Results of MISO's Analysis of the EPA's Proposed CSAPR Update

May 2016

Overview

- **Purpose**
  - Provide overview of study design
  - Review impact of MISO
  - Show areas of highest impact
- **Takeaway**
  - Regional energy and emission trading eases implementation of the CSAPR update in MISO
- **Next Steps**
  - Continue discussions with interested parties on the impact of CSAPR to specific areas

Study design: models

Model Description
PLEXOS model, which produces optimal hourly economic dispatch considering generation, transmission, and environmental constraints
Utilized final MISO CPP (MTEP15) cases for 2020, 2025, and 2030
Modified 2020 case with 2017 load data
Updated NOx emission production rates for all units in affected states based on average of recent historical data - Production rates do not include underutilized control technology
Updated natural gas prices with NYMEX Henry Hub forecast - 2017 seasonal average $2.64
Updated generation for actual retirements and conversions from MISO's EPA survey

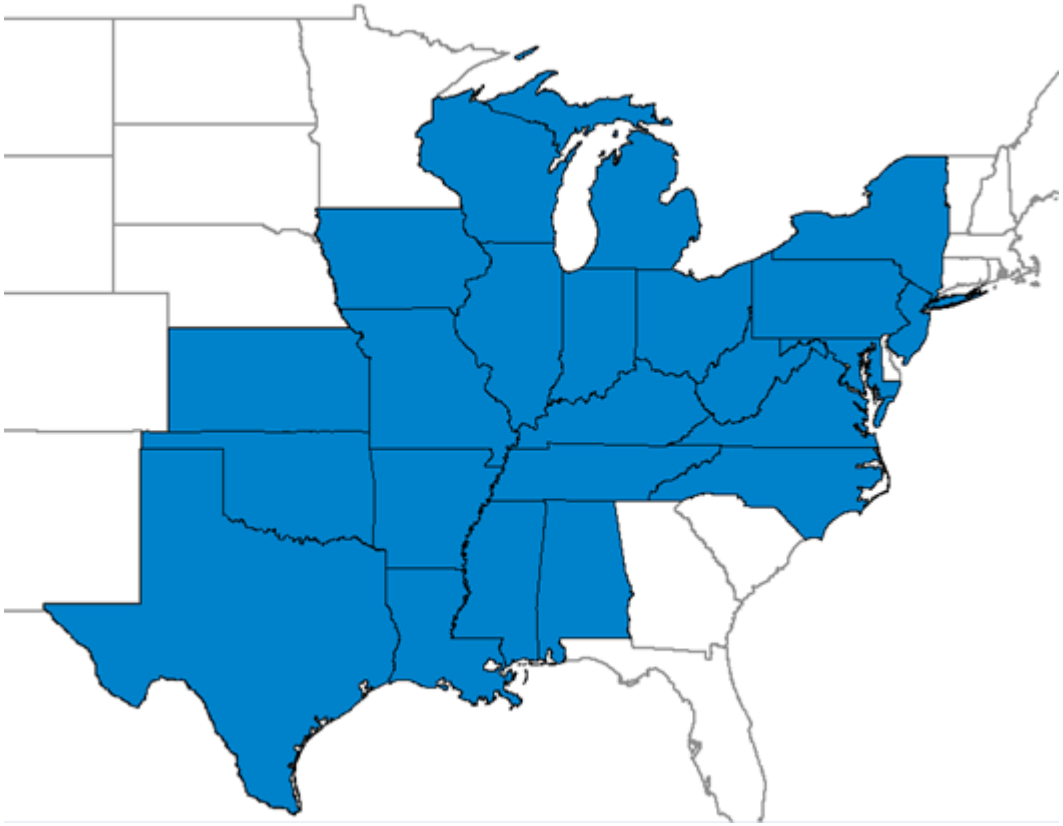
- **Major modeling assumptions:**
  - Includes only currently used emission control technology
  - Compliance achieved through energy and emission trading only

