

Aligning RGGI with Reliability and the Clean Power Plan

U.S./Canada Cross-Border Summit, Building Capacity in
the Face of Mounting Environmental Constraints

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March 14, 2016

The Regulatory Assistance Project (RAP)[™]

Regional Greenhouse Gas Initiative - RGGI

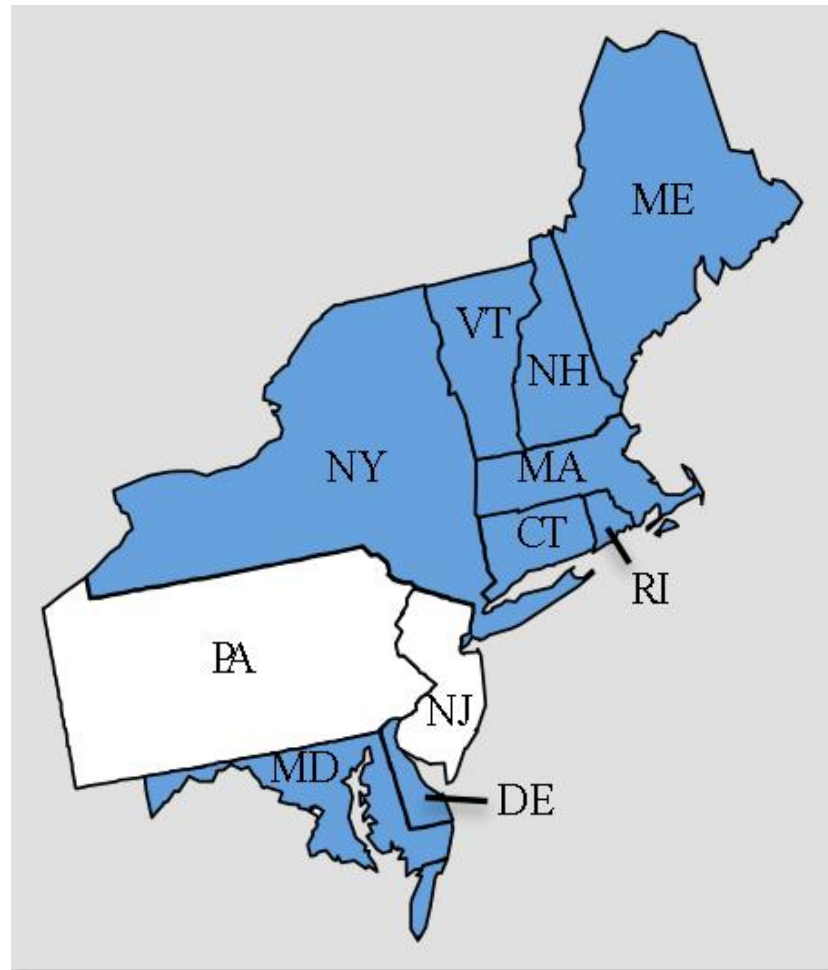


Image from CNY Energy Challenge

Regional Greenhouse Gas Initiative - RGGI

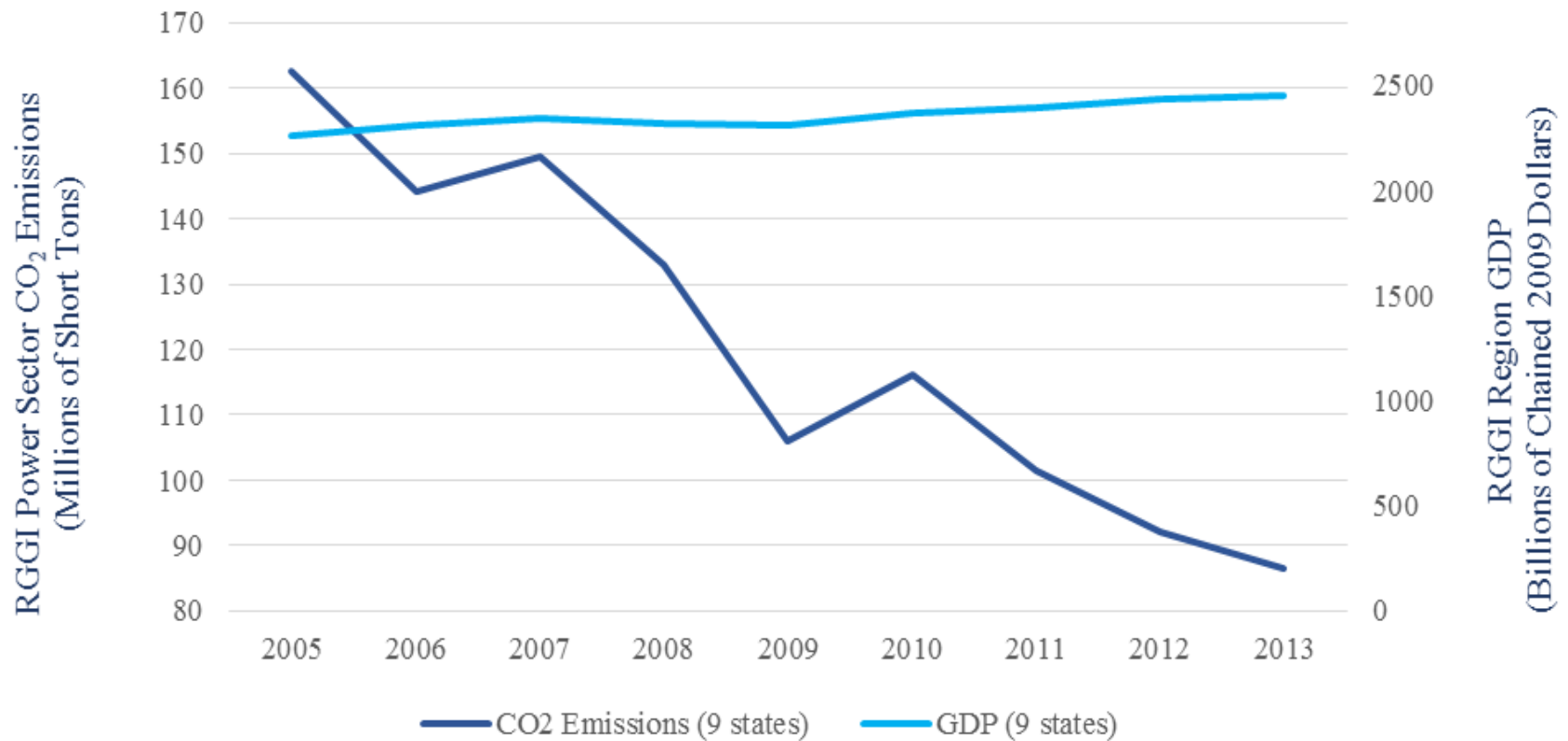
- Northeast and Mid-Atlantic states cap and reduce carbon dioxide emissions from the power sector
 - Power plants 25 MW or greater to hold one CO₂ allowance for each ton of CO₂
 - Three-year control periods starting with 2009-2011, currently in third control period (2015-2017)
 - 2015 first year of interim compliance
- CO₂ Cap: 88.7 million short tons in 2015, and declines 2.5 percent each year until 2020
 - Two interim adjustments to the cap (2014-2020) to account for banked allowances
 - 2015 RGGI adjusted cap is 66.8 million short tons
 - Cost containment reserve (CCR) of 10 million allowances

