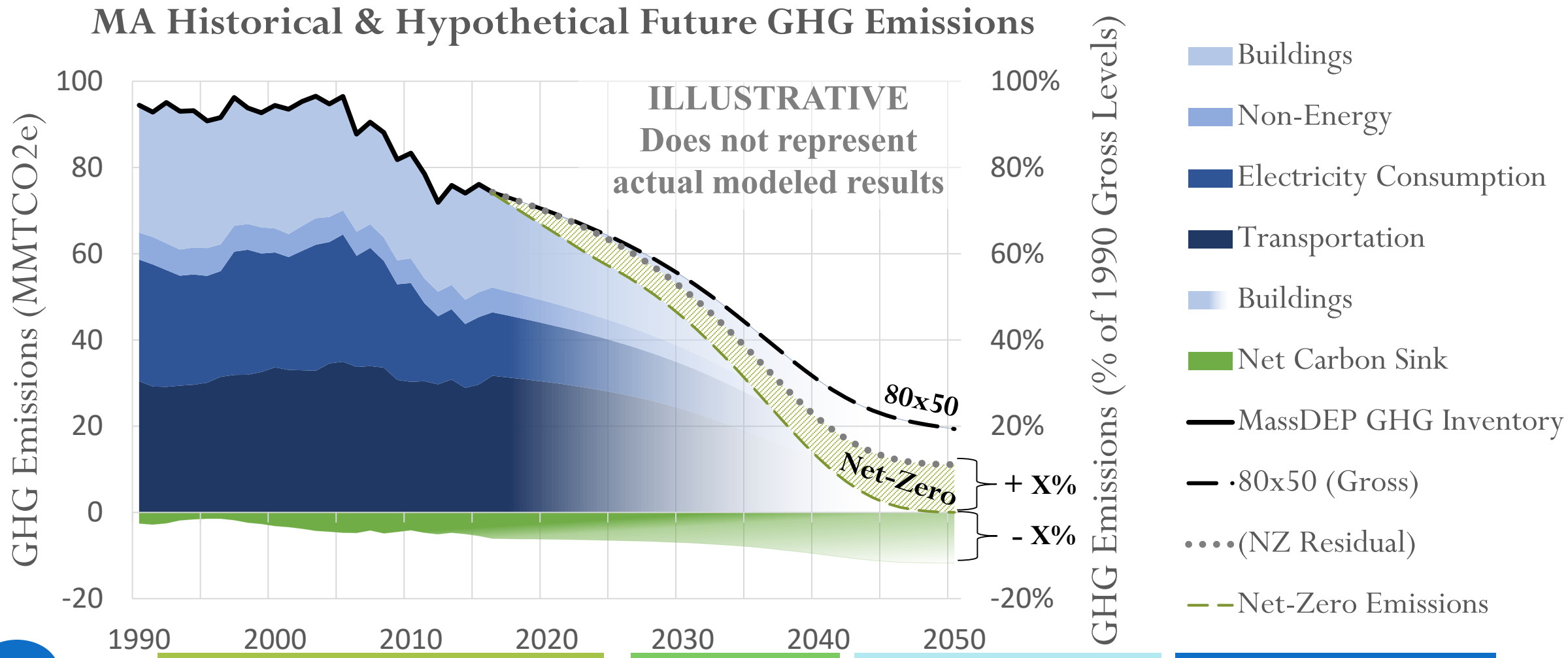


MA Economy Grows Even As Emissions Decrease



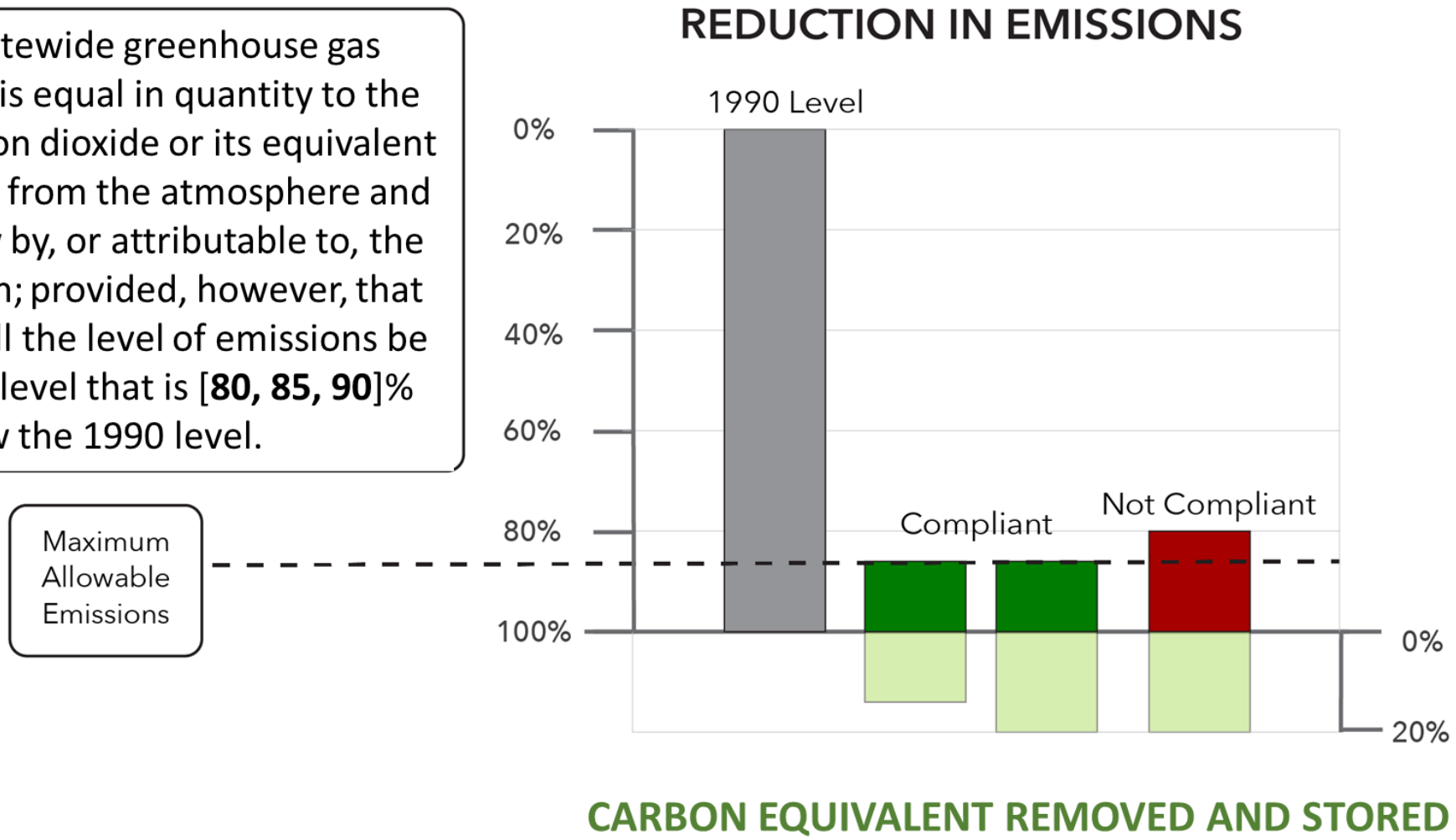
New Goal: Net-Zero Emissions by 2050

What is Net-Zero Emissions?



2050 Emissions Limit: Submit Comments at www.mass.gov/2050Roadmap by 4/10/2020

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 [**80, 85, 90**]% below the 1990 level.



The “2050 Roadmap”

Roadmap to a Decarbonized MA

- GOAL: Identify the strategies, policies, and implementation pathways for MA to achieve at least 80% GHG reductions by 2050, and the priorities to achieve an interim goal by 2030.
  - The Study will characterize impacts of policy implementation, including but not limited to:
    - GHG emissions
    - Costs and benefits
    - Socioeconomic equity
    - Public health impacts

