



Clean Power Plan Assessment Final Report

Peter Carney
Project Manager Environmental Studies
ESPWG
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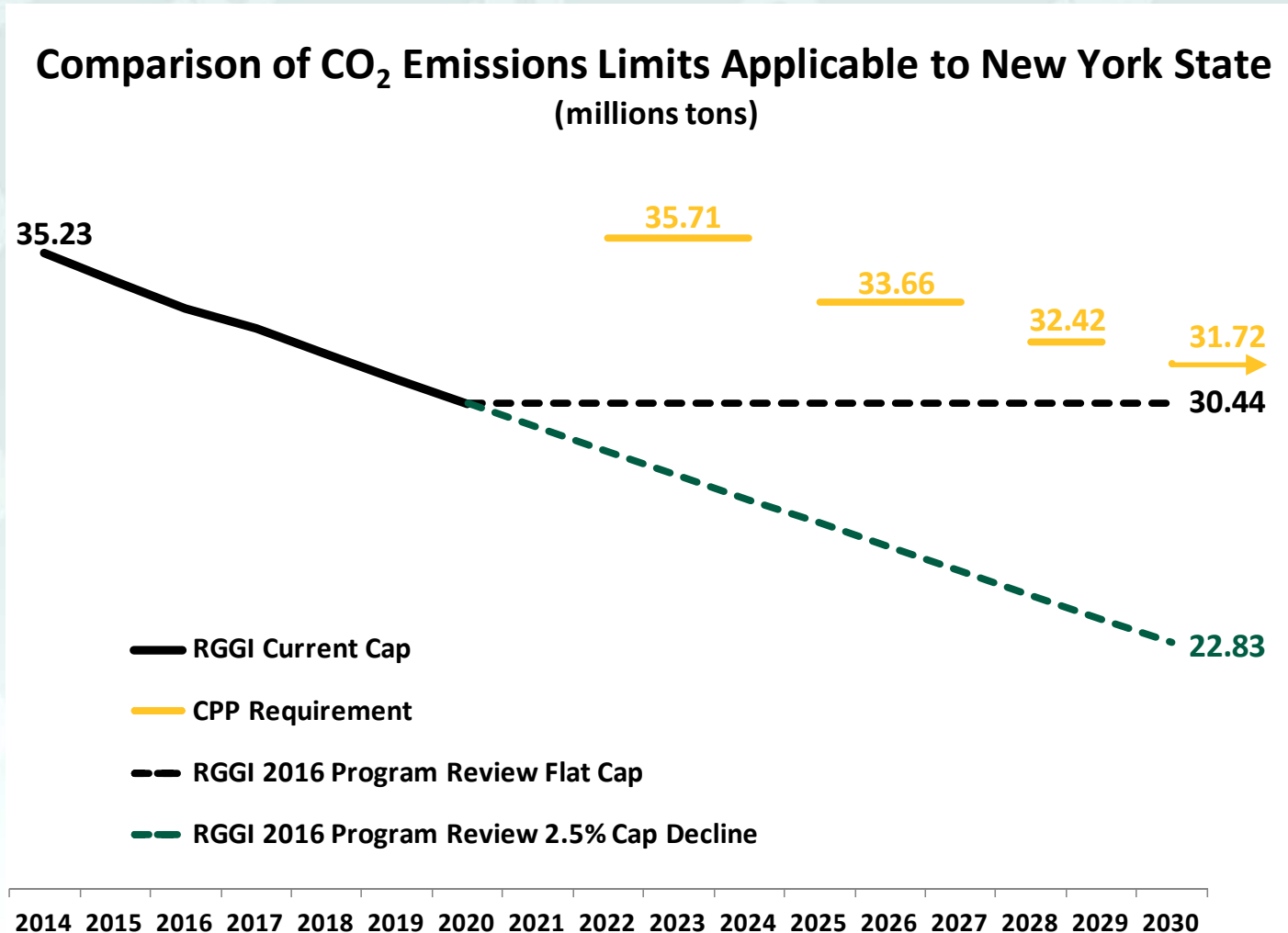
Agenda

- ◆ **Objectives**
- ◆ **RGGI**
- ◆ **Clean Power Plan**
- ◆ **Summary of Findings**
- ◆ **Assessment Approach**
- ◆ **Scenarios**
- ◆ **Detailed Study Findings**

