NYISO CPP Study Plan

Phase I Status Report and Preliminary Findings

Peter Carney
Electric System Planning Working Group
July 5, 2016

DRAFT – FOR DISCUSSION PURPOSES ONLY

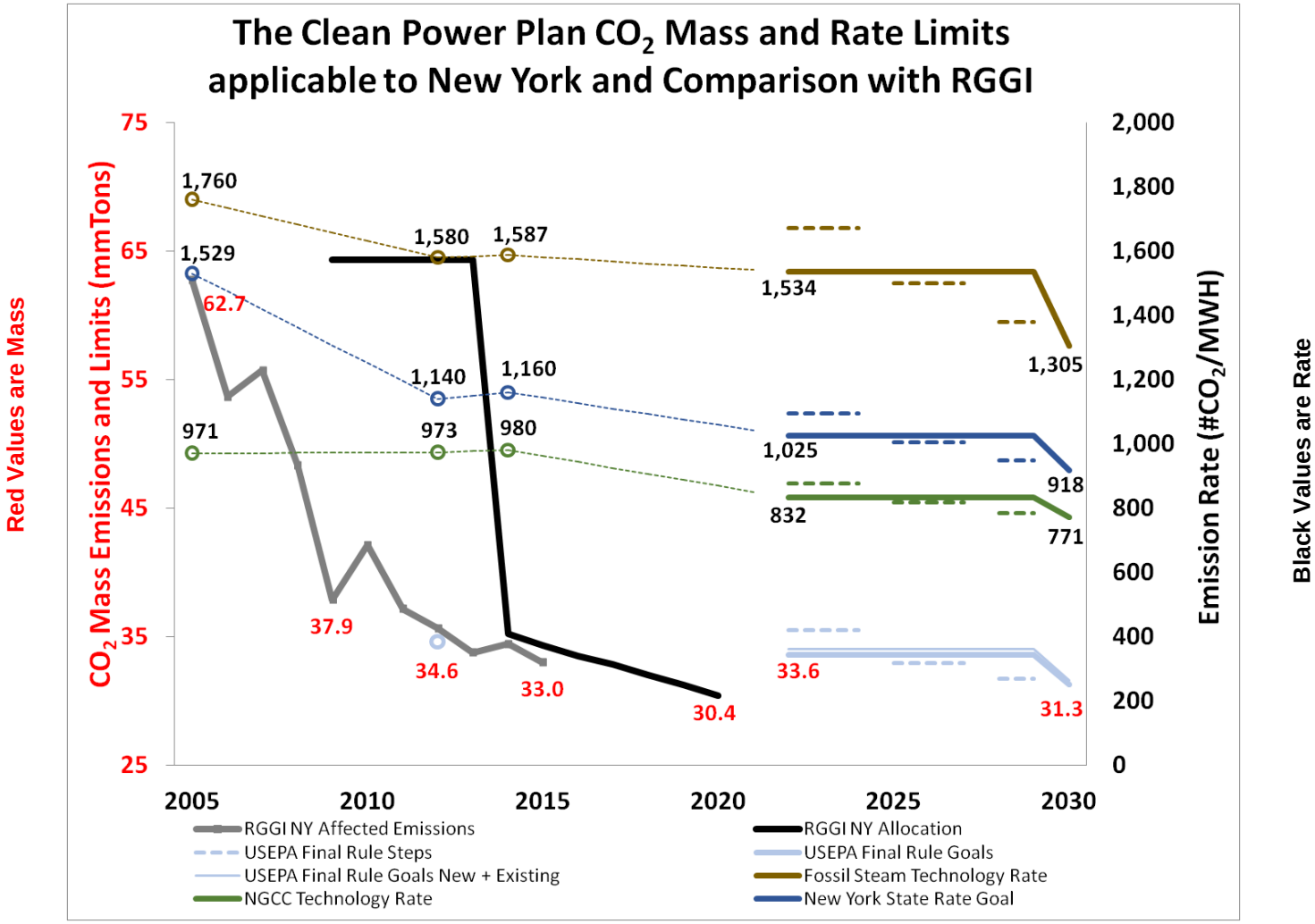
Study Plan

- Deliverables
- CPP and RGGI Limits
- Preliminary Findings
- Scenarios and Metrics
- Essential Reliability Services (ERS)
- Phase II Scope and Schedule

Key Deliverables

- **Phase I**
  - ***Estimates of renewable resources necessary to comply with RGGI, CPP, and CSAPR in 2024***
  - ***Identification of generation operational limits and possible requirement for new market products***
  - ***Potential changes in production metrics for 2024***
  - ***Estimates of allowances levels or Emission Rate Credits necessary to achieve compliance***
- **Phase II**
  - ***Review of NY Initial Submittal of CPP***
  - ***Same analyses as Phase I with additional 2030 scenarios, resource adequacy analysis, and stability analysis***

