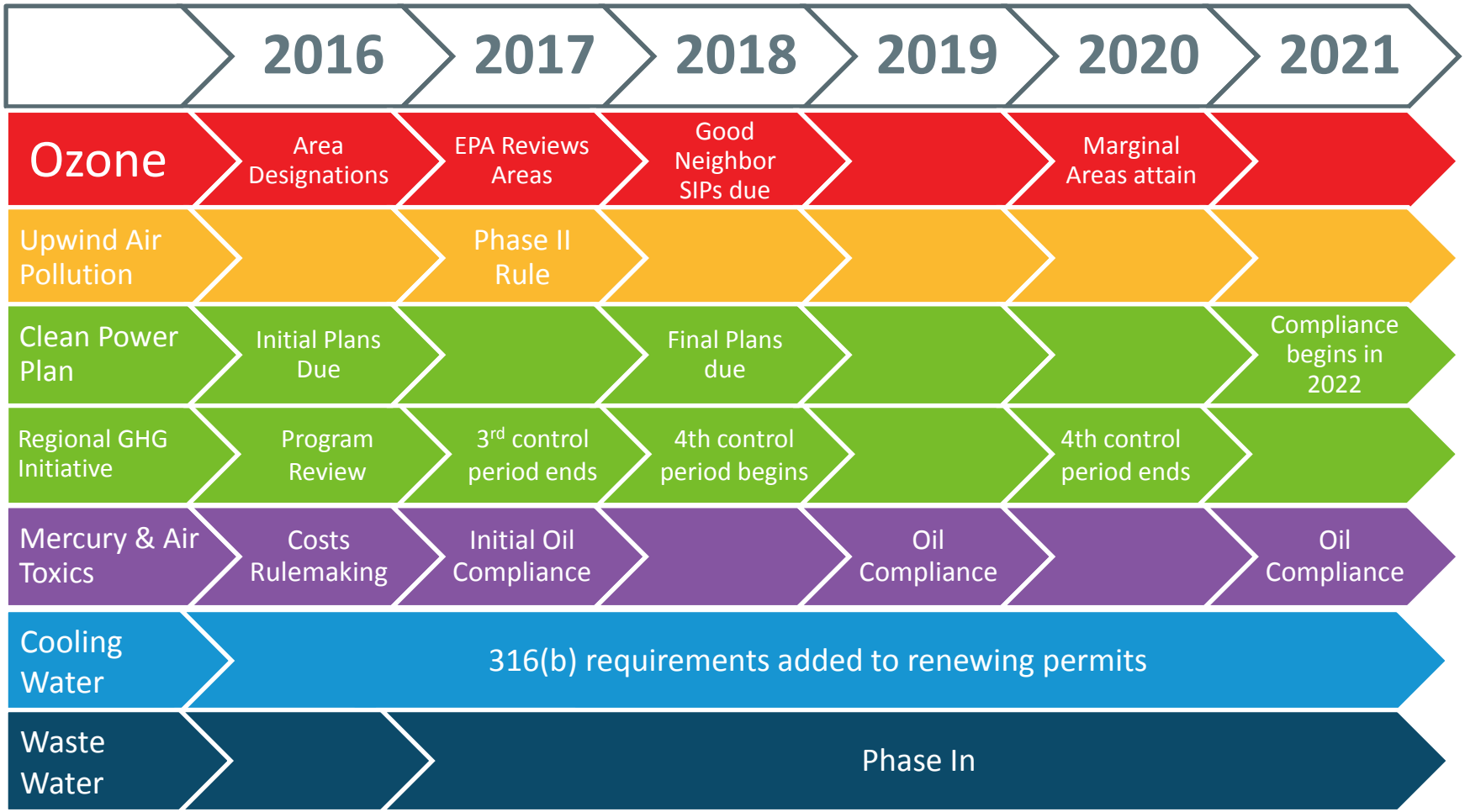
# Environmental Update

*Planning Advisory Committee*

Patricio Silva

SENIOR ANALYST, SYSTEM PLANNING

# Timeline of EPA Regulatory Actions Impacting Electric Generators




Sources: EPA, RGGI

# Environmental Actions Affecting Generators

## *Expected to Affect Operations and Influence Retirements*

### Mercury & Air Toxics Standards

- Survived 2015 litigation challenges, other litigation remains
- EPA proposed costs findings in December 2015, due mid-2016
- Extension request expire in April 2016

### Ozone

- EPA adopted more stringent ozone standard (70 ppb)
- Designations due by October 2016
- Southern New England design values 71-81 with 2013-2015 data

### Cooling Water Intake Rule

- Affected generators may need operational changes or retrofits
- Requires Endangered Species Act habitat and species protection
- Additional litigation on technical matters

# Power Plant Emissions Have Declined with Changes in the Fuel Mix

*Reduction in Aggregate Emissions (ktons/yr)*

| Year | $NO_x$ | $SO_2$ | $CO_2$ |
|---|---|---|---|
| 2001 | 59.73 | 200.01 | 52,991 |
| 2014 | 20.49 | 11.68 | 39,317 |
| **% Reduction, 2001–2014** | **⬇ 66%** | **⬇ 94%** | **⬇ 26%** |

*Reduction in Average Emission Rates (lb/MWh)*

| Year | $NO_x$ | $SO_2$ | $CO_2$ |
|---|---|---|---|
| 1999 | 1.36 | 4.52 | 1,009 |
| 2014 | 0.38 | 0.22 | 726 |
| **% Reduction, 1999–2014** | **⬇72%** | **⬇ 95%** | **⬇ 28%** |

Source: 2014 ISO New England Electric Generator Air Emissions Report, January 2016

# MERCURY & AIR TOXICS STANDARDS IMPLEMENTATION

*Final Rule 77 FR 9304 (February 16, 2012)*

*Supplemental Appropriate & Necessary Finding, 80 FR 75025 (December 1, 2015)*

# MATS Affected Coal-fired Steam Units

## *Retrofits Apparently Completed Where Needed*

**1,976 MW**


### Merrimack Station

Unit 1: 108 MW (coal)
Unit 2: 330 MW (coal)
Activated carbon injection (Hg)
Wet Scrubber (acid gases)

### Schiller Station

Unit 4: 48 MW (coal)
Unit 6: 48 MW (coal)
Hg controls installed and tested.
Extension request until April 2016 to add controls

### Brayton Point Station

Unit 1: 225 MW (coal)
Unit 2: 237 MW (coal)
Unit 3: 596 MW (coal)
Activated carbon injection (Hg)
Spray dry absorber & fabric filter baghouse (acid gases)

### Bridgeport Harbor

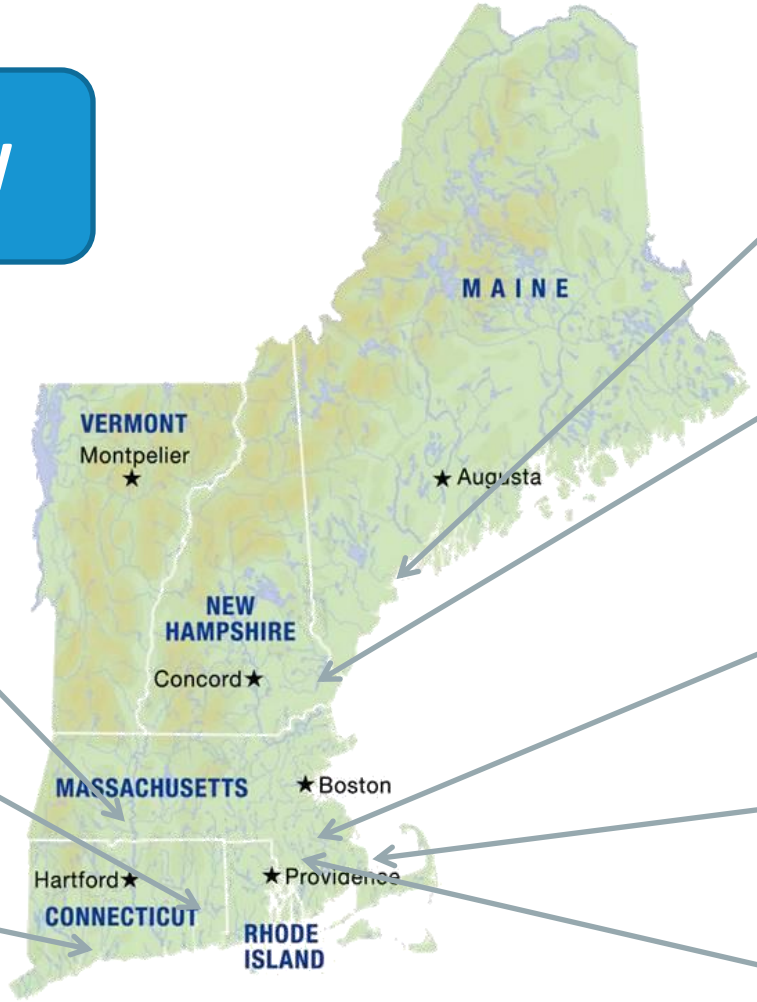
Unit 3: 383 MW (coal)
Activated carbon injection (Hg)
Fabric filter baghouse (acid gases)

Sources: EPA, NH DES, EIA, Ventyx Velocity Suite

# MATS Affected Liquid Oil-fired Steam Units

***Several units averaging >4% capacity factor since April 2015 according to regulators***

**4,367 MW**




**West Springfield**
Unit 3: 94.2 MW (oil)
Electrostatic precipitator

**Montville**
Unit 5: 81 MW (oil)
Unit 6: 391.7 MW (oil)
Electrostatic precipitator

**New Haven Harbor**
Unit 1: 442.5 MW (oil)
Electrostatic precipitator

**Wyman Station**
Unit 1: 108 MW (oil)
Unit 2: 330 MW (oil)
Unit 3: 330 MW (oil)
Unit 4: 330 MW (oil)
Electrostatic precipitator, cyclone