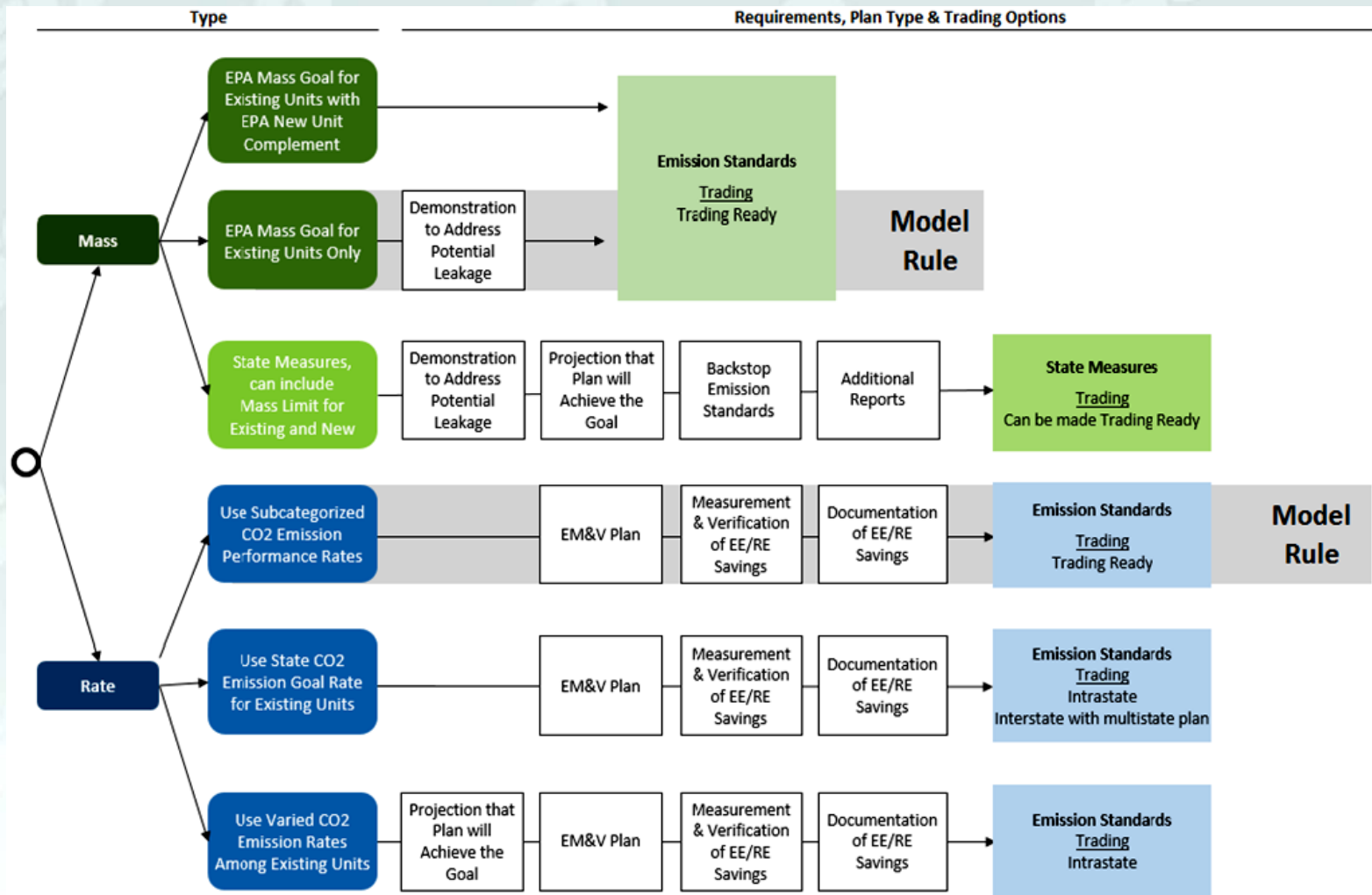
Objectives

- ◆ **Understand how potential New York compliance approaches interact with existing market rules and system reliability criteria under various scenarios for RGGI and CPP**
 - *Identify approaches that can achieve environmental goals while maintaining electric system reliability, including adequacy of capacity and energy resources*
 - *Assess the impact of various future fuel mix assumptions on environmental compliance, system reliability and the markets*
 - *Advise New York State implementation for CPP and RGGI on approaches for maintaining reliability*