CPP and RGGI Limits



Operational Limits

Variable	Description	Symbol (Units)
Gold Book Data		Various
Inertia		H (MW-sec/MVA)
MVA Rating		Mbase (MVA)
Leading/Lagging MW and MVAR		
GSU		
Gen Term Volt		
Black Start (BS) Validation	Unit BS capability	
Min Run Time		(hours)
Min Down Time		(hours)
Max Stops/Day		(# stops/day)
Min Gen		MG (MW)
Emergency Response Rate		EmRR(MW/min)
Response Rate Curve		RR(MW/min)
Reg Mvmt Response Rate		RMRR(MW/6Sec)
EPA AMPD Annual and OS Data		Various
Permitted Limits	EGU environmental limits	Various

Scenarios Studied

Assumption	BAU	Flat Cap	Dec Cap	HiRE	HiGT
Ginna and FitzPatrick	In	Out	Out	Out	Out
Indian Point	In	In	In	Out	Out
CPV	In	In	In	In	In
RGGI CO_2 Price ($/ton)	18.48	27.74	36.96	27.74	27.74
Ontario CO_2 Price ($/ton)	36.96	36.96	36.96	36.96	36.96
NonRGGI CO_2 Price ($/ton)	-	18.48	18.48	18.48	18.48
Wind (MW)	1,820	1,820	1,820	8,000	4,250
PV (MW)	2,538	2,538	2,538	3,538	3,288
GT Replacement (MW)				1,400	2,500
RGGI Wide CO_2 Target (mmtons)	78.18	78.18	70.65	78.18	78.18

Case Descriptions

- **BAU:** Ginna and Fitzpatrick nuclear units in-service. CO2 allowance price is zero for non-RGGI states; RGGI CO2 Cap is kept flat post-2020 at 78.175 million ton for 2024 and 2030.
- **Flat Cap:** Ginna and Fitzpatrick nuclear units retired before 2024; CPP is a constraining factor in the design of this scenario for non-RGGI states in the remaining scenarios; RGGI CO2 Cap is kept flat post-2020 at 78.175 million ton for 2024 and 2030.
- **Declining Cap (DecCap):** Ginna and Fitzpatrick nuclear units retired before 2024; CPP is a constraining factor in non-RGGI states; RGGI CO2 emissions are capped by a 2.5% annual reduction post-2020, i.e. 70.646 million tons for 2024 and 60.690 million tons for 2030.
- **High Renewable Energy (HiRE):** Ginna, Fitzpatrick, and Indian Point nuclear units retired before 2024; CPP is a constraining factor in non-RGGI states; RGGI CO2 emissions are kept flat post-2020 at 78.175 million ton for 2024 and 2030; Indian Point capacity and energy are replaced by 1,400 MW Gas Turbine units at Indian Point plant location, 6,791 MW of wind generators in upstate New York as identified in the NYISO Wind Study, and 1,400 MW offshore wind off Long Island, 1,000 MW solar PV distributed to all zones in New York. The combinations of resources have been selected to approximately provide equivalent replacement capacity and energy in this scenario, as well as the High Gas Turbine scenario.
- **High Gas Turbine (HiGT):** Ginna, Fitzpatrick, and Indian Point nuclear units retired before 2024; CPP is a constraining factor in non-RGGI states; RGGI CO2 emissions are kept flat post-2020 at 78.175 million ton for 2024 and 2030; Indian Point capacity and energy are replaced by 2,500 MW Gas Turbine units at Indian Point plant location, 4,250 MWs of wind generators in upstate New York as identified in the NYISO Wind study, and 750 MW solar PV distributed to all zones in New York.

Preliminary Findings

- **Under the assumptions and conditions studied for 2024:**
  - ***Compliance with the CPP Initial Period can be achieved within either a mass-based or rate-based State Plan***
  - ***Compliance with the RGGI Flat Cap, Dec RGGI cap, and CSAPR OS NOx Phase 2 limits will depend upon a supply of surplus allowances from outside NY***
  - ***Simulated changes in Essential Reliability Services are within the order of magnitude currently necessary to respond to planned contingencies***
  - ***Compliance and resource mix changes, while achievable as modeled, come with a significant increase in costs:***
    - **Simulated Production Cost increases: 14%–22%**
    - **Simulated Load Weighted LMP increases: 15%–20%**
  - ***The assumed levels of renewable generation for 2024 are an estimate of just two possible mixes of renewables that might be necessary to replace retired nuclear capacity and may not necessarily represent a likely scenario.***

