EPA's Clean Power Plan Proposal: A Summary of Key Results from PJM's Economic Analysis

National Association of State Utility Consumer Advocates

June 9, 2015

PJM as Part of the Eastern Interconnection

21% of U.S. GDP produced in PJM

KEY STATISTICS

Member companies: 925+
People Served: 61 Million
Peak load in megawatts:165,492
MWs of generating capacity:183,604
Miles of transmission lines: 62,556
2014 GWh of annual energy: 797,461
Generation sources: 1,376
Square miles of territory: 243,417
States served: 13 + DC

Caveats and Cautions…Qualitative Observations are Key

Assess, but not forecast potential energy market and reliability impacts based on

- Generation entry/exit assumptions
- Fuel Price Assumptions

While

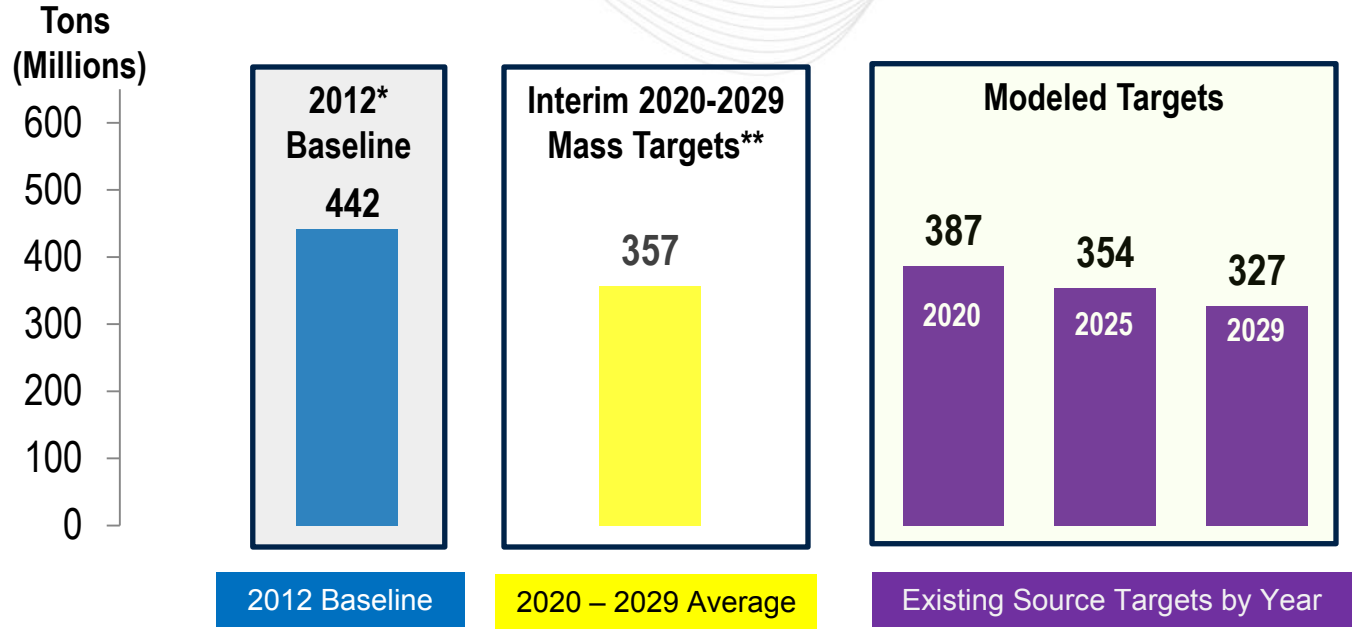
- Maintaining neutrality on environmental policy
- And providing an independent source of information on policy implications

Actual results will depend upon several variables, including:

- The final EPA rule
- How states choose to implement the rule
- Actual Economic Conditions