**Newington Station**
Unit 1: 400.2 MW (oil)
Electrostatic precipitator

**Mystic Station**
Unit 7: 570.8 MW (oil)

**Cleary Flood**
Unit 8: 24.8 MW (oil)

**Canal**
Unit 1: 565.2 MW (oil)
Unit 2: 558.7 MW (oil)
Electrostatic precipitator

**Brayton Point Station**
Unit 4: 445.5 MW (oil)
Electrostatic precipitator

Sources: EPA, EIA, Ventyx Velocity Suite

# EPA AIR QUALITY RULES IMPACTING GENERATORS

*Ozone Standard, 80 FR 65291 (October 26, 2015)*

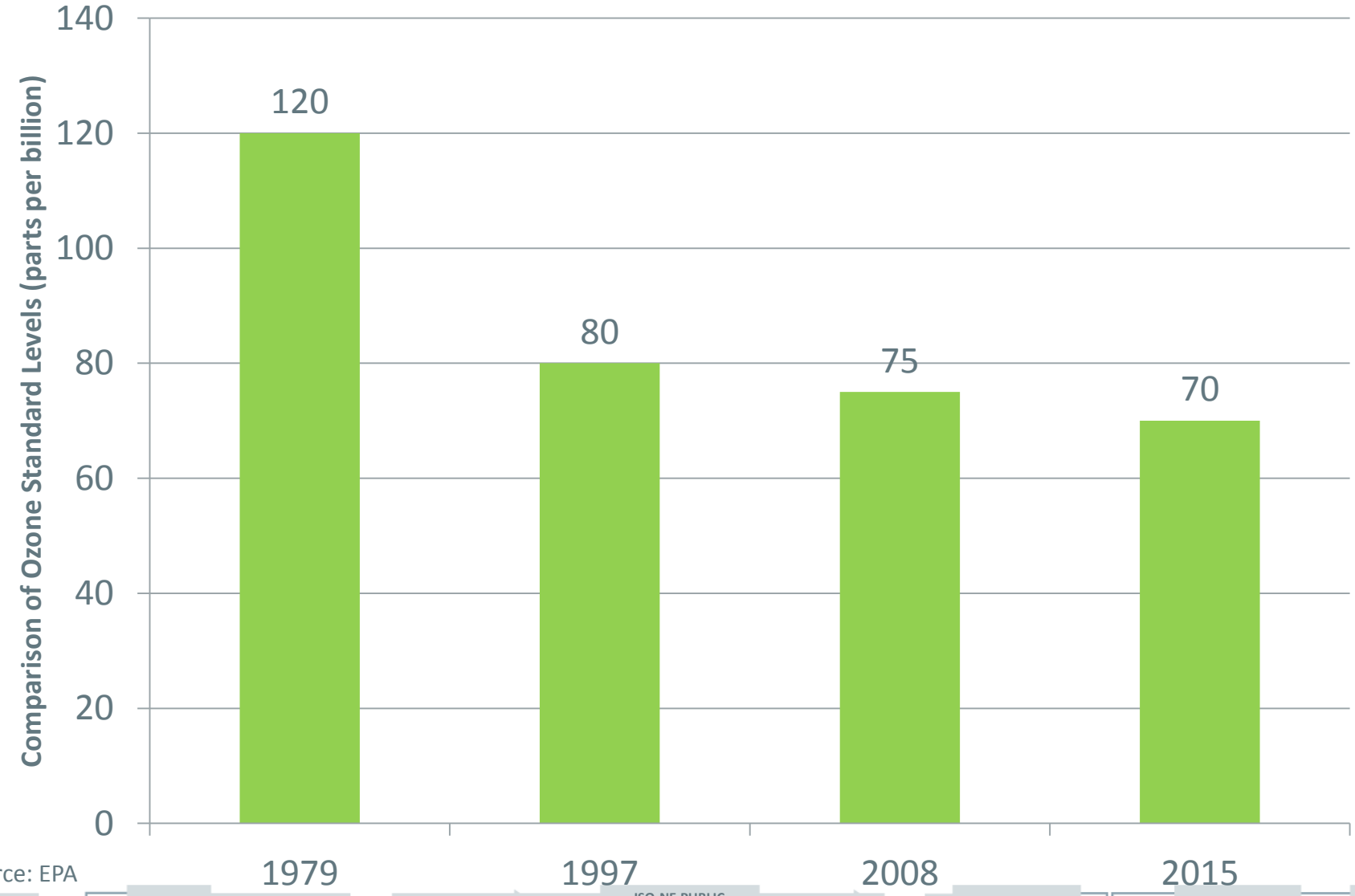
*Proposed Cross-State Air Pollution Update Rule, 80 FR 75706 (December 3, 2015)*

*Extension of Comment Period for proposed Cross-State Air Pollution Update Rule, 80 FR 81251 (December 29, 2015)*

