Environmental Update

Planning Advisory Committee

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SENIOR ANALYST

Trends in Federal Environmental Regulatory Policy – *Considerable Uncertainty, Uneven Impacts*

Clean Air Act

- Clean Power Plan
- Carbon New Source Performance Standards
- 2015 Ozone Standard*
- Startup, Shutdown, and Malfunction emissions

Clean Water Act

- Cooling Water Intake Structure Rule
- Wastewater Discharge Rule

Resource Conservation and Recovery Act

- Coal Ash Rule

National Environmental Policy Act

- Downstream GHG emissions

Major Environmental Rules Related to Coal, Natural Gas, and Nuclear Generation

Title	Year Finalized	Years Implemented	Authorizing Statute	Major Provisions	Generation Sources Affected
Cooling Water Intake Rule	2001 (Phase 1) 2003 (revised Phase 1) 2014 (Phase 2)	Phase 2: 2014-2018;	Clean Water Act	• Promulgated under 316(b) of the Clean Water Act. New sources regulated under Phase I and existing sources regulated under Phase II. • States consider requirements for power plants on a case-by-case basis • Requires controls to reduce mortality to fish and other aquatic organisms	Coal Natural Gas Nuclear
Cross-State Air Pollution Rule	2011	Phase 1: 2015 Phase 2: 2017	Clean Air Act	• The Cross-State Air Pollution Rule replaced the Clean Air Interstate Rule starting on January 1, 2015, and requires states to reduce power plant emissions of SO_2 and NOx that contribute to ozone emissions and fine particle pollution in other states	Coal Natural Gas
Steam Electric Effluent Limitation Guidelines	1974; policy updates in 1977, 1978, 1980, 1982, and 2015	1982; 2015-; 2017 EPA suspends 2015 rule for review Litigation suspended	Clean Water Act (40 CFR 423)	• Established limitations on the discharge of toxic and other chemical pollutants and thermal discharges from existing and new steam electric power plants, as well as pretreatment standards. • The 2015 update sets the first Federal limits on levels of toxic metals that can be discharged	Coal Natural Gas

DOE Staff Report to the Secretary on Electricity Markets and Reliability (August 2017) Table 3-4 (pp. 40-41)

Source: DOE

Major Environmental Rules Related to Coal, Natural Gas, and Nuclear Generation

Title	Year Finalized	Years Implemented	Authorizing Statute	Major Provisions	Generation Sources Affected
New Source Review	1980; policy updates in 1996 and 2002	1980; 2002 updates 2017 Litigation suspended	Clean Air Act	• Affects stationary sources of air pollutants. Requires that a new or modified power plant obtain a pre-construction permit to ensure, among other things, that modern pollution control equipment is installed. • Requirements differ depending on whether or not the plant is located in an area that meets the requirements under the National Ambient Air Quality Standards	Coal Natural Gas
Mercury and Air Toxics Standards	2012	2015-2016 Implemented 2017 Litigation suspended	Clean Air Act	• Set mercury, arsenic, acid gases, and other toxic pollutants emissions limits for coal- and oil-fired power plants • Operators had until April 2015 to comply with many plants receiving additional multi-year extensions	Coal Oil
Coal Combustion Residuals Rule	2015	2015-2018; 2017 Rule suspended Litigation suspended	Resource Conservation and Recovery Act	• Addresses groundwater contamination risks from coal combustion residuals (i.e., "coal ash") disposal in unlined landfills and surface impoundments by establishing national standards for disposal	Coal

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Regional Haze Rule	1999; policy revisions in 2017	Implemented Revised state plans due in 2021, some plans under review	Clean Air Act	• Requires states to develop long-term strategies, including enforceable measures to improve visibility in 156 national parks and wilderness areas • Aims at returning visibility to natural conditions by 2064	Coal Oil Natural Gas
Carbon New Source Performance Standards	2015	2016 Suspended 2017 Litigation suspended pending EPA review	Clean Air Act	• Carbon New Source Pollution Standards established CO_2 emission standards for new fossil fuel-fired generators under Clean Air Act section 111(b)	Coal Oil Natural Gas
Clean Power Plan	2015	2017 Litigation suspended EPA proposes withdrawal	Clean Air Act	• The Clean Power Plan, establishes CO_2 emission standards for existing power plants under section 111(d) of the Clean Air Act	Coal Oil Natural Gas

DOE Staff Report to the Secretary on Electricity Markets and Reliability (August 2017) Table 3-4 (pp. 40-41)

Source: DOE

REGIONAL POWER GENERATION ENVIRONMENTAL METRICS

Preliminary 2016 Estimated ISO-New England Annual System Emissions

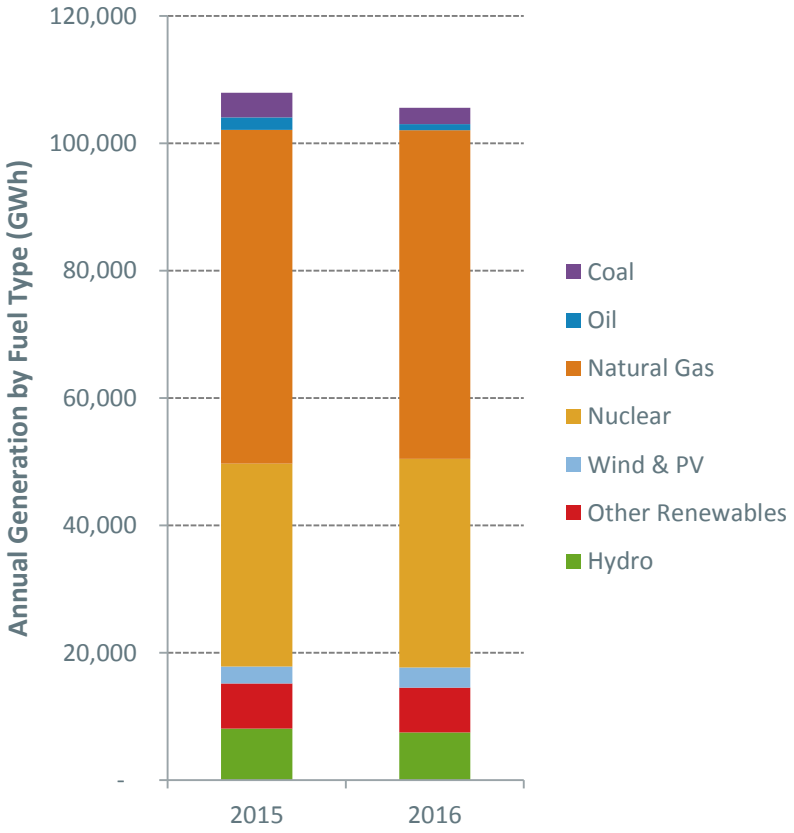
	2015 Emissions (K Tons)	2016 Emissions (K Tons)	Total Emissions (% Change)	2015 Emission Rate (lb/MWh)	2016 Emission Rate (lb/MWh)	Emission Rate (% Change)
NO_x	18.86	16.26	-13.8	0.35	0.31	-11.4
SO_2	9.11	5.12	-50.9	0.17	0.08	-52.9
CO_2	40,312	37,468	-7.1	747	710	-5.0

Note: 2016 values are preliminary and subject to additional quality assurance and review. Final values are expected by December 2017.

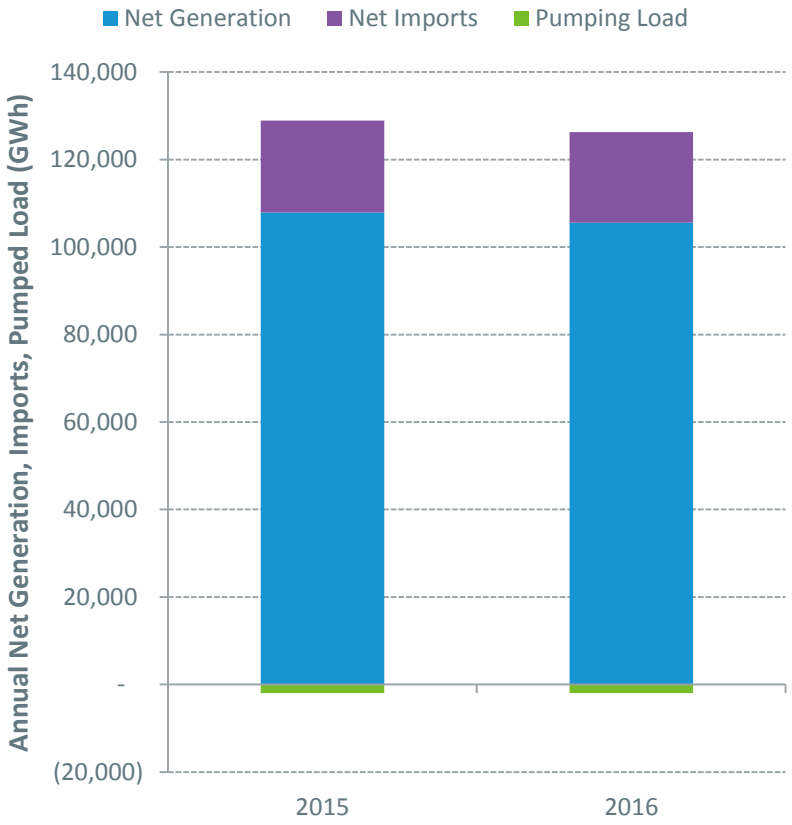
Source: ISO-NE

New England Net Generation by Fuel Type, Imports 2015-2016 (GWh)

