

Update: Assessment of the Clean Power Plan Proposal

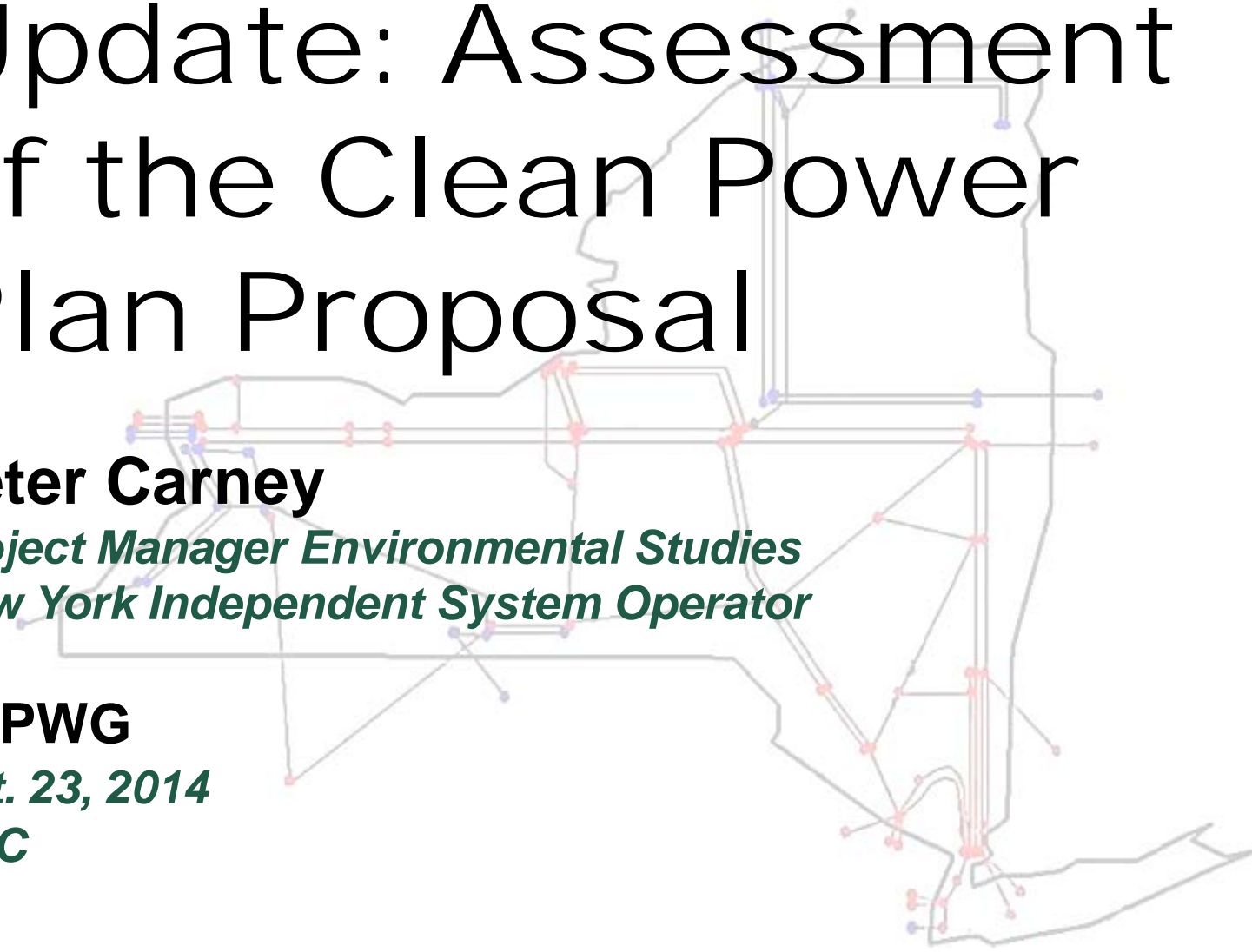
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ESPWG

Oct. 23, 2014

KCC



Agenda

- ◆ Schedule
- ◆ Assessment Coordination
- ◆ Focus Areas
- ◆ Next Steps

Schedule

- ◆ **EPA has extended the public comment period to December 1, 2014**
- ◆ **EPA reported that supplemental information may be available within the next several weeks**