Mass-Based Program CO_2 Emissions Targets

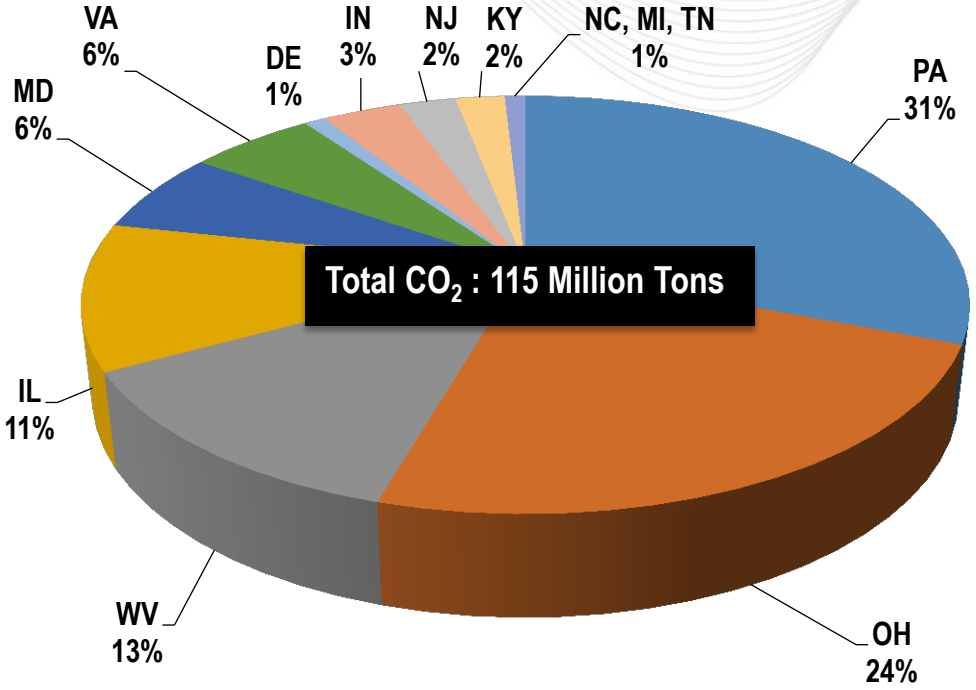
PJM Regional Mass-Based CO_2 Emissions Targets



*2012 baseline emissions include emissions from units that have already announced deactivations

**Mass Target = Target Rate x (2012 Covered Sources MWh + 2012 Renewables + $Nuclear_{,at\text{-}risk}$)

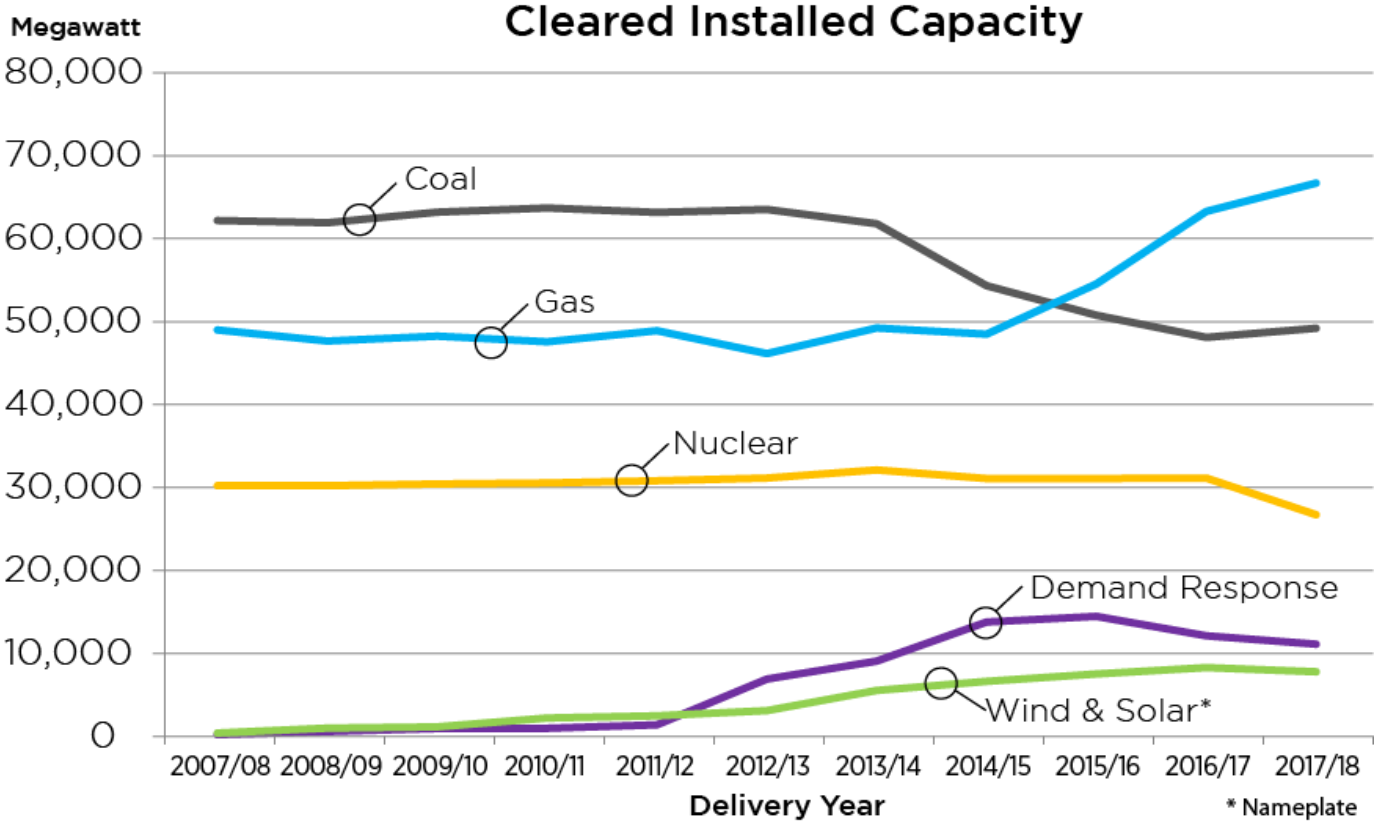
Interim Compliance (2020-2029) Period
EPA Emissions Reductions by State