Study design: constraint modeling

Scenarios
Business-as-usual – used for benchmarking, no seasonal NOx budget limits
No trading* – affected states must meet updated budget limit
Seasonal NOx trading* – affected states constrained by assurance emission levels • EI trading constrained by sum of affected states' budget limit • Georgia and South Carolina not included in the trading pool
Sensitivities
$2 increase in natural gas price
Interaction with CPP (mass-based compliance) in 2025 and 2030
Disabling of coal units' must run statuses
Significant buildout of renewables and new gas in later years (referred to as GWS in MISO's CPP study)

**Budgets do not include banking or borrowing*

23 states impacted by proposed update to CSAPR for 2008 ozone NAAQS



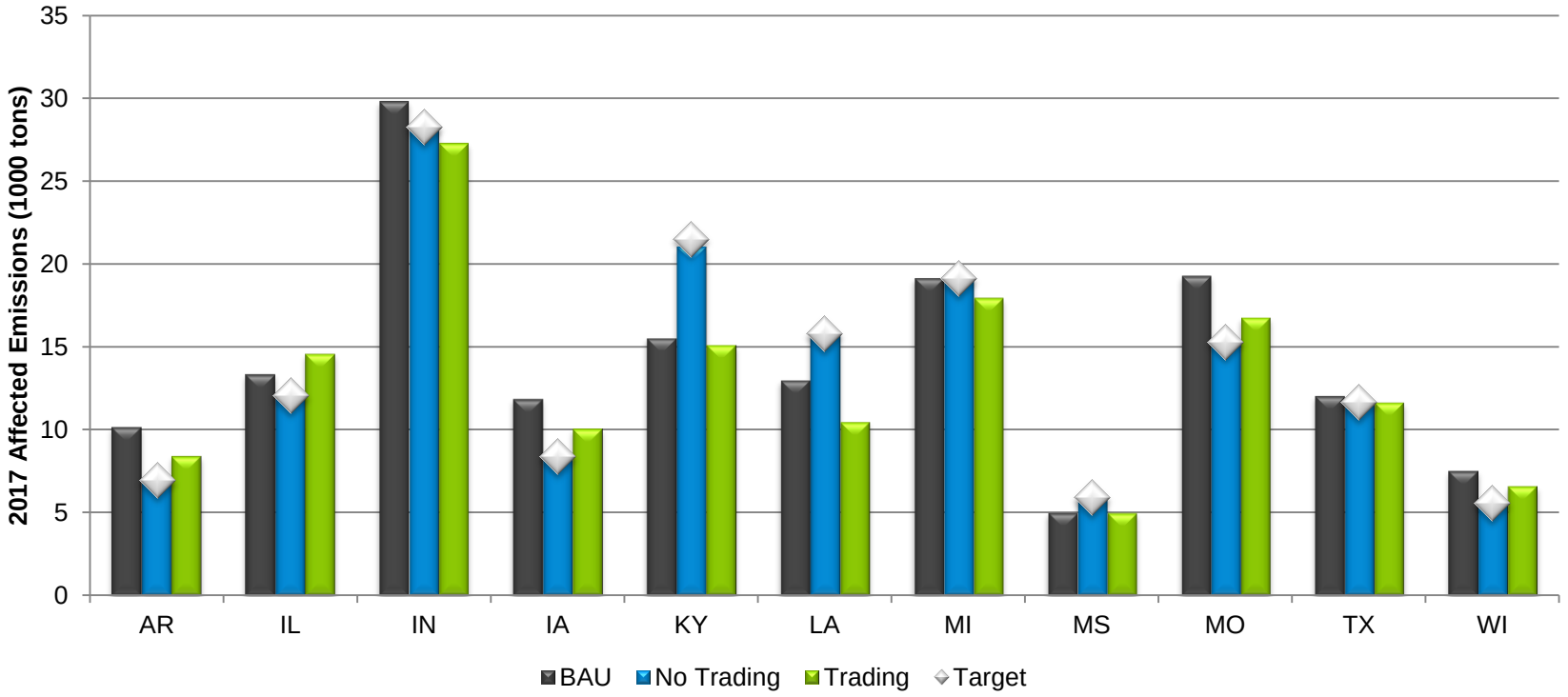
- 11 impacted states are in the MISO footprint