*RICE/NESHAP, 78 FR 6674 (January 20, 2013)*

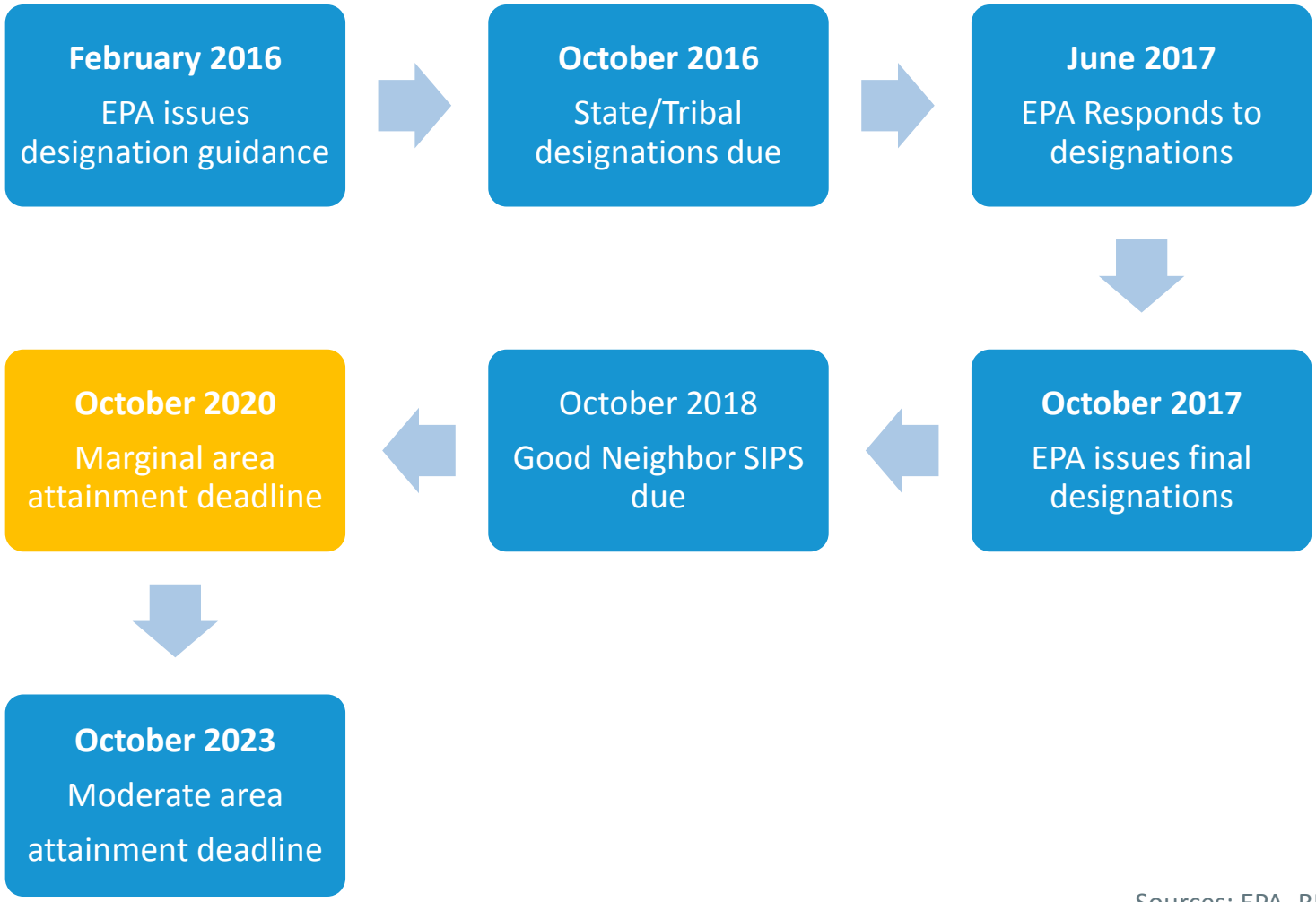
# EPA Adopts Lower Ozone Standard

***Tightens permissible levels further***



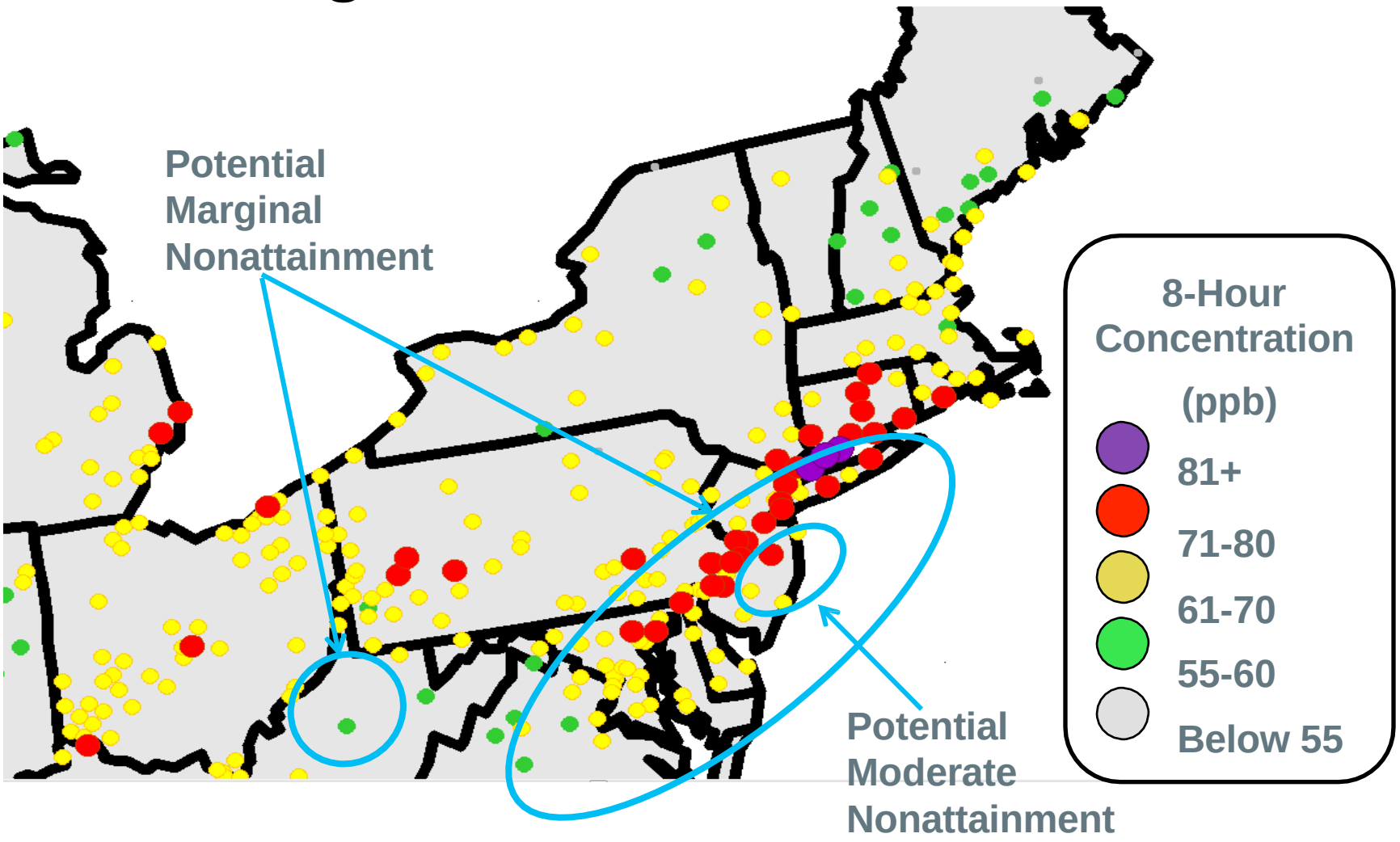

Source: EPA

# EPA Projected Implementation Timeline for 2015 Ozone Standards




Sources: EPA, BNA

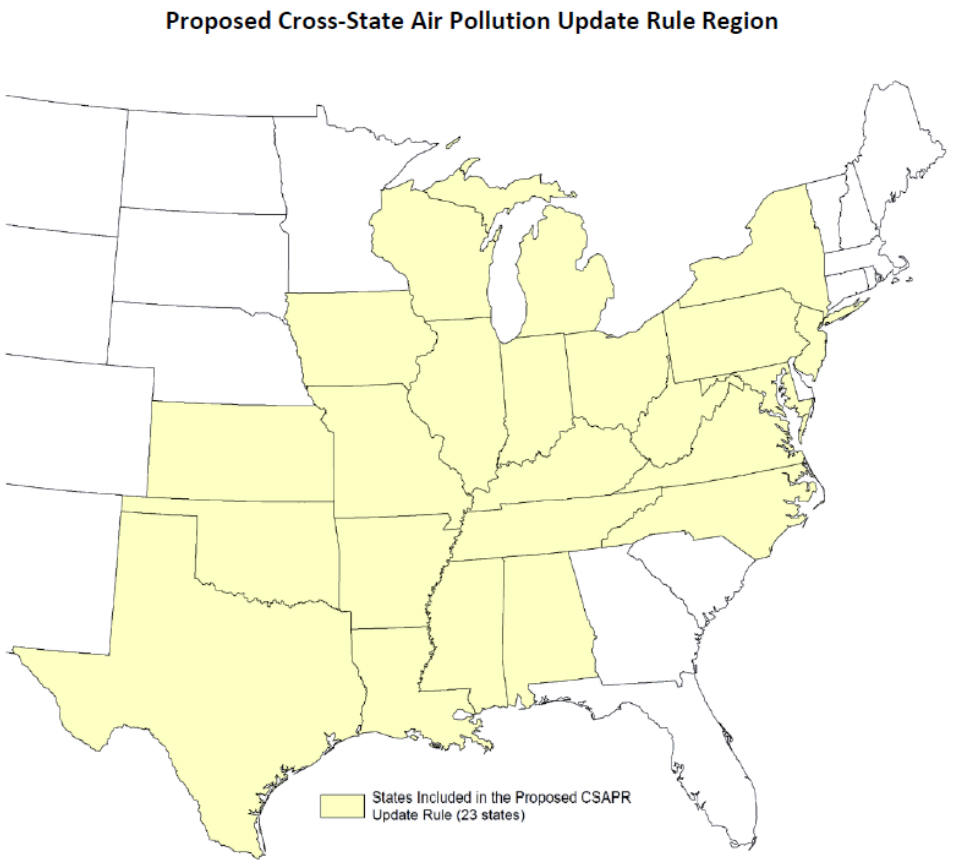
# Ozone Transport Commission: Preliminary 2013-15 Ozone Design Values




Source: Underhill, Ozone Transport Commission

# EPA Proposes Cross-State Air Pollution Update Rule *(Starting in 2017)*

- Proposed rule would lower $NO_x$ ozone season emission for 23 States (highlighted) beginning with the 2017 ozone season
  - EPA estimates an additional 85,000 tons in summer $NO_x$ emissions reduction from generators across parts of the eastern United States




Sources: EPA, BNA

# EMERGENCY ENGINES REGULATORY UPDATE

*National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines; New Source Performance Standards for Stationary Internal Combustion Engines, 78 FR 6674 (January 20, 2013)*

*40 CFR Part 63 Subpart ZZZZ*

*40 CFR Part 60 Subparts IIII and JJJJ*

# EPA RICE/NESHAP Emergency Engine Operational Limitations

- Unlimited use for emergencies (e.g., power outage, fire, flood)
- 100 hours per year of operation allowed for a combination of:
  - maintenance/testing
  - emergency demand response if Energy Emergency Alert (EEA) Level 2 declared by reliability coordinator
  - deviation of voltage or frequency by 5% or greater below the standard
  - 40 CFR 63.6640(f), 40 CFR 60.4211(f), 40 CFR 60.4243(d)
- 50 hours per year of the 100 hour allocation can be used for:
- Non-emergency situations if no financial arrangement
- local reliability as part of a financial arrangement with another entity (only for NESHAP area sources and NSPS) if:
  - Engine dispatched by local balancing authority or local transmission and distribution system operator
  - Dispatch mitigates local transmission and/or distribution system limitations
  - Dispatch follows reliability, emergency operation or similar protocols by NERC, regional, state, public utility commission or local standards
  - Power is provided only to the facility itself or to support local system

Source: EPA

# EPA RICE/NESHAP New Electronic Reporting Requirements

- RICE units > 100 horsepower (HP) that are:
  - Operated in 2015 or were contractually obligated to be available >15 hours per year for emergency demand response or voltage/frequency deviation, or operated for local reliability
- Beginning with 2015 operation, such RICE units > 100 HP must submit electronic compliance reports to EPA by March 31, 2016
- Operators should upload reports through the Compliance and Emissions Data Reporting Interface
  - Available at EPA's Central Data Exchange at http://www.epa.gov/cdx