Total CO_2 From PJM Planned Deactivations and Fuel Conversions 50 Million Tons

*DC does not have a compliance obligation. The portion of Tennessee in PJM does not have any sources covered by the proposed rule.

PJM's Evolving Resource Mix

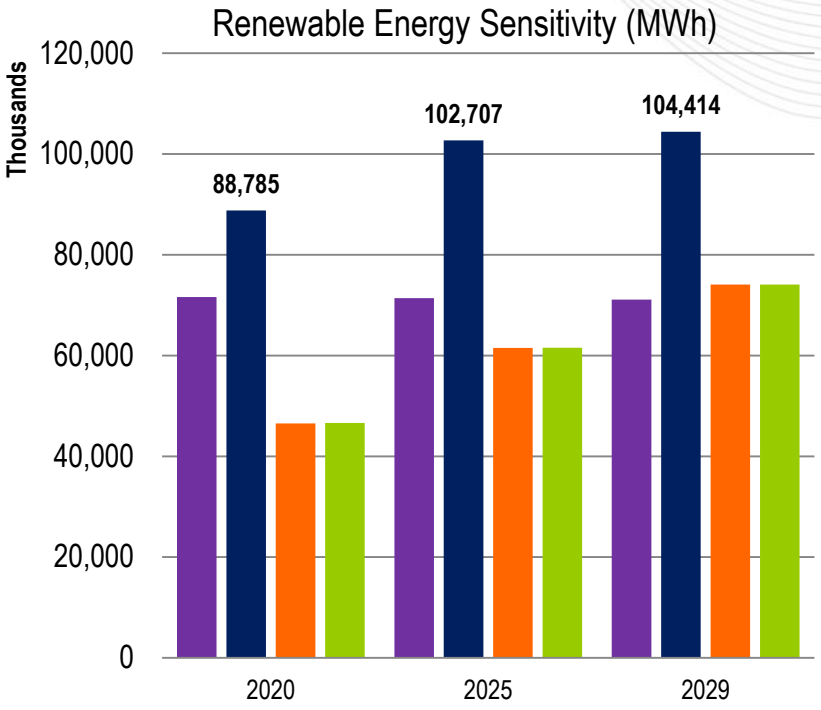


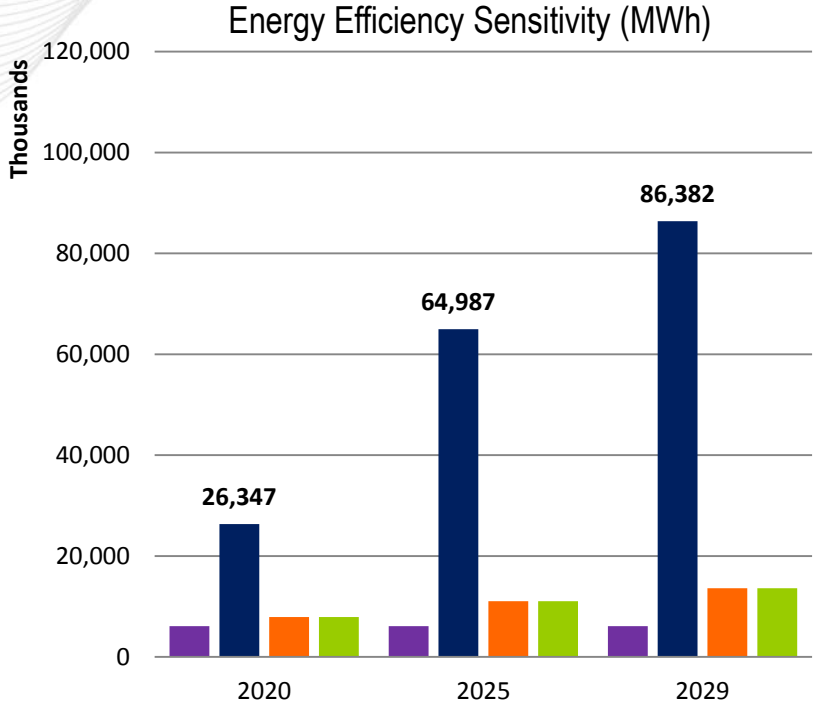
2020-2029 Scenario Summary

Driver	Achieve State RPS and EPA EE Targets	Lower Growth in Renewables and EE	Limited New 111(b) NGCC
Renewables Modeled	89 – 104 GWh (Thousands)	47 - 74 GWh (Thousands)	47 - 74 GWh (Thousands)