The RGGI Market-Based System

- CO₂ allowance auctions are open to all prequalified bidders
- After seven years, no evidence of anti-competitive conduct
- 31 quarterly auctions held since September 2008
- CO₂ allowance auction clearing prices have ranged from \$1.86 to \$7.50.

RGGI Experience: Pollution Reductions with Economic Growth

RGGI Power Sector Pollution Reductions



RGGI Mechanics in Brief

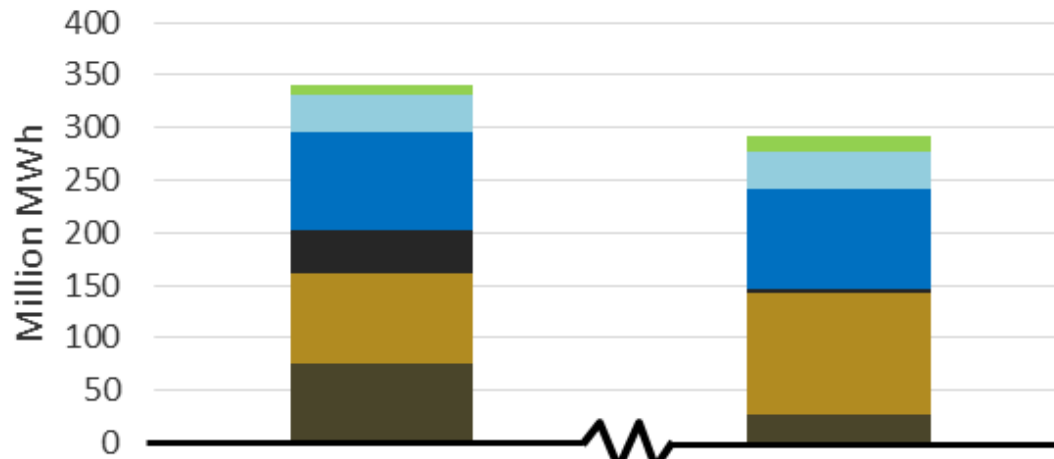
- Quarterly regional CO₂ allowance auctions
 - CO₂ allowances are issued by each state
 - Compliance occurs at the state level
 - One tradable CO₂ allowance market - CO₂ allowances are fungible across the multi-state region
 - CO₂ allowances issued by any participating state can be used for compliance in any of the participating states
- Auction proceeds invested by the states
- Centralized allowance tracking and emissions tracking platform (RGGI COATS)
 - Market monitoring of CO₂ allowance market
 - Limited use (3.3%) of offsets

RGGI 2013 Program Review

- RGGI states work with stakeholders on comprehensive program evaluations
- Last program review resulted in updates:
 - Reduction in the 2014 RGGI cap from 165 million short tons to 91 million short tons
 - Interim adjustments to the state CO₂ allowance budgets to account for banked allowances
 - Cost Containment Reserve
 - Interim compliance
- Modeling and analysis indicate that 2013 changes would:
 - Increase gross regional product, real personal income, and jobs
 - Reduce projected 2020 power sector pollution to about half of 2005 levels

RGGI Experience: Total Generation Mix

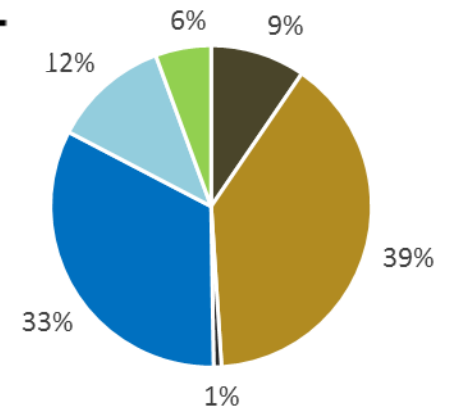
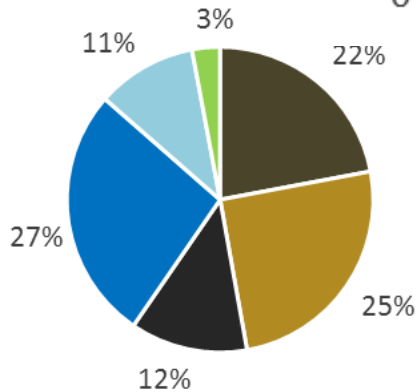
Total generation mix in RGGI states