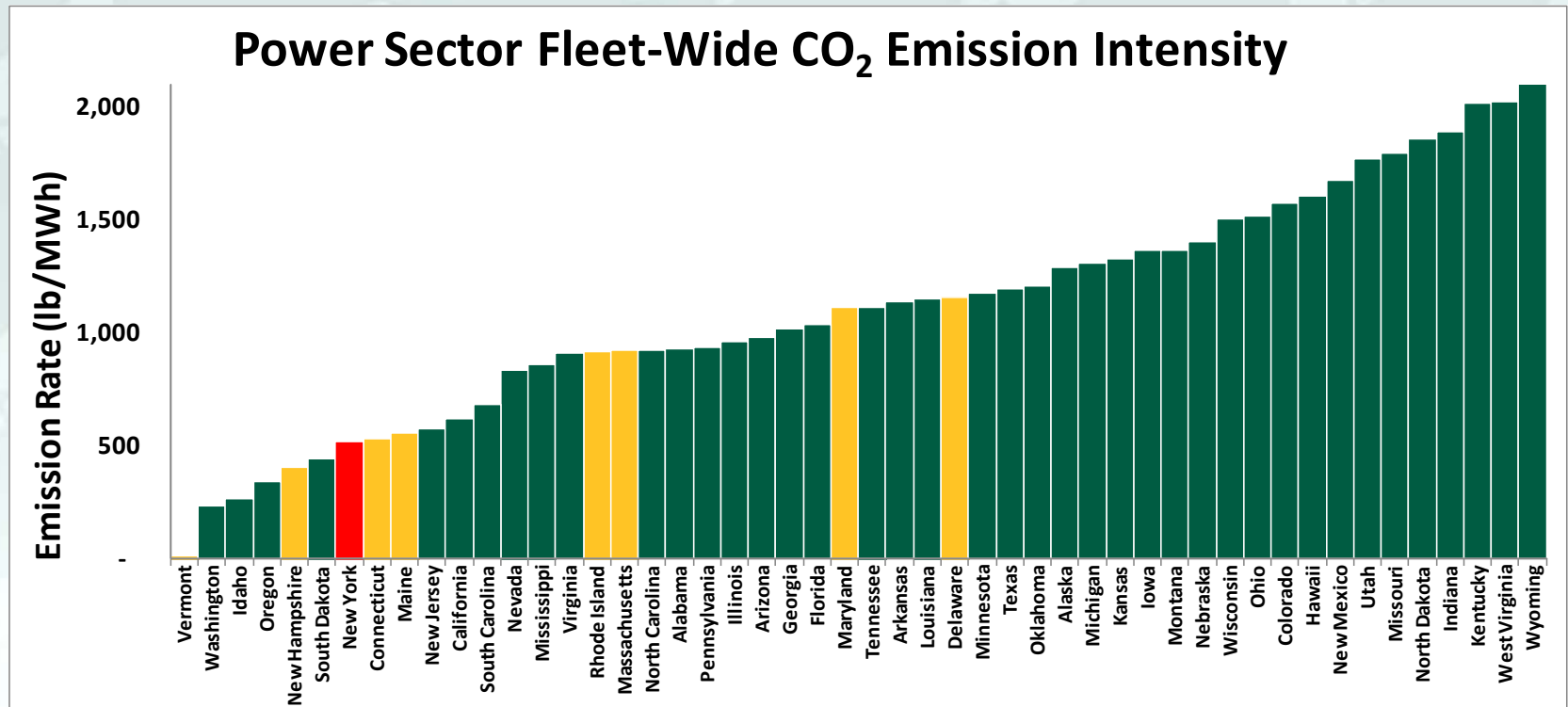
RGGI Program Review Options



State Plan Compliance Pathways



NY is already amongst the cleanest states, thus trading either allowances or emission rate credits outside of NY and outside of RGGI makes sense.