Assessment Collaboration

- ◆ **Meetings with:**
 - *EPA*
 - *NYSDEC*
 - *NYSDPS*
 - *NYSERDA*
 - *TOs*
 - *EEANY*
- ◆ **Assessment Goal**
 - *Identify issues where parties can align comments*
 - *Understand potential areas of conflict*
 - *Work to identify acceptable solutions*

Terms

- ◆ **EGU: Electric Generating Unit**
- ◆ **NGCC: Natural Gas Combined Cycle**
- ◆ **OG: Oil & Gas**
- ◆ **RE: Renewable Energy**
- ◆ **EE: Energy Efficiency**



EPA state goal formula for an emission rate

$$\text{Rate}[\text{lbs/MWh}] = \frac{\text{FossilEmissions}[\text{lbs}]}{\text{QualifyingGeneration}[\text{MWh}]} = \frac{\text{mass}}{\text{generation}}$$

Where,

Fossil Emissions = (coal gen. X coal emission rate) + (OG gen X OG emission rate) + (NGCC gen X NGCC emission rate) + “Other” emissions; and

Qualifying Generation = Coal Gen+ OG gen + NGCC gen_{uc+ar} + “Other” gen + Nuclear gen + RE gen + EE gen

Qualifying Generation includes:

- 1. Fossil fueled EGUs (Coal, OGST, NGCC, and a portion of Useful Thermal Output (UTO) at cogeneration facilities termed “other” by EPA)**
- 2. Nuclear generation, both under construction and “at-risk”**
 - a) Only 3 states have under construction nuclear plants: GA, SC, and TN**
 - b) The “at-risk” portion represents 5.8% of the 2012 NY Nuclear Capacity at 90% CF**
- 3. Renewable Energy generation (excludes existing hydro/includes incremental hydro)**
- 4. Energy Efficiency that reduces load adjusted to account for transmission losses and net-imports is added as zero-emissions generation**

Building Blocks (BB) Explained

$$\frac{(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}}{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{“Other” gen.} + \text{Nuclear gen.}_{uc+ar} + \text{RE gen.} + \mathbf{EE \text{ gen.}}}$$

$$\frac{(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}}{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{“Other” gen.} + \text{Nuclear gen.}_{uc+ar} + \text{RE gen.} + \mathbf{EE \text{ gen.}}}$$

BB1: Decrease Coal emission rate by 6% - For NY: 2,219 lbs/MWh → 2,086 lbs/MWh

$$\frac{(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}}{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{“Other” gen.} + \text{Nuclear gen.}_{uc+ar} + \text{RE gen.} + \mathbf{EE \text{ gen.}}}$$

BB2: Proportionally redispatch Coal/OGST gen. to NGCC gen. such that the total gen is constant up to 70% NGCC CF - For NY fossil gen. is 60,661,478 MWh

Building Blocks Explained

$$\frac{(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}}{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{“Other” gen.} + \text{Nuclear gen.}_{uc+ar} + \text{RE gen.} + \mathbf{EE \text{ gen.}}}$$

$$\frac{(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}}{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{“Other” gen.} + \mathbf{\text{Nuclear gen.}_{uc+ar} + \text{RE gen.}} + \mathbf{EE \text{ gen.}}}$$

BB3a: Add Generation from 5.8% of Nuclear Fleet at 90% CF - For NY 2,410,637 MWh

BB3b: Add RE generation (excluding hydro) per EPA - For NY 24,261,905 MWh

$$\frac{(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}}{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{“Other” gen.} + \text{Nuclear gen.}_{uc+ar} + \text{RE gen.} + \mathbf{EE \text{ gen.}}}$$

BB4: Add EE as generation per EPA- NY must deploy 18,105,990 MWh to get credit for 16,847,624 MWh due to 93.05% in-state gen./sales ratio

2012 Fossil Emission Rate for NY's Affected EGUs

$(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{"Other" emissions}$

$\underbrace{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{"Other" gen.}}_{63,251,689 \text{ MWh}} + \cancel{\text{Nuclear gen.} + \text{RE gen.} + \text{EE gen.}}$

34,657,573 tons

$$\frac{((4,156,143 \times 2,219) + (12,502,558 \times 1,366) + (44,002,777 \times 934) + 1,921,012,400)}{(4,156,143 + 12,502,558 + 44,002,777 + 2,590,211)} = 1,096 \frac{\text{lbs}}{\text{MWh}}$$