Net Generation by Fuel Type (GWh)

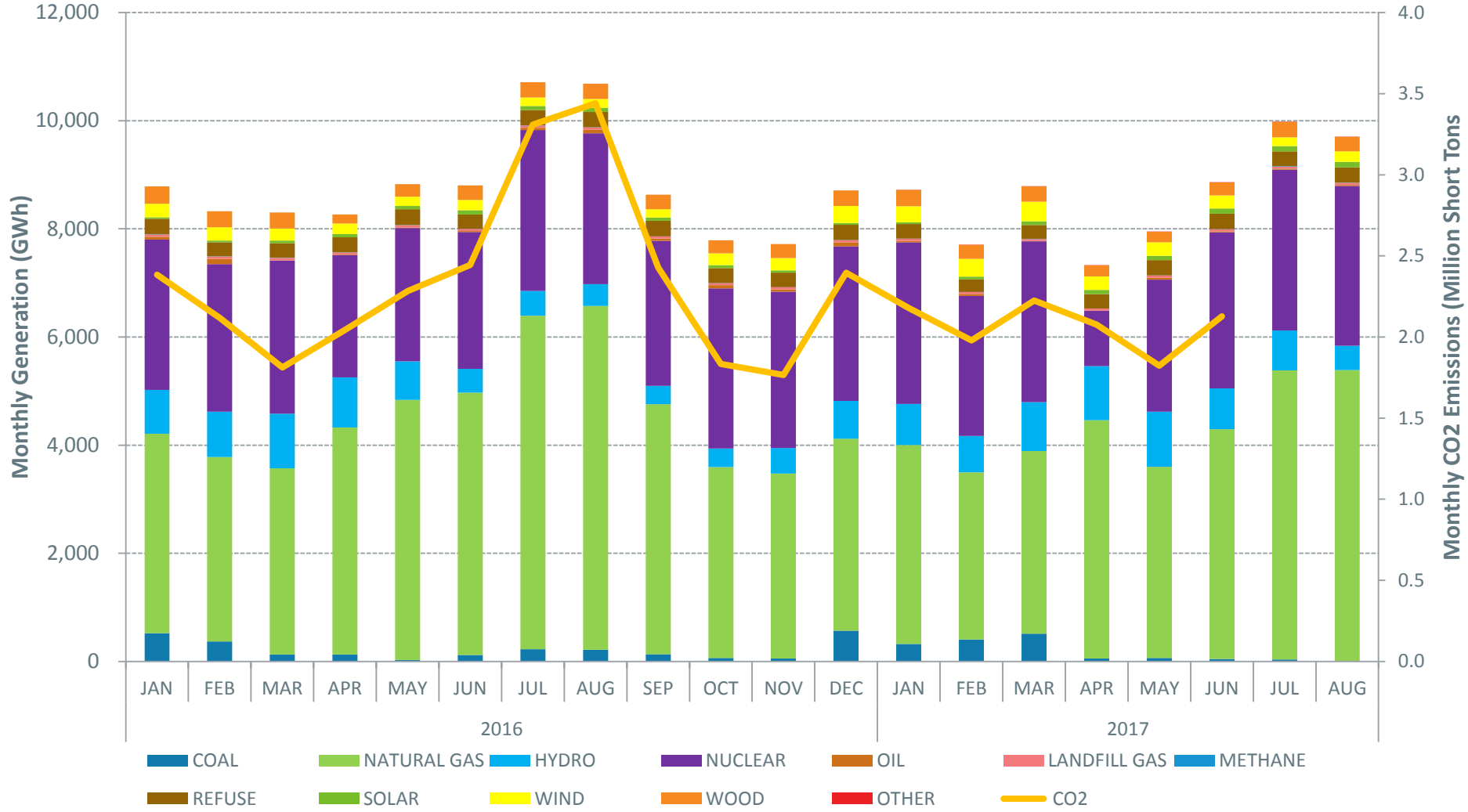


Net Generation, Imports & Pumping Load (GWh)



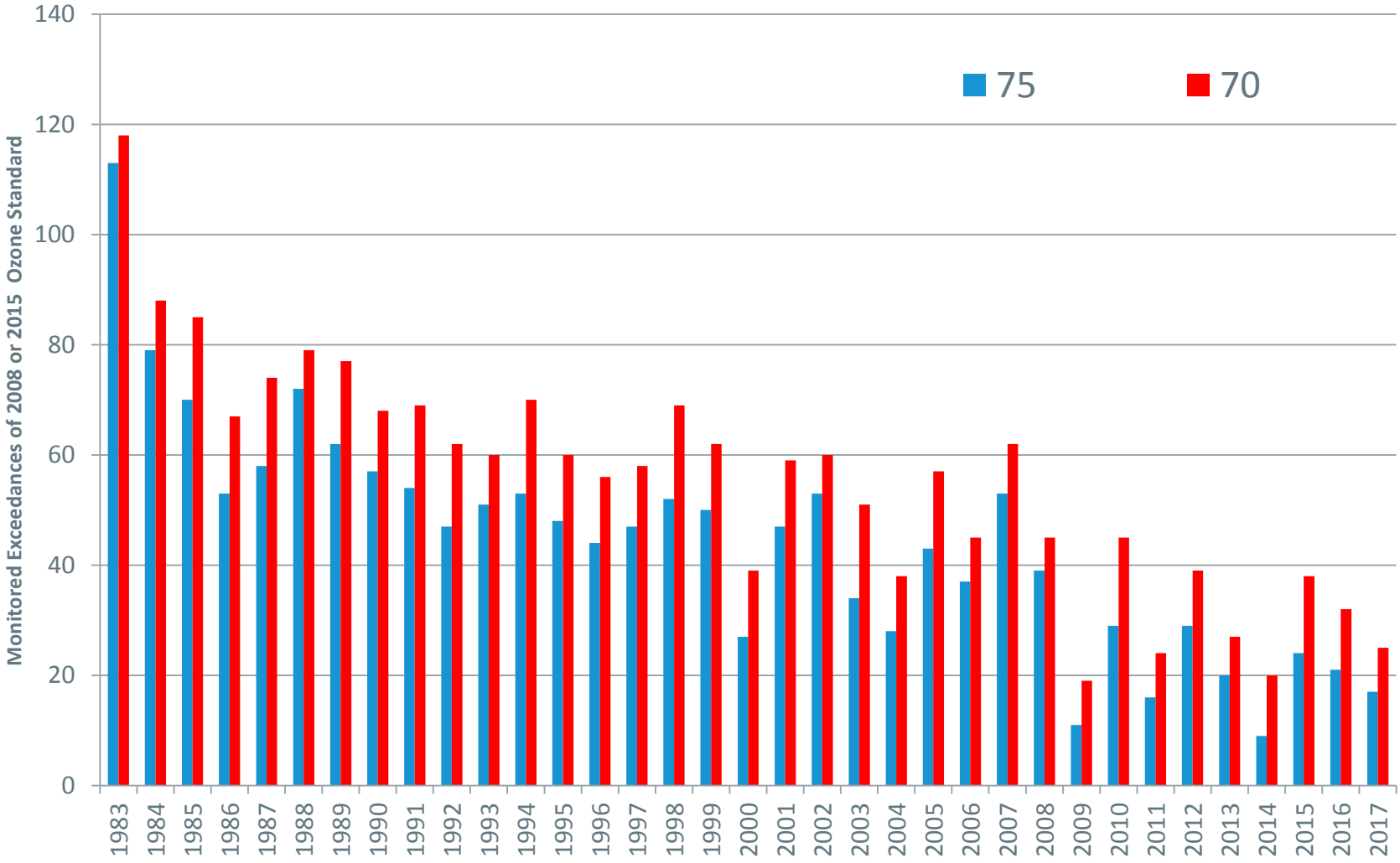
Source: ISO-NE

New England 2016-2017 Monthly Generation (*GWh*) & CO_2 Emissions *(Million Short Tons)*