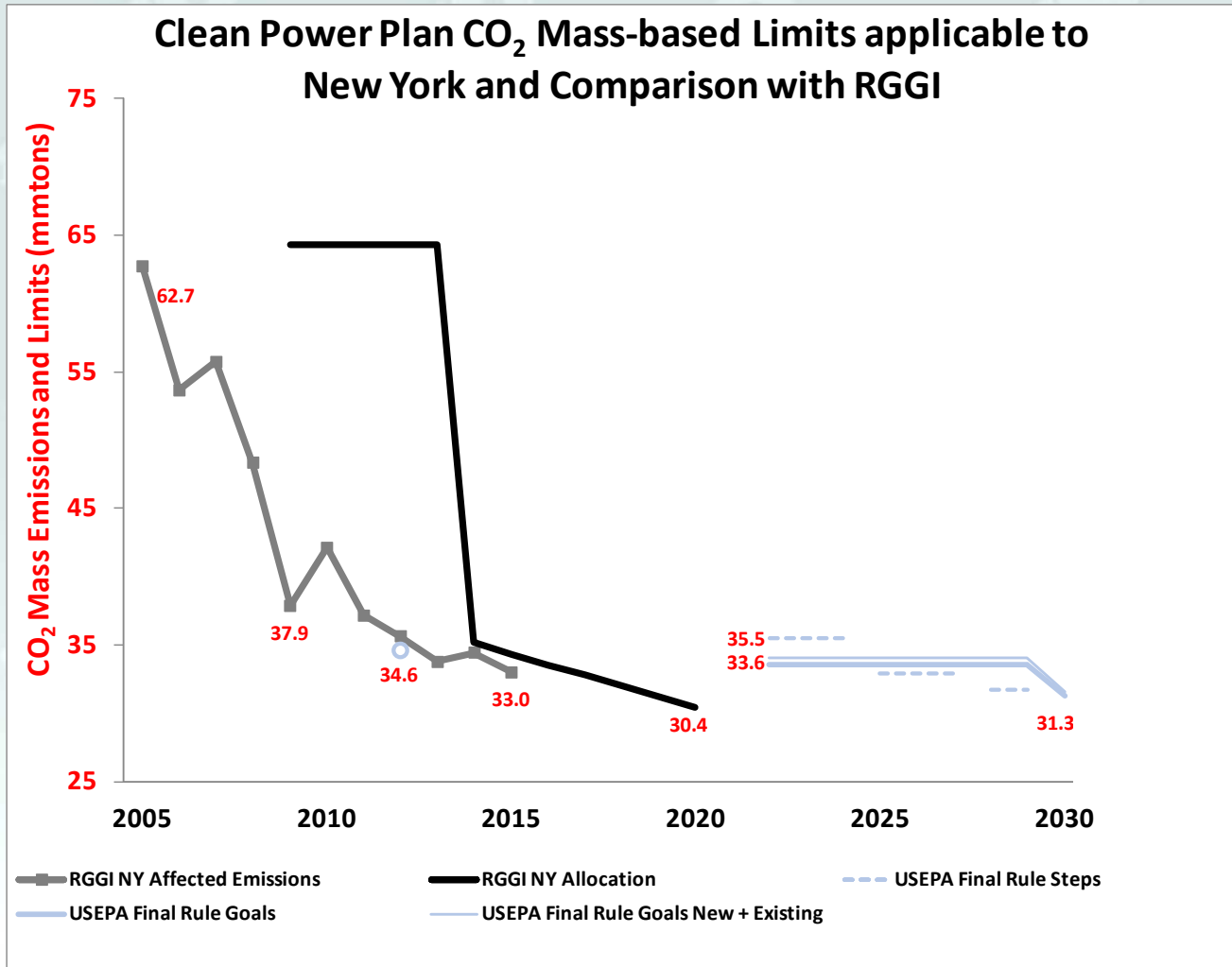


Mass and Rate

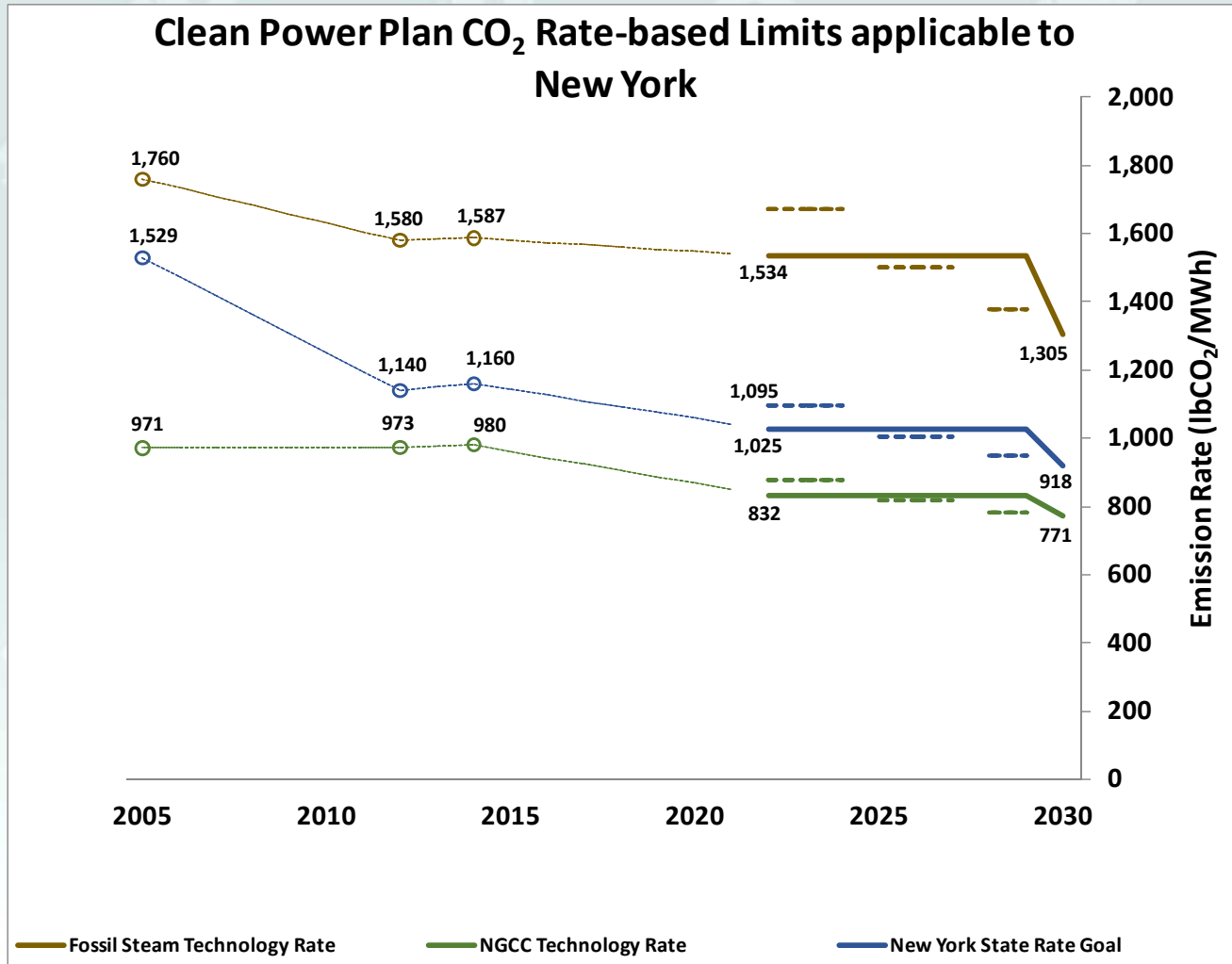
- ◆ **CPP mass pathways are similar to RGGI where CO₂ allowances are traded with other states, however, the RGGI cohort of units includes new units and gas turbines**
- ◆ **CPP rate pathways are similar to RPS programs where credit is given for generation from new renewables:**