Scenarios and Metrics

Assumption	BAU	Flat Cap	Dec Cap	HiRE	HiGT
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Indian Point	In	In	In	Out	Out
CPV	In	In	In	In	In
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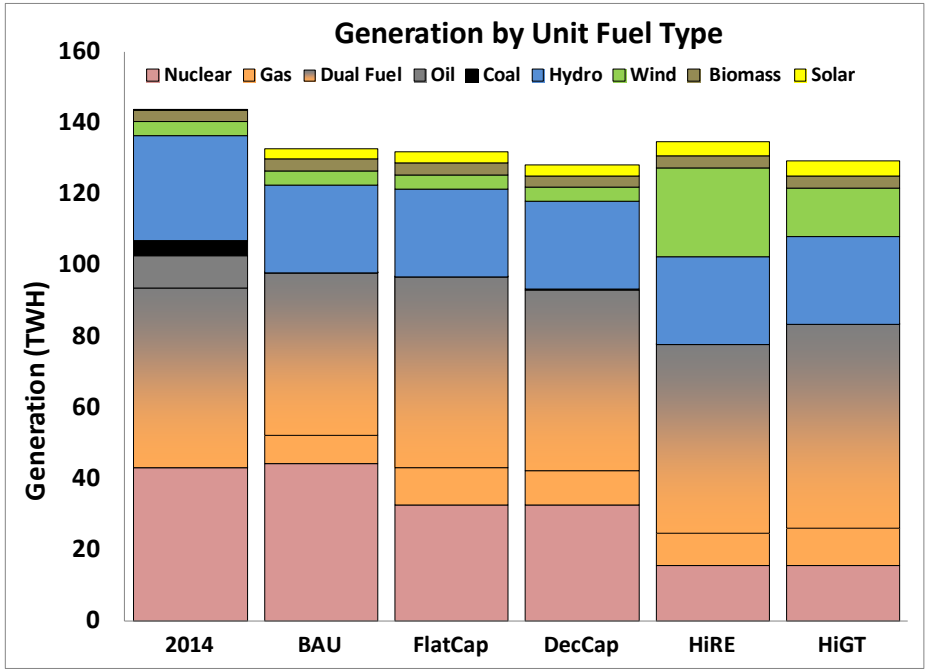
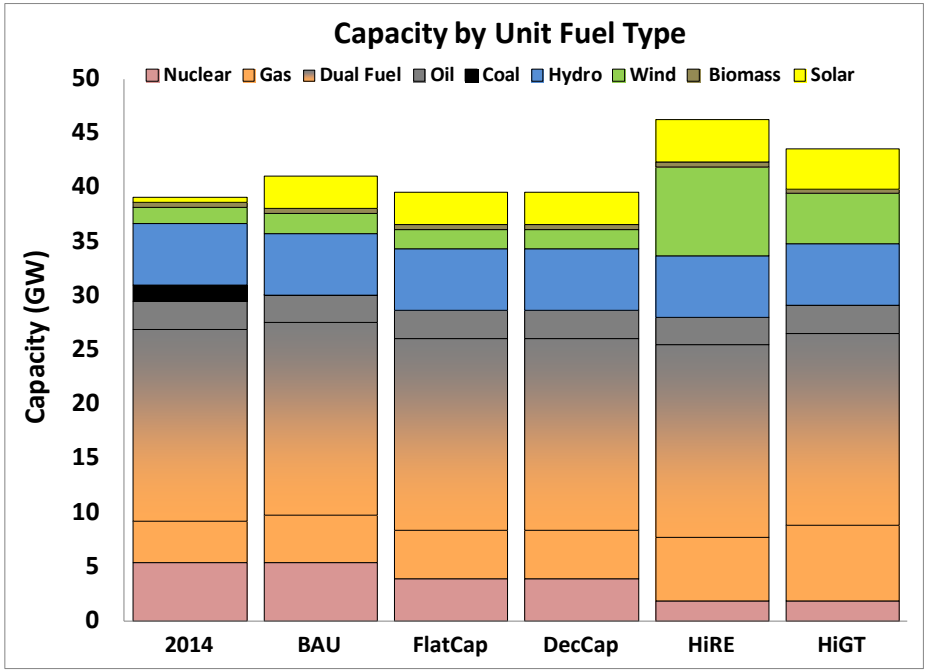
Metrics	BAU	Flat Cap	Dec Cap	HiRE	HiGT	Program Limit 1	Program Limit 2
NY CPP CO2 (mmtons)	25.56	30.74	28.41	29.70	32.26	35.49	35.71
NY CPP EGU Rate (#CO2/MWH)	1,049	1,026	1,021	1,028	1,025	1,095	
NY CPP EGU Rate w/ RE ERCs (#CO2/MWH)	980	971	962	712	842	1,095	
NY RGGI (mmtons)	25.89	31.11	28.77	30.01	32.62	30.44	27.50
NY CSAPR OS NOx (tons)	4,538	5,661	4,907	5,487	6,059	4,361	5,277
Generation (GWH)	131,791	130,803	127,170	133,747	128,246		
Total Net Imports (GWH)	27,225	25,729	30,003	21,955	26,911		
ProductionCost (mm$)	3,845	4,646	4,681	4,397	4,752		
Generation Payment (mm$)	6,613	7,640	7,801	7,344	7,451		
Load Payment (mm$)	8,513	9,762	10,244	9,471	9,845		
Load Weighted LMP ($/MWH)	51.02	58.73	61.61	57.21	59.58		