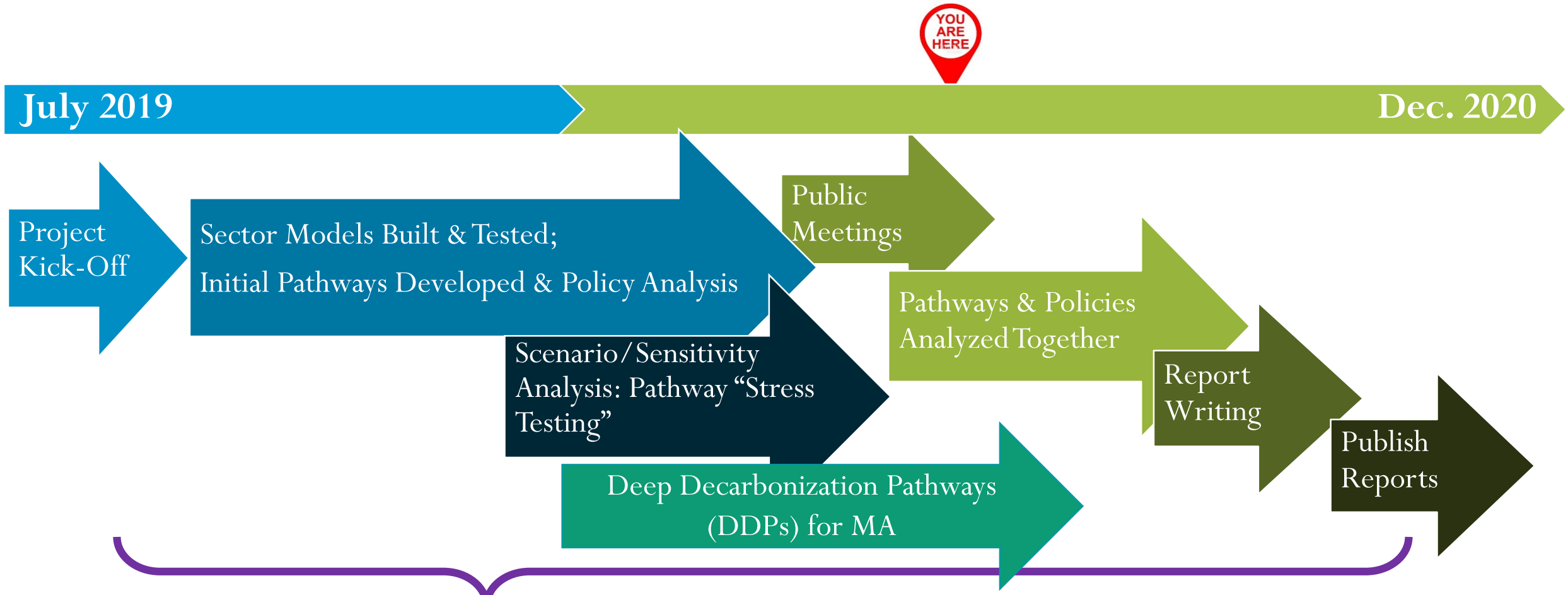
- Outputs include:

Roadmap to a Decarbonized MA by 2050 (and 5 technical reports)