$$Rate = \frac{Emissions (lb)}{Generation (MWh) + ERCs}$$

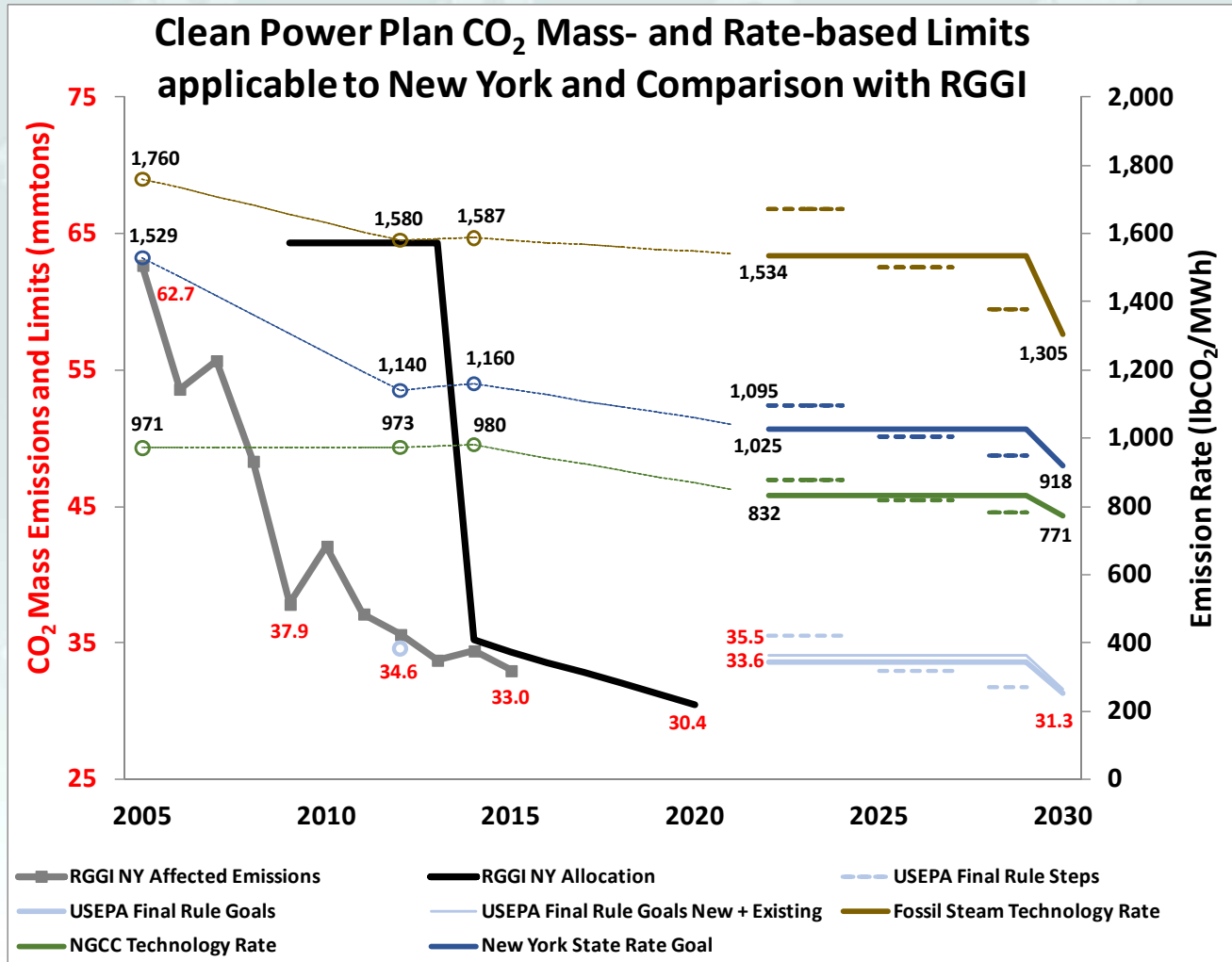
NY Emission History (Mass)



NY Emission Rate History



CPP Mass and Rate compared to RGGI



Summary of Findings

- ◆ **Various combinations of additional renewable resources and fossil fuel-fired peaking generators can provide adequate supplies of energy while meeting the emission caps or emission rates of the CPP, as well as the RGGI caps under consideration.**
 - *However, New York will need additional resources beyond those considered in this assessment to comply with the resource adequacy criterion in 2030*
- ◆ **Increasing deployment of renewable resources increases CPP compliance margin.**
- ◆ **New York's compliance will on some occasions be dependent upon an adequate supply of emission allowances or emission rate credits from other affected states.**

Assessment Approach

- ◆ **Build on existing NYISO studies**
 - *2010 Wind Study*
 - *2015 Solar Photovoltaic (“PV”) Study*
 - *2015 CARIS*
 - *2016 RNA*
- ◆ **The assessment is focused on NY with limited external changes.**
 - *Net imports are held approximate to current levels by adjustment of RGGI price and adjustments for nuclear retirements*
- ◆ **Five scenarios developed to span potential futures**
 - *Production simulations employed to satisfy energy and emission requirements*
 - *Followed by Resource Adequacy analyses to identify additional needs*
 - *Clean Energy Standard not within the scope of this study*
- ◆ **Study Years**
 - *2024 last year of first compliance period of the CPP*
 - *2030 horizon year for CPP reductions*

Scenarios

2030 Assumption	2030 Assumption				
	BAU	FlatCap	DecCap	HiRE	HiGT
RGGI CO ₂ Price (\$/ton)	24.14	36.21	60.00	36.21	40.00
Ontario CO ₂ Price (\$/ton)	48.28	48.28	48.28	48.28	48.28
Non-RGGI CO ₂ Price (\$/ton)	-	24.14	24.14	24.14	24.14
Wind (MW)	1,820	1,820	8,049	8,192	4,619
PV (MW)	2,538	2,538	3,538	3,538	3,288
Replacement GT (MW)	-	-	-	1,400	2,500
RGGI Wide CO ₂ Target (mmtons)	78.18	78.18	58.63	78.18	78.18