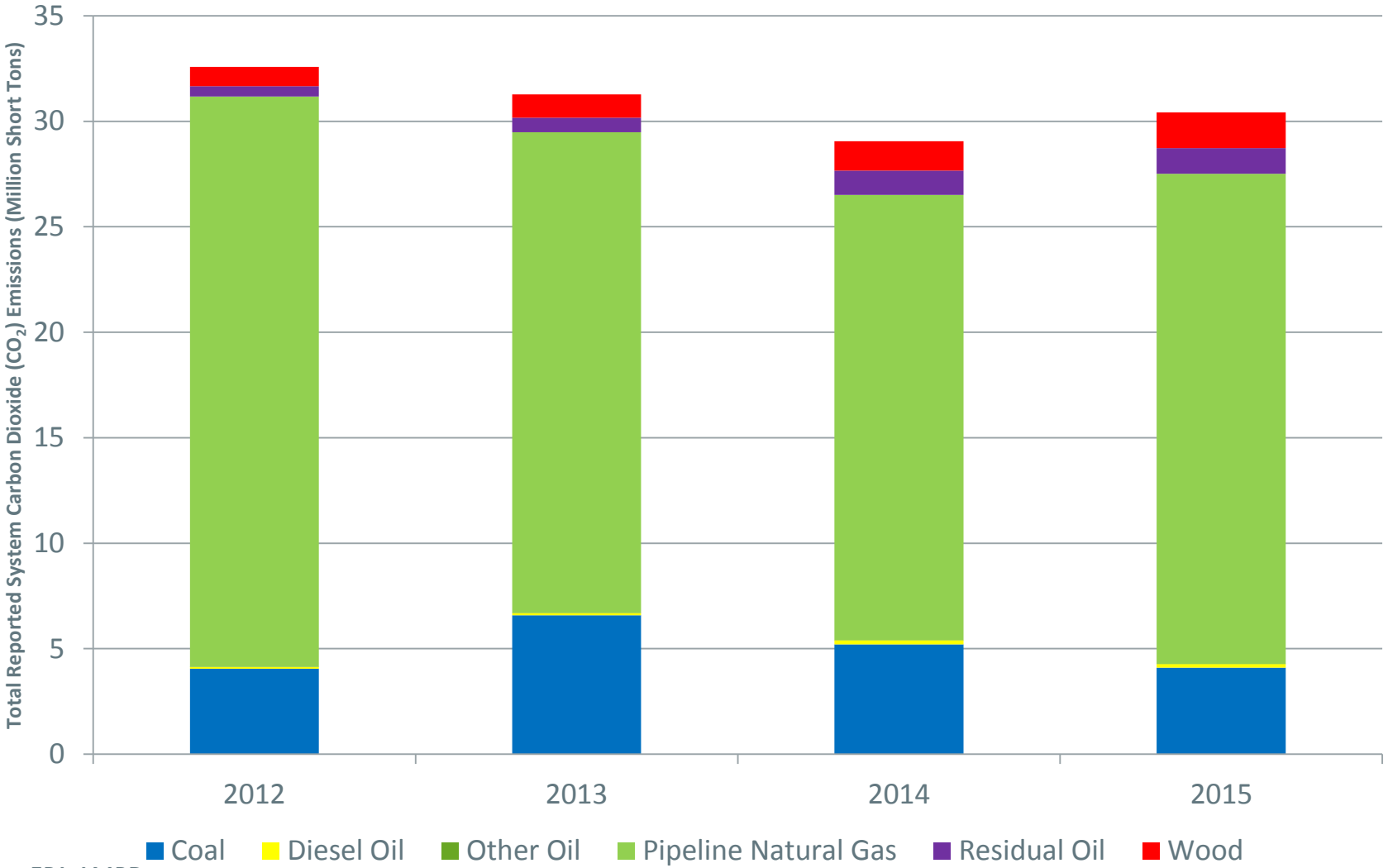
Source: EPA


# GREENHOUSE GAS REGULATORY UPDATE

*Clean Power Plan*

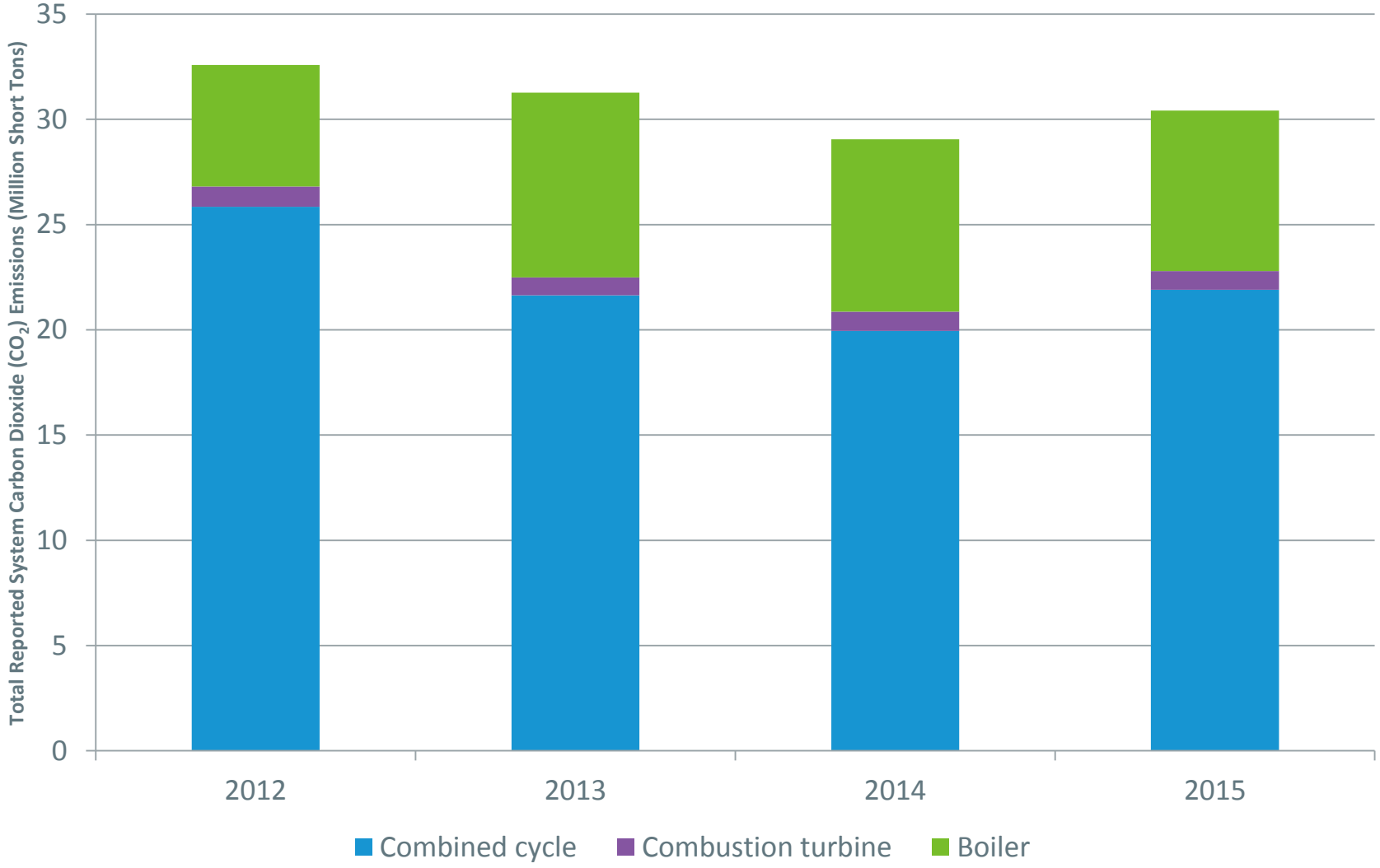
*Regional Greenhouse Gas Initiative (RGGI)*

# EPA New England $CO_2$ System Emissions by Fuel (2012-2015) *(Million Short Tons)*




Source: EPA AMPD

# EPA New England System $CO_2$ Emissions by Prime Mover (2012-2015) *(Million Short Tons)*



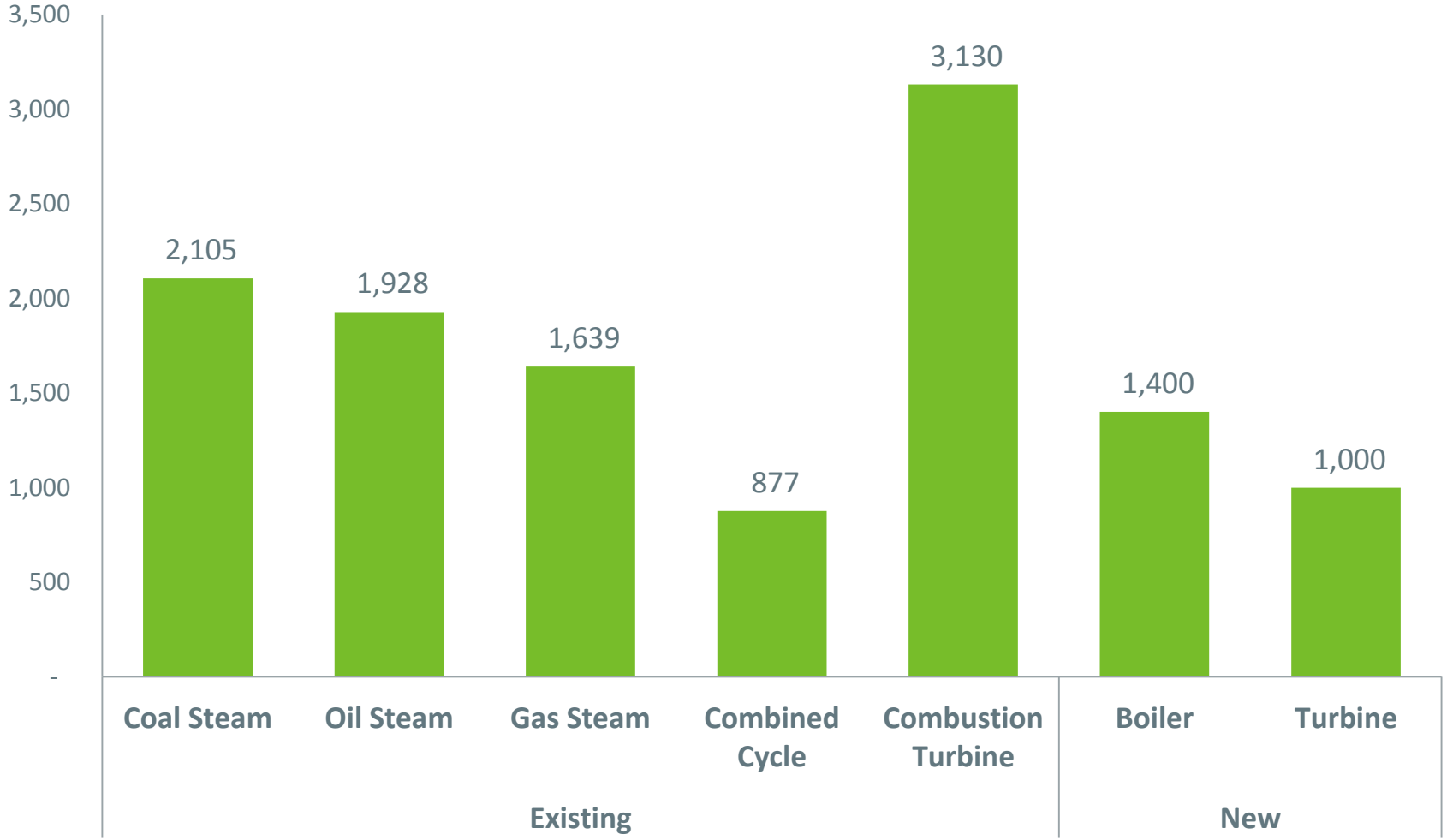

Source: EPA AMPD


# *STANDARDS OF PERFORMANCE FOR GREENHOUSE GAS EMISSIONS FOR NEW, MODIFIED, AND RECONSTRUCTED GENERATORS*

***Final Rule 80 FR 64509 (October 23, 2015)***

*Regulatory Docket EPA-HQ-OAR-2013-0603*

# $CO_2$ New Unit Performance Standards 111(b) vs. New England Existing Unit Average Rate (lbs/MWh)




Sources: EPA, ISO-NE

# EPA CLEAN POWER PLAN (111(d))

***Final Rule 80 FR 64662 (October 23, 2015)***

*Regulatory Docket EPA-HQ-OAR-2013-0602*

# Clean Power Plan 111(d) Overview & Litigation Update - *Final outcome in 2017-2018?*

## Existing Fossil Generators $CO_2$ Standards

- Clean Power Plan (111(d)) established statewide $CO_2$ emission standards (rate or mass) for existing fossil fuel-fired generators
  - Sets a nationwide goal of cutting $CO_2$ emissions 32% by 2030, using a 2005 baseline
  - States were required to submit initial state plans by September 2016 or request a two (2) year extension
  - Compliance would have not begun until 2022

## 111(d) Litigation Update

- **February 9, 2016**: Supreme Court grants stay of CPP based on a "fair prospect" that a majority of justices will conclude that the decision below on the merits was erroneous, and irreparable harm will occur absent a stay:
  - Stay remains in place pending a final decision by the D.C. Circuit Court of Appeals, and
  - During consideration of any petition for review of that action by the Supreme Court until denied, or if granted, when judgment is entered