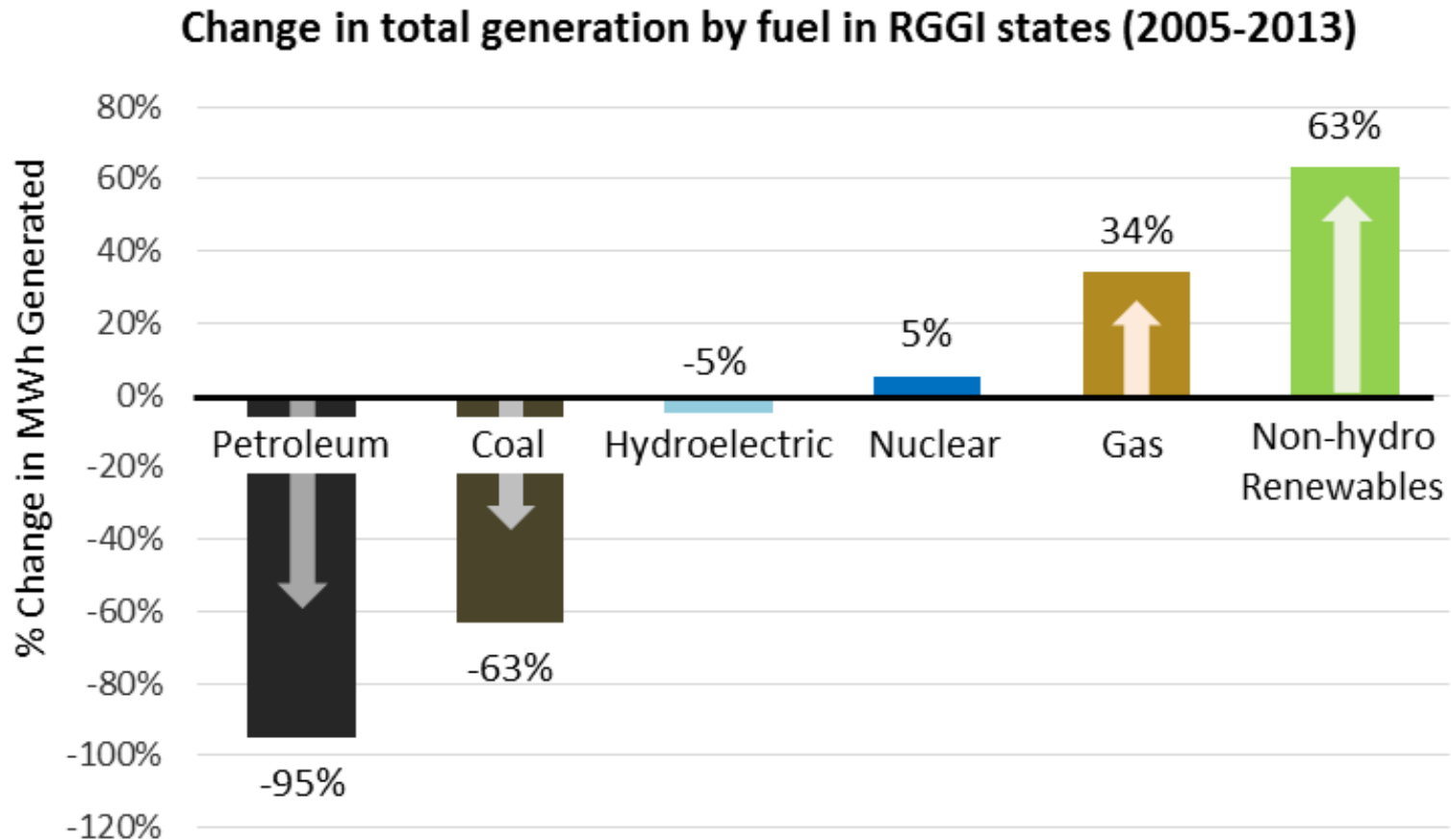
2005

2013

- Coal
- Gas
- Petroleum
- Nuclear
- Hydro
- Non-Hydro Renewable



RGGI Experience: Total Generation Change



RGGI 2016 Program Review

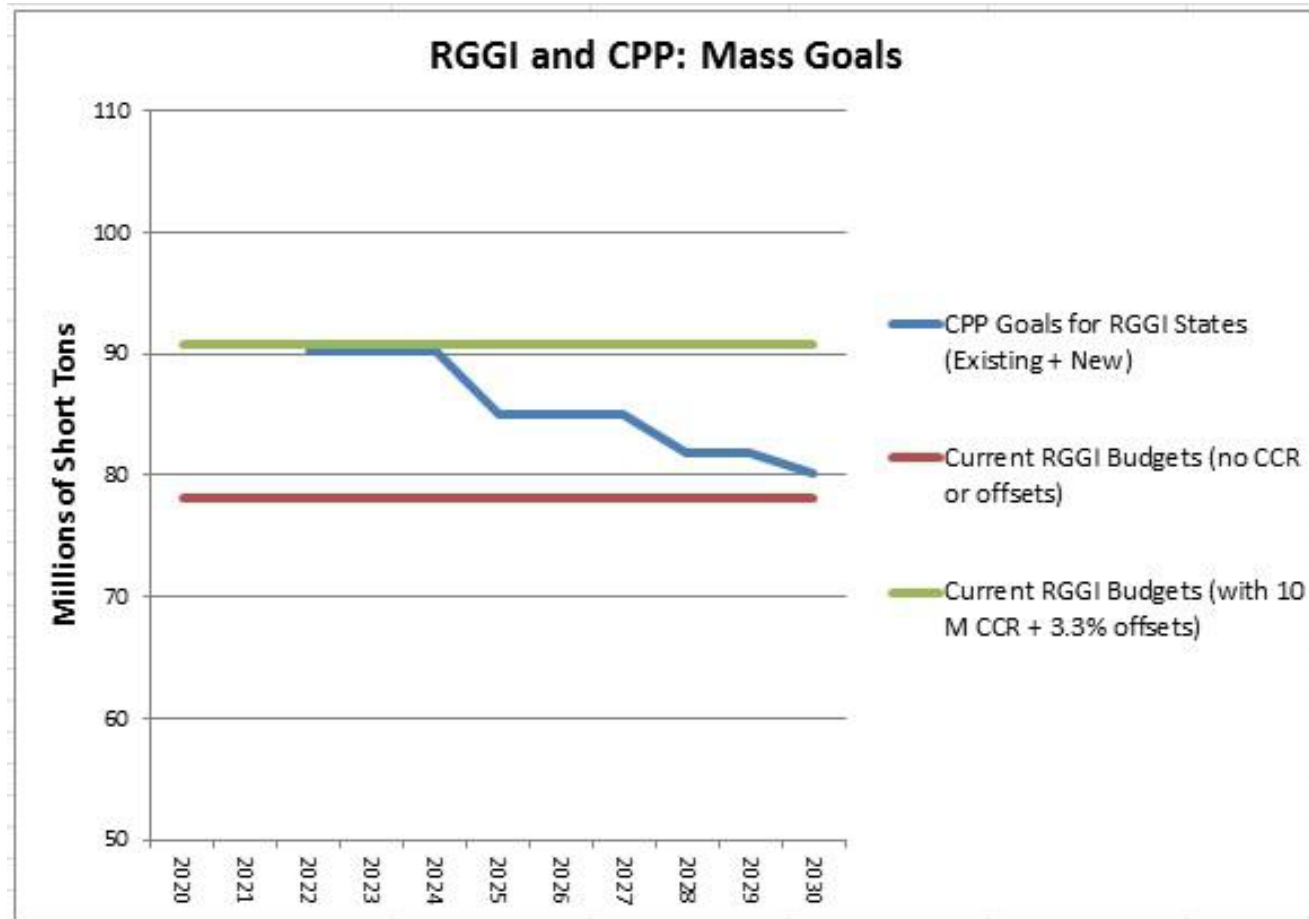
- Regular program review has been key to RGGI's success
- RGGI's 2016 program review will include meetings to gather stakeholder and expert input
 - Topics include program design and successes, the RGGI cap, program flexibility mechanisms, and other stakeholder raised considerations
 - Also discussing considerations regarding Clean Power Plan compliance
 - Public meeting Nov. 2015 in NY, stakeholding meeting Feb. 2016 in DE
- Improvements implemented in previous (2012) program review included 45% reduction in the RGGI cap, interim cap adjustments, and the creation of the Cost Containment Reserve (CCR)

Analysis of RGGI Program Design Elements

- These analyses do not reflect a preference for any
- specific policy
- The modeling will provide information to inform
- consideration of:
- CPP State Plan Options
- Cap Level and CO₂ emission reductions
- Flexibility Mechanisms, i.e. Cost Containment Reserve, Offsets, Banking, Control Periods
- Broadening Trading Markets
- Regulated Sources

Source: RGGI
2016 Program
Review, Feb. 2016

RGGI Analysis of Program Review Elements



Source: RGGI
2016 Program
Review, Feb.
2016

RGGI Program Review Reference Case Net Generation (GWh)