In 2017, the seasonal* NOx budget can be met in MISO states through redispatch

- MISO states in sum perform under budget
- Production cost change in MISO +$31M from BAU with trading
- With allowance trading, seasonal NOx price output at $5,470/ton

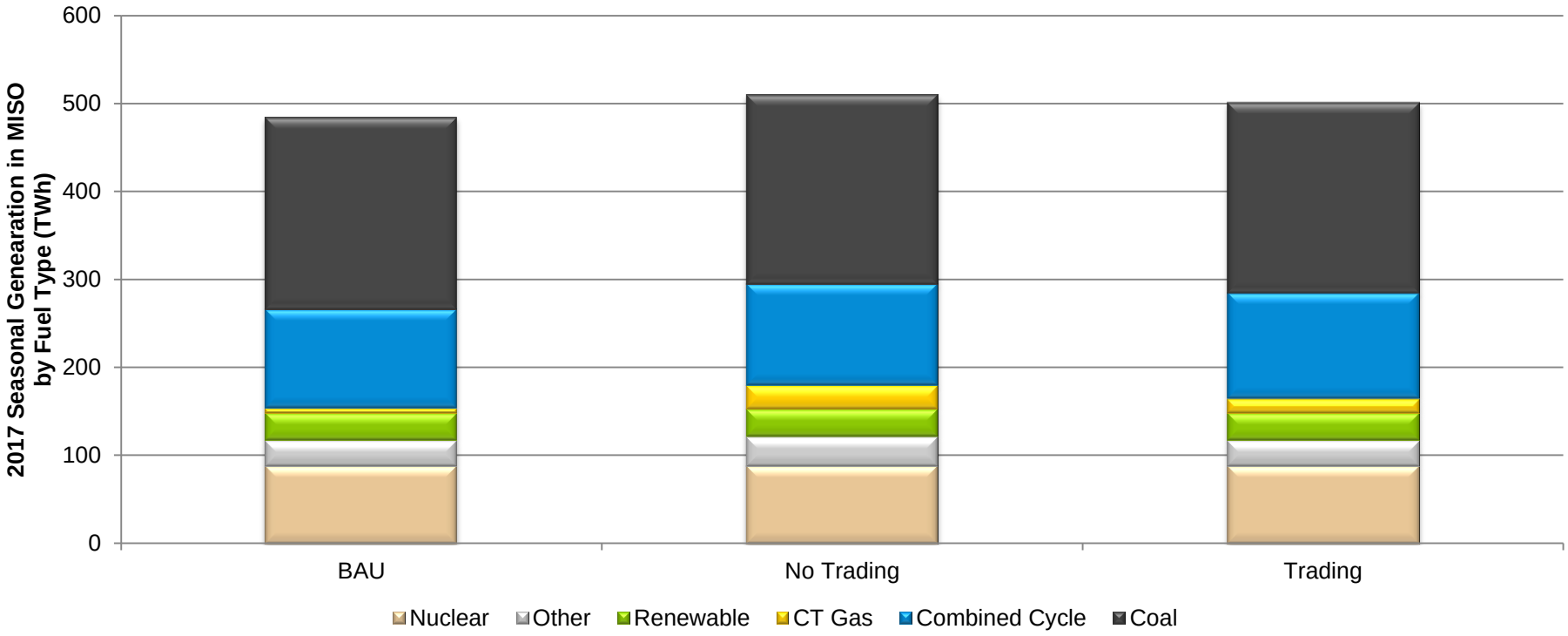
**Seasonal = May through September*

In 2017, MISO states in