111(b) NGCC	14.5 GW	14.5 GW	2.8 - 14.5 GW
Nuclear	33.4 GW	33.4 GW	33.4 GW
Natural Gas Price*	5.25 - 8.35 $/MMBtu	5.25 - 8.35 $/MMBtu	5.25 - 8.35 $/MMBtu
Energy Efficiency Modeled	26 - 86 GWh (Thousands)	7.9 – 13.6 GWh (Thousands)	7.9 – 13.6 GWh (Thousands)

*Natural gas price forecast in nominal dollars. Coal prices not shown as each coal unit has a unique delivery and commodity charge.

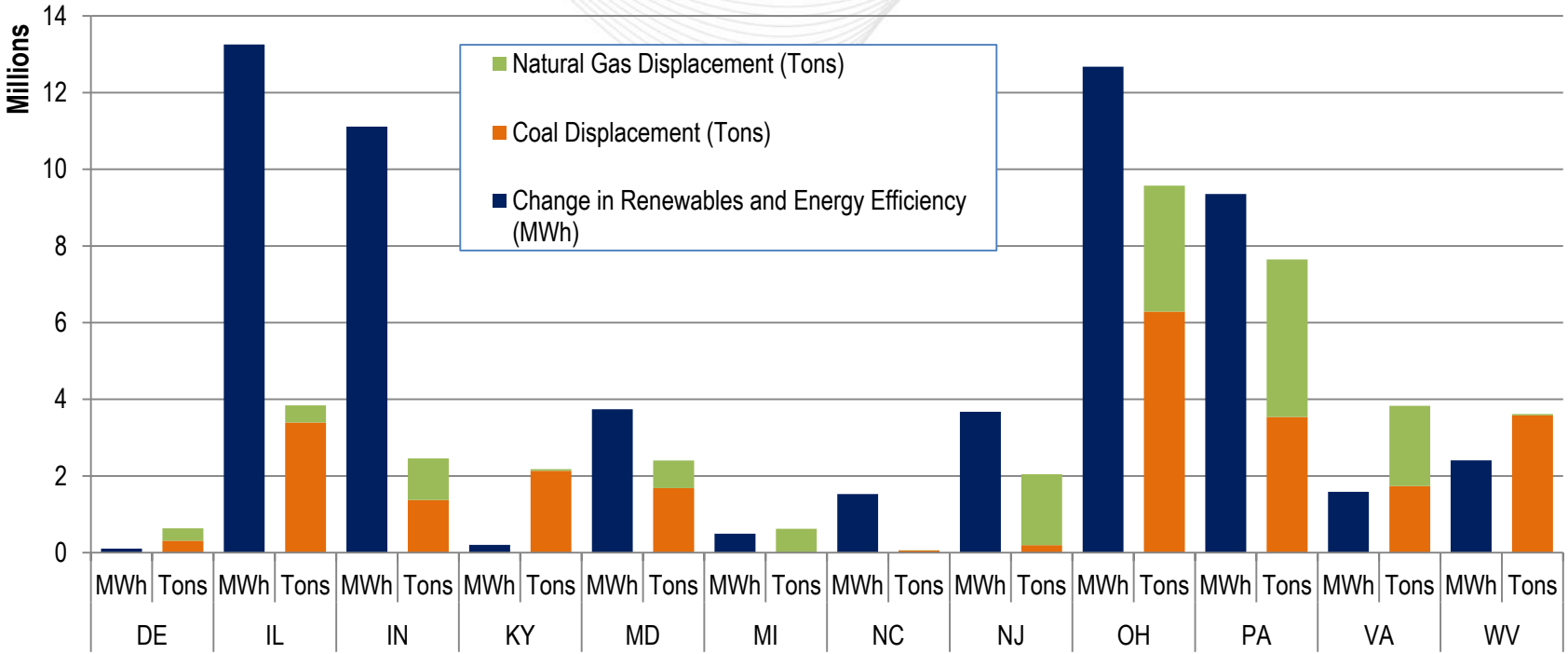
Change in Zero Emitting Resource Assumptions Between 2020 and 2029