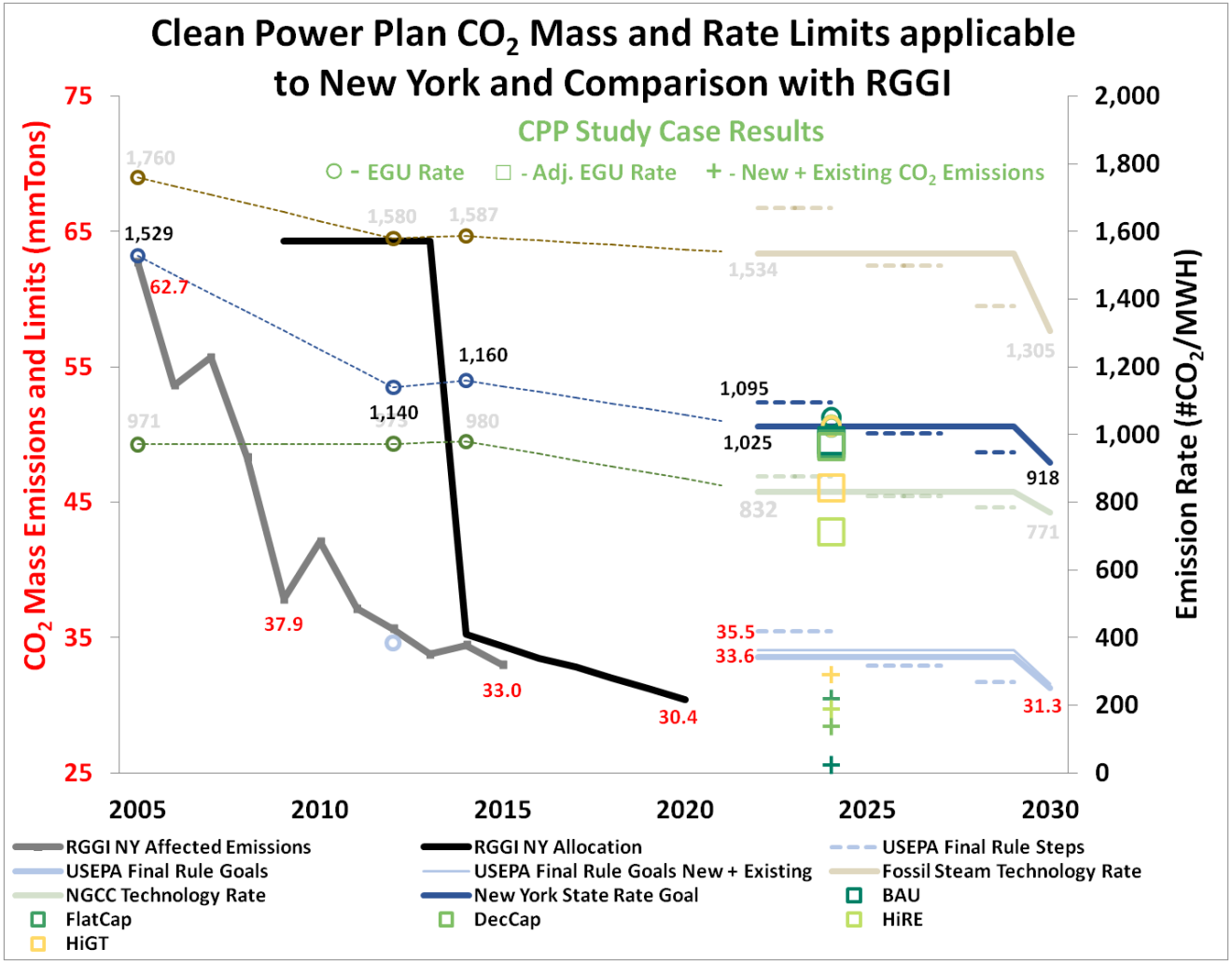
	Program Limit 1	Program Limit 2
NY CPP CO2	2024 Existing Only	2024 New+Existing
NY CPP EGU Rate	2024 State Rate Goal	
NY CPP EGU Rate w/ RE ERCs	2024 State Rate Goal	
NY RGGI	Flat Cap	2024 Declining Cap
NY CSAPR OS NOx	Budget	Trading Limit