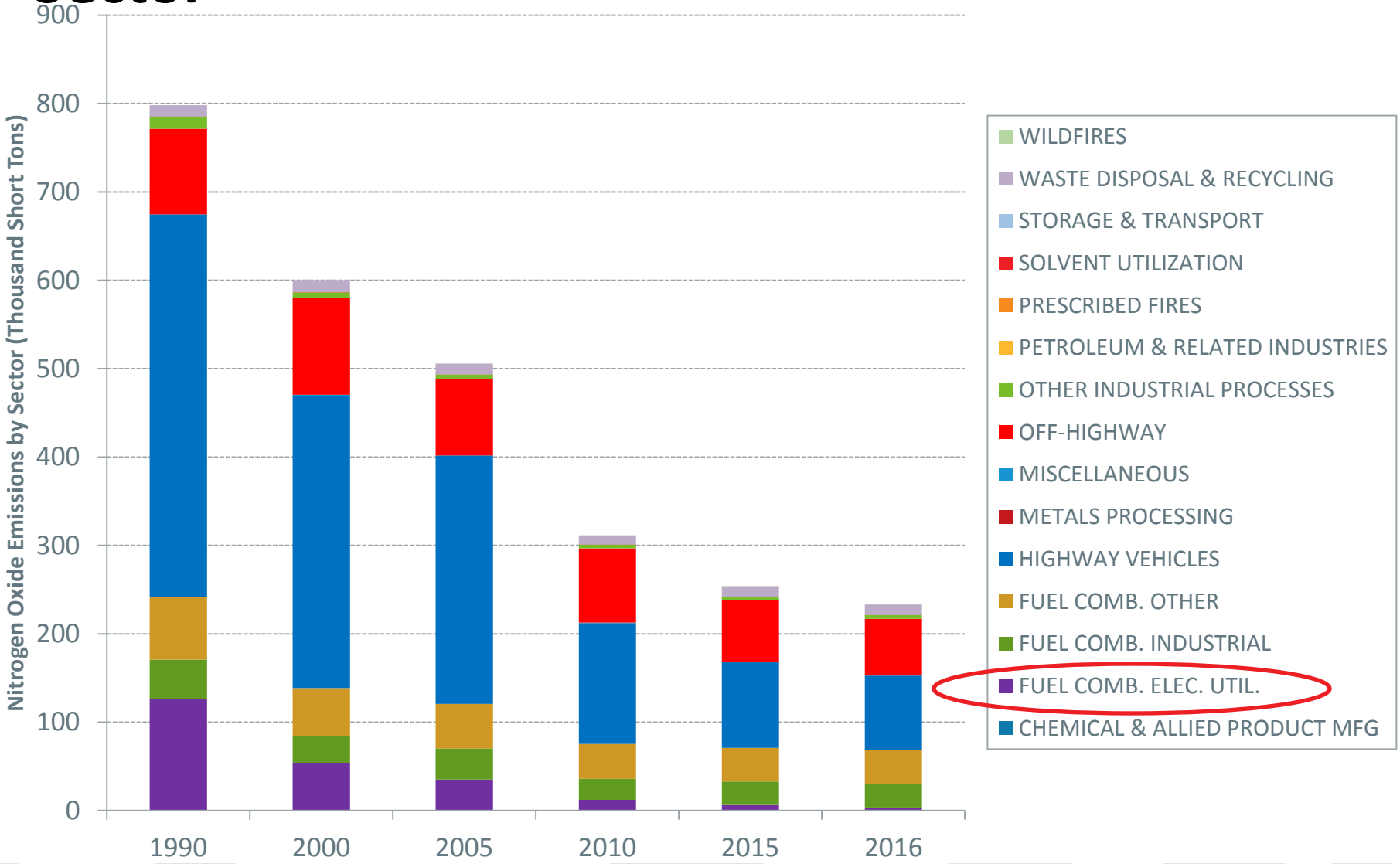
Source: ISO-NE

1983-2017 New England Ozone Exceedances
75 (2008) or 70 (2015) parts per million standard



Sources: EPA; States

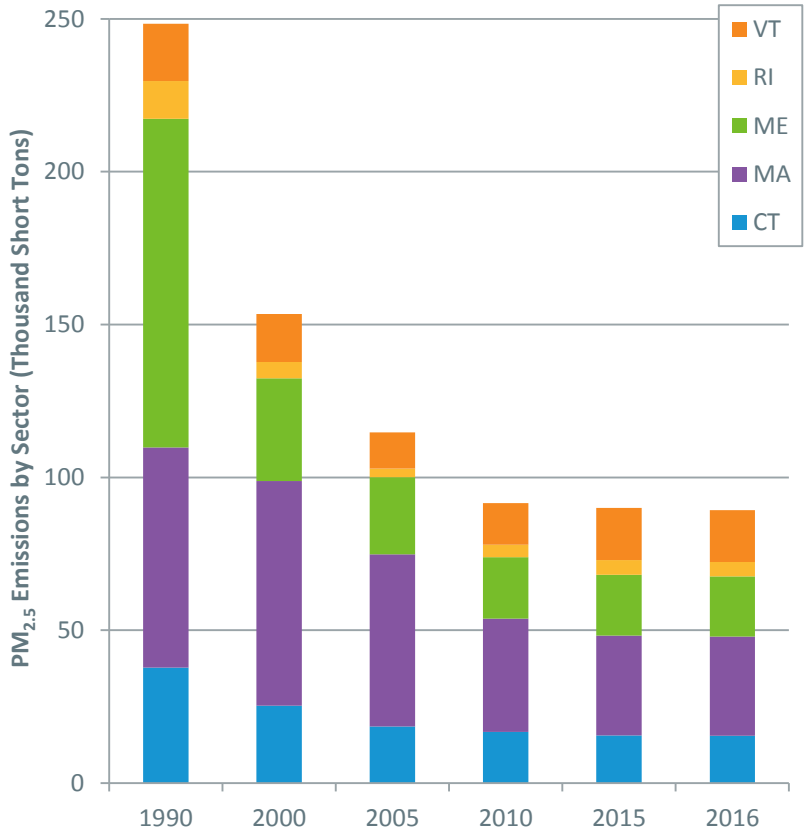
EPA New England NO_x Emissions Trends By Sector



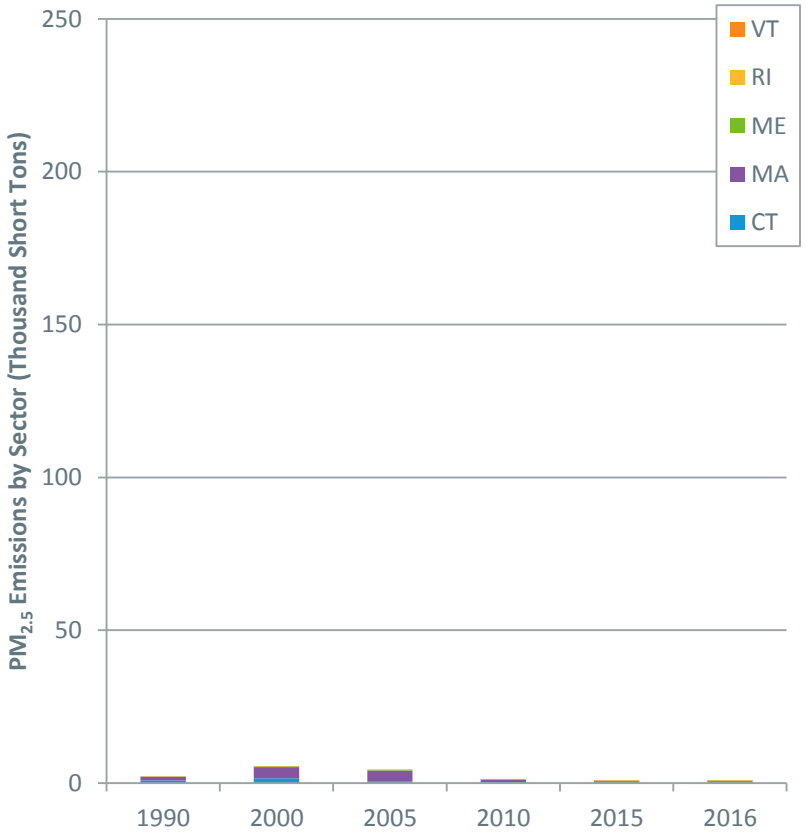
Source: EPA

EPA New England $PM_{2.5}$ Emissions Trends By Sector (Thousand Short Tons)

$PM_{2.5}$ Emissions Inventory – All Source Sectors



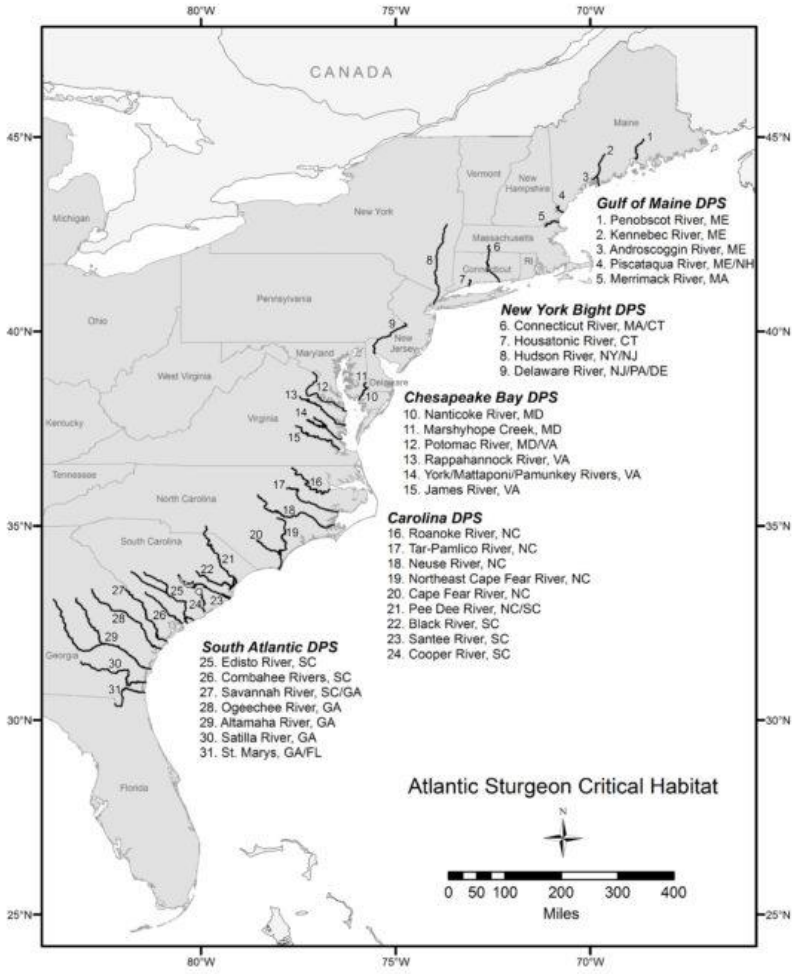
$PM_{2.5}$ Emissions Inventory – Electric Generating Sources