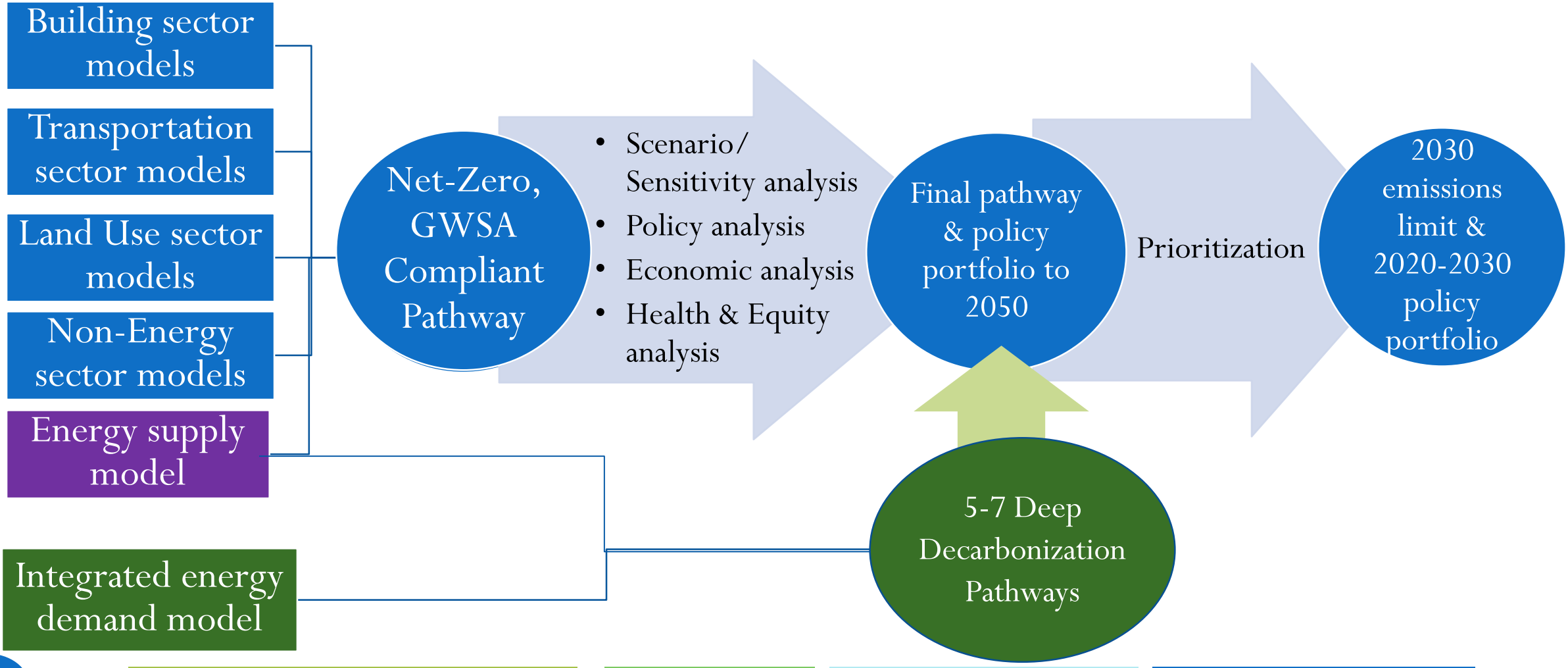
2030 GHG emissions limit (to be set by EEA Secretary)

MA Clean Energy and Climate Plan for 2030

Project Components and Timeline



Analytical Process



Scenario/Sensitivity Analysis

High Technological Change

Low Social Response

High Social Response

A. Uneven Technology Adoption:

High electric vehicle adoption due to low cost;

Land development sprawls;

Renewables and storage grow, low cost;

Heat electrification AND building efficiency are slow.

D. High Response, High Challenge

Impacts of climate change are most severe;

Electric vehicles and mode shifting both popular;

Higher population leads to building development increases in urban, suburban, and rural;

Renewables and storage grow;

Building efficiency slows due to warmer weather.

B. High Inertia:

Adoption of electric vehicles is slow;

Land development sprawls;

Renewable electricity grows;

Heat electrification gains traction, but building efficiency does not.

C. Slow Renewable Deployment:

Electric vehicles remain expensive, mode shifting more popular;

New development is denser;

Renewables grow slowly, high cost;

Building efficiency grows more readily.

Low Technological Change

2050 Preview: Decarbonization and Net-Zero Emissions

Pillars of Decarbonization & Net-Zero

Increase Energy Efficiency, Reduce Energy Consumption:

Building weatherization, passive house construction, public transit, etc.

End-Use Fuel Switching:

Electric cars, hydrogen trucks, heat pumps, biofuels, etc.

Expand Clean Energy:

Renewable electricity, grid storage, advanced biofuels, etc.