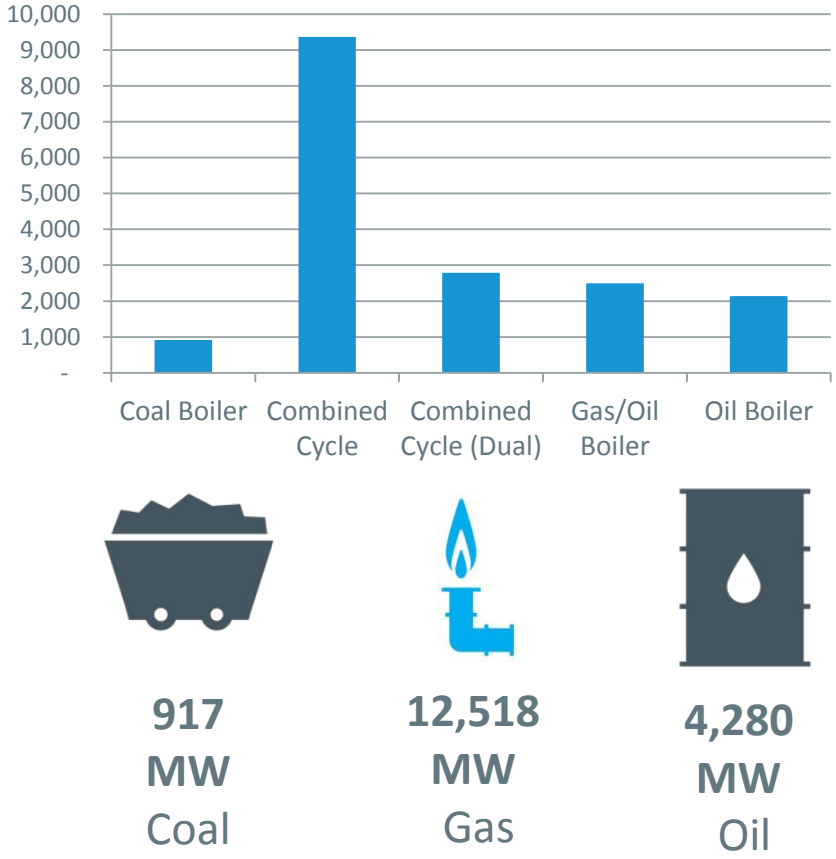
# Clean Power Plan Affected Generators

## *Overlaps, but not identical to RGGI Affected Capacity in Region*

### Affected Existing Fossil Generators Under Clean Power Plan

- Fossil electric utility steam boiler or combined cycle that:
  - either in operation or under construction on January 8, 2014
  - serving a generator capable of selling > 25 MW to a utility distribution system
  - a baseload rating greater than 260 gigajoules/hour heat input of fossil fuel
- **Excluded source category**: simple cycle turbines, regardless of size