63,251,689 MWh

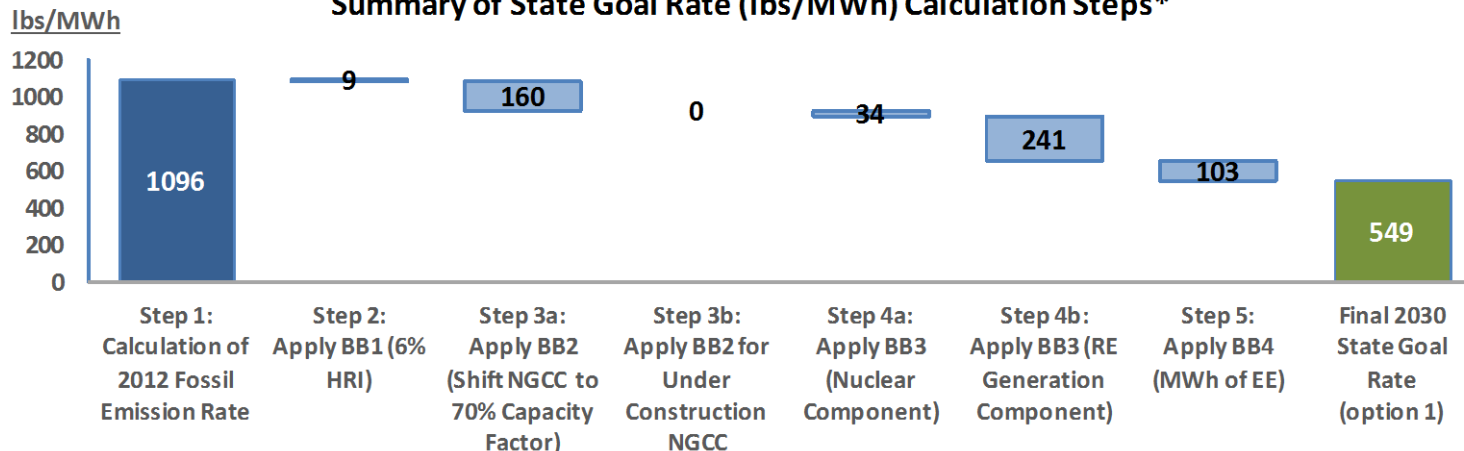
Stepwise changes using EPA's Building Block Approach for NY



Getting from 2012 Fossil Emission Rate to Final 2030 State Goal Rate (option 1)

Building Block 1 (step 2)	Improve the heat rate at existing coal units 6% to reduce the emission rate from 2,219 lbs/MWh to 2,086 lbs/MWh
Building Block 2 (steps 3a and 3b)	Shift generation from fossil-fired boilers to NGCC units up to a 70% capacity factor, increasing NGCC generation from 44,003 GWh to 60,551 GWh
Building Block 3 (steps 4a and 4b)	Increase generation from renewable sources from 5,192 GWh in 2012 to 24,262 GWh in 2030. Incentivize preservation of 2,411 GWh of generation (~5.8%) from historic nuclear fleet
Building Block 4 (step 5)	Improve end-use energy efficiency to decrease electricity demand 16,848 GWh , equivalent to avoiding 11.8% of projected electricity sales in 2030