Generation Changes by Fuel

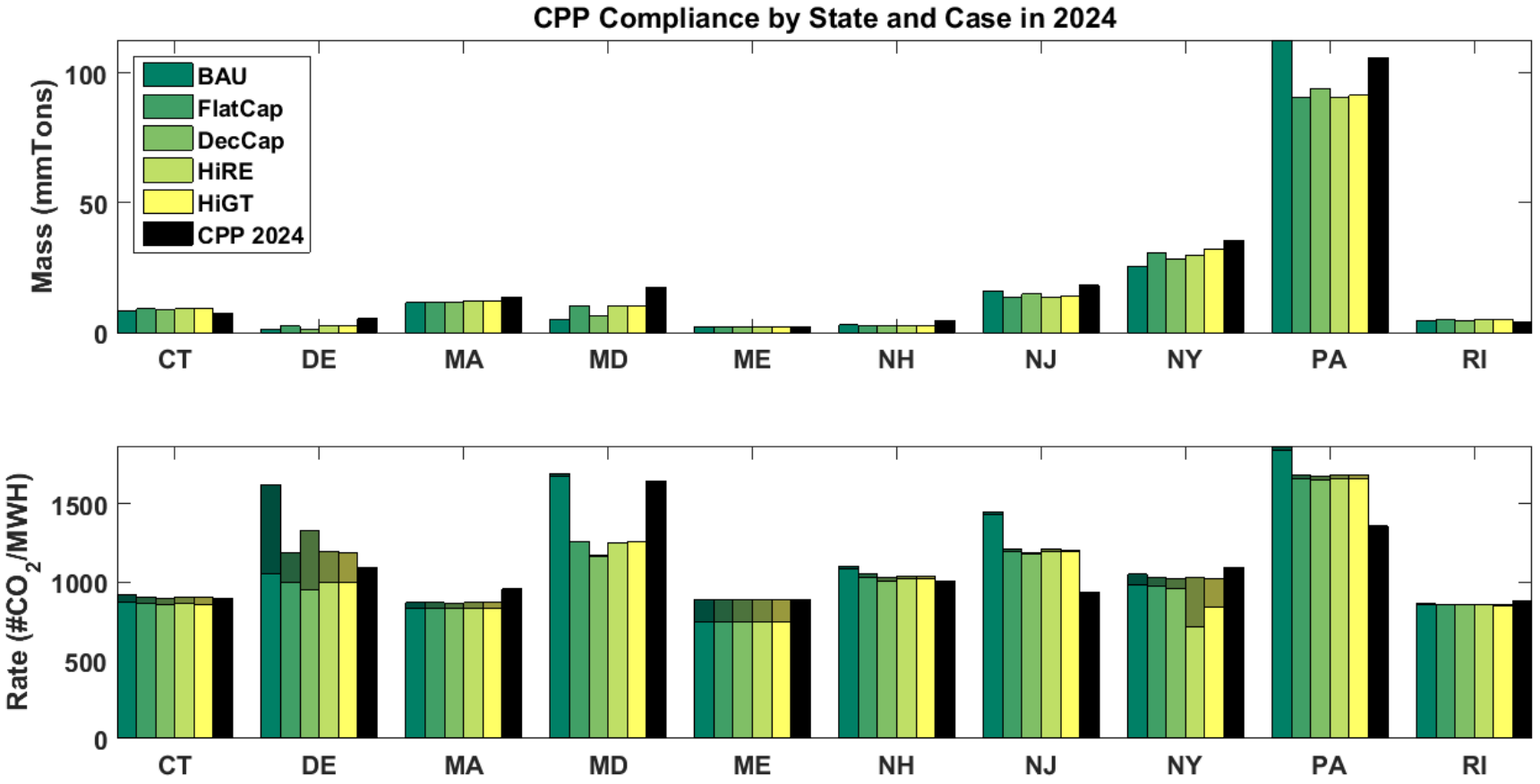




Simulation Results Compared to CPP and RGGI Limits

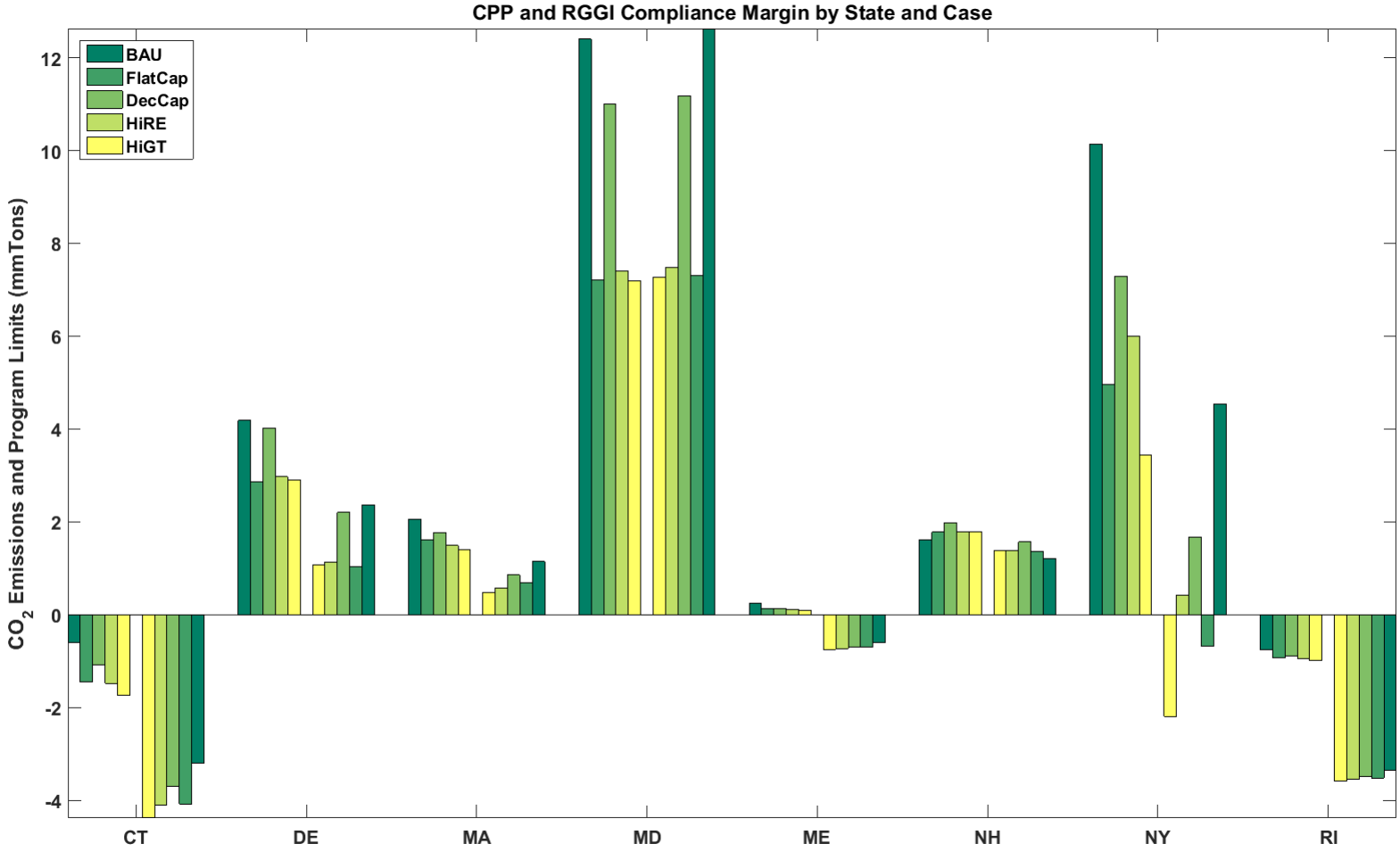