| RGGI | 2017 | 2020 | 2023 | 2026 | 2029 | 2031 |
|-------------------------------|---------|---------|---------|---------|---------|---------|
| Biomass | 13,452 | 16,702 | 18,443 | 19,882 | 20,907 | 21,734 |
| Coal (Without CCS) | 19,038 | 15,362 | 19,248 | 21,805 | 21,559 | 20,861 |
| Combined Cycle (Gas) | 108,457 | 122,400 | 116,777 | 116,298 | 119,165 | 119,657 |
| Combustion Turbine (Gas) | 11,378 | 6,757 | 6,369 | 6,143 | 6,250 | 6,169 |
| Nuclear | 88,840 | 64,776 | 66,636 | 65,500 | 65,749 | 56,909 |
| Oil/Gas Steam | 24,840 | 17,314 | 15,649 | 15,691 | 15,896 | 16,048 |
| New Combined Cycle (Gas) | 0 | 2,459 | 3,379 | 4,548 | 4,966 | 9,622 |
| New Combustion Turbine (Gas) | 3,109 | 2,538 | 2,159 | 1,918 | 2,514 | 2,807 |
| Other | 82 | 98 | 98 | 98 | 98 | 98 |
| Conventional Generation Total | 269,196 | 248,406 | 248,758 | 251,882 | 257,105 | 253,904 |
| Hydro | 39,853 | 39,204 | 39,258 | 39,351 | 39,244 | 39,441 |
| Solar | 777 | 842 | 842 | 842 | 842 | 842 |
| Wind | 7,617 | 8,230 | 8,230 | 8,230 | 8,230 | 8,230 |
| New Solar | 673 | 1,651 | 1,736 | 1,808 | 1,816 | 1,823 |
| New Wind | 766 | 1,723 | 2,564 | 3,408 | 4,339 | 4,954 |
| Other Renewable | 2,631 | 2,786 | 2,945 | 2,965 | 2,986 | 2,999 |
| Renewable Generation Total | 52,317 | 54,436 | 55,574 | 56,604 | 57,457 | 58,291 |
| Total | 321,514 | 302,842 | 304,332 | 308,486 | 314,562 | 312,194 |