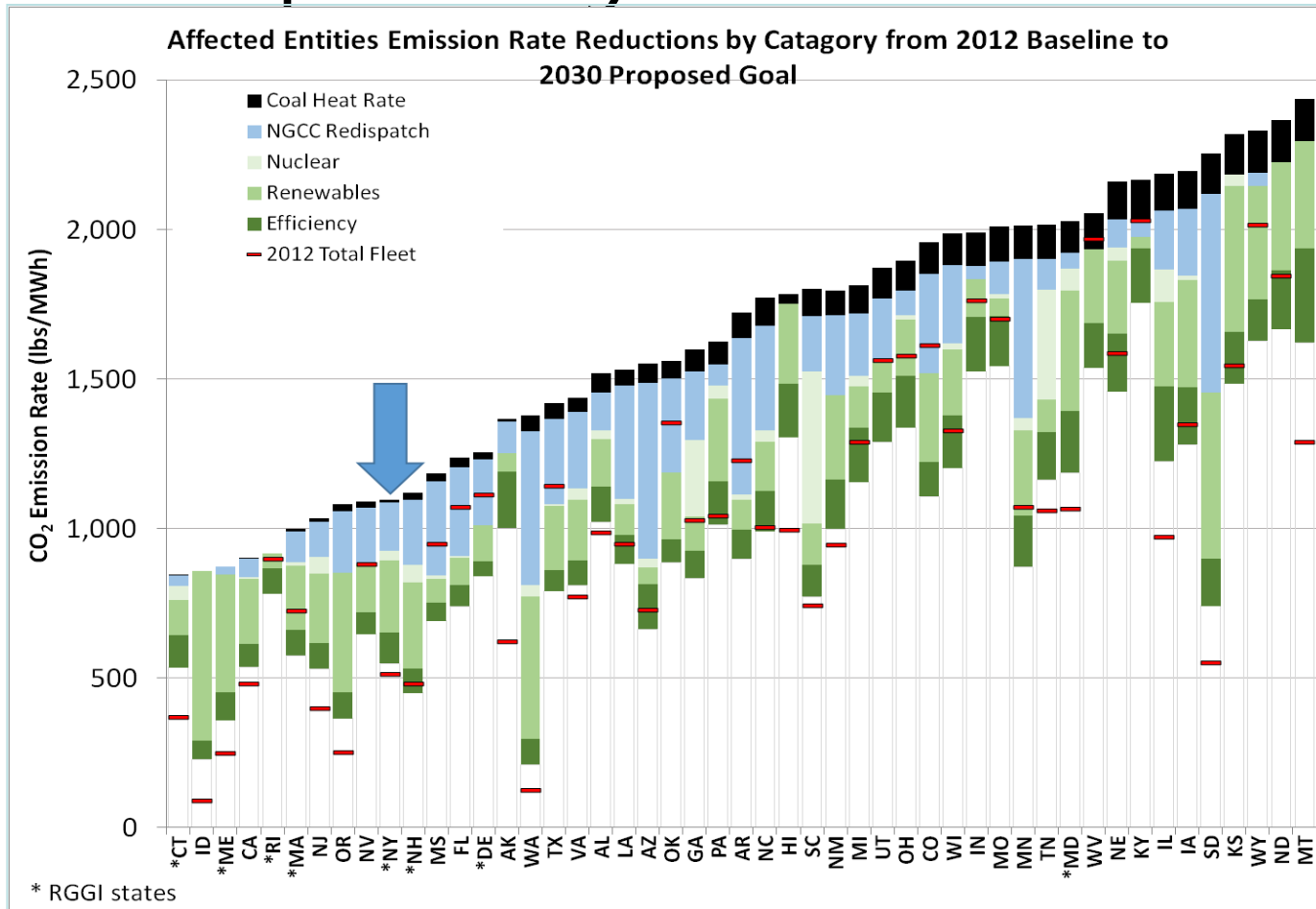
Summary of State Goal Rate (lbs/MWh) Calculation Steps*



The assessment is focused on three areas

- ◆ **Does the Clean Power Plan (CPP) treat NY equitably?**
 - *How do the reductions required for NY compare to those for other states?*
 - *Are NY's clean energy programs fully credited in the CPP?*
- ◆ **The CPP as implemented in NY - impacts?**
 - *What are the possible market impacts likely to result from the CPP?*
 - *Is technology available to achieve the required reductions?*
 - *What are the potential impacts on fuel diversity?*
 - *How will NY State implement the "outside of the fence" requirements?*
- ◆ **Will the CPP impact reliability?**
 - *Does the CPP provide sufficient flexibility to operate the system?*
 - *Can the required renewables be integrated into the NY electric system without disruption?*

Does the CPP treat NY equitably?



NY has the 9th cleanest generator fleet. The CPP requires NY to make the 8th largest reduction

Are NY's clean energy programs fully credited in the CPP?

- ◆ **NY's Renewable Portfolio Standard is set to achieve 30% of generation from renewable resources including existing hydro, however, the CPP excludes existing hydro**
- ◆ **NY produces approximately 44,000 GWH of non-emitting nuclear energy annually, however only 2,500 GWHs are allowed in the State Rate Goal**
- ◆ **Reaching 18,100 GWH in energy efficiency savings by 2030 will be difficult and expensive to achieve. Utility programs are now budgeted at \$351/MWH through 2015.**

Can the CPP be implemented in NY?