aggregate perform under budget with seasonal NOx trading



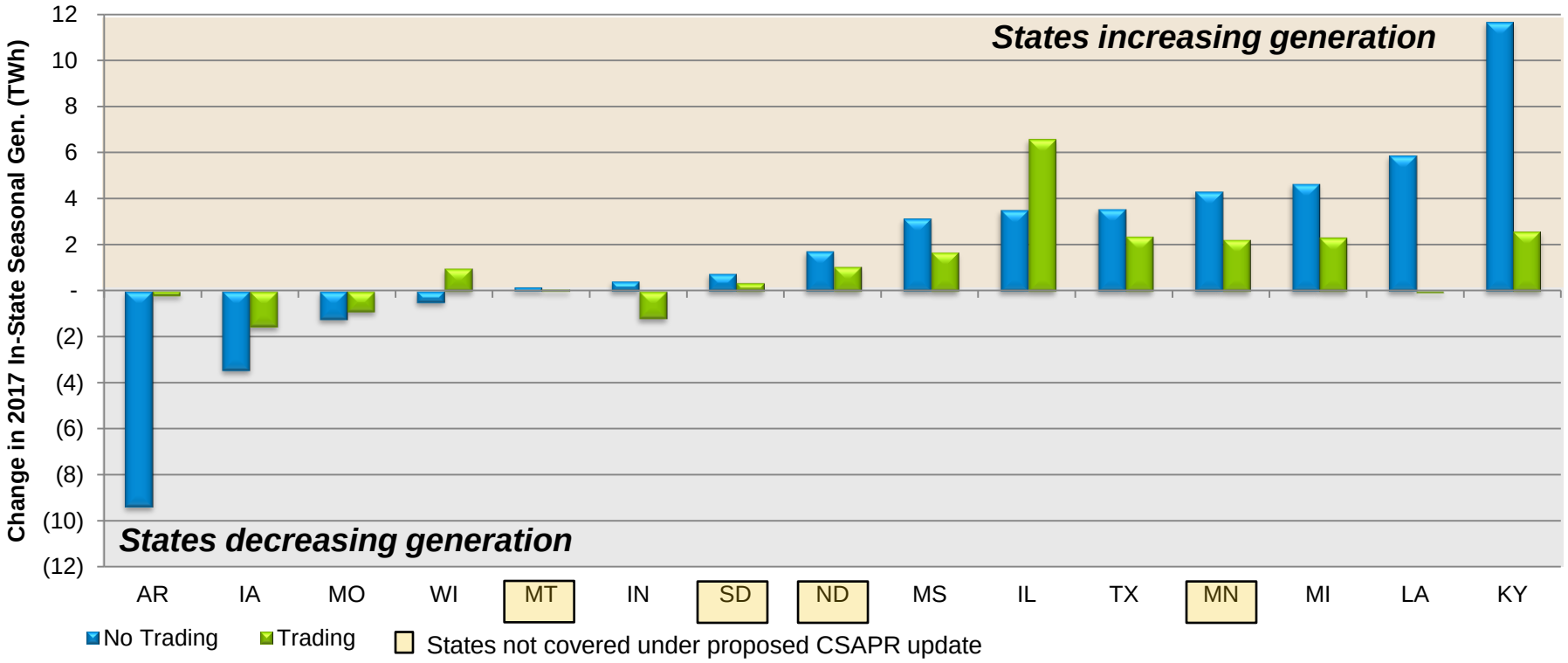
- With no trading, MISO states' emit up to their respective seasonal NOx emissions budgets
- Several MISO states purchase allowances under trading to emit over their budget

In aggregate for MISO states, 2017 seasonal generation shifts in fuel mix are small