BAU: Business As Usual

FlatCap: National CO₂ Program

DecCap: RGGI Cap decreased annual 2.5% of 2020 Cap

HiRE: New generation predominately renewables

HiGT: New generation predominately GTs

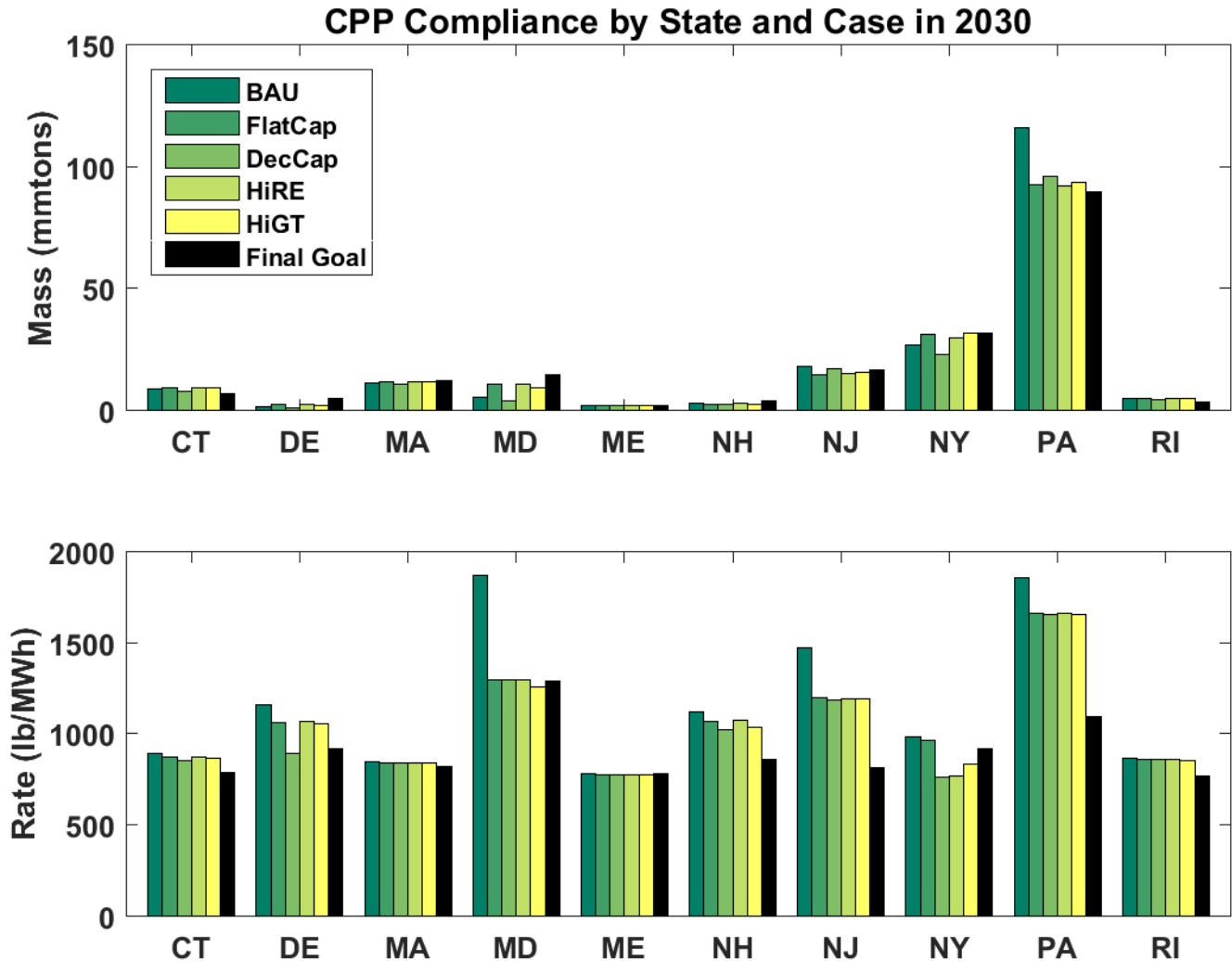
Results: Emissions

Environmental Program Metrics	BAU	FlatCap	DecCap	HiRE	HiGT
NY CPP CO ₂ (mmtons)	26.89	31.18	23.03	29.88	31.66
NY CPP Rate (lbCO ₂ /MWh)	986	964	764	770	837
NY RGGI CO ₂ (mmtons)	27.21	31.54	23.29	30.26	32.14

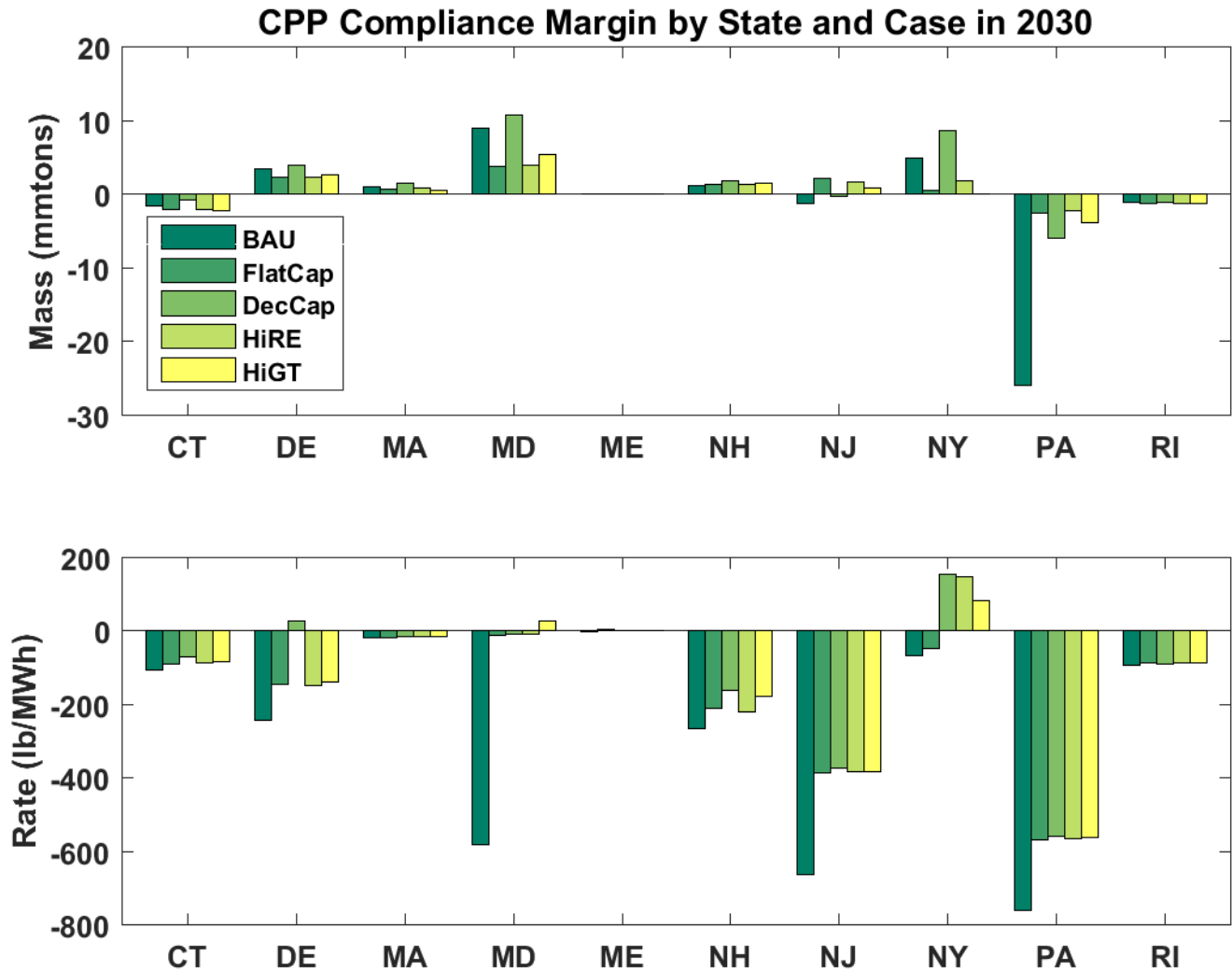
Environmental Program Margins	BAU	FlatCap	DecCap	HiRE	HiGT
NY CPP CO ₂ (mmtons)	4.83	0.54	8.69	1.84	0.06
NY CPP Rate (#CO ₂ /MWh)	-68	-46	154	148	82
NY RGGI CO ₂ (mmtons)	3.22	-1.11	-0.47	0.18	-1.70