- ◆ **Will the CPP Building Blocks be adjusted?**
 - *The NGCC Capacity Factor for BB2 is too high.*
 - *BB2 does not provide sufficient CO₂ to run the existing system as is.*
 - *BB3 does not provide credit for existing hydro toward the RPS.*
 - *BB2 and BB3 need to be cross limited.*
 - *BB4 sets very aggressive goals for NY.*

- ◆ **Or, will EPA approve an acceptable method for the rate to mass conversion?**

BB2 Estimates for NGCC operation are too high

- ◆ **EPA uses nameplate capacity to establish production targets based on a 70% Capacity Factor**
 - *Capacity Factors are established based on DMNC*

	Nameplate MW	CRIS MW	Summer DMNC MW	Winter DMNC MW
With Linden	11,273	9,251	8,991	10,239
W.O. Linden	10,238	8,498	8,235	9,439

BB2 cont.

- ◆ **Recent experience with NGCCs in NY**
 - *12 consecutive months of lowest gas prices*
 - Nov. 2011 to Oct. 2012
 - Nameplate Capacity Factor: 46%
- ◆ **CARIS Model simulation**
 - *At a RGGI Allowance Price of \$100/ton the Nameplate Capacity Factor only increased to 59%*
- ◆ **BB2 Does not estimate a level of emissions from the existing steam units that is sufficient to support operations to satisfy reliability criteria.**
 - *Coal Generation: 28 GWH*
 - *Oil/Gas Steam Generation: 84 GWH*
 - *In 2013 Oil was fired in Oil/Gas Steam Generators on 161 days.*

NYISO Wind Study

- ◆ **The NYISO Wind Study determined that the NY electric system could accommodate up to 8,000 MW of wind generators.**
 - *The study determined that 0.8 MW of fossil generators would be required for each MW of wind.*
 - *The study also found that NGCCs would reduce their output by 9% as a result of the incremental wind generation injected into the system.*
- ◆ **BB2 needs to be adjusted to represent what can be demonstrated to be necessary in NY**
- ◆ **BB2 needs to be adjusted to include a cross limit with BB3, i.e., more renewable and more NGCC quickly reach limits where portions of both can not operate simultaneously.**

BB3 Additional non-emitting generation

- ◆ **In 2013, 53% or 73,977 GWH of NYCA generation was non-emitting.**
- ◆ **The CPP only credits NY with 2,481 GWH or 5.2%**
- ◆ **The NY RPS is set at 30% which includes existing hydro**
- ◆ **BB3 should be adjusted to include existing hydro in NY**

BB4

- ◆ **BB4 assumes that NY will add 18,100 GWH cumulative annual savings by 2030.**
- ◆ **NY has invested ratepayer funds to achieve energy efficiency savings estimated to equal 7,800 GWH.**
- ◆ **The goal for NY for BB4 is aggressive and does not recognize accomplishments to date.**

An option to the redesign of the Building Blocks, is the rate to mass conversion process.

Will EPA approve methodology that is compatible with NYISO's markets and RGGI?

Final Goal – 2030 Fossil Emission Rate And Equivalent Mass for NY

$(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}$

$\underbrace{\text{Coal gen.} + \text{OG gen.} + \text{NGCC gen.} + \text{“Other” gen.}}_{\text{Fossil Generation}} + \underbrace{\text{Nuclear gen.}_{uc+ar} + \text{RE gen.} + \text{EE gen.}}_{\text{Non-Fossil Generation}}$

29,316,167 tons

$((27,582 \times 2,086) + (82,973 \times 1,366) + (60,550,923 \times 934) + 1,921,012,400)$

$\frac{\text{---}}{(27,582 + 82,973 + 60,550,923 + 2,590,211 + 2,410,637 + 24,261,905 + 16,847,624)} = 549 \frac{\text{lbs}}{\text{MWh}}$