Increased Carbon Sequestration:

Conserving natural lands, best management practices

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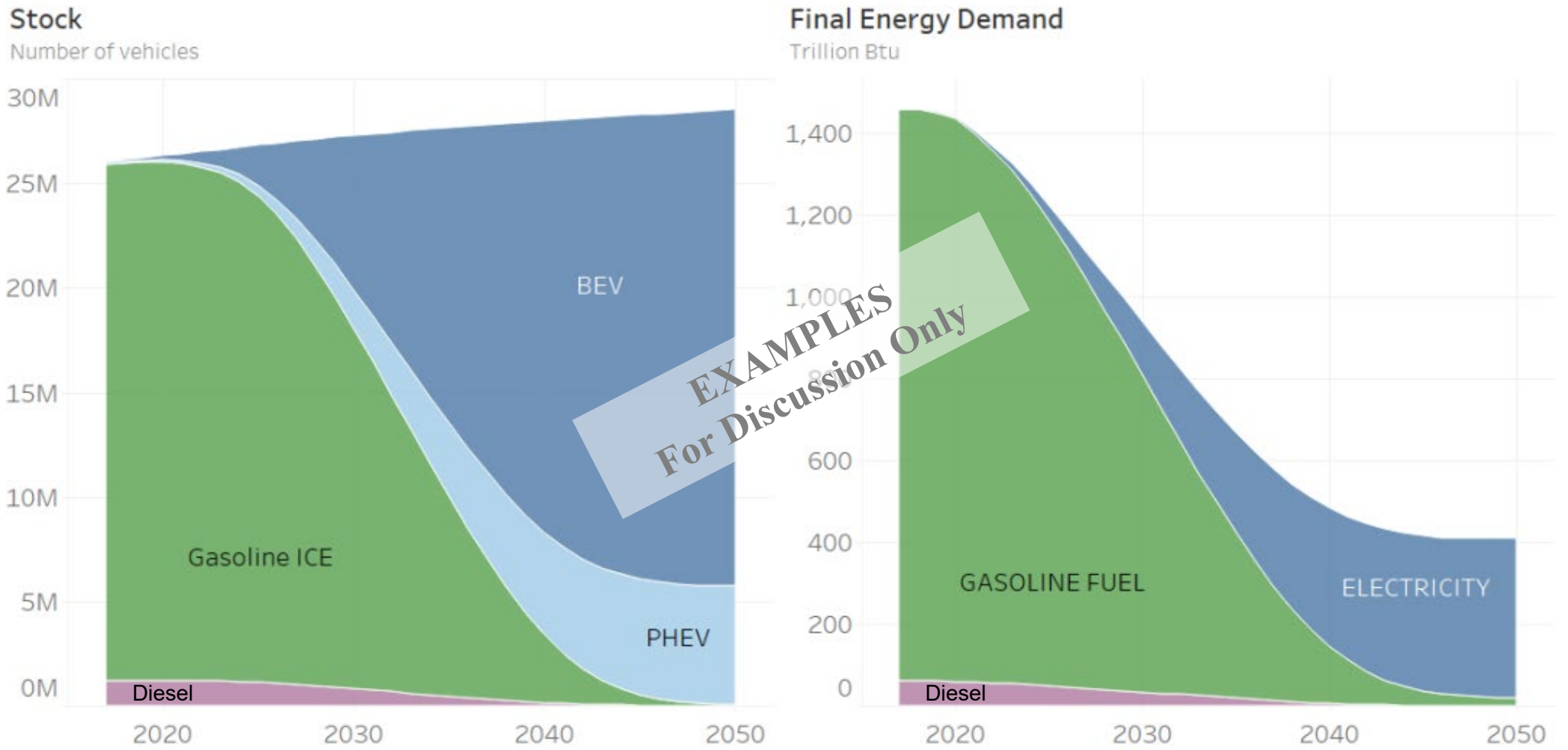
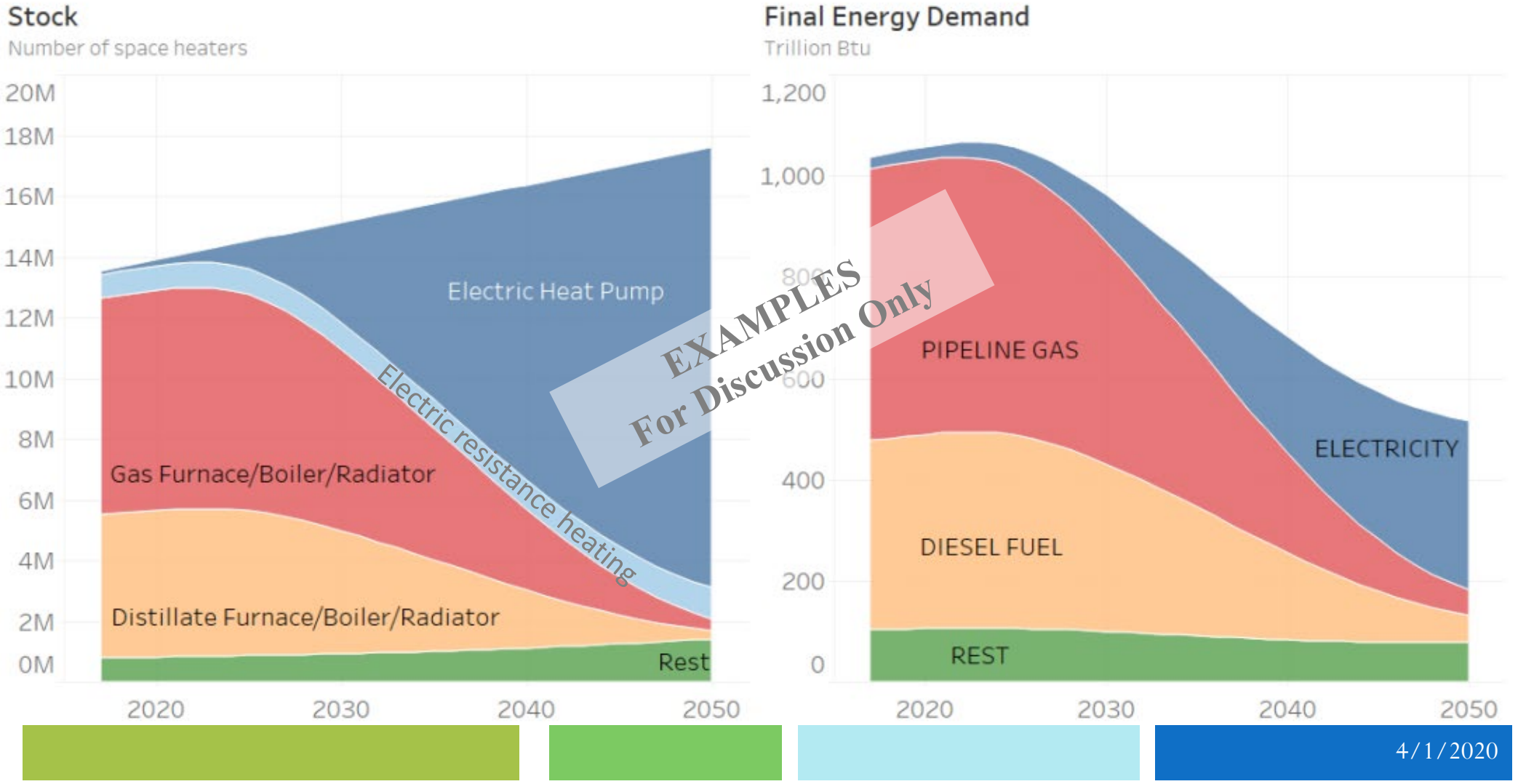
Personal vehicles: moving from gasoline to electric