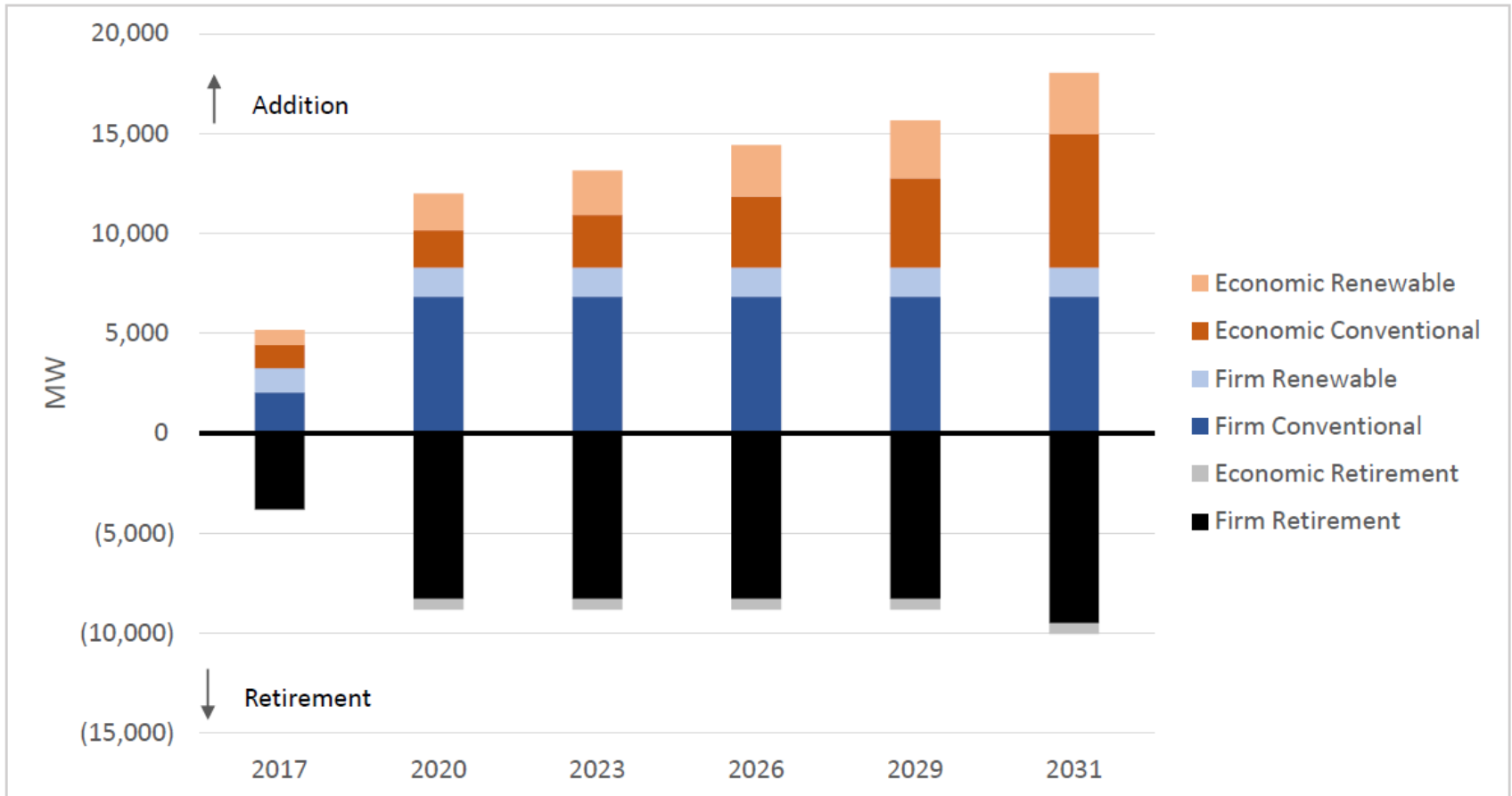
Source
RGGI
Prog.
Rev.
Feb.
2016

RGGI Emissions Reference Case

| RGGI 2016 Program Review Reference Case | | | | | | | | | |
|---|---------|---------|----------|----------|----------|----------|-----------|-----------|-----------|
| Released 2/9/2016 | | | | | | | | | |
| Prepared by ICF International | | | | | | | | | |
| Total CO2 Emissions [Million Tons] | | | | | | | | | |
| | 2017 | 2020 | 2023 | 2026 | 2029 | 2031 | 2022-2029 | 2030-2031 | 2022-2031 |
| MA | 13 | 13 | 13 | 13 | 13 | 13 | 102 | 26 | 128 |
| CT | 8 | 8 | 8 | 7 | 7 | 7 | 58 | 14 | 72 |
| ME | 2 | 2 | 2 | 2 | 2 | 2 | 14 | 4 | 18 |
| NH | 2 | 1 | 1 | 1 | 1 | 1 | 8 | 2 | 10 |
| RI | 3 | 2 | 2 | 2 | 2 | 2 | 16 | 4 | 21 |
| VT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| NY | 34 | 36 | 35 | 37 | 37 | 39 | 291 | 78 | 370 |
| DE | 3 | 2 | 2 | 3 | 3 | 2 | 19 | 5 | 24 |
| MD | 24 | 20 | 21 | 23 | 24 | 24 | 182 | 47 | 229 |
| Total RGGI | 89 | 83 | 84 | 87 | 89 | 91 | 693 | 181 | 874 |
| Total Affected Emissions | 86 | 81 | 81 | 85 | 87 | 88 | 674 | 176 | 850 |
| CCR Allowances Purchased | - | - | 2 | 7 | 9 | 10 | 46 | 20 | 66 |
| CO2 Credit Price (2012\$/Ton) | \$ 7.19 | \$ 8.04 | \$ 9.00 | \$ 9.00 | \$ 9.00 | \$ 9.60 | | | |
| CO2 Credit Price (Nominal \$/Ton) | \$ 7.99 | \$ 9.65 | \$ 11.61 | \$ 12.52 | \$ 13.42 | \$ 15.08 | | | |