63,251,689 MWh

43,520,166 MWh

106,771,855 MWh

25,822 GWH Hydro and 42,226 GWH Nuclear Excluded

An Alternative Interpretation of Rate to Mass Conversion for NY

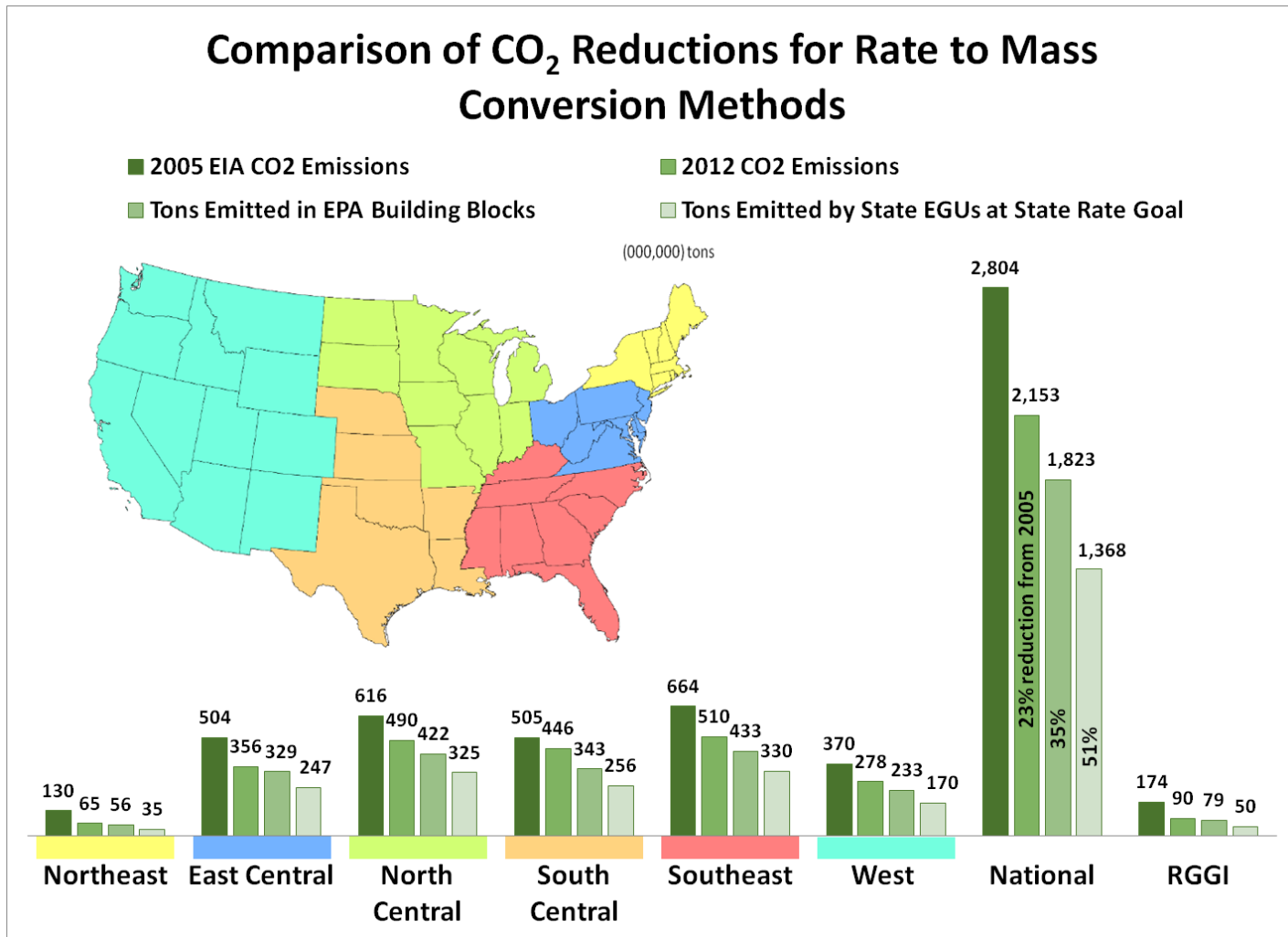
$(\text{coal gen.} \times \text{coal emission rate}) + (\text{OG gen.} \times \text{OG emission rate}) + (\text{NGCC gen.} \times \text{NGCC emission rate}) + \text{“Other” emissions}$

Coal gen. + OG gen. + NGCC gen. + “Other” gen. + ~~Nuclear gen. + RE gen. + EE gen.~~