Source: Northeast Deep Decarbonization Study (2018)

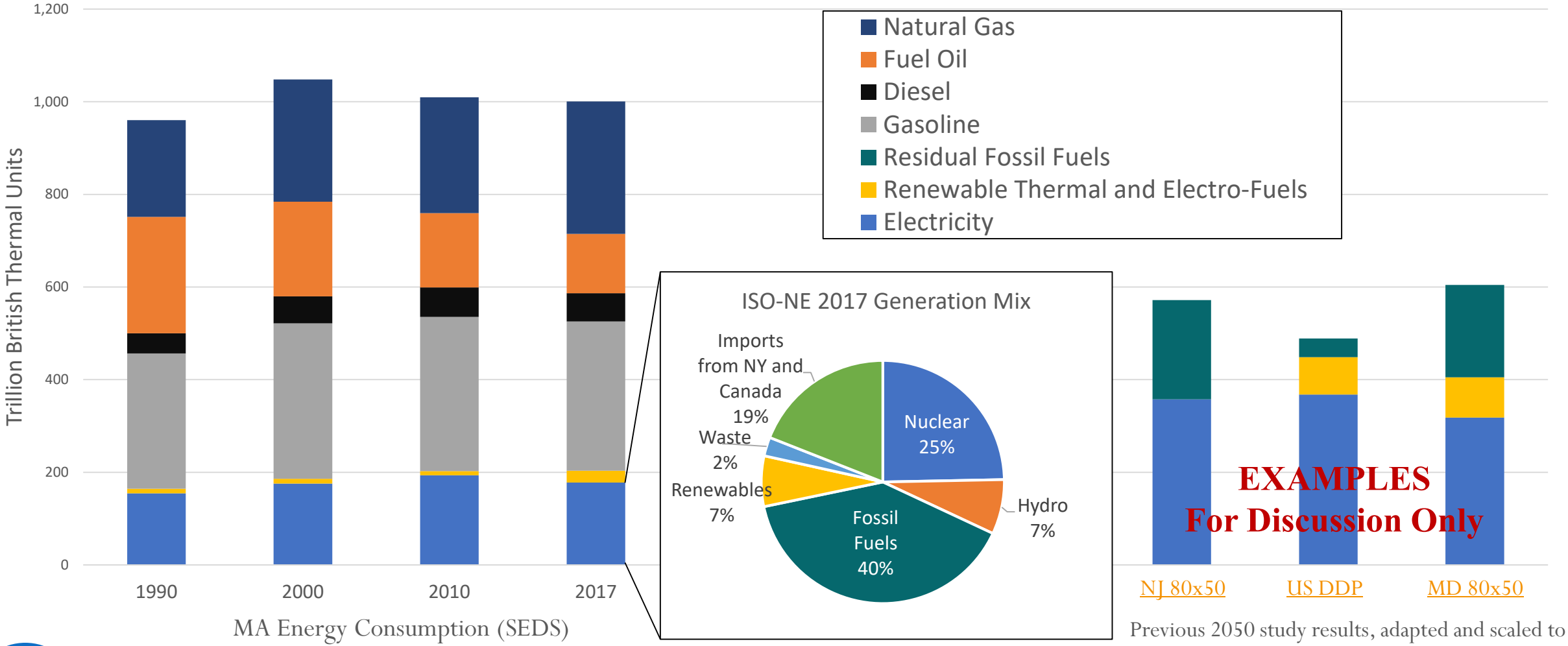


Transforming how buildings are heated

Source: Northeast Deep Decarbonization Study (2018)