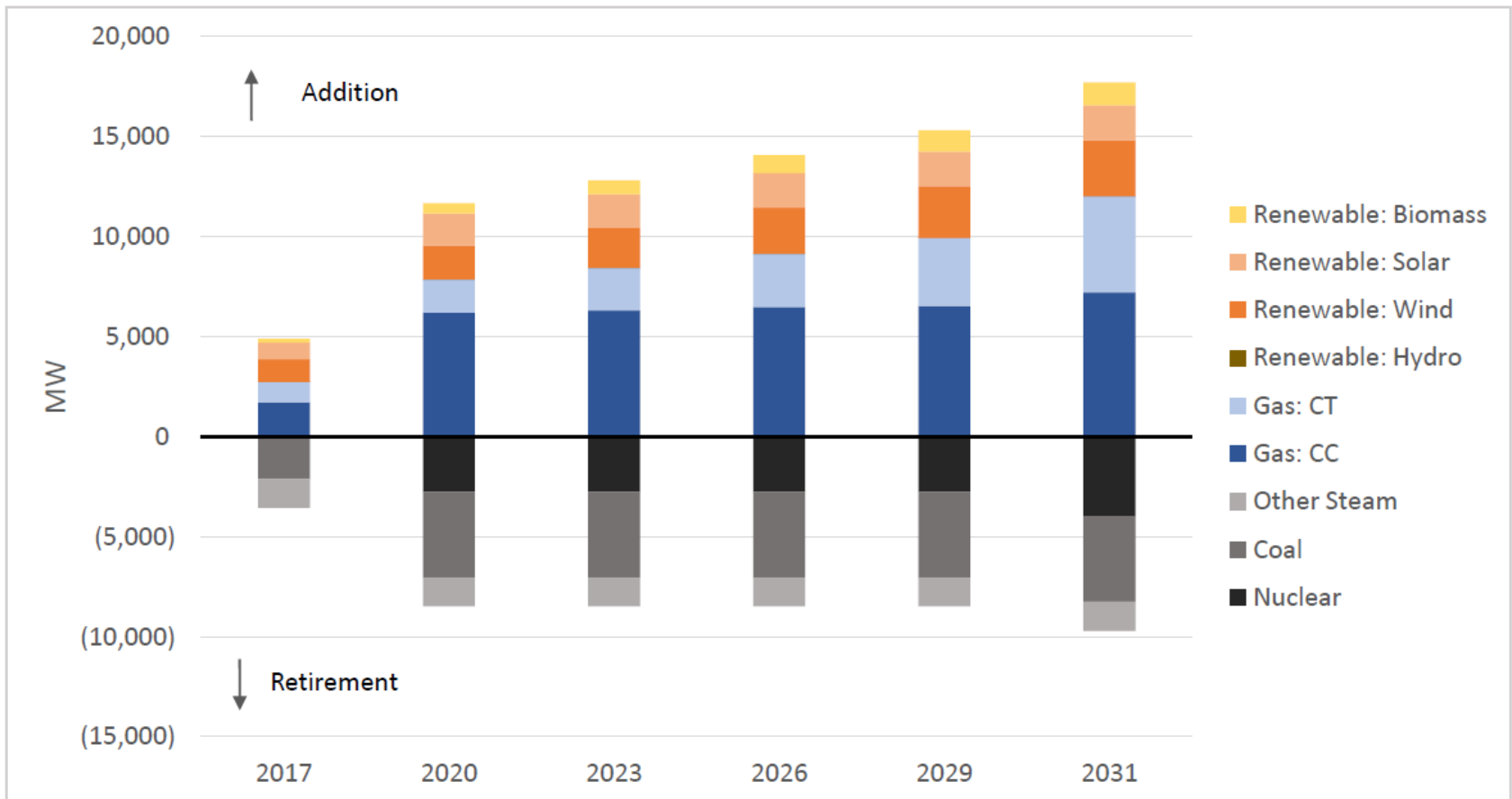
Source:
RGGI
Prog. Rev.
Feb. 2016

RGGI Projection: Cumulative Capacity Additions



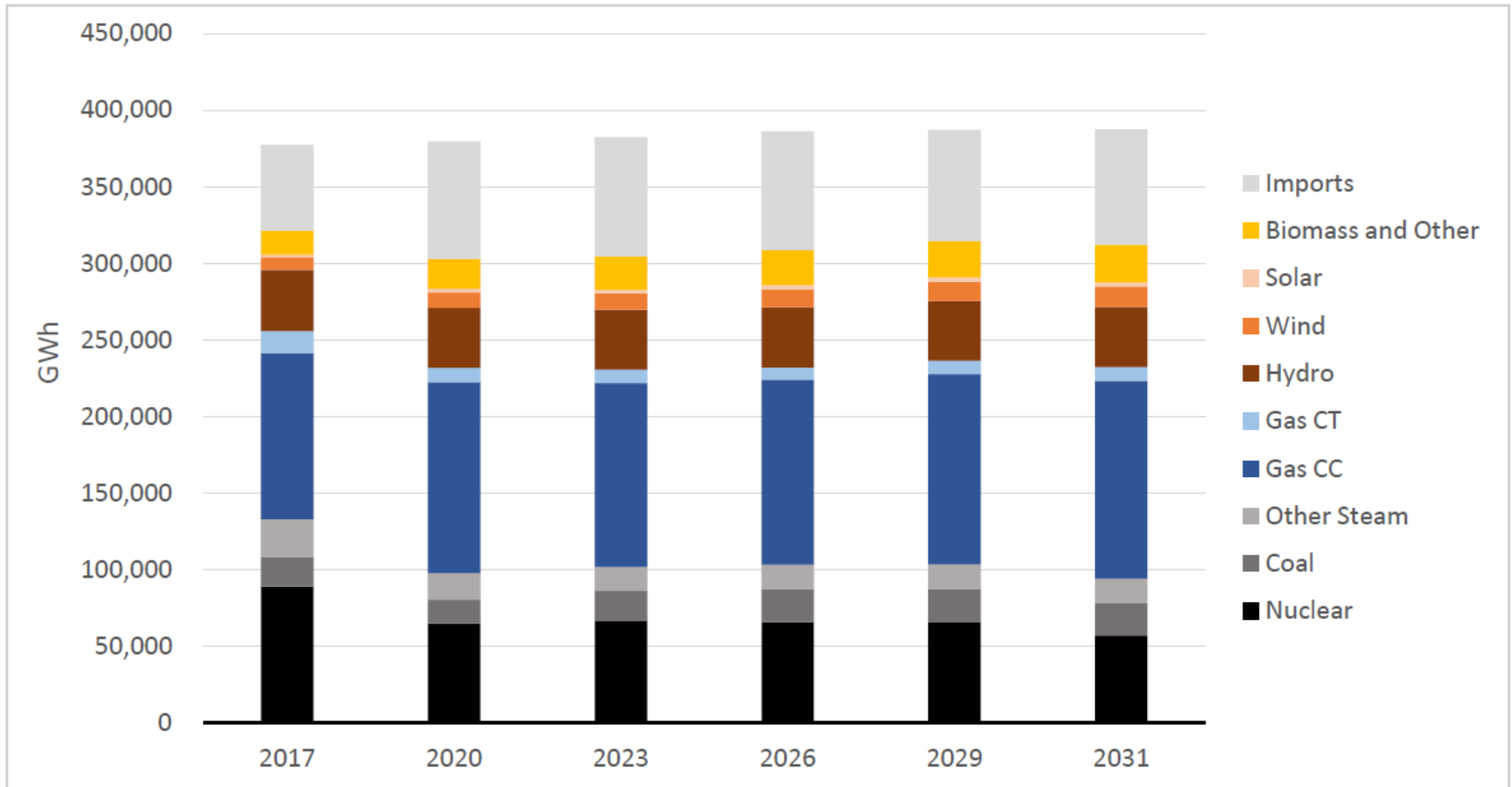
Source: Draft 2016 RGGI Program Review Reference Case Results, Feb. 2016