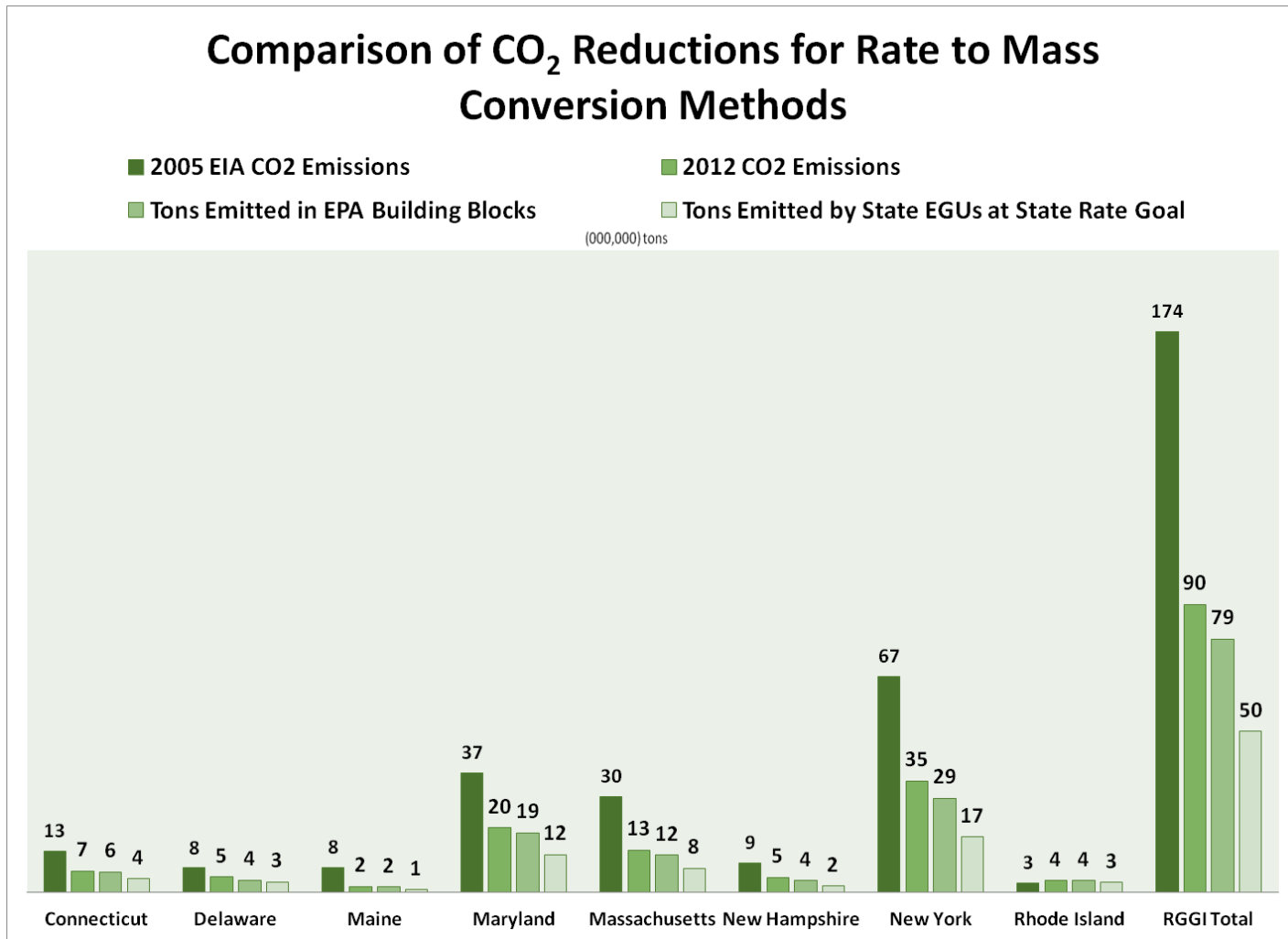
$$\left(549 \frac{\text{lbs}}{\text{MWh}} \right) \times (27,582 + 82,973 + 60,550,923 + 2,590,211) \text{MWh} \left| \frac{1 \text{ ton}}{2,000 \text{ lbs}} \right| = 17,362,589 \text{ tons}$$

63,251,689 MWh

Regional/National Comparison



RGGI States Comparison



Next Steps

- ◆ **Continue collaboration**
- ◆ **Assess supplemental materials when available**
- ◆ **Assess reliability and market impacts to the extent feasible.**

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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