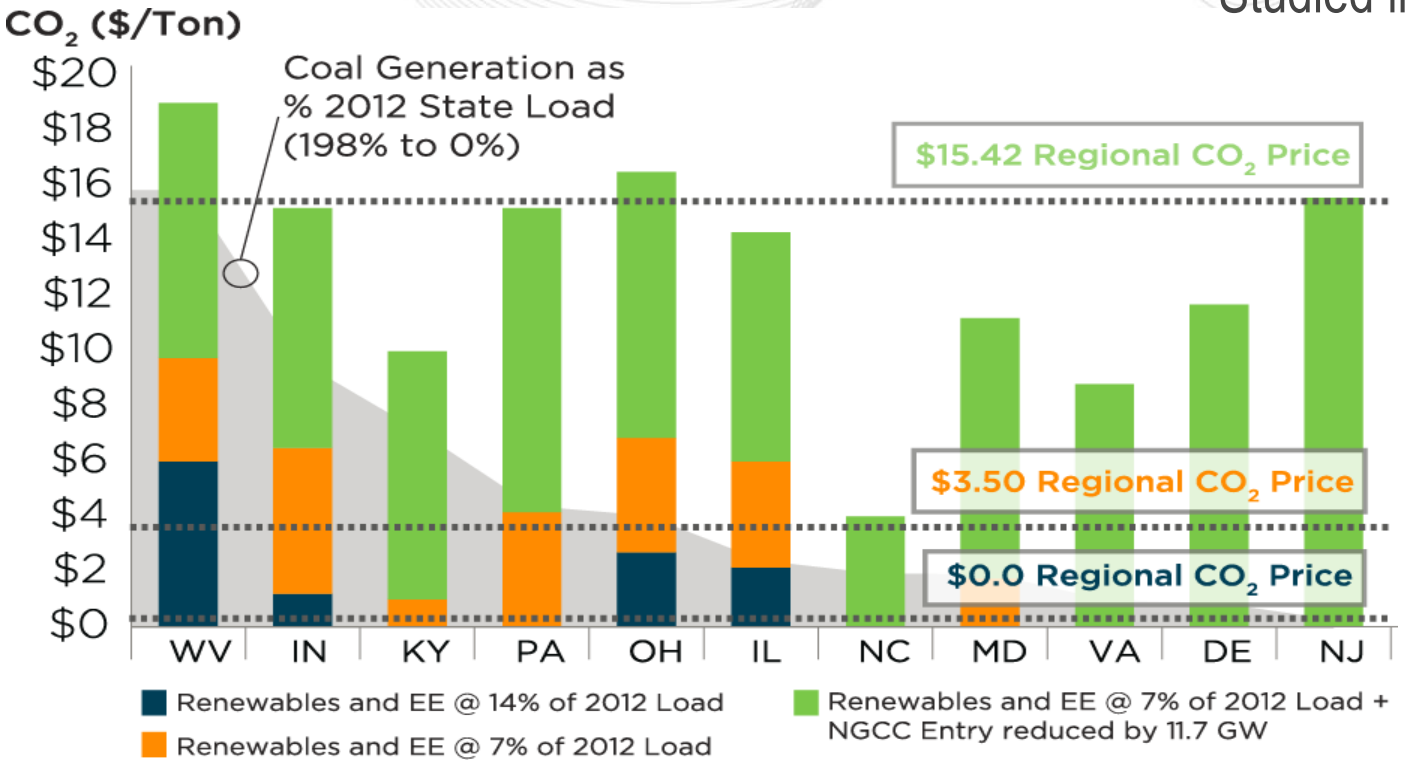
PJM Transmission Planning (RTEP) | Achieve State RPS and EPA EE Targets | Lower Renewable and EE Growth | Limited New 111(b) Resource Entry

Generation Investment Location doesn't always Match the Emissions Displacement Location