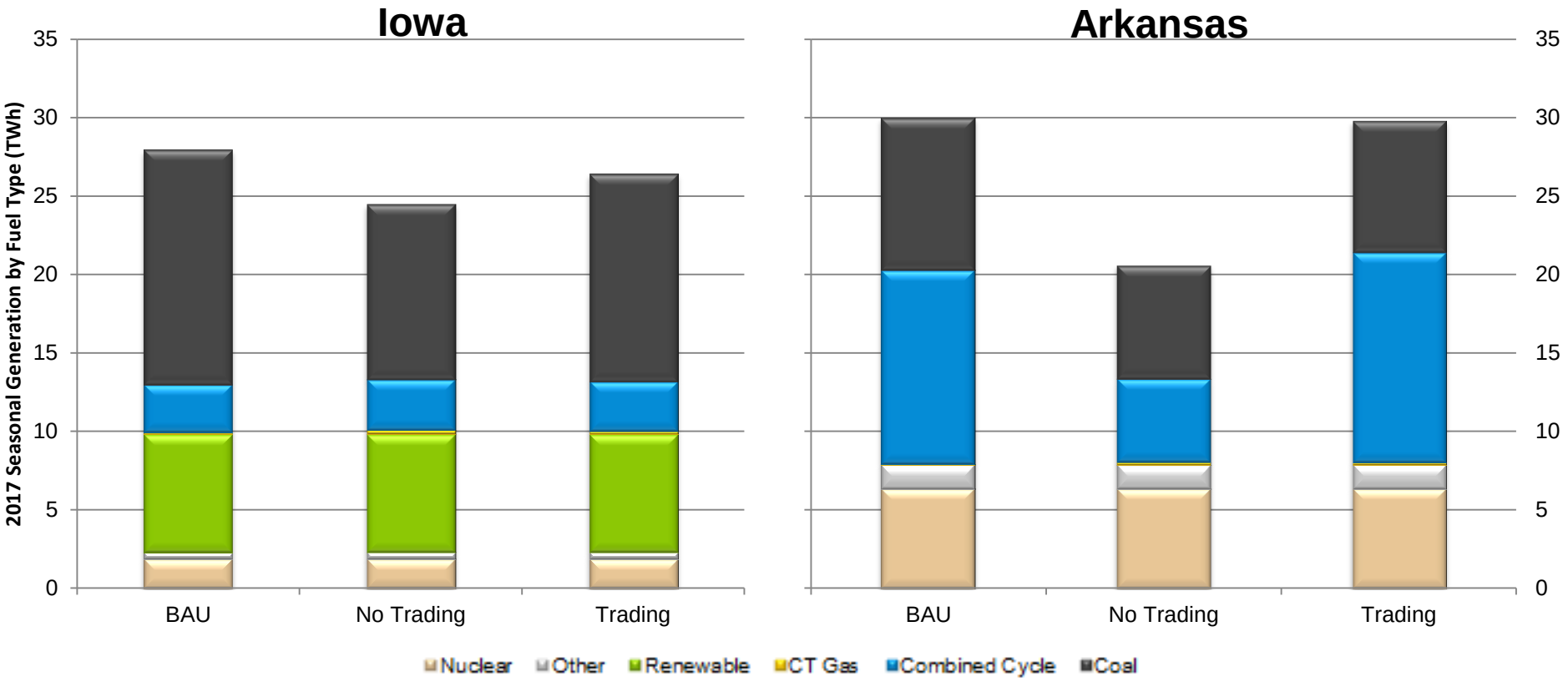
- MISO states meet CSAPR constraint by shifting coal to gas
- MISO states also increases overall generation to balance decreases elsewhere in the EI