### Preliminary Screen by ISO of Affected Existing Sources in New England (2022)

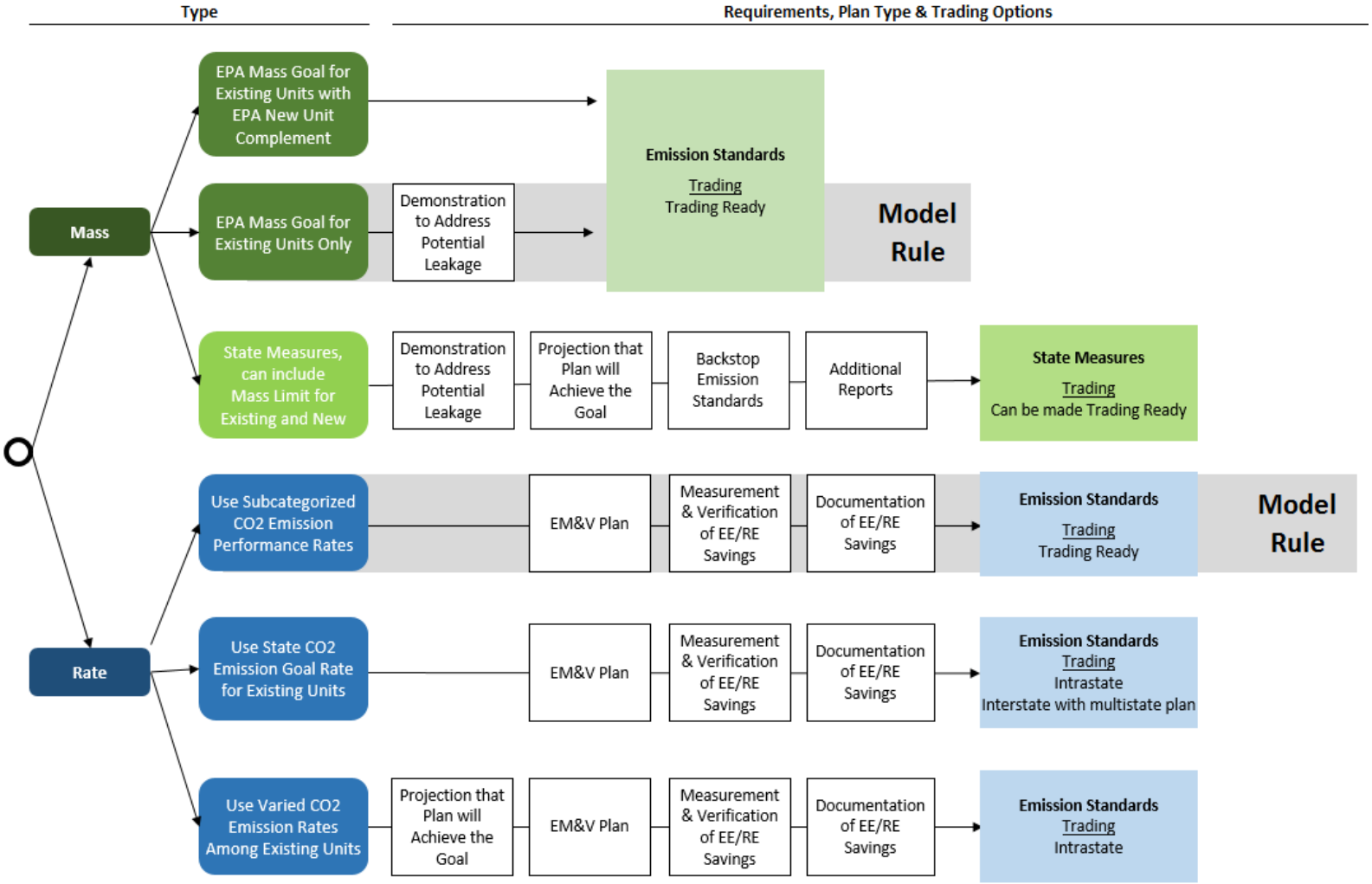



**Note**: ISO-NE estimated CPP affected capacity based on 2015 CELT and known retirements <2022.

**Sources**: EPA, MJ Bradley

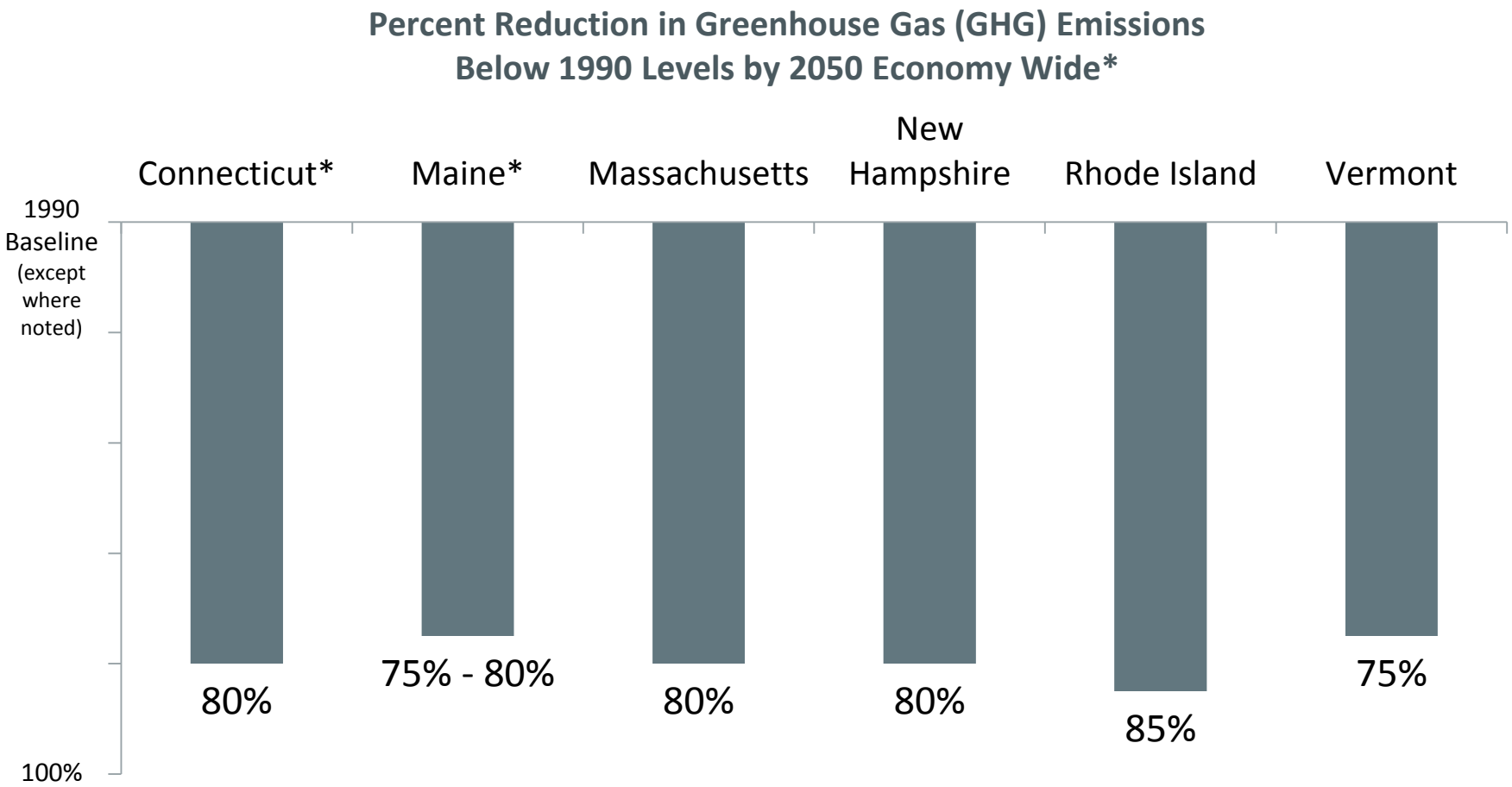
# EPA Outline of State Plan Approaches

## *Individual or Joint Plans, Various Trading Options Available*




**Source:** EPA, *Clean Power Plan State Plan Decision Tree* (August 2015)

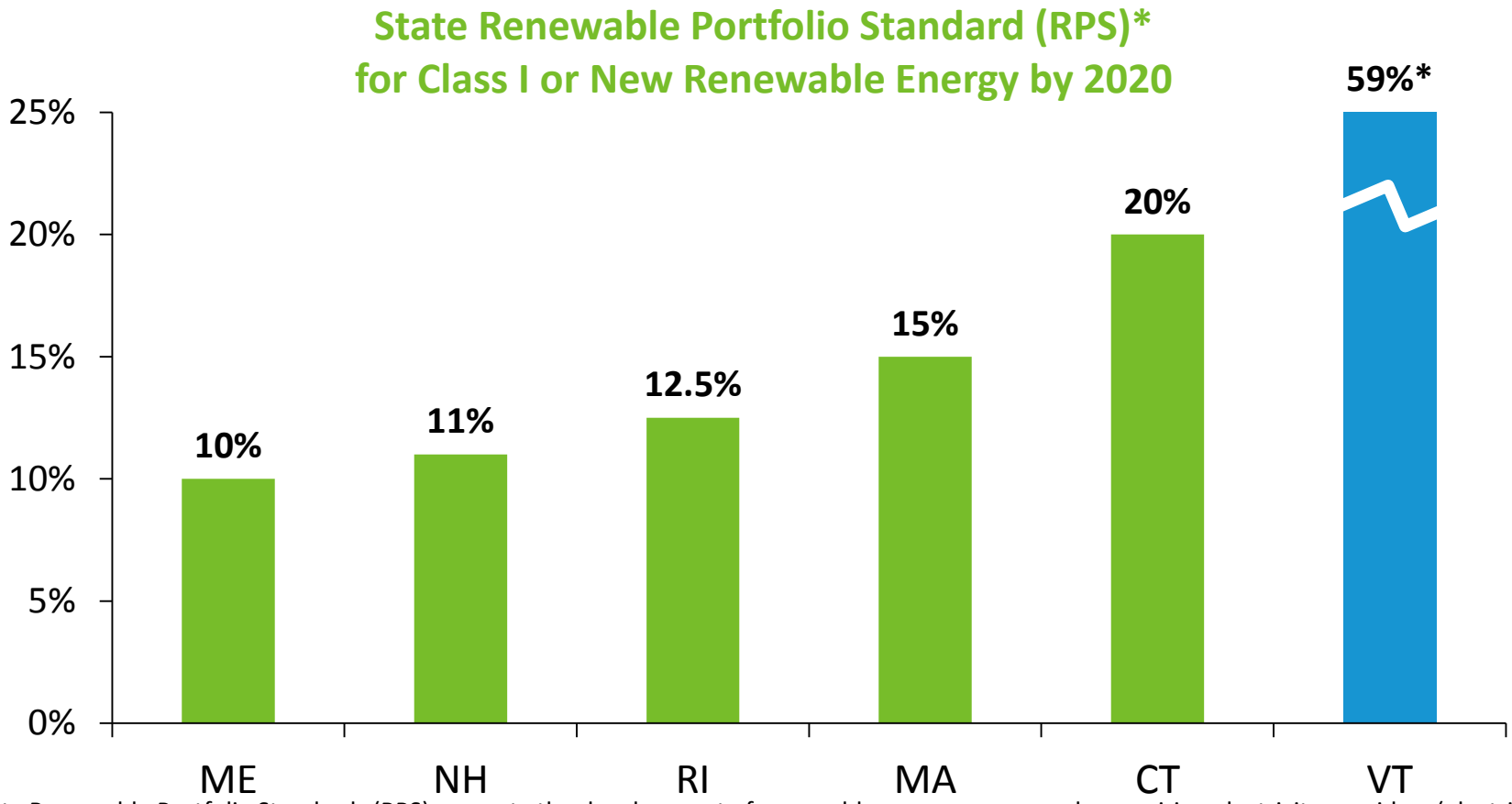
# New England States Adopted Robust Greenhouse Gas Emissions Reduction Goals




* Connecticut's long-term GHG reduction goal is 80% below 2001 levels (Global Warming Solutions Act (2008)). Maine's long-term GHG reduction goal is 75-80% below 2003 levels "in the long term" (An Act to Provide Leadership in Addressing the Threat of Climate Change (2003)).

Source: ISO-NE

# State Policy Requirements Drive Proposals for Renewable Energy




* State Renewable Portfolio Standards (RPS) promote the development of renewable energy resources by requiring electricity providers (electric distribution companies and competitive suppliers) to serve a minimum percentage of their retail load using renewable energy. Vermont's new Renewable Energy Standard has a 'total renewable energy' requirement (reflected above), which recognizes large-scale hydro and all other classes of renewable energy.

Source: ISO-NE

# Clean Power Plan Major Milestones

| | |
|---|---|
| 2014 | • Existing or under construction (January 8th)<br>• Modified or reconstructed (June 30th) |
| 2016 | • Plans or extension requests due (September 6) |
| 2017 | • Progress reports due (September 6) |
| 2018 | • All plans due (September 6) |
| 2022 | • Compliance period begins (January 1) |

Source: EPA, *Clean Power Plan, State Plan Submittal and Timing (Page 64798).*

# RGGI States Comments on the Proposed CPP Federal Plan

- **January 21, 2016**: RGGI States made several recommendations on the CPP federal plan and model rule:
  1. The EPA should adopt a mass-based program for the FP;
  2. the EPA should encourage auctioning and reinvestment of auction proceeds;
  3. The new source complement is the most effective means of preventing leakage from existing sources to new sources, and alternative methods of allocation must be equally effective;
  4. the EPA should adopt a trading platform that is flexible and customizable to encourage broader trading markets;
  5. the EPA should allocate CEIP allowances more equitably; and
  6. the EPA should continue to support state energy efficiency programs.

Source: RGGI


# REGIONAL GREENHOUSE GAS INITIATIVE

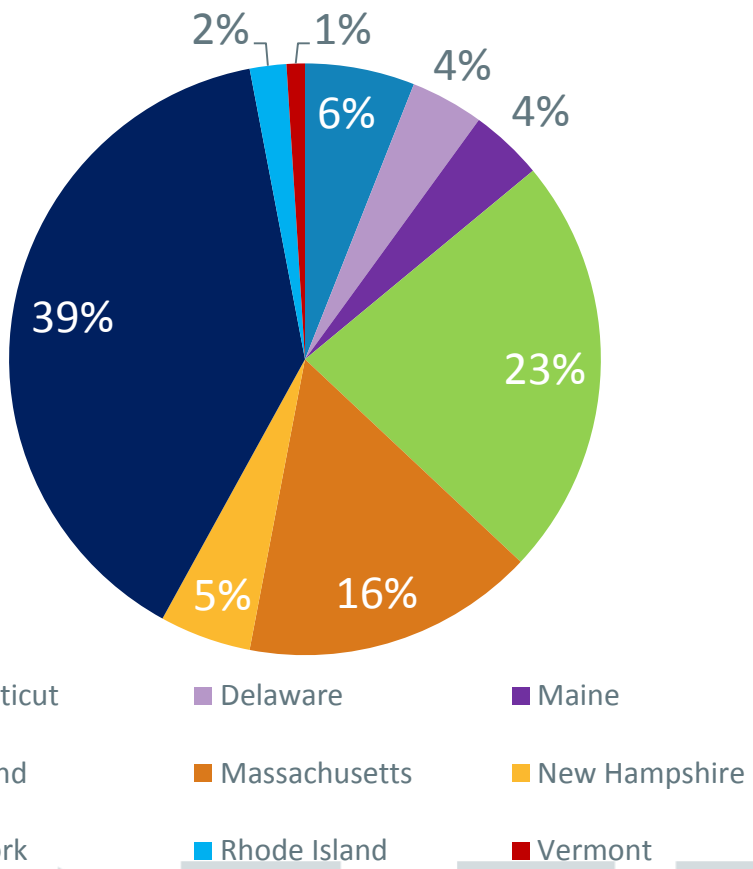
*2016 Program Review and Interaction with Clean Power Plan*

# RGGI Program Overview
# 3rd Control Period (2015-2017)

## Program Overview, Allocations & Compliance Schedule

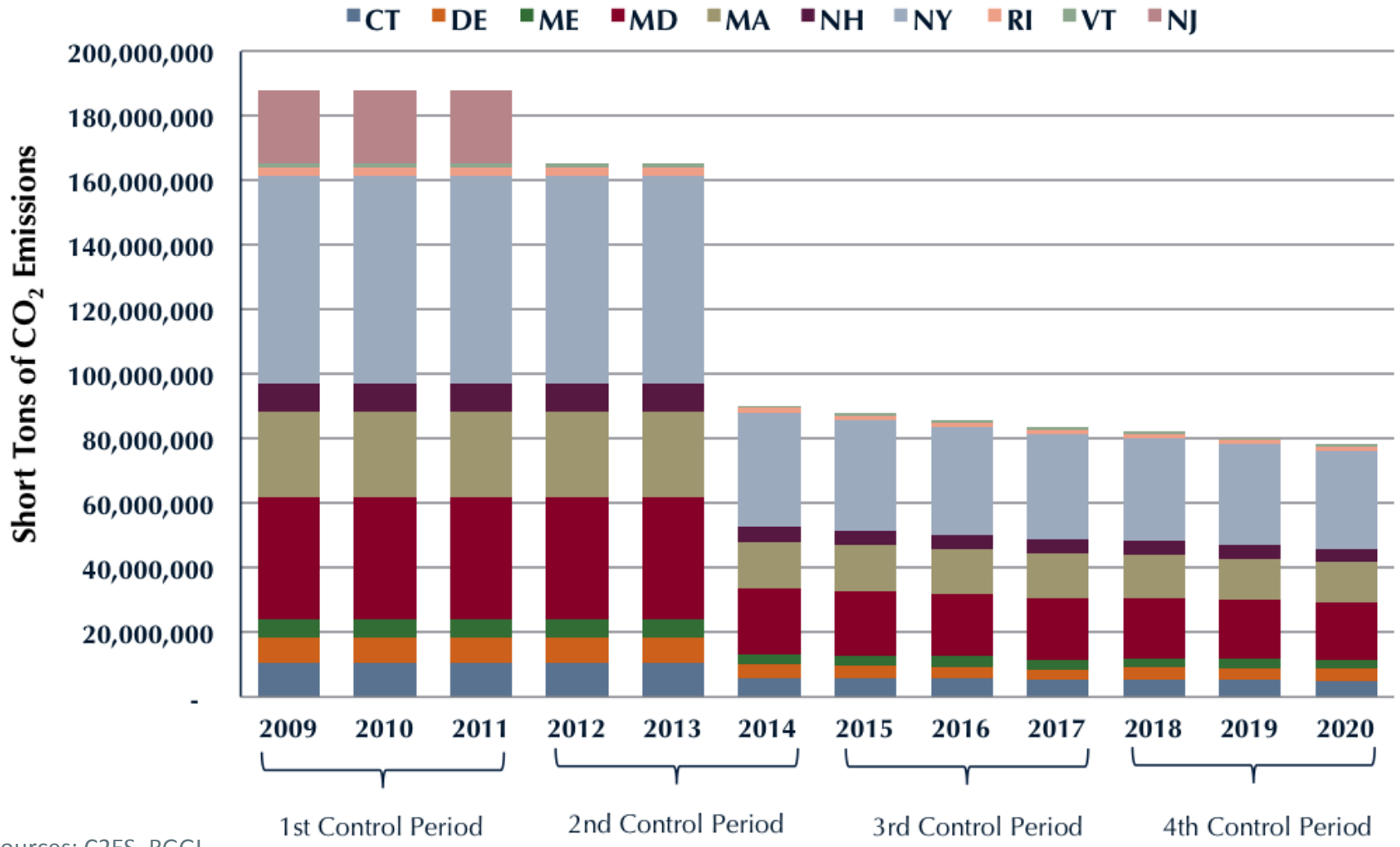
- **86.5** million short tons - RGGI 2015 cap (2014 cap was 91 M)
  - New England share **30.6** M
- **64.6** million short tons – 2016 Adjusted RGGI cap
  - New England share **21.7** M
- RGGI reports 169 million allowances in circulation as of mid-2015
- Next auction: Auction 31, on March 9th, 14.8 million allowances scheduled to be auctioned