RGGI Projection: Cumulative Capacity Additions by Capacity Types



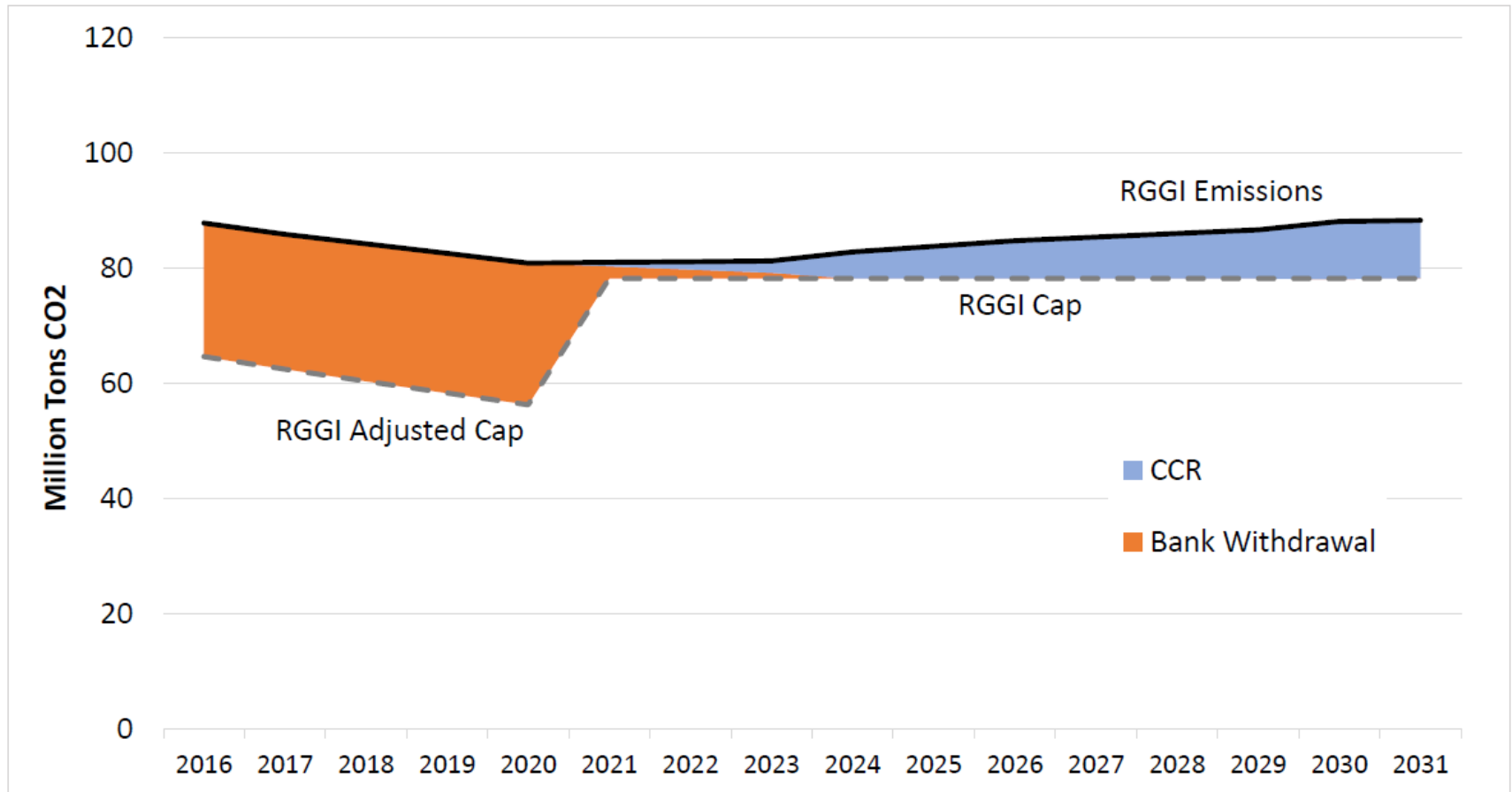
Source: Draft 2016 RGGI Program Review Reference Case Results, Feb. 2016