Trading reduces the extent of changes in exports or imports in 2017



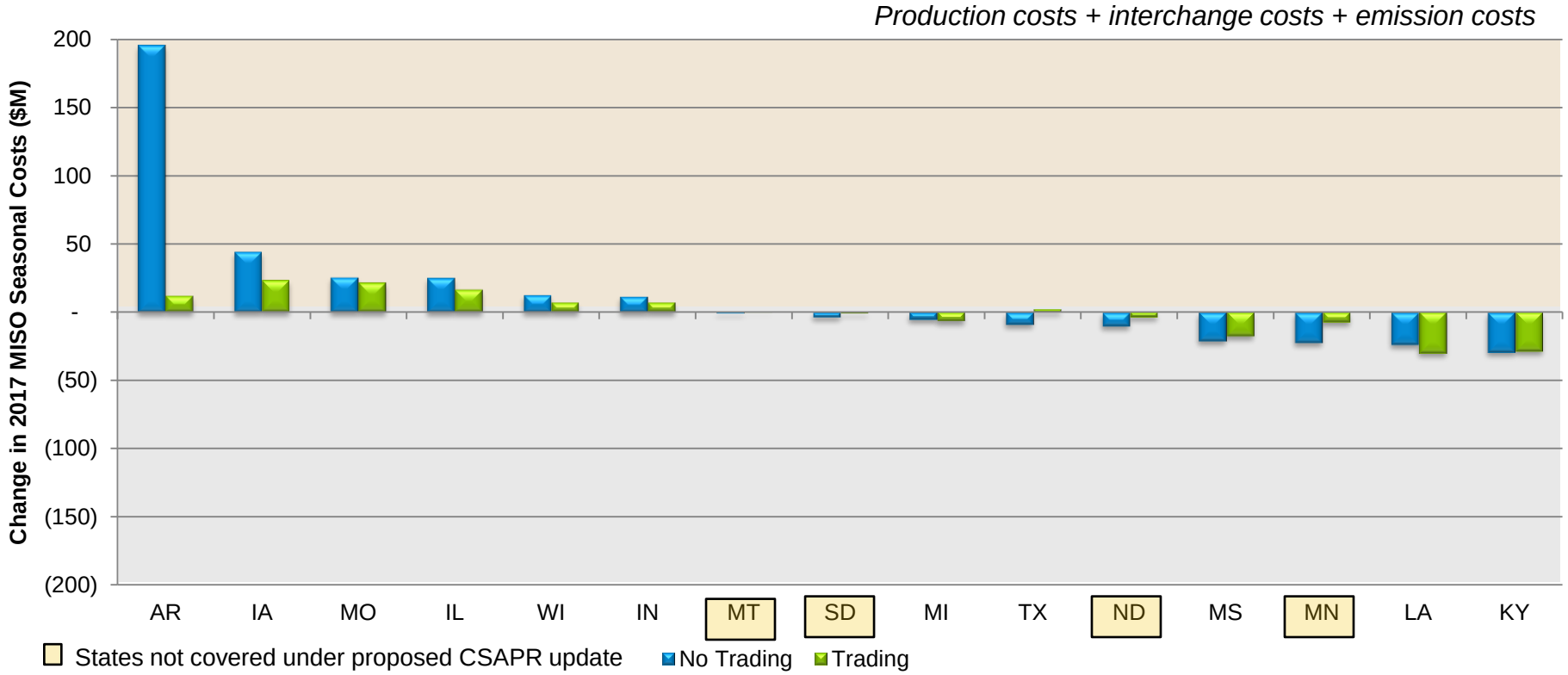
- MISO states generally increase generation output under seasonal NOx constraints
- MISO states without the constraint also increase generation