Source: EPA

Critical Habitat for Threatened and Endangered Atlantic Sturgeon

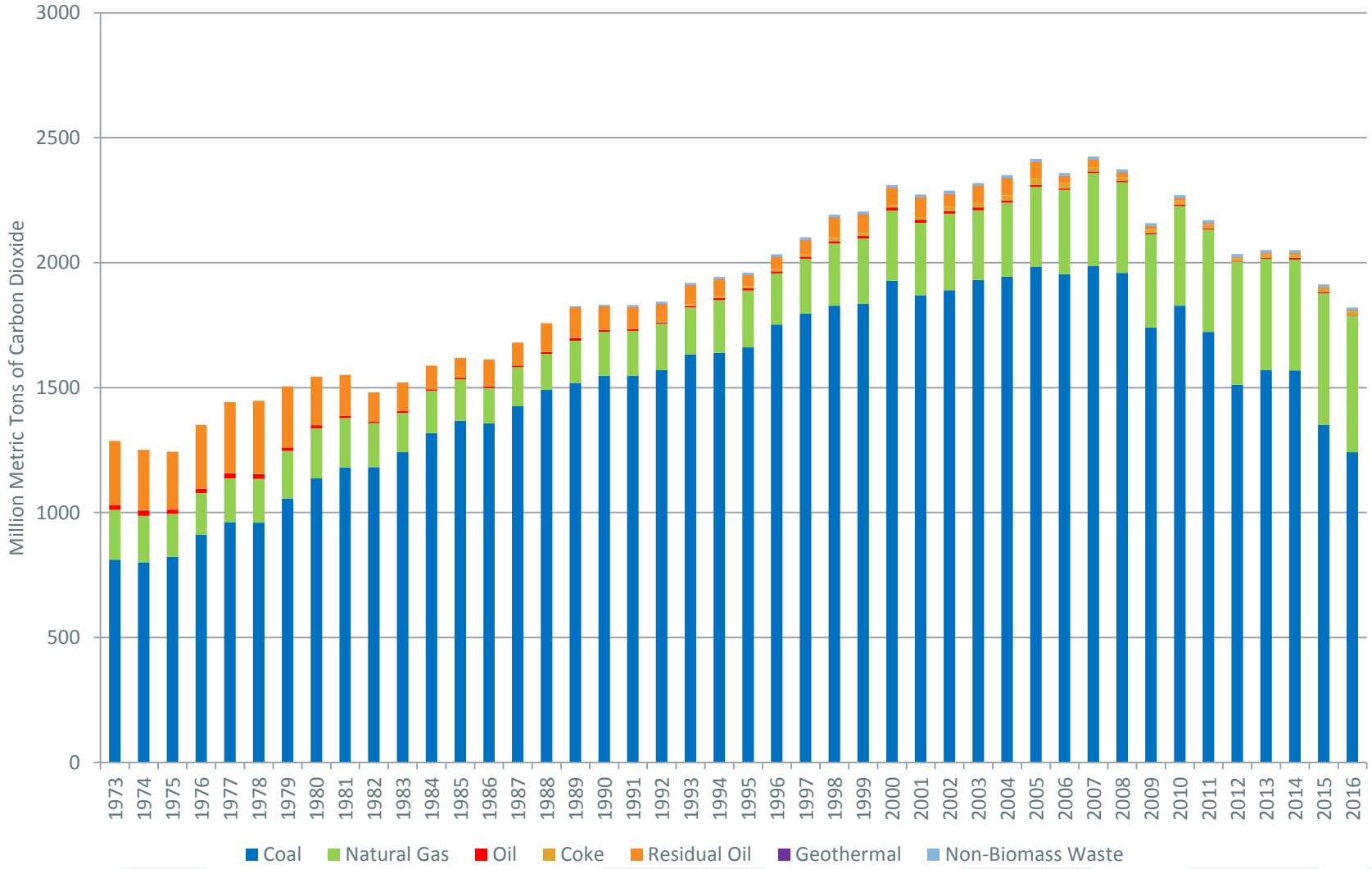
- **August 17, 2017**: The National Marine Fisheries Service designated as critical habitat for the Atlantic Sturgeon portions of several rivers in New England (82 FR 39160) :
  - Connecticut: Connecticut, Housatonic rivers
  - Maine: Androscoggin, Kennebec, Penobscot, and Salmon Falls rivers
  - New Hampshire: Piscataqua, Cocheco, Salmon Falls rivers
  - Massachusetts: Merrimack river
- Requires federal agencies to ensure any action does not jeopardize the species or habitat
  - May affect hydroelectric and transmission infrastructure



Sources: NMFS; Hunton & Williams; Preti Flaherty

GREENHOUSE GAS (GHG) REGULATORY UPDATE

EIA National Electric Generation CO_2 Emissions by Fuel Type (Million Metric Tons)



National & Regional GHG Overview

Clean Power Plan (CPP)

- EPA proposes withdrawal of CPP
- CPP litigation stay extended another 60 days

GHG New Source Performance Standards (NSPS)

- GHG NSPS litigation stayed indefinitely

Regional Greenhouse Gas Initiative (RGGI)

- RGGI proposes additional 30% reduction to emissions cap by 2030 from 2020 levels

Global Warming Solutions Act (GWSA)

- Massachusetts finalizes generator CO_2 emissions cap

FERC Review Must Consider Downstream Emissions from Proposed Projects

Sierra Club v. Federal Energy Regulatory Commission, No. 16-1329 (D.C. Circuit)

- **October 6, 2017**: FERC requests limited rehearing
- **September 27, 2017**: FERC staff issue draft supplemental environmental impact statement, estimating downstream greenhouse gas (GHG) emissions from the Southeast Market Pipelines (SMP) project
- **August 22, 2017**: D.C. Circuit found FERC's environmental review inadequately considered the indirect effects of downstream GHG emissions from the SMP Project

EPA GHG New Source Performance Standards Litigation Update – §111(b)

North Dakota v. EPA, No. 15-1381 (D.C. Circuit)

- **August 10, 2017**: D.C. Circuit, on the court's own motion, issues order indefinitely holding litigation in abeyance
  - **October 27, 2017**: EPA required to submit status report
- **April 28, 2017:** D.C. Circuit grants stay request, holding the litigation in abeyance for 60 days
- **April 4, 2017**: EPA "is reviewing and if appropriate will initiate proceedings to suspend, revise or rescind the Standards for Performance for [GHG]emissions from new, modified, and reconstructed" electric generating units In conformance with the Executive order 13783 (March 28, 2017) (82 FR 16330)

EPA Clean Power Plan Litigation Update – Existing Fossil Generators - Clean Air Act §111(d)

West Virginia v. EPA, No. 15-1363(D.C. Circuit)

- **September 7, 2017**: EPA submitted status report to D.C. Circuit, noting:
  - "EPA has begun the interagency review process of a proposed regulatory action resulting from its review of the Rule. EPA has transmitted a draft proposed rule to the Office of Management and Budget's Office of Information and Regulatory Affairs [and] EPA expects that the Administrator will sign the proposed rule in the fall of 2017."
- **April 4, 2017**: EPA announces review of CPP (82 FR 16329)
- **April 3, 2017**: EPA announces withdrawal of proposed Model Trading Rules; and Clean Energy Incentive Program (CEIP) design details (82 FR 16144)
- **Sept 27, 2016**: Oral arguments on litigation heard
- **February 9, 2016**: Implementation of the CPP stayed by the Supreme Court