## RGGI 2016 $CO_2$ Allowance Allocation (State %)




Source: RGGI

# RGGI Annual $CO_2$ Emissions Cap




Sources: C2ES, RGGI

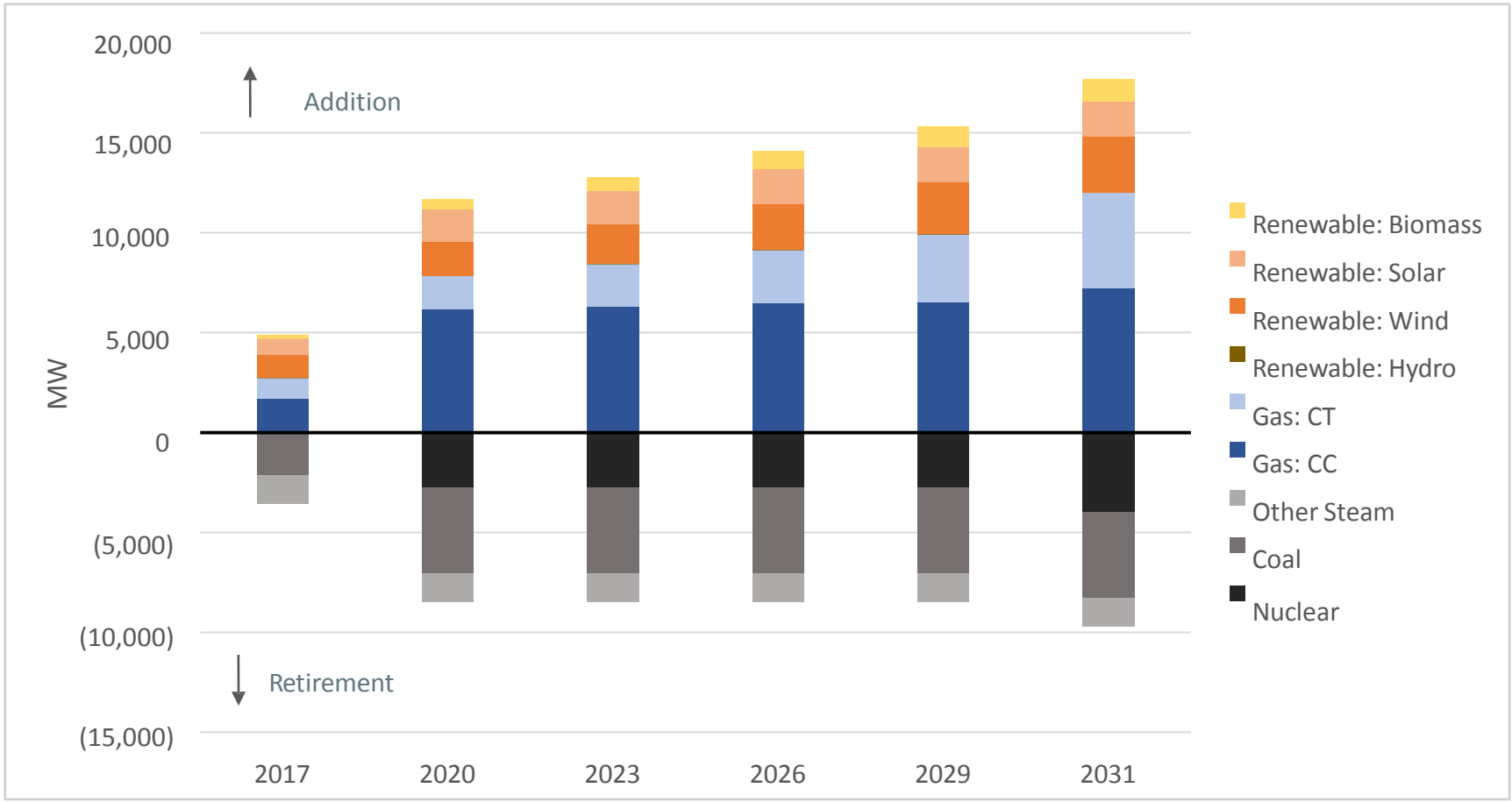
# 2016 RGGI Program Review Overview

- RGGI states completed a comprehensive program review in 2013, lowering the overall $CO_2$ budget (annual cap) to 91 million tons beginning in 2014, reducing the cap by 2.5% each year through 2020
- 2016 Program Review underway to consider program performance, impacts and design elements
- The RGGI participating states will use the regional 2016 Program Review stakeholder meetings as an opportunity to receive comments from stakeholders and experts on potential program changes in pursuit of compliance with the EPA Clean Power Plan (CPP)

Source: RGGI

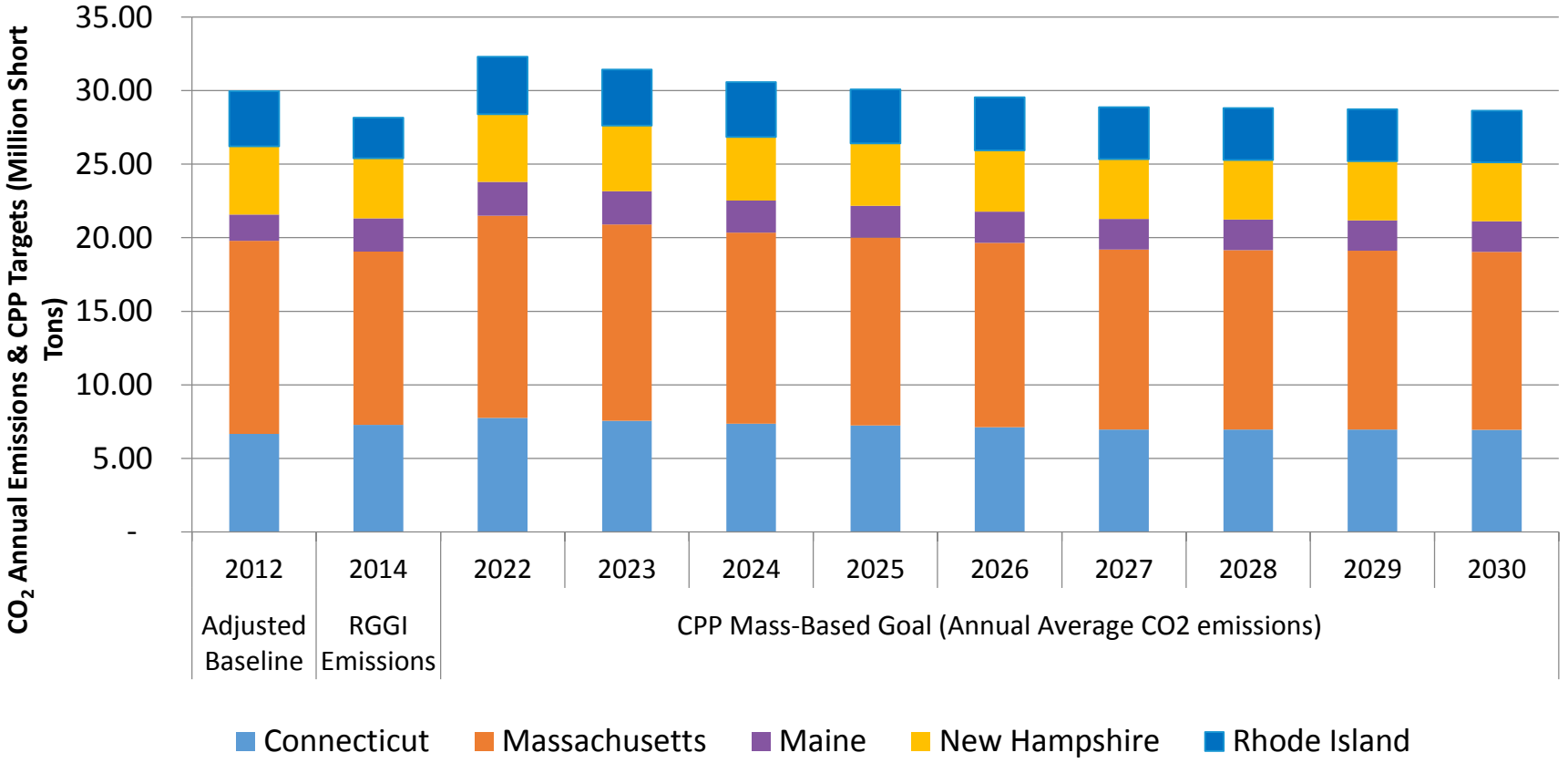
# RGGI 2016 Program Review Reference Case Projections: *Cumulative Capacity Additions*

- The chart shows the distribution of projected capacity additions and retirements by capacity type in the RGGI region. Wind and solar additions are shown at nameplate capacity.