RGGI Generation Mix Project By Capacity Type with Imports



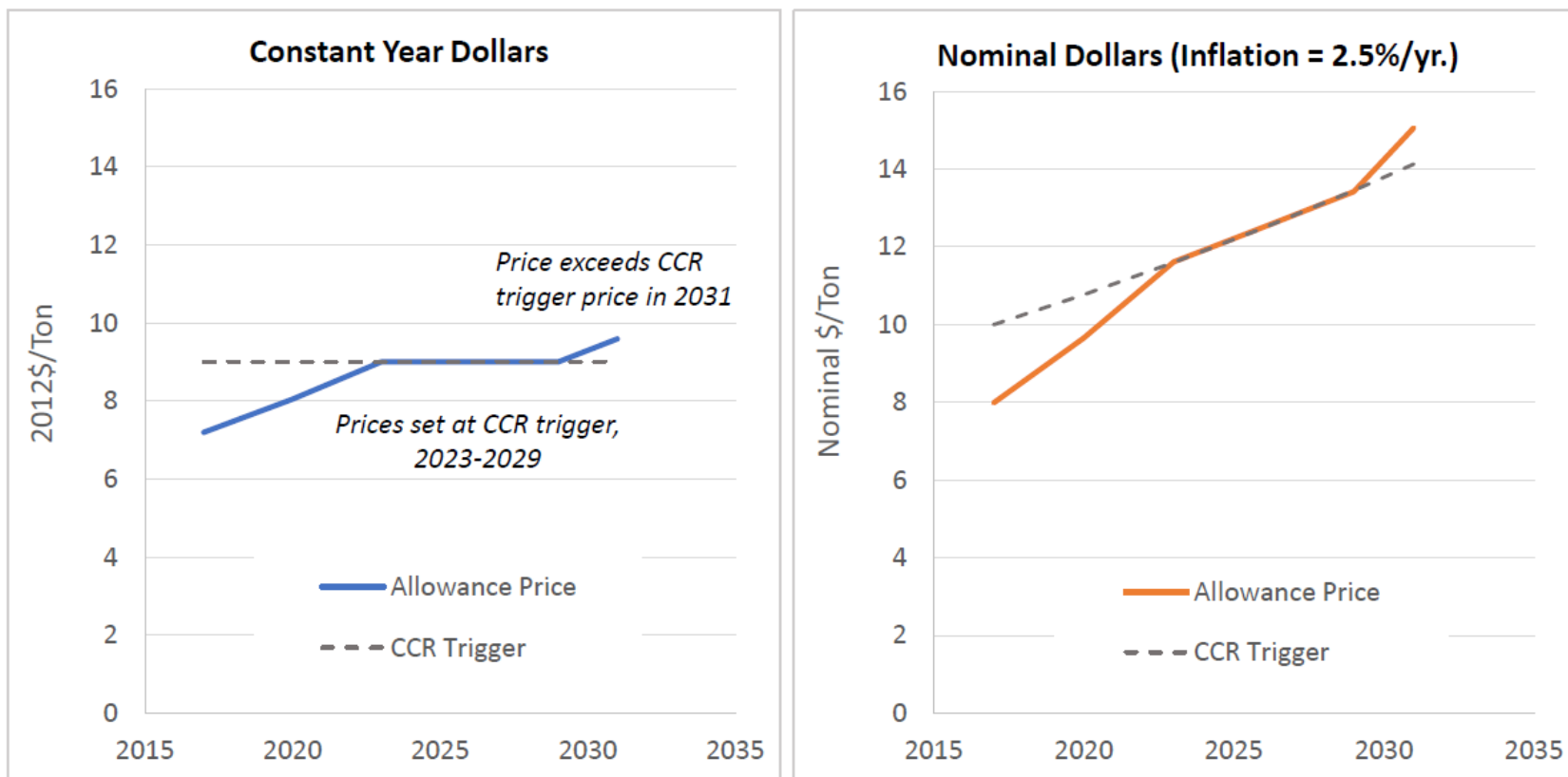
Source: Draft 2016 RGGI Program Review Reference Case Results, Feb. 2016

RGGI Projected CO2 Emissions Relative to Cap with Banked and CCR Allowances



Source: Draft 2016 RGGI Program Review Reference Case Results, Feb. 2016

RGGI Projected Allowance Price Constant 2015 \$/ton and Nominal



Source: Draft 2016 RGGI Program Review Reference Case Results, Feb. 2016

RGGI Experience: Consumer Benefits

- More than 3.7 million households and 17,800 businesses are participating in RGGI proceeds-funded programs
- RGGI proceeds invested in energy efficiency, clean and renewable energy, energy bill assistance and GHG abatement through 2013 returning \$2.9 billion in lifetime bill savings to consumers



RGGI Experience: Economic Benefits



- An independent 2015 report by the consulting firm Analysis Group found that RGGI's second three years are creating:
 - \$1.3 billion in net economic benefit
 - 14,200 additional job-years
- In addition to benefits from RGGI's first three years:
 - \$1.6 billion in net economic benefit
 - 16,000 additional job-years
- Benefits in each state – but more with higher energy efficiency investments



About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power sector. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raonline.org

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