REGIONAL GREENHOUSE GAS INITIATIVE

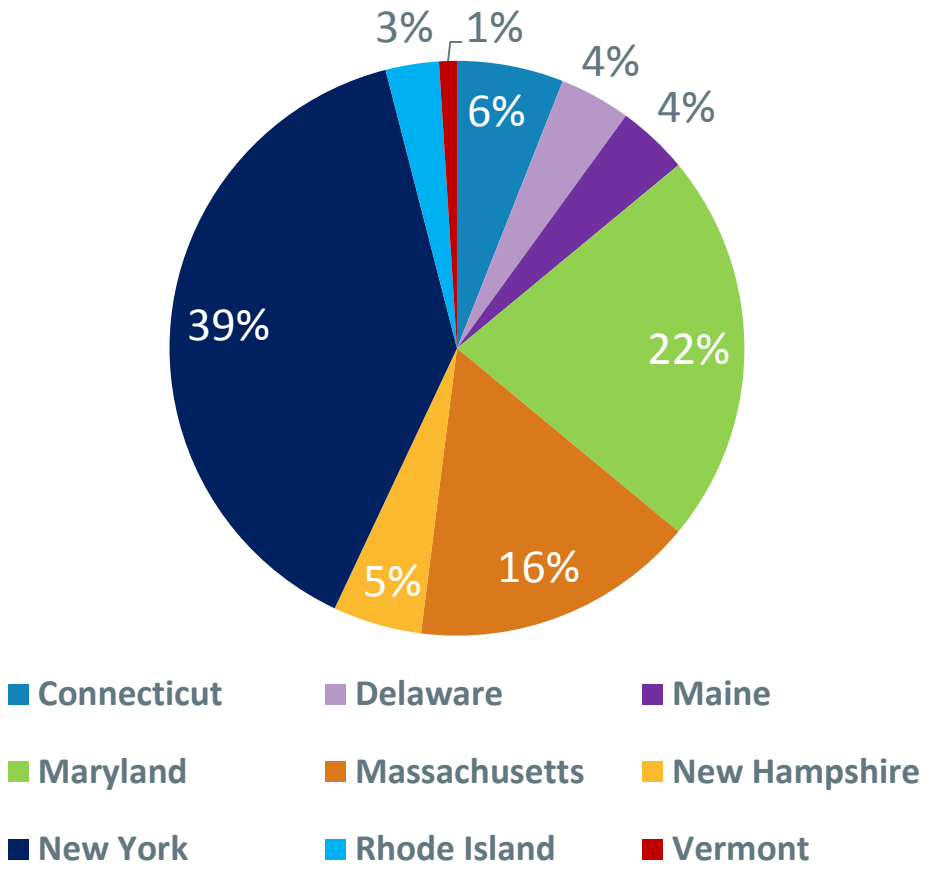
2017 Program Review and Recent Auction Activity

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

Overview, Allocations & Auction 35 (March 2017) Results

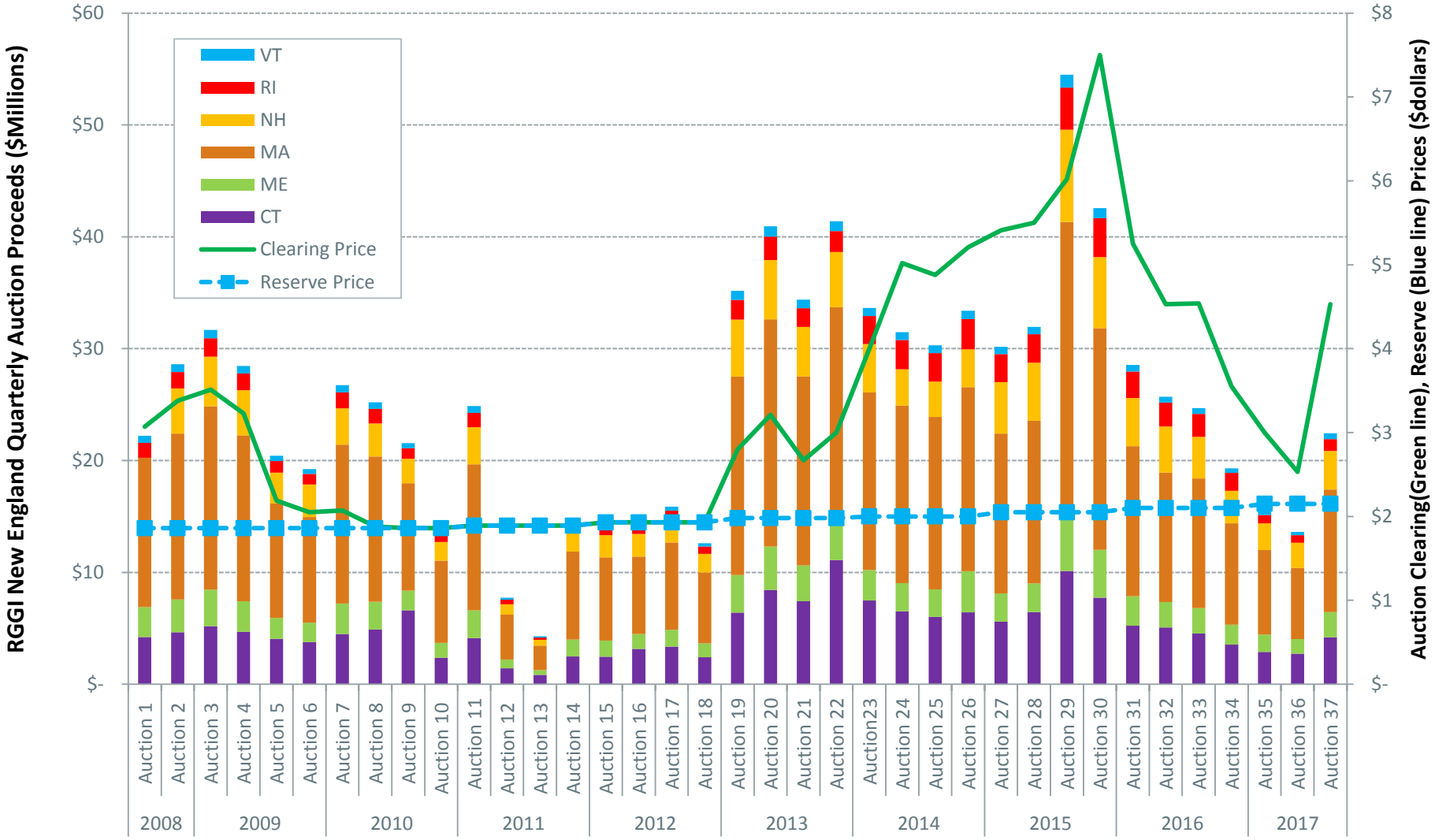
- **84.3** million short tons - RGGI 2017 cap, covers 20% of 9 RGGI States total GHG emissions inventory
  - 163 affected entities (RGGI wide)
  - New England share **28.5** M
- **62.4** million short tons – 2017 Adjusted RGGI cap (to account for banked allowances)
  - New England share **21.1** M (34% of total)
- **223** million allowances in circulation at the end 2nd Qtr 2017
- **Auction 37 (September 6, 2017) results:** All 14.37 million allowances offered purchased at clearing price of $4.35/ton
- **Auction 38 (December 7, 2017)**: offering 14.57 million 2017 vintage year allowances

RGGI 2017 CO_2 Allowance Allocation (State %)



Sources: RGGI; MJ Bradley & Associates LLC

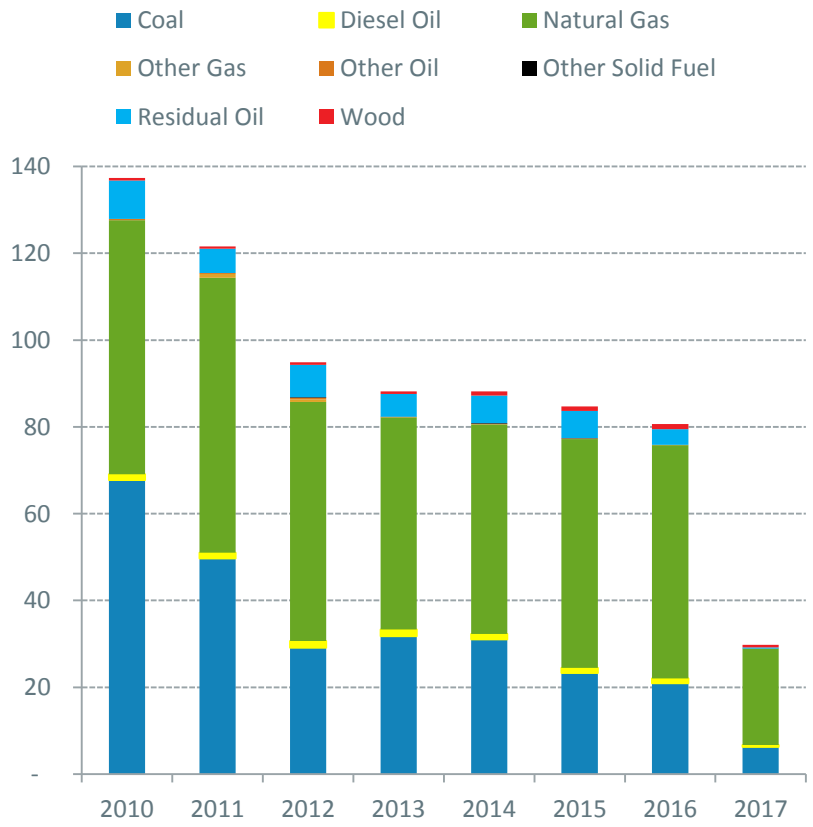
RGGI New England Auction Proceeds & Clearing Price (2008-2017YTD)