Compliance in 2017 may be met with shift from coal to gas



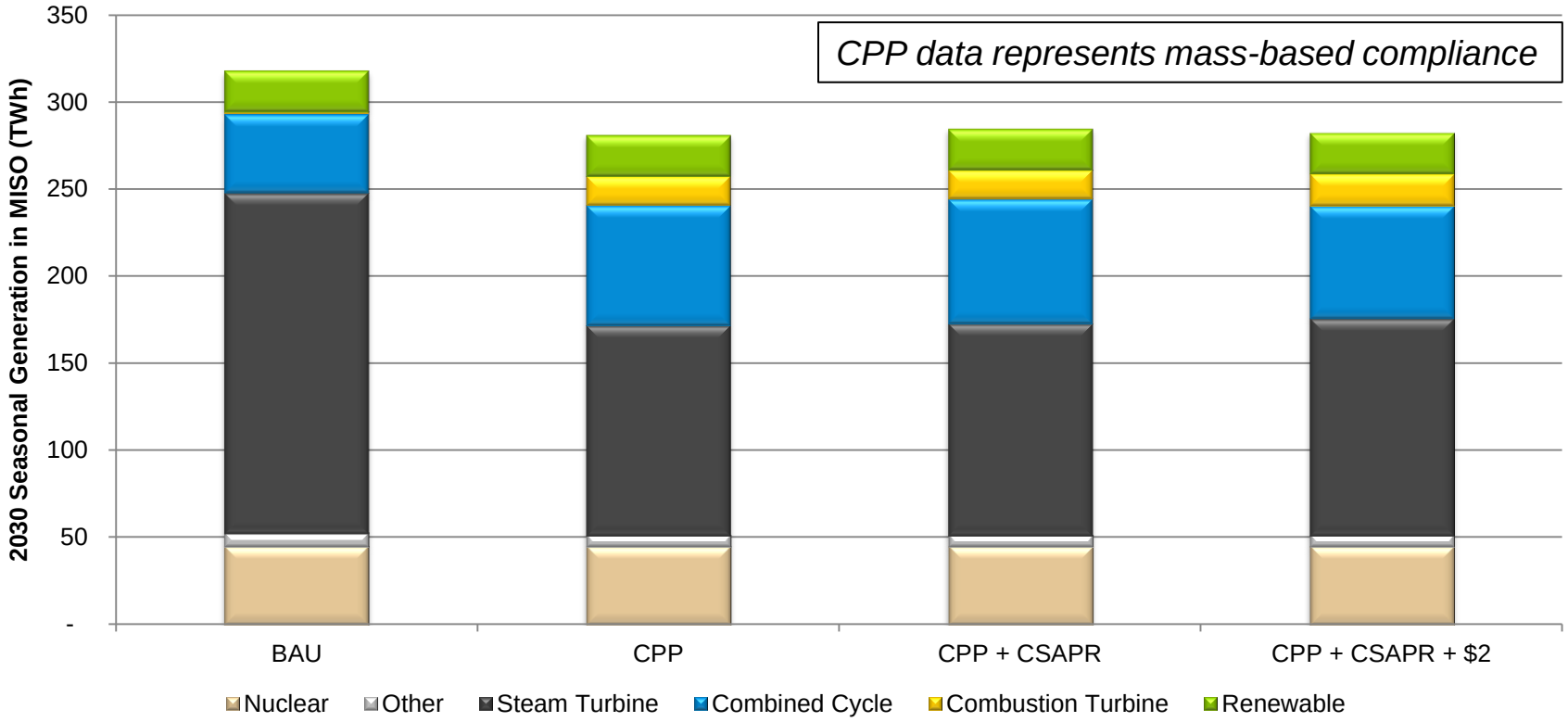
- Coal dispatch is likely to decrease under seasonal NOx constraint
- Gas dispatch may increase in gas heavy states

MISO states with more difficult compliance in 2017 see increased costs



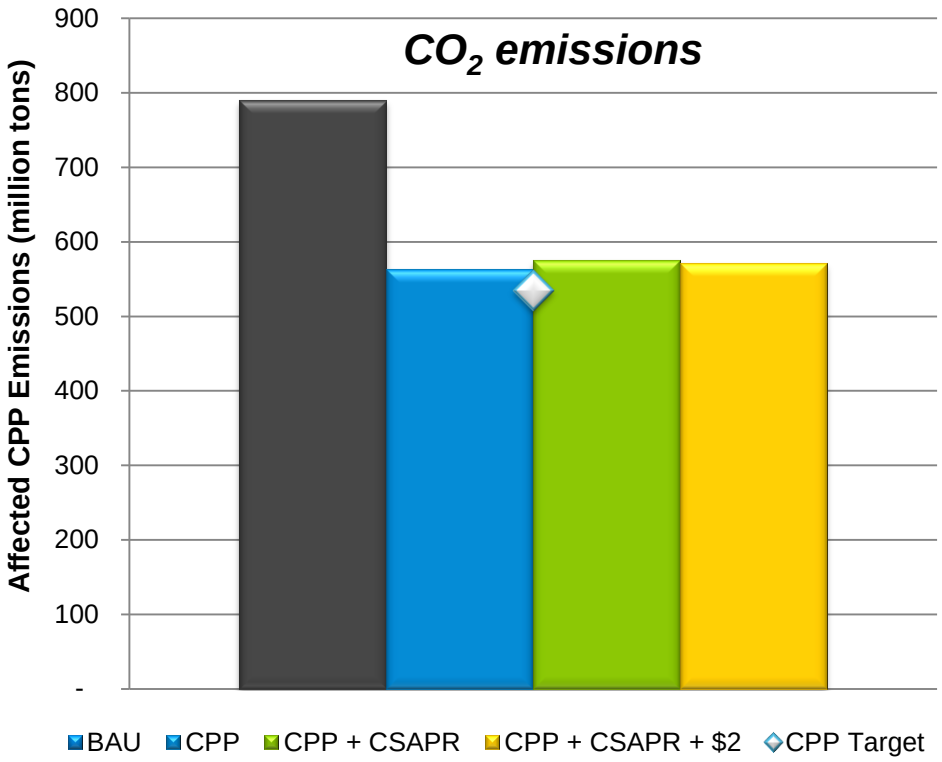
- Non-covered MISO states tend to see reduced production + interchange costs during the restricted emission season