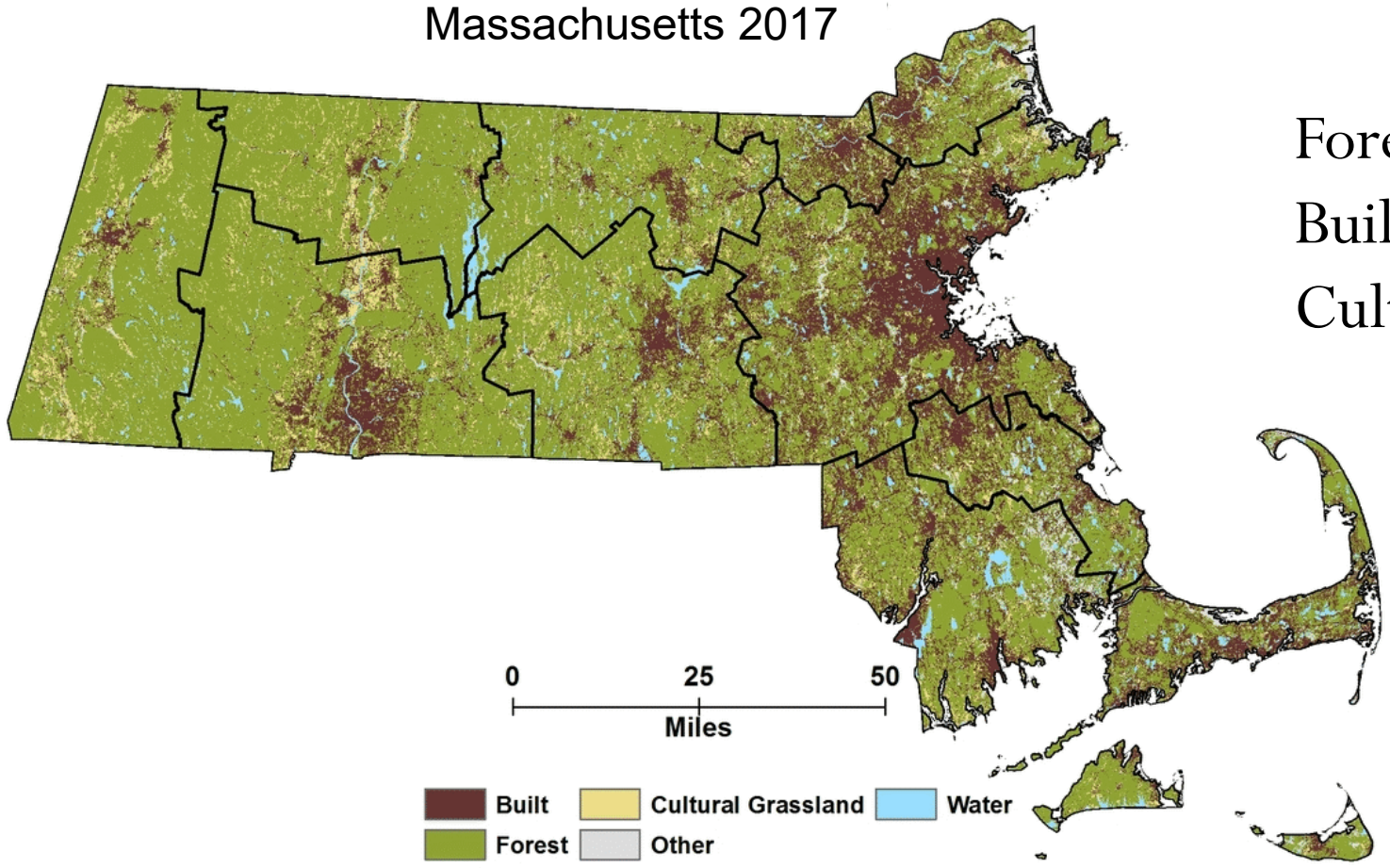
Energy resources needed to support these transformation & increased total energy demand



MA Energy Consumption (SEDS)

Previous 2050 study results, adapted and scaled to MA

MA's Land Cover Distribution



Forest: 3.3 million acres

Built: 1.1 million acres

Cultural Grassland: 0.3 million acres

1.4 million acres of natural lands conserved to date

Source: Harvard Forest (2019)

See yourself in 2050

Image Credit Renewable Energy World

Audience Feedback

- If you have any clarifying questions on the content from this presentation, please type it into the GoToWebinar panel now
- If you would like to provide verbal comments, please click on the "raise your hand" button. I will unmute you in the order the hands "line up." Comments are welcome on anything from this webinar, including, but not limited to:
  - The proposed emissions limit for 2050
  - Suggestions for implementation pathways, policies, programs, etc. to consider for greenhouse gas emissions reduction
  - Feedback on the anticipated systems transformations for achieving net-zero emissions
- Please limit your remarks to ~1 minute to allow time for everyone to speak
- Note: Comments can also be submitted online at www.mass.gov/2050Roadmap.
  - Comments on the 2050 emissions limit are being accepted until 5pm on April 10th. Once all comments are submitted, these comments will be posted at www.mass.gov/2050Roadmap.
  - There is another form for general comments that will be open throughout the duration of the study and which is checked regularly.

THANK YOU

Please feel free to provide written feedback on the 2050 emissions limit or the study more broadly at www.mass.gov/2050Roadmap

EXTRA SLIDES

Study Team

Stakeholders

- State Agencies & Governor's Office
- GWSA Implementation Advisory Committee (IAC)
- Technical Steering Committee
- Focus Groups
- Community Members

Research Team

- Cadmus Group
- ARUP
- Evolved Energy Research
- Harvard Forest
- VEIC
- RSG
- AEG
- Converge Strategies
- Dr. Jonathan Krones*
- Dr. Wendy Jacobs*

*Independent Consultant

Sector Models and Analytical Process