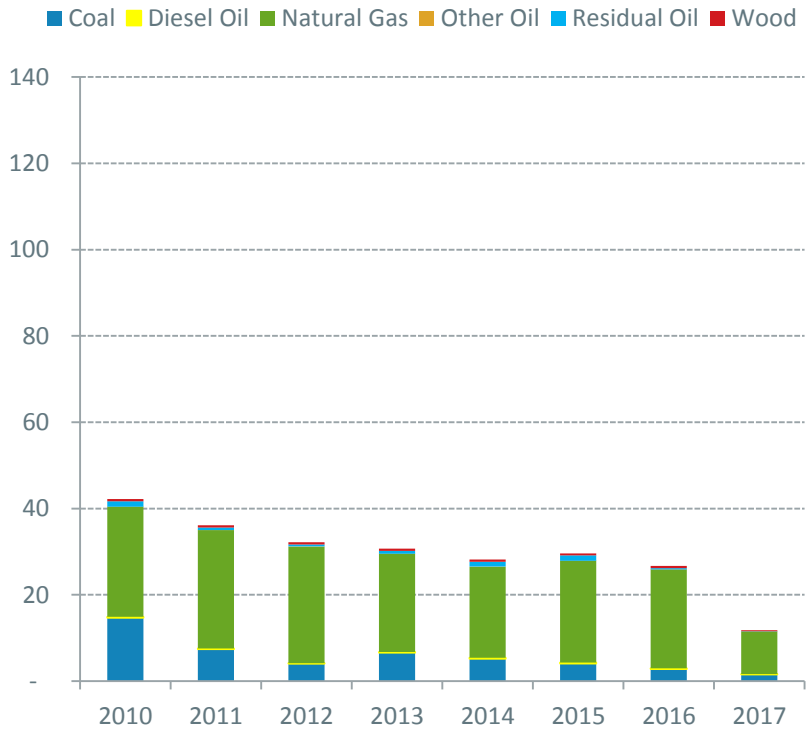
Source: RGGI

RGGI Annual CO_2 Emissions by Fuel Comparing Total to New England (2010-2017YTD) Million Short Tons

All RGGI Region Annual CO_2 Emissions (Million Short Tons)



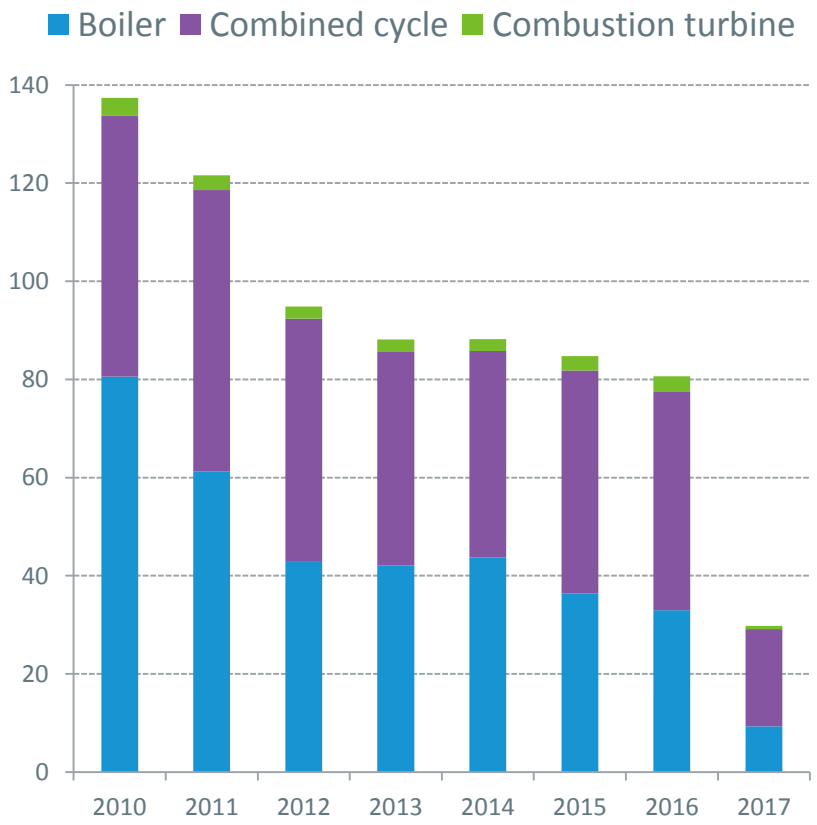
New England RGGI Annual CO_2 Emissions (Million Short Tons)



Source: EPA

RGGI Annual CO_2 Emissions by Type Comparing Total to New England (2010-2017YTD) Million Short Tons

All RGGI Region Annual CO_2 Emissions (Million Short Tons)



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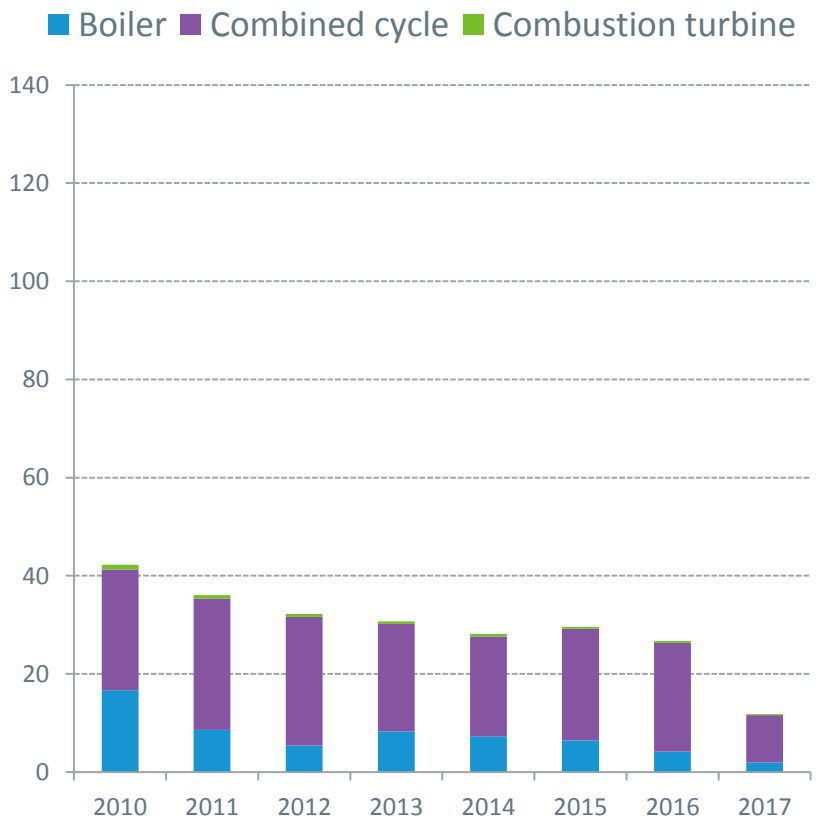


Source: EPA

RGGI Program Review

- **August 23, 2017**: RGGI states propose changes to program design, including a 30% reduction in the emissions cap by 2030 from 2020 levels:
- RGGI 9-State cap would decline 2,275,000 short tons of CO_2 annually, from 2021 through 2030, reducing the cap by 22.75 million short tons of CO_2
- Additional cap adjustments (not yet determined) would be implemented between 2021 and 2025 to account for 'excess' banked allowances