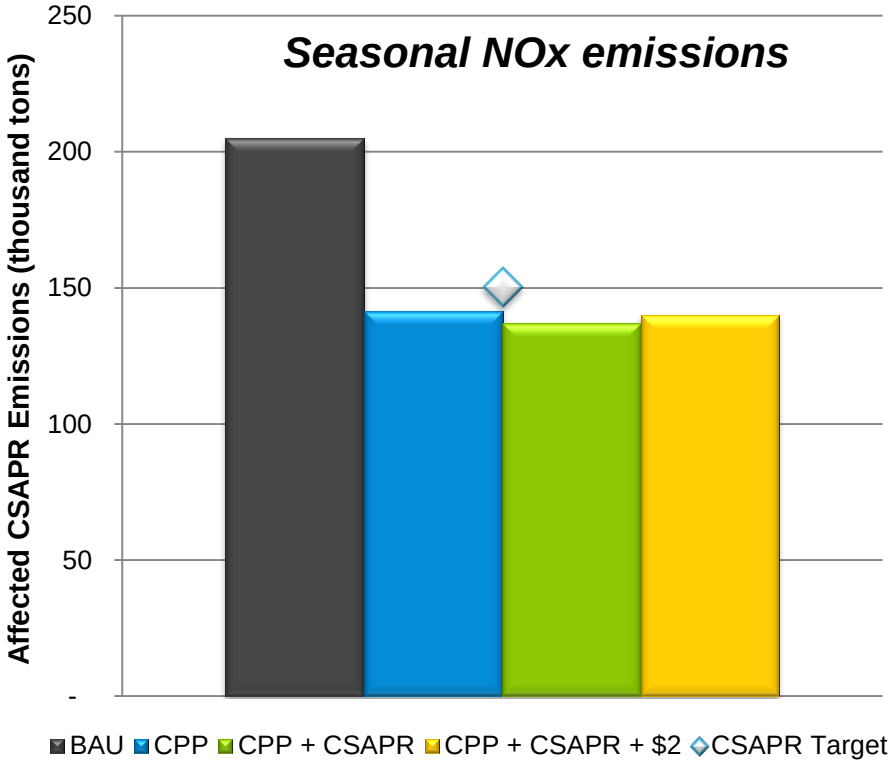
In 2030, CSAPR does not significantly alter how MISO performs under CPP compliance



- Coal to gas shift remains a compliance option
- CPP's effect on CT gas dispatch in MISO states does not change with the seasonal NOx constraint

In 2030, MISO states can meet CSAPR constraint with little change to CPP emissions





- In MISO, under the CPP and CSAPR together, CO_2 emissions increase slightly and NOx emission decrease slightly
- An increase in gas price reduces CSAPR's interaction with the CPP constraint
- CO_2 price is relatively unaffected by addition of the CSAPR constraint

Next Steps and Contact Info

- **Next Steps**
  - Continue discussions with interested parties on the impact of CSAPR to specific areas

- **Additional questions? Please contact:**

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