Source: RGGI

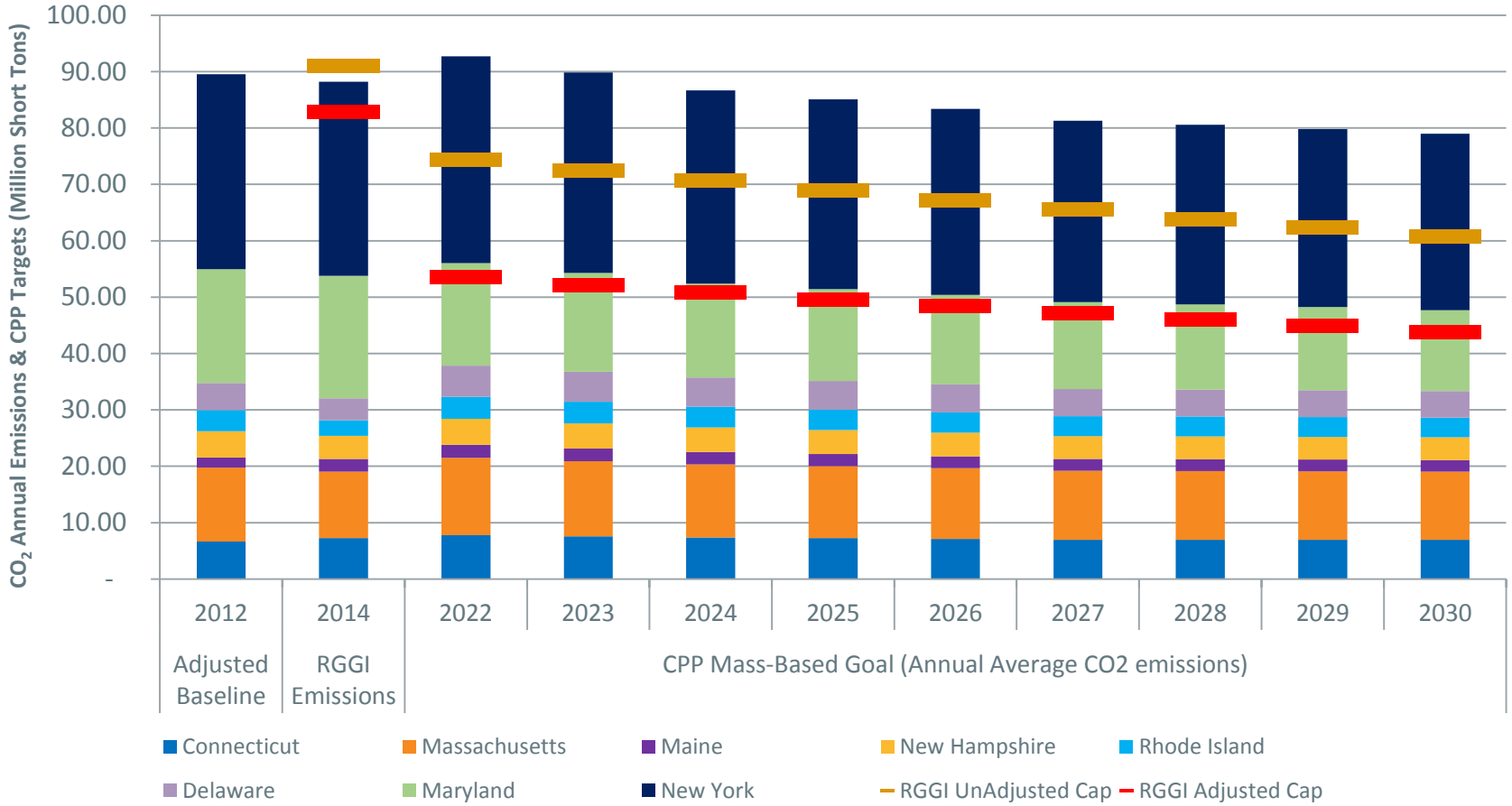
# Comparison of RGGI Targets & Emissions to CPP Targets (Short Tons)




**Notes:** EPA calculated adjusted 2012 state baselines and interim (2022 to 2029) and final (2030) targets. Annual 2014 $CO_2$ emissions from RGGI states are shown for comparison purposes but are not projections of future regional emissions.

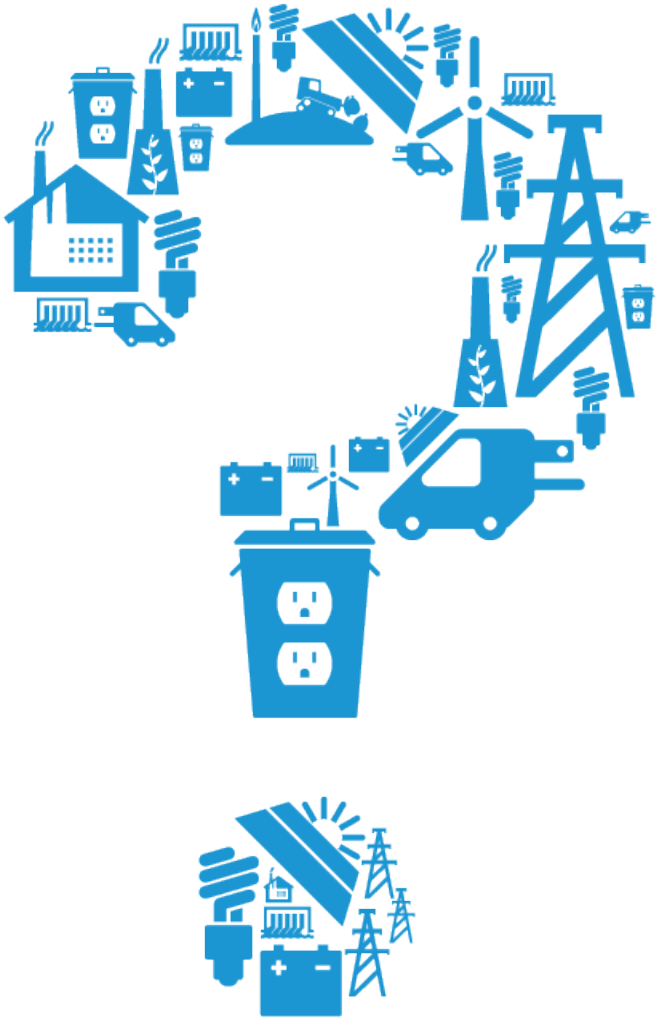
**Sources:** EPA, *Clean Power Plan Technical Support Document: Emissions Performance Rate and Goal Computation Appendix-1-5* (August 2015); http://www.epa.gov/airquality/cpp/tsd-cpp-emission-performance-rate-goal-computation-appendix-1-5.xlsx. EPA, Air Markets Program data, RGGI 2014 Emissions; http://ampd.epa.gov/ampd/;

# CPP Mass-based State Targets & Projected Extension of RGGI Reduction Targets To 2030




**Sources:** EPA, *Clean Power Plan Technical Support Document: Emissions Performance Rate and Goal Computation Appendix-1-5* (August 2015); http://www.epa.gov/airquality/cpp/tsd-cpp-emission-performance-rate-goal-computation-appendix-1-5.xlsx. EPA, Air Markets Program data, RGGI 2014 Emissions; http://ampd.epa.gov/ampd/; Regional Greenhouse Gas Initiative Design Overview, Adjusted RGGI Cap (extrapolating 2.5% reduction out to 2030) http://www.rggi.org/design/overview/cap.

# Questions



# APPENDIX - DETAILED CPP RATE & MASS TABLES

# Regional CPP Interim and Final Rate Goals for Existing Sources (lb/Net MWh)

| | Adjusted 2012 | 2020 Projections w/o CPP | Interim Period (2022-2029) | 2022-2024 | 2025-2027 | 2028-2029 | 2030+ |
|---|---|---|---|---|---|---|---|
| **Connecticut** | 846 | 858 | 852 | 899 | 836 | 801 | 786 |
| **Maine** | 873 | 736 | 842 | 888 | 827 | 793 | 779 |
| **Massachusetts** | 1,003 | 808 | 902 | 956 | 885 | 844 | 824 |
| **New Hampshire** | 1,119 | 636 | 947 | 1,006 | 929 | 881 | 858 |
| **Rhode Island** | 918 | 845 | 832 | 877 | 817 | 784 | 771 |
| **Average** | **952** | **777** | **875** | **925** | **859** | **821** | **804** |

**Source:** EPA, *Clean Power Plan Technical Support Document: Emissions Performance Rate and Goal Computation Appendix-1-5* (August 2015)

# CPP Mass-based Goals for Existing Sources ($CO_2$ Short tons)

| | Adjusted 2012 | 2020 Projections w/o CPP | Interim (2022-2029) | 2022-2024 | 2025-2027 | 2028-2029 | 2030+ |
|---|---|---|---|---|---|---|---|
| **Connecticut** | 6,659,803 | 7,819,591 | 7,237,865 | 7,555,787 | 7,108,466 | 6,995,080 | 6,941,523 |
| **Maine** | 1,795,630 | 3,718,956 | 2,158,184 | 2,251,173 | 2,119,865 | 2,076,179 | 2,073,942 |
| **Massachusetts** | 13,125,148 | 12,392,303 | 12,747,677 | 13,360,735 | 12,511,985 | 12,181,628 | 12,104,747 |
| **New Hampshire** | 4,642,898 | 3,937,924 | 4,243,492 | 4,461,569 | 4,162,981 | 4,037,142 | 3,997,579 |
| **Rhode Island** | 3,735,786 | 2,981,490 | 3,657,385 | 3,811,632 | 3,592,937 | 3,522,686 | 3,522,225 |
| **Total** | **29,959,265** | **30,850,264** | **30,044,603** | **31,440,896** | **29,496,234** | **28,812,715** | **28,640,016** |

**Note:** Vermont is excluded from table as EPA determined it has no CPP affected generation.
**Source:** EPA, *Clean Power Plan Technical Support Document: Emissions Performance Rate and Goal Computation Appendix-1-5* (August 2015); http://www.epa.gov/airquality/cpp/tsd-cpp-emission-performance-rate-goal-computation-appendix-1-5.xlsx

# CPP Mass-based Goals Existing Sources & New Source Complement ($CO_2$ Short tons)

| | Adjusted 2012 | 2020 Projections w/o CPP | Interim Period (2022-2029) | 2022-2024 | 2025-2027 | 2028-2029 | 2030+ |
|---|---|---|---|---|---|---|---|
| Connecticut | 6,659,803 | 7,819,591 | 7,237,865 | 7,555,787 | 7,108,466 | 6,995,080 | 6,941,523 |
| Maine | 1,795,630 | 3,718,956 | 2,158,184 | 2,251,173 | 2,119,865 | 2,076,179 | 2,073,942 |
| Massachusetts | 13,125,148 | 12,392,303 | 12,747,677 | 13,360,735 | 12,511,985 | 12,181,628 | 12,104,747 |
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# RGGI 2016 Program Review Key Discussion Topics

- **November 17, 2015**: following slides summarize the questions posed by the RGGI States soliciting stakeholder feedback on RGGI Program elements and how they could accommodate Clean Power Plan requirements:
  1. EPA Clean Power Plan:  State Plan Approaches
  2. CO2 Emissions Reductions
  3. RGGI Flexibility Mechanisms
  4. RGGI Regulated Sources
  5. EPA Clean Power Plan: Promoting Renewable Energy and Energy Efficiency
  6. Broadening the RGGI Market/Increasing RGGI Trading Partners
  7. RGGI Allowance Auctions & Tracking System
- Commenters submitted a diverging and wide ranging responses to the questions posed by the RGGI States

Source: RGGI