Source: RGGI

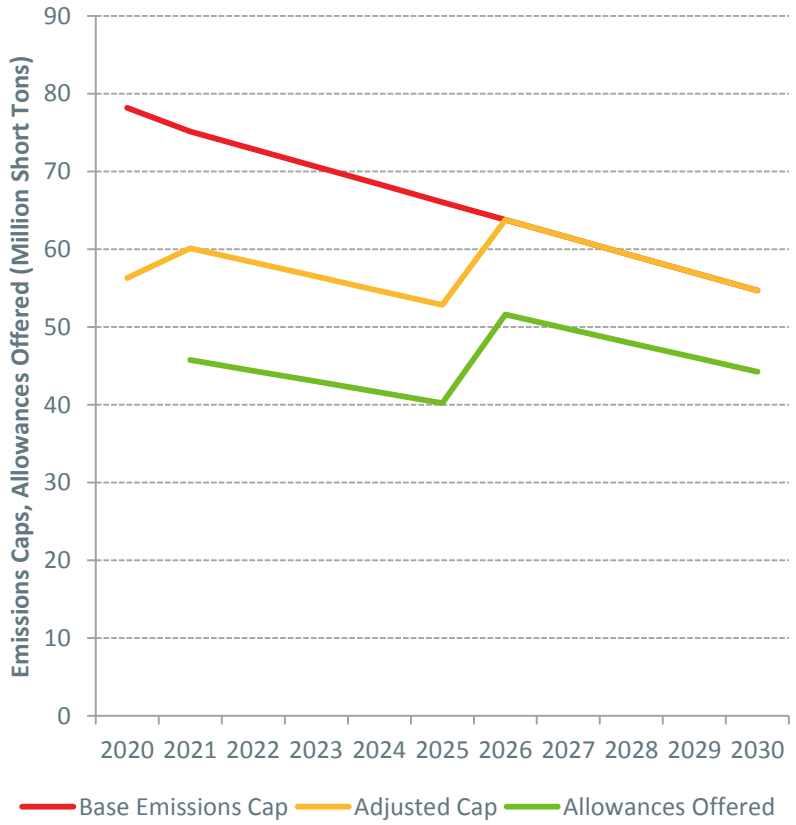
RGGI Program Review Proposed Changes

- **Cost Containment Reserve** (CCR): is a fixed reserve of additional CO2 allowances offered into an auction once per year if an interim clearing price reaches the preset CCR trigger price:
  - Set at $13.00/ton in 2021, increasing 7% annually
  - From 2021 to 2030, the CCR is proposed to remain 10% of the annual regional cap
- **Emissions Containment Reserve** (ECR) (New): RGGI States except for Maine and New Hampshire will withhold up to 10% of the allowances, if auction prices fall below a trigger price
  - Set at $6.00/ton in 2021, the ECR trigger price increases 7% annually

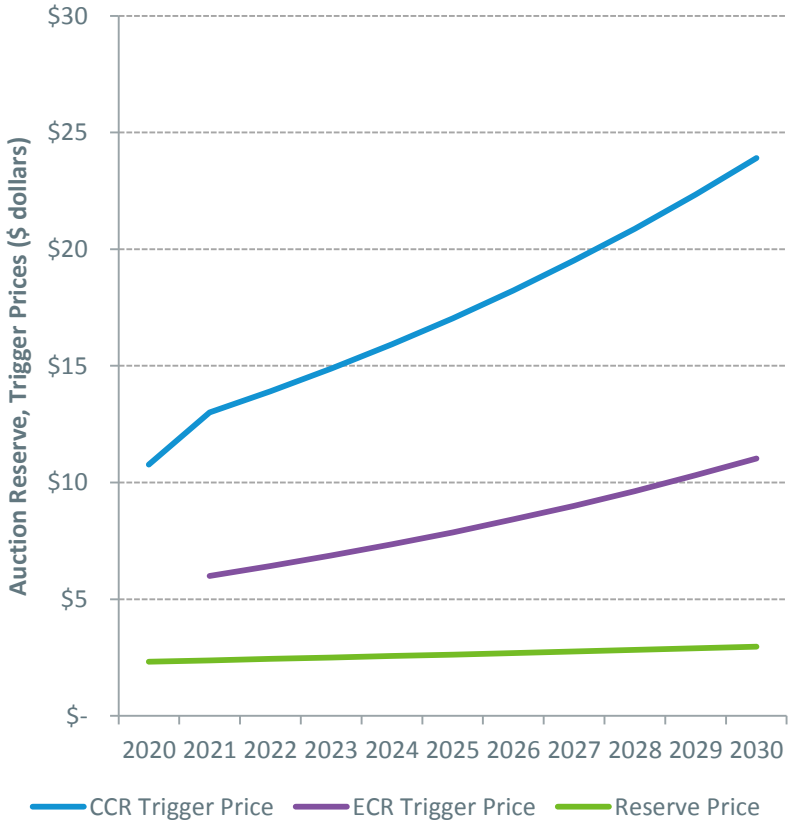
Source: RGGI

Potential RGGI Emissions Cap Assuming 20% Adjustment for Existing Banked Allowances

Future RGGI Emissions Cap, Bank Adjustment, Allowances Offered



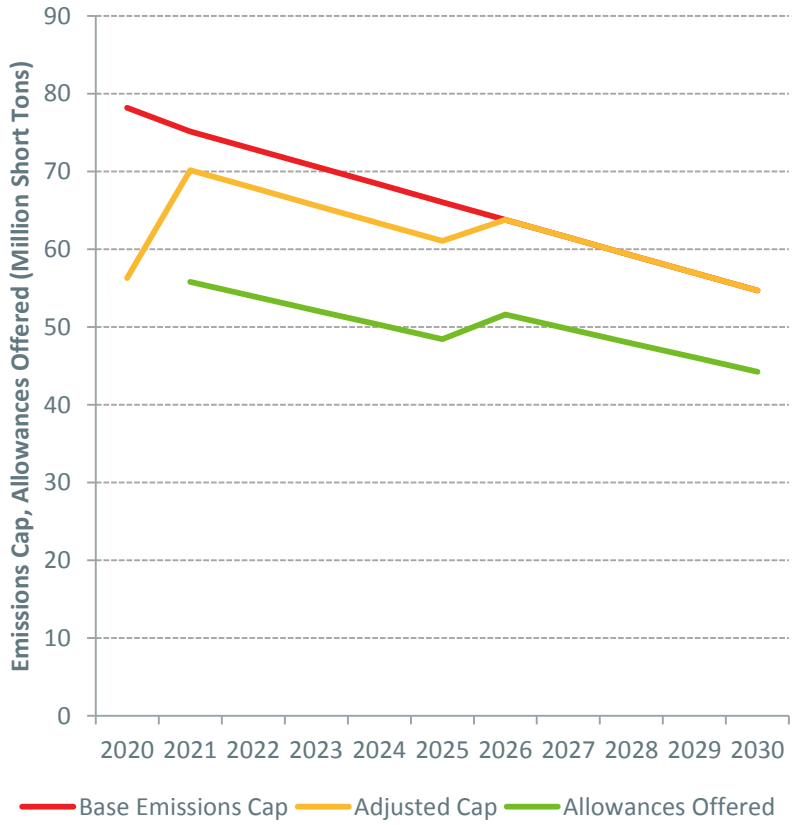
Future RGGI Auction Reserve, Trigger Prices ($ dollars)



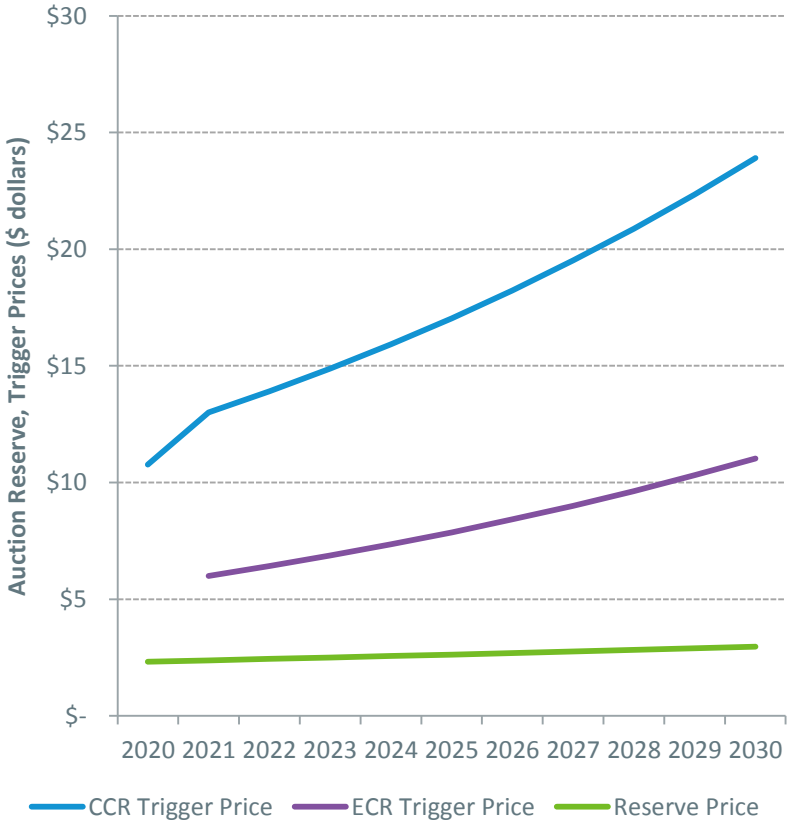
Sources: RGGI; MJ Bradley & Associates LLC

Potential RGGI Emissions Cap Assuming 5 MT Adjustment for Existing Banked Allowances

Future RGGI Emissions Cap, Bank Adjustment, Allowances Offered



Future RGGI Auction Reserve, Trigger Prices ($ dollars)



Sources: RGGI; MJ Bradley & Associates LLC

MASSACHUSETTS GLOBAL WARMING SOLUTIONS ACT

Generator Emissions Cap (310 CMR 7.74) Overview & Impacts Analysis

Massachusetts Global Warming Solutions Act (GWSA)