Regional CPP Compliance by Case in 2024



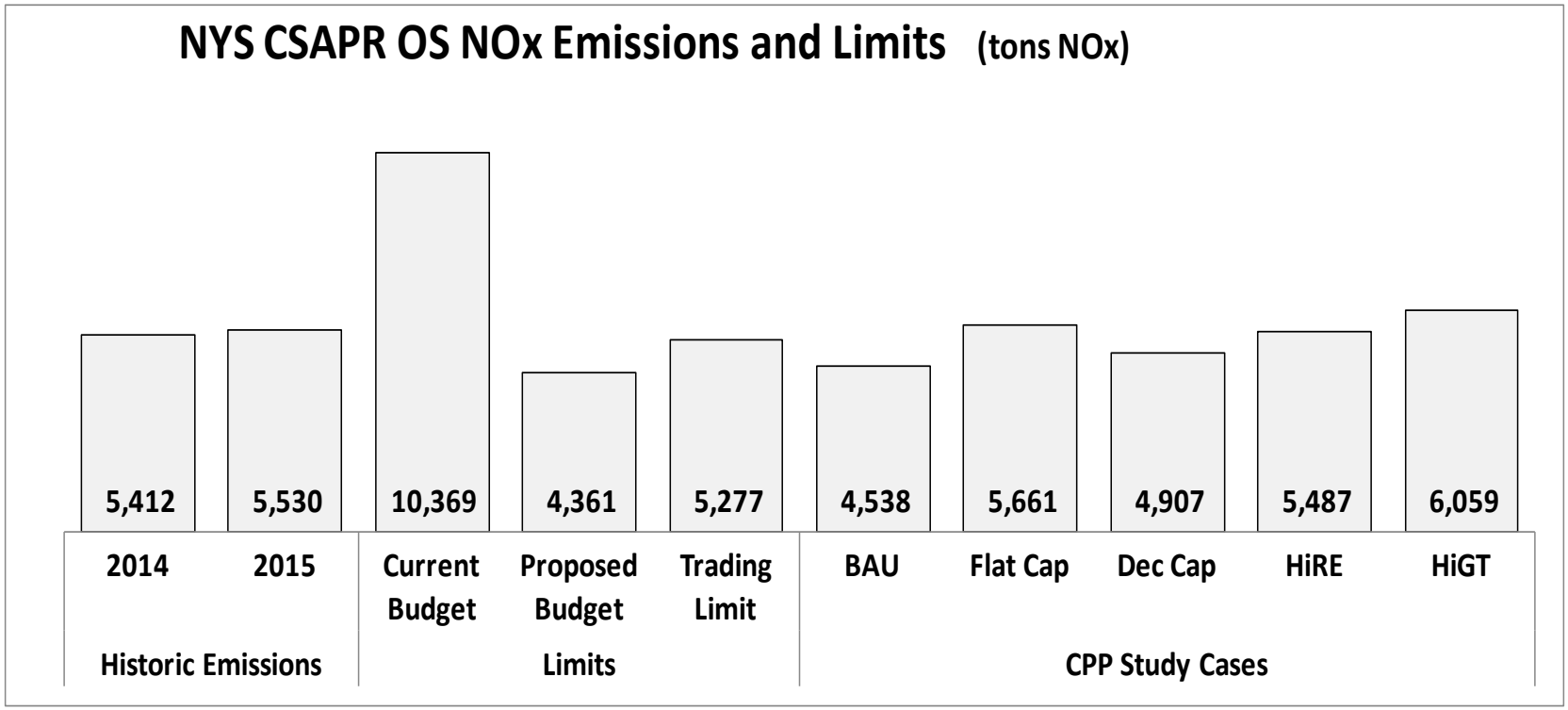
*** The darker rate bar segments represent the rate reduction from eligible renewable energy Emission Rate Credits**