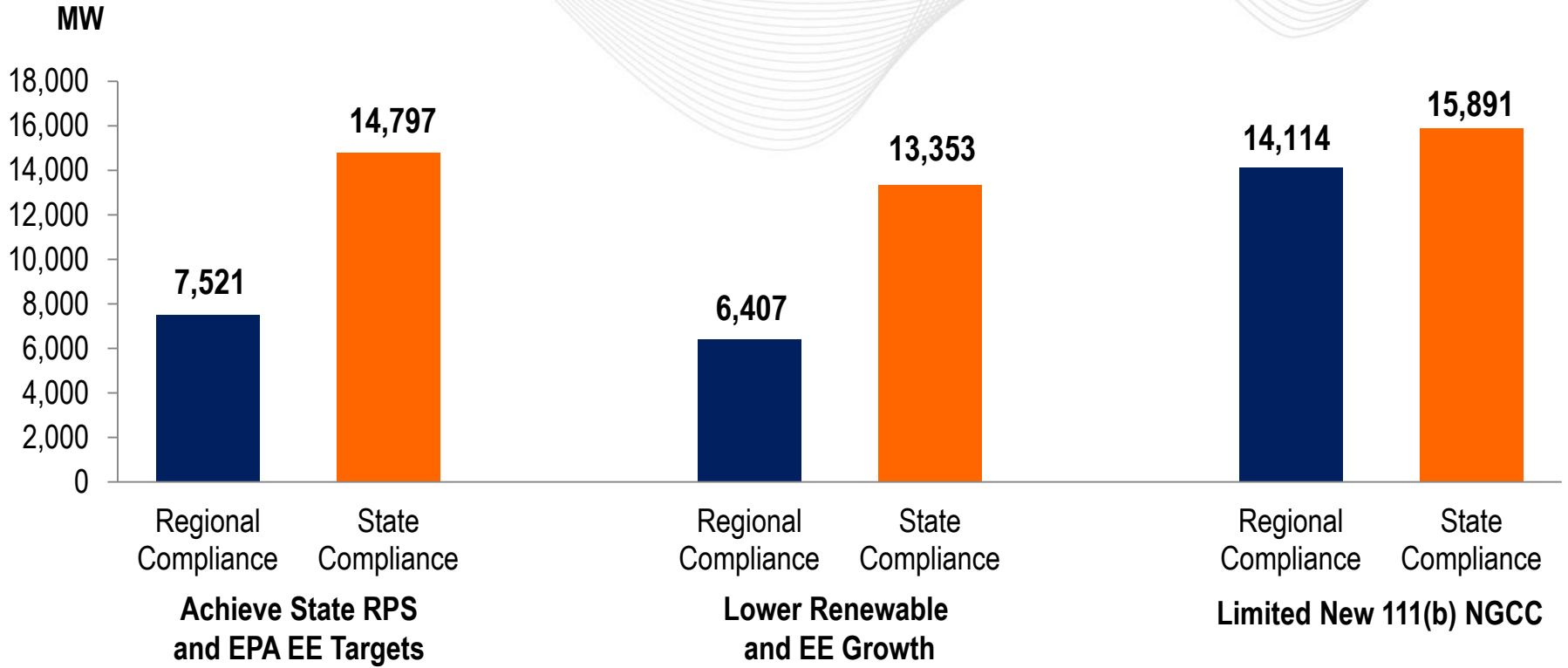


*Data based on OPSI 2a (Achieve State RPS and EPA EE targets) versus PJM 4 (Lower Growth in Renewables and EE) Scenario in 2020