- Enacted in 2008, the GWSA requires Massachusetts to achieve greenhouse gas (GHG) reductions of 80% by 2050 from 1990 levels:
  - **1990 level** = 94.4 million metric tons carbon dioxide equivalent ($MMTCO_2eq$)
  - **2020 interim target** = 70.8 $MMTCO_2eq$ (25% by 2020) later set by rule
  - **2050 target** = 18.88 $MMTCO_2eq$
- Massachusetts adopted **Clean Energy and Climate Plan** in 2010, updated in 2015, focusing on GHG reductions from:
  - building fuels & energy efficiency
  - energy generation & distribution
  - transportation, land use & smart growth
  - non-energy emissions
  - cross-sector policies
- **Clean Energy and Climate Plan** relied on credit from participating in Regional Greenhouse Gas Initiative (RGGI)

Source: MA EOEEA

GWSA 310 CMR 7.74 – Reducing Emissions from Electricity Generating Facilities

- **Emissions Cap**: Sets declining annual aggregate CO_2 emission limits for electricity generating facilities from 2018 to 2050
- **Compliance**: Affected generators must comply by offsetting their total CO_2 emissions with GWSA allowances where an allowance is a limited authorization to emit one metric ton of CO_2 in a calendar year
  - State specific, RGGI allowances cannot be substituted
- **Allowances**: Allocated directly to generators based on historical generation in 2018 only, beginning in 2019 and thereafter GWSA allowances will be auctioned
- **Trading**: bilateral trades between GWSA generators allowed along with limited banking of unused allowances

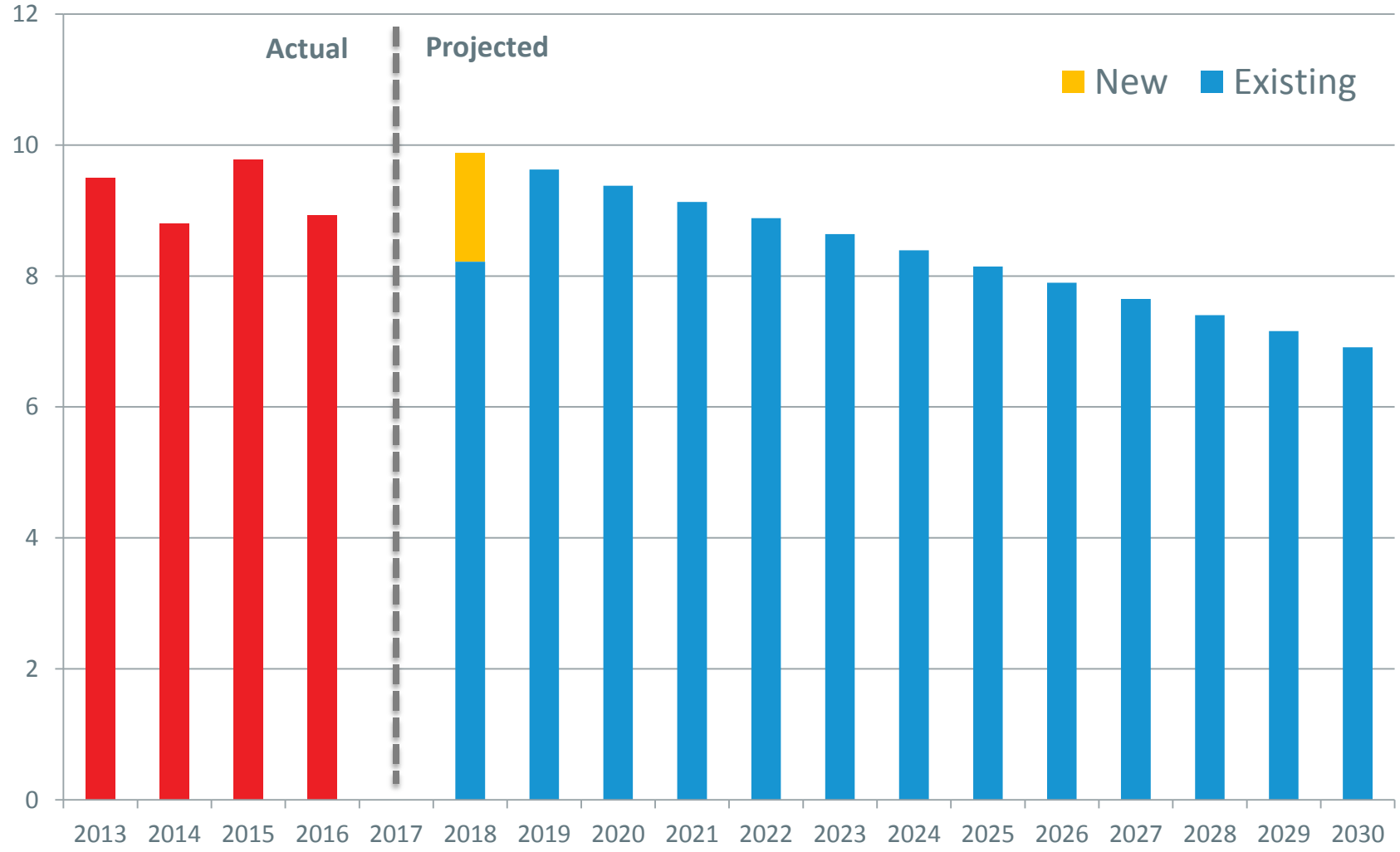
Source: MA DEP

Proposed, Final GWSA Generator CO_2 Emission Total Cap 2018 - 2050

Year	Total Cap (Million Metric Tons)		Total Cap (Million Short Tons)	
	Proposed	Final	Proposed	Final
2018	9.12	8.95	10.05	9.86
2019	8.89	8.73	9.80	9.61
2020	8.66	8.50	9.55	9.36
2025	7.52	7.38	8.30	8.13
2030	6.38	6.26	7.04	6.90
2040	4.10	4.02	4.52	4.43
2050	1.82	1.79	2.01	1.96

Source: MA DEP

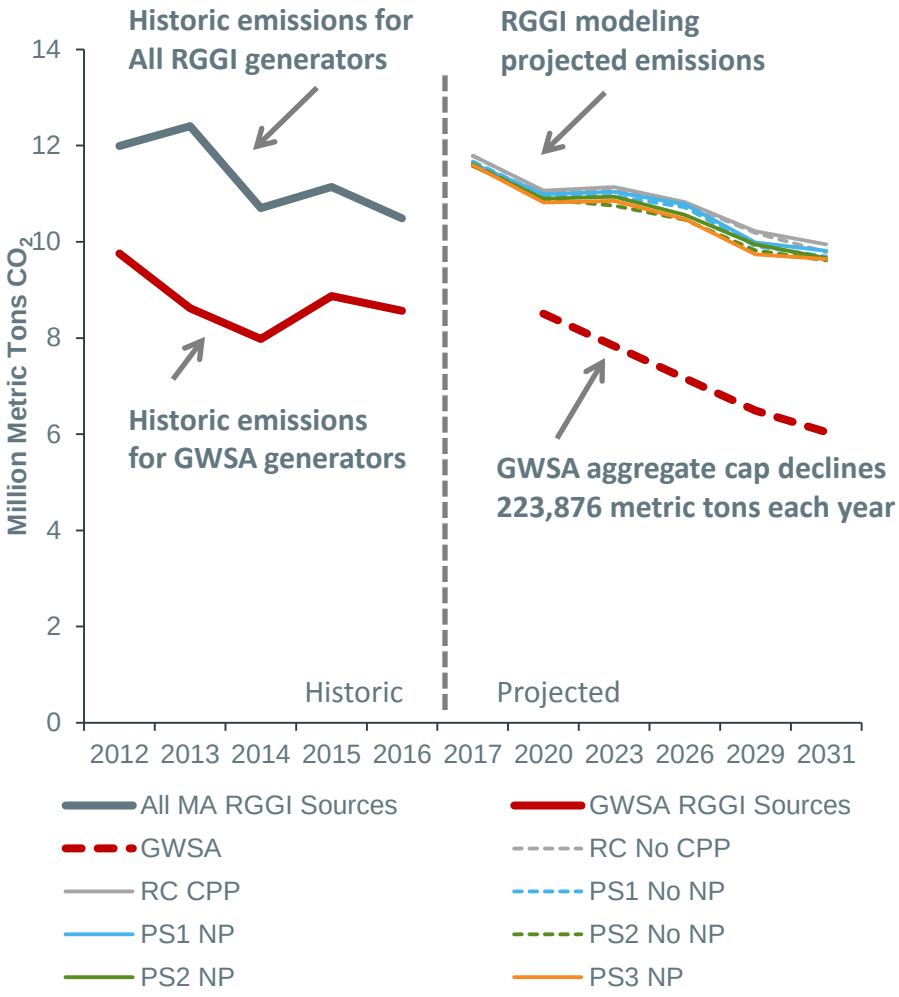
Final GWSA CO_2 Emissions Cap (2018-2030) vs. Actual Emissions (2013-2016)



Source: MA DEP

Significant Gap Emerges Over Time Between GWSA, RGGI Annual Caps in Massachusetts

- GWSA 310 CMR 7.74 emission cap is below projected Massachusetts RGGI budget modeling:
  - In 2021, GWSA cap is 21-23% below RGGI program review modeling results
  - By 2031, GWSA cap is 37-39% below RGGI program review modeling results



Source: MJ Bradley & Associates LLC

Questions