Regional CPP and RGGI Comparison to Mass Limits

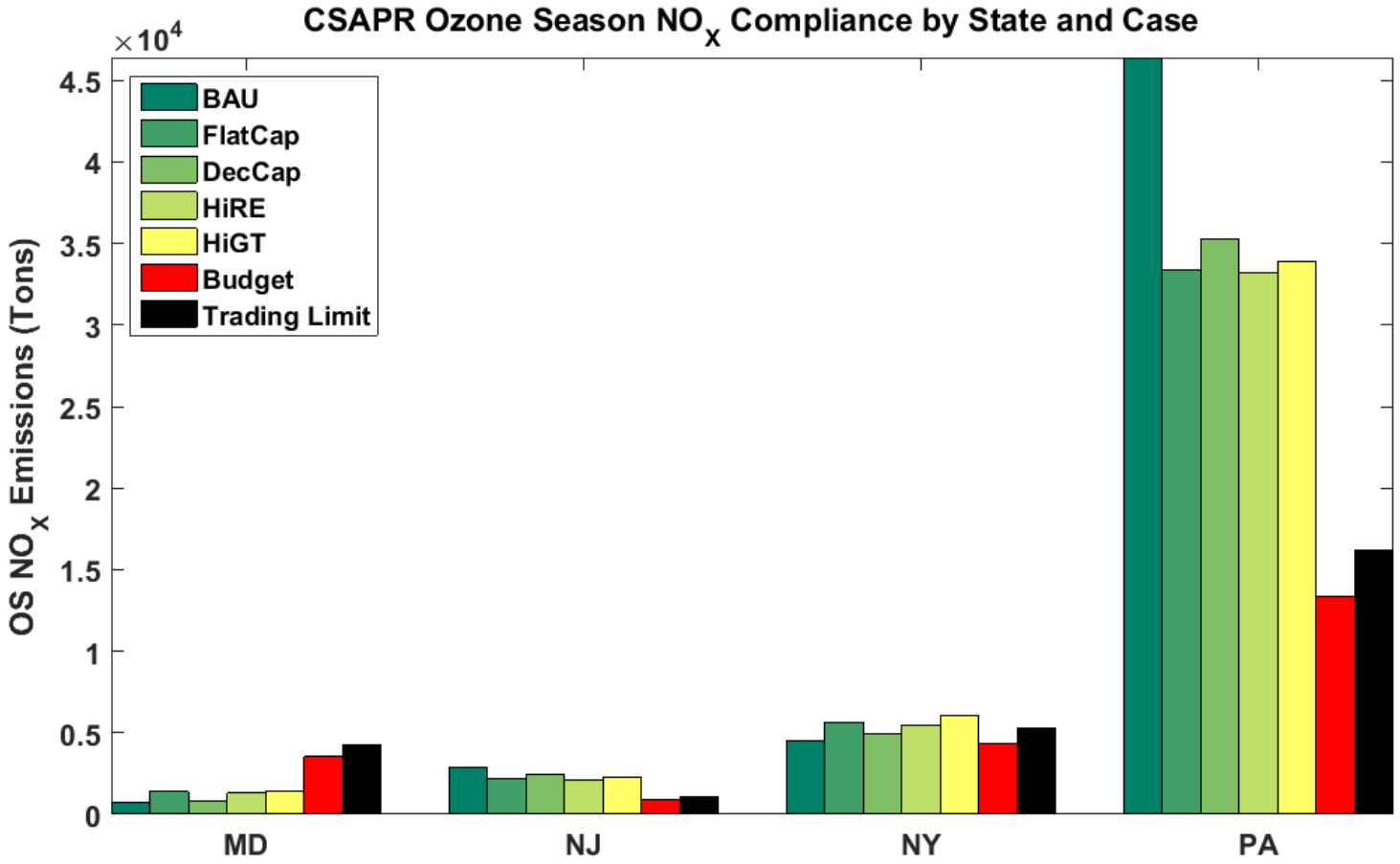


CPP on the left of blank and RGGI the right

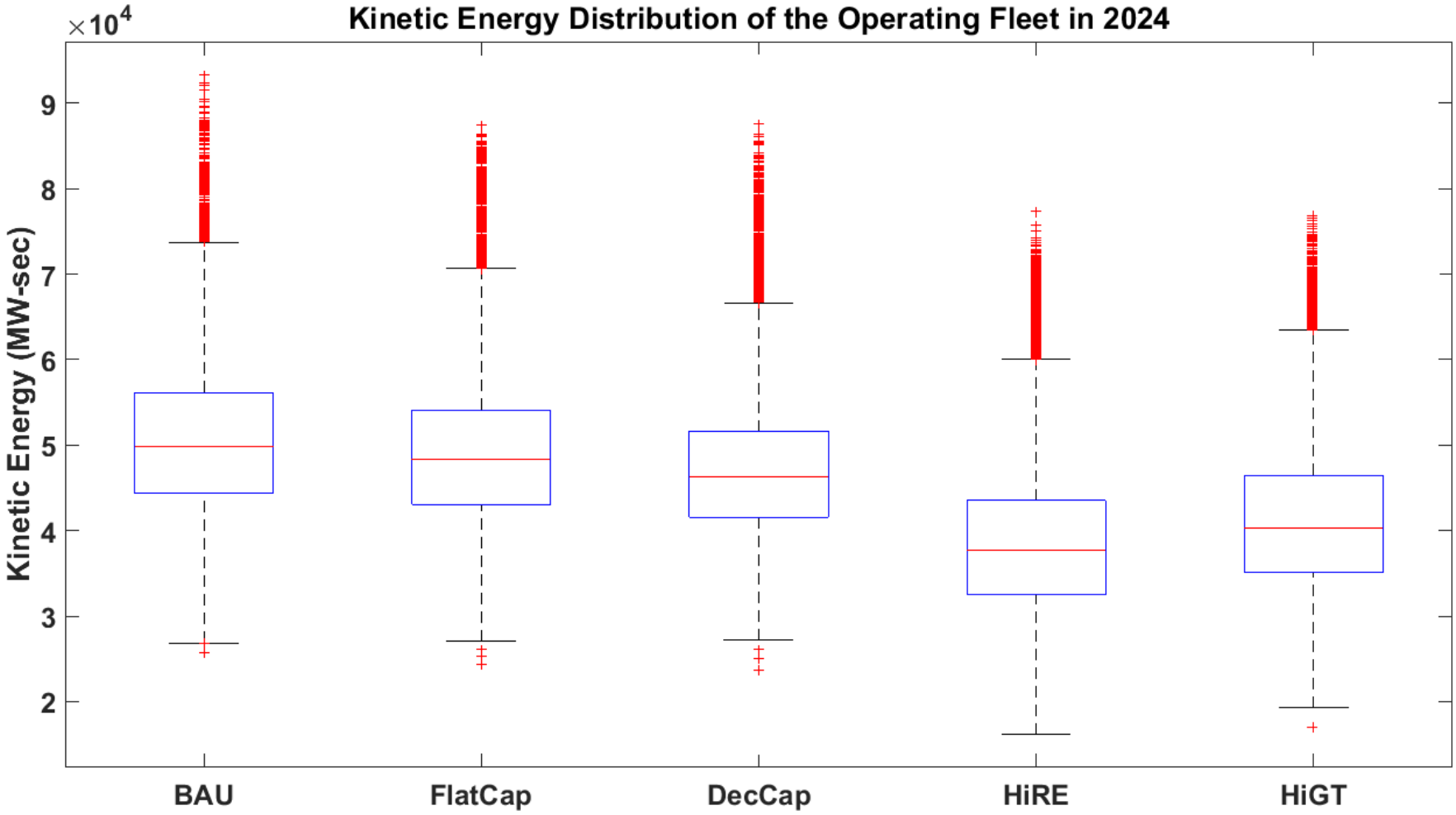
CSAPR Proposed OS NOx Limits and Simulation Results



Regional CSAPR OS NOx Comparison



NERC ERS Inertial Capability Decreases with Increasing Renewable Energy Penetration



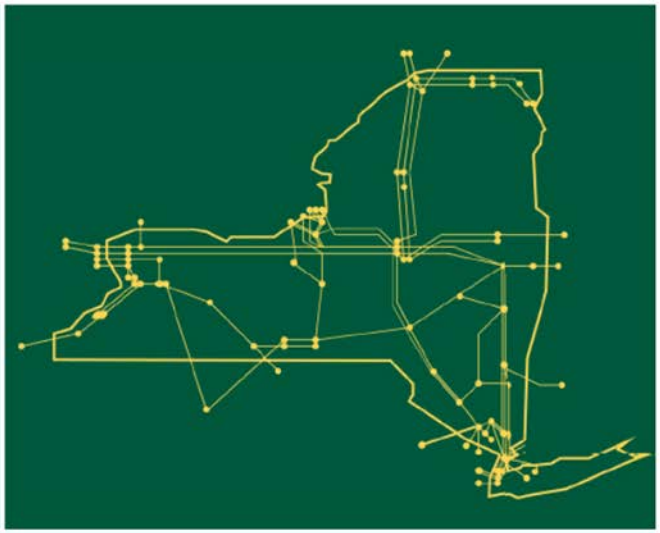
Proposed Phase II

- **Significant work remains to fully evaluate potential changes in resources and networks:**
  - ***Resource Adequacy***
  - ***Transmission Security***
  - ***System Stability***
  - ***Extreme weather analysis***
  - ***Simulations for 2030***
  - ***Sub-hourly simulations***

Schedule

- **Jul. 5 - Review preliminary results for Phase I with stakeholders**
- **Nov. 15 - Draft Phase II Report**
- **Dec. 15 - Final CPP Study Report**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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