Environmental Program Margins	BAU	FlatCap	DecCap	HiRE	HiGT
NY CPP CO ₂ (mmtons)	15%	2%	27%	6%	0.2%
NY CPP Rate (#CO ₂ /MWh)	-7%	-5%	17%	16%	9%
NY RGGI CO ₂ (mmtons)	11%	-4%	-2%	1%	-6%

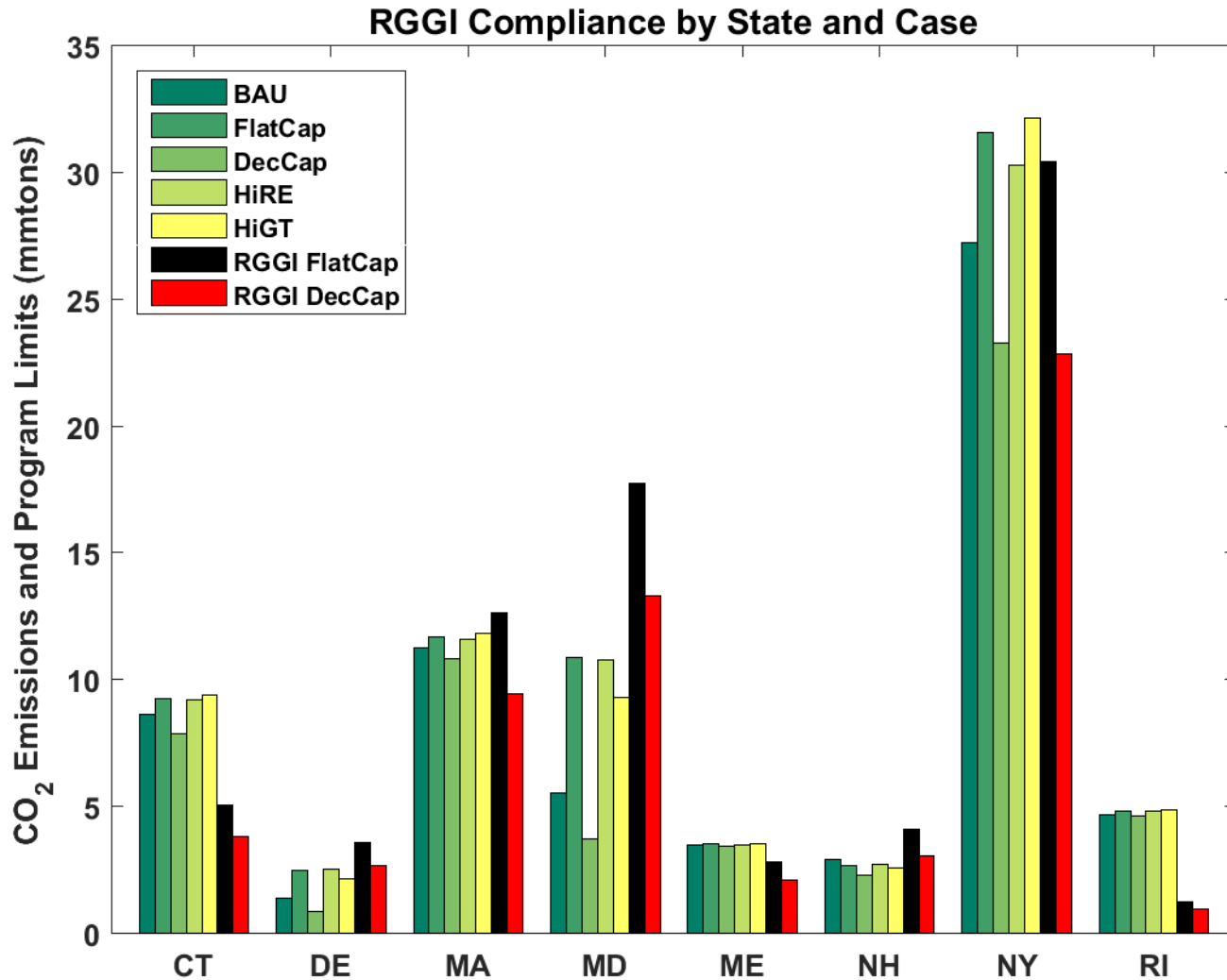
Results: CPP Rate and Mass



Results: CPP Margins



Results: RGGI

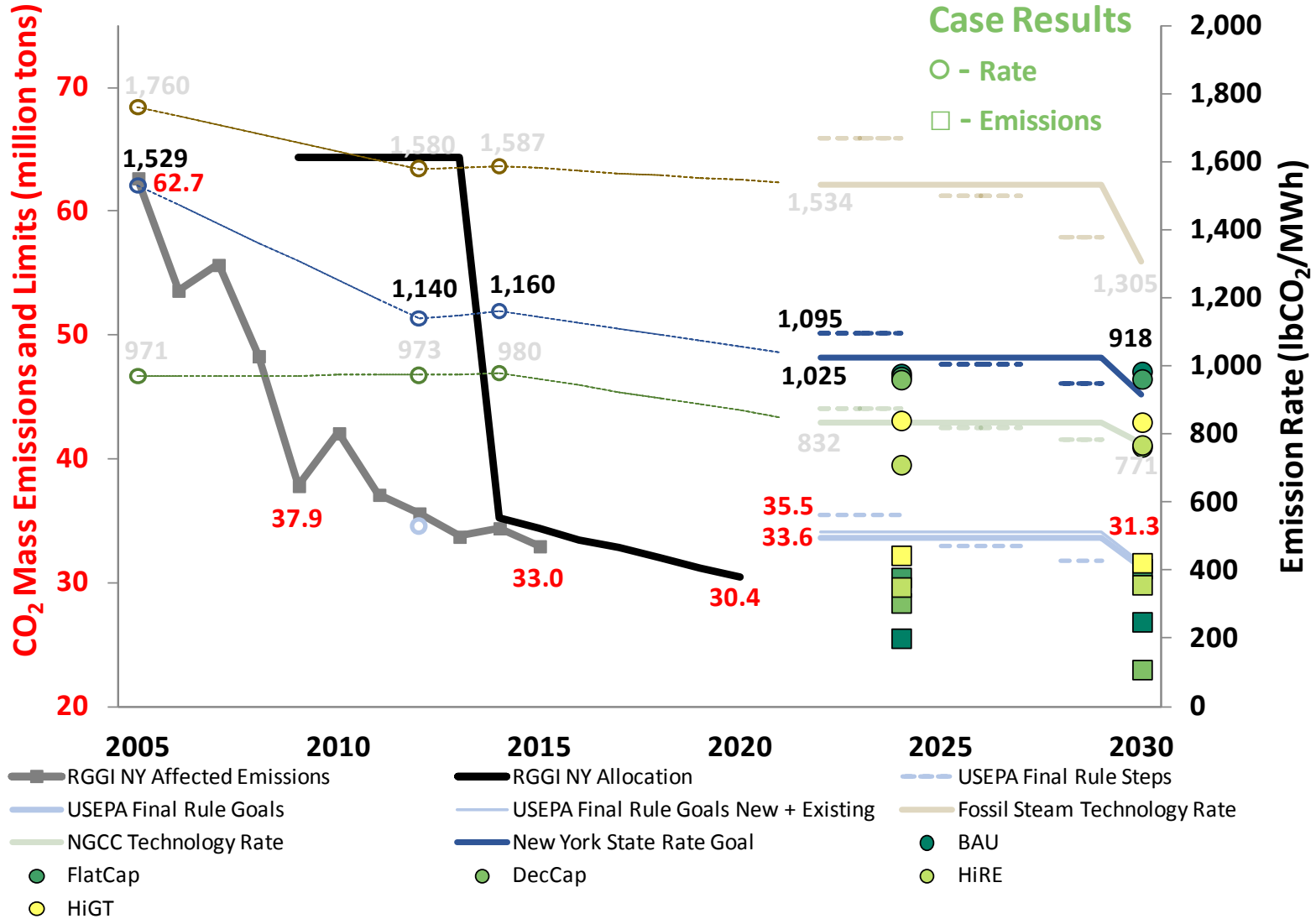


Resource Adequacy Findings

- ◆ Resource Adequacy is the ability to deliver capacity when and where it is needed to meet system peak load in summer or winter.
- ◆ Resource Adequacy Criterion: The bulk power system shall be designed such that there will be no more than one unplanned loss of load event in ten years.
 - *This analysis takes full account of the probabilities that resources or transmission facilities may not always be available.*
- ◆ This study finds that sufficient replacement energy can be provided from the combinations of renewable resources and fossil fuel-fired peaking units in this study.
 - *The findings in this assessment should not be confused with a full retirement reliability impact evaluation conducted per the NYISO tariff for any specific unit that may cease operations.*

"The Chart"

Clean Power Plan CO₂ Mass and Rate Limits applicable to New York and Comparison with RGGI



The mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefit to consumers by:

- *Maintaining and enhancing regional reliability*
- *Operating open, fair and competitive wholesale electricity markets*
- *Planning the power system for the future*
- *Providing factual information to policy makers, stakeholders and investors in the power system*

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