CO_2 Prices for Regional and State Compliance Studied in 2020

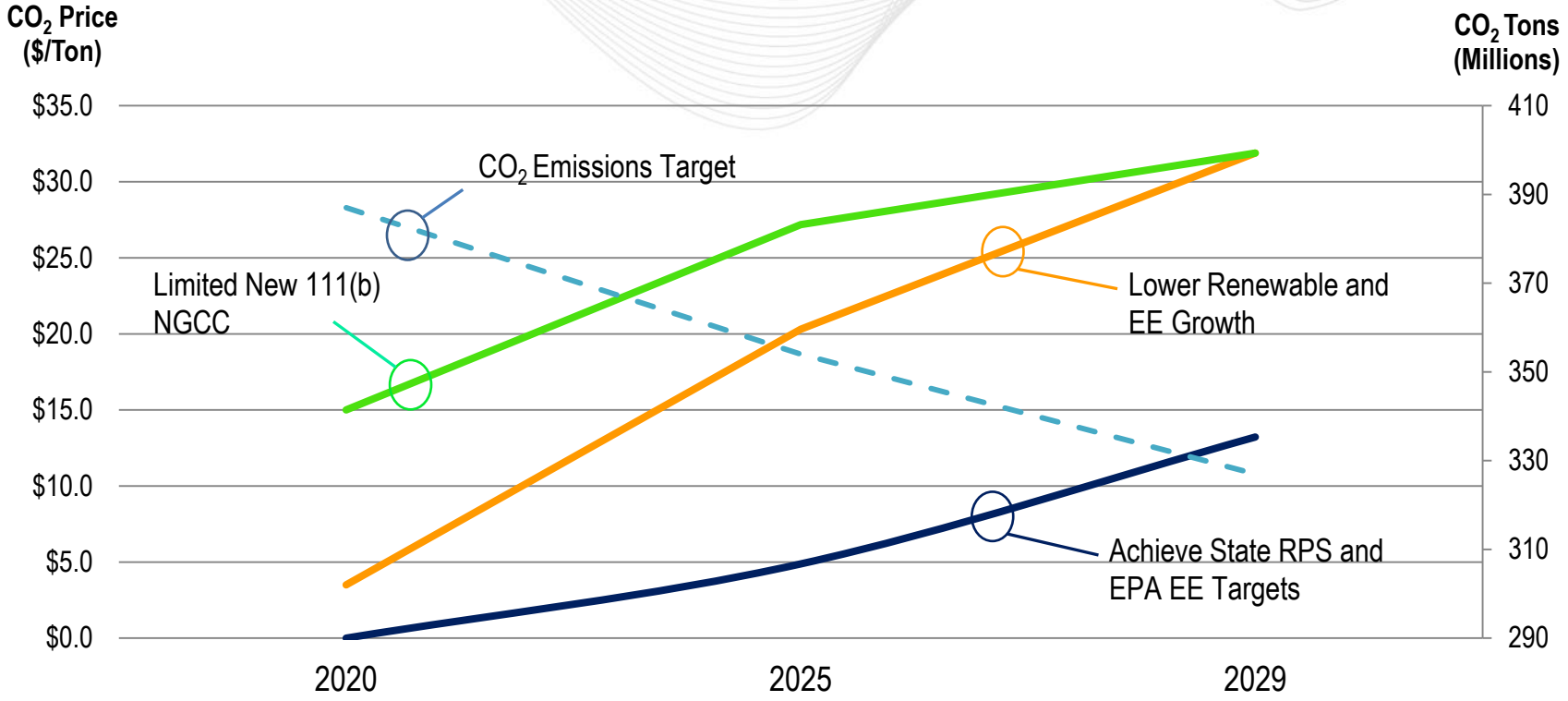


2020 State-by-State Compliance = More CO_2 Constraints >> More At-Risk Generation*



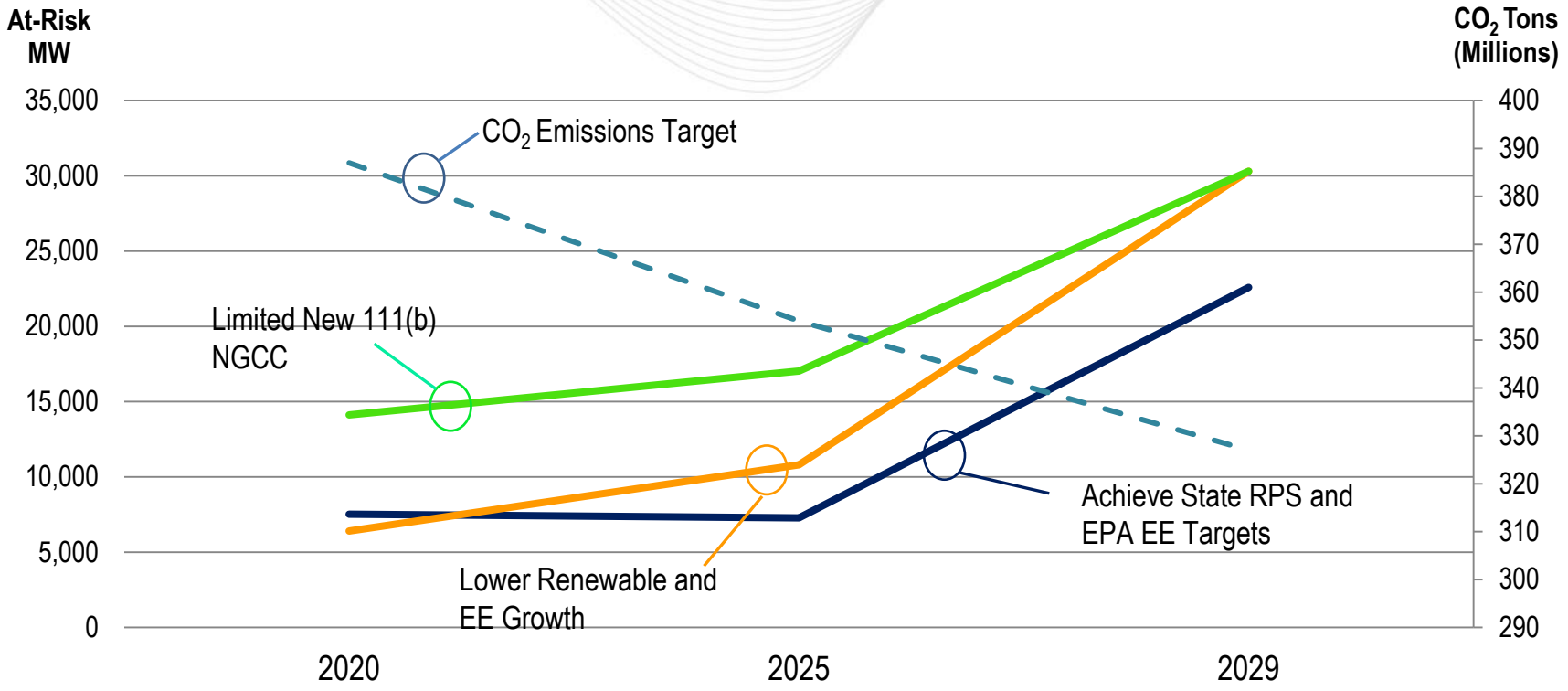
*Unit determined at-risk when its Revenue Requirement is greater than 0.5 Net Cost of New Entry for a Combustion Turbine

Lower CO_2 Targets + Less Zero-Emitting Resources = Higher CO_2 Prices



*By 2029 all FSA and ISA units are modeled to satisfy reserve margin requirements. Limited New NGCC entry sensitivity only applies to 2020 and 2025

Lower CO_2 Limits + Less Zero-Emitting Resources = More At-Risk Generation

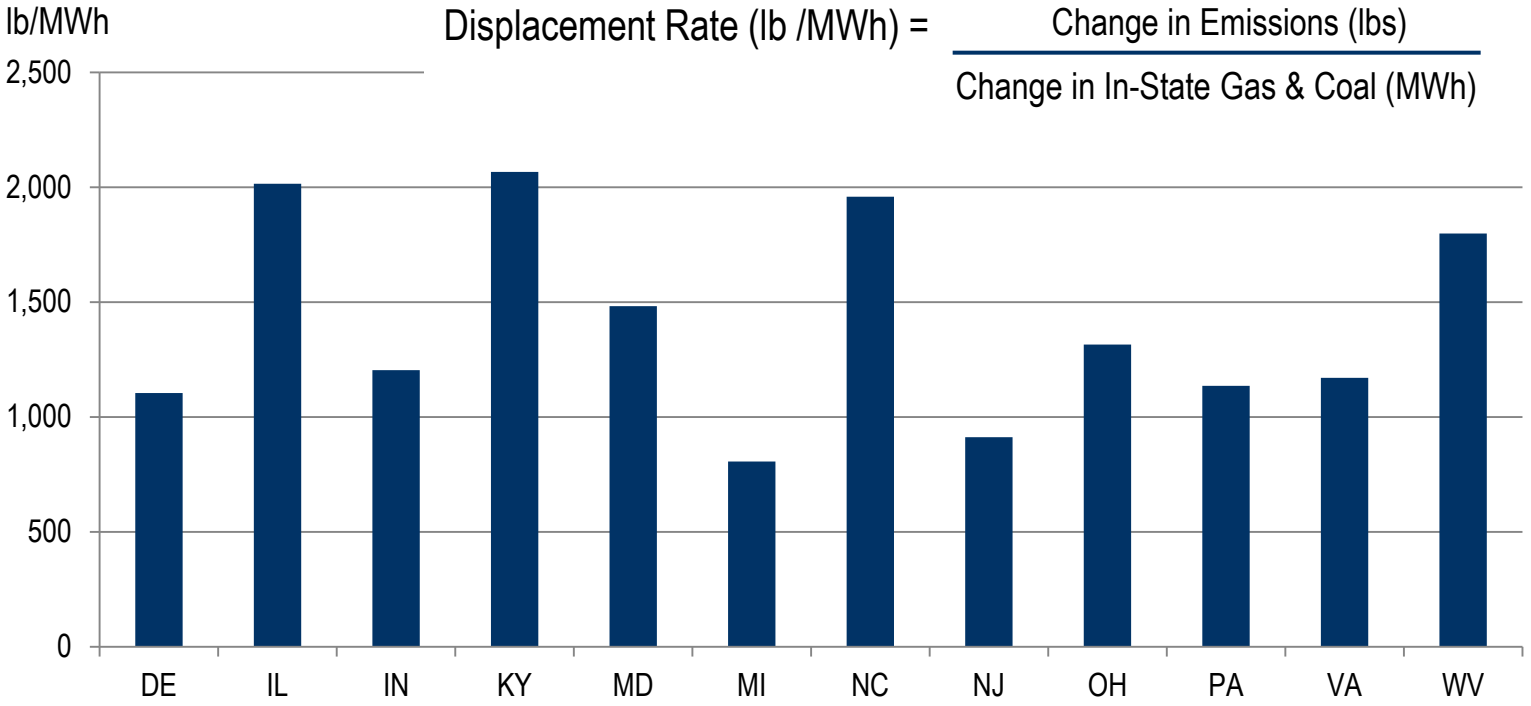


Next Steps

- Reliability analysis of at-risk generating units
- Continue to advocate for a reliability safety valve
- Educate on economic and reliability implications of CPP policy decisions
- Subsequent to EPA's final rule:
  - Update analysis for select scenarios
  - Respond to state requests for analysis

Appendix: In-State Emissions Displacement Rates

$$\text{Displacement Rate (lb /MWh)} = \frac{\text{Change in Emissions (lbs)}}{\text{Change in In-State Gas \& Coal (MWh)}}$$



Appendix: In-State Emissions Displacement Rates

$$\text{Displacement Rate (lb /MWh)} = \frac{\text{Change in Emissions (lbs)}}{\text{Change in In-State RE and EE (MWh)}}$$