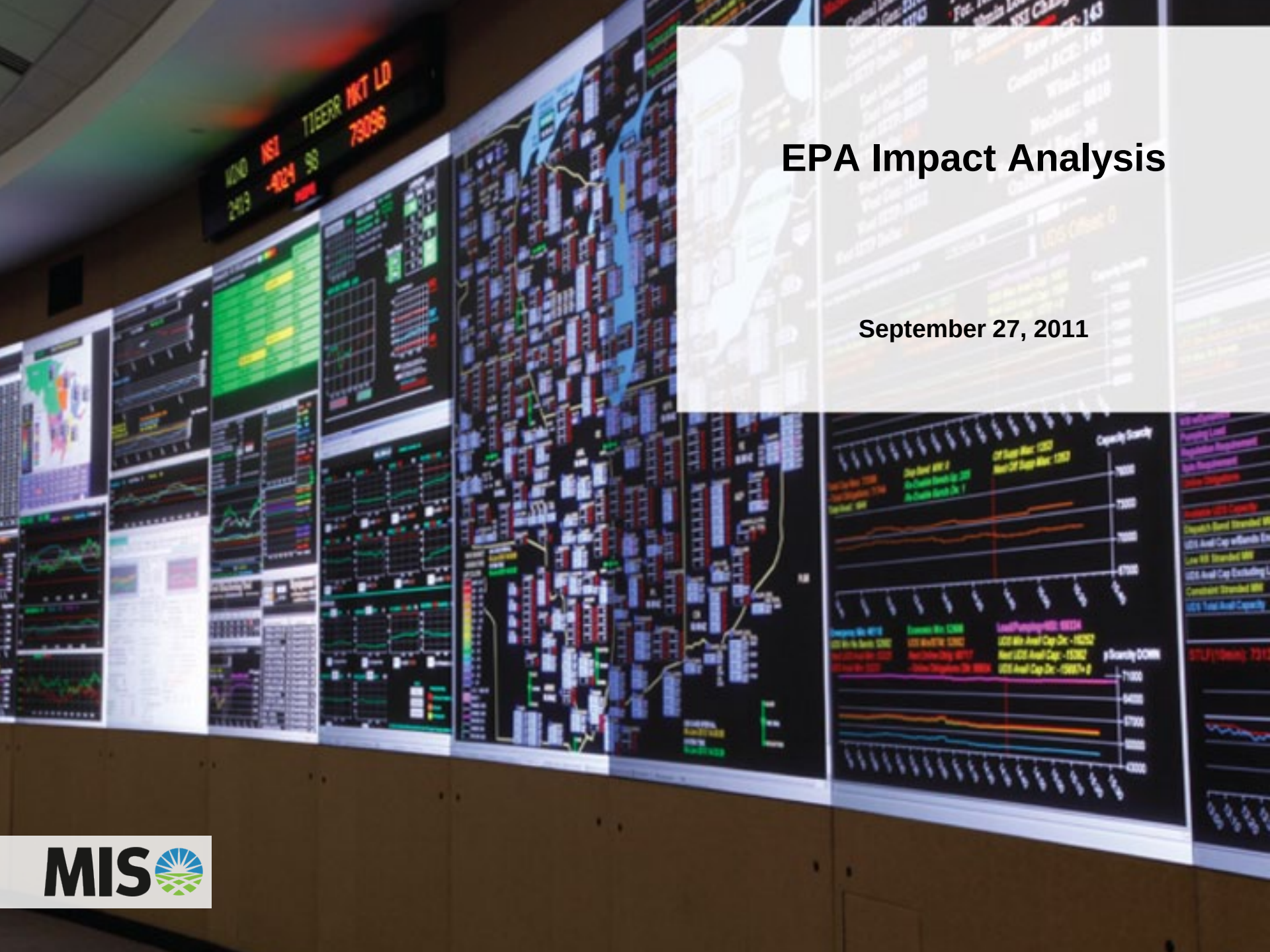
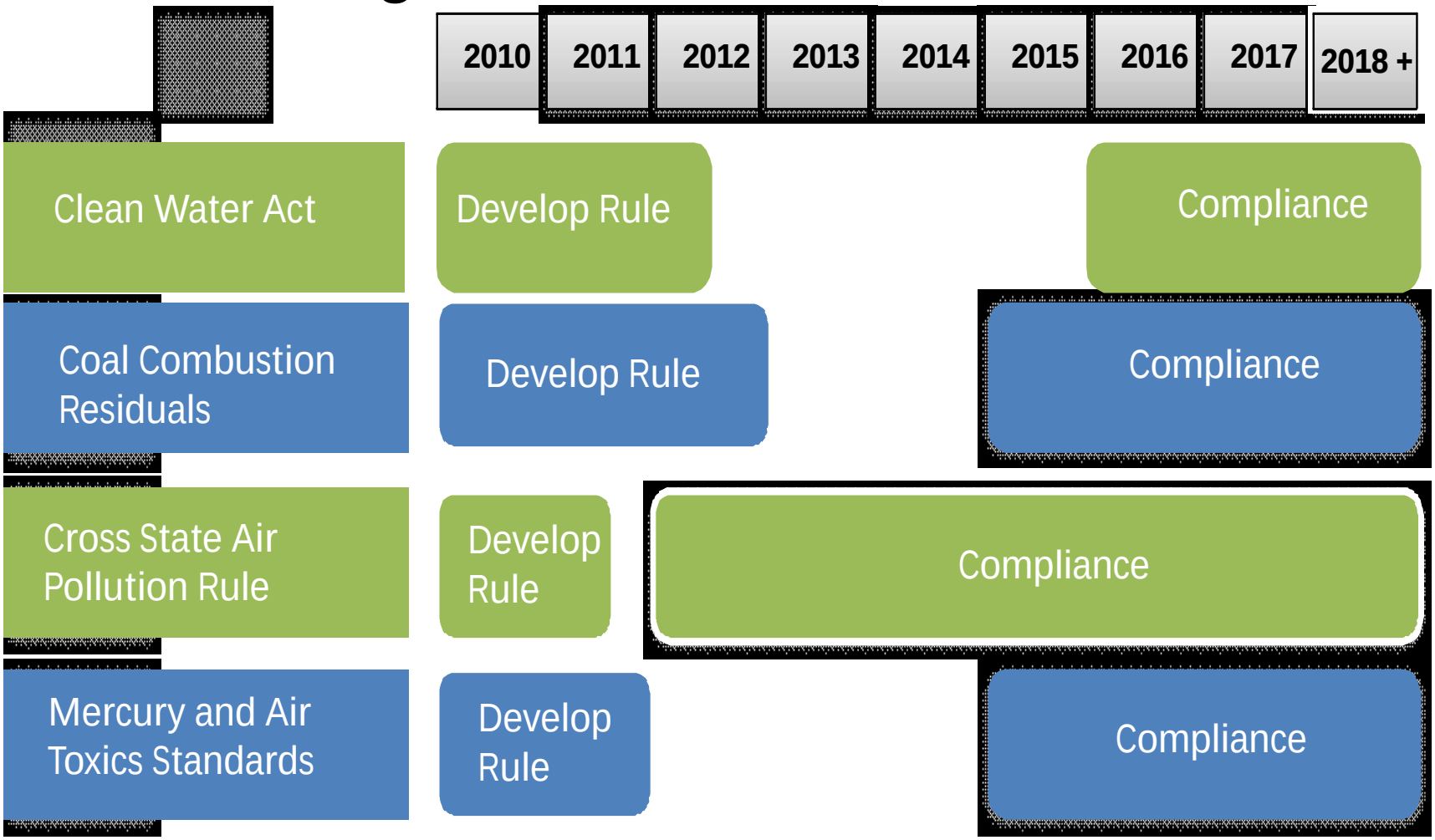


# EPA Impact Analysis

**September 27, 2011**

MISO

# Environmental Protection Agency Proposing Four New Regulations



# Study Overview

- Given proposed EPA regulations, study goal is to address four key questions:
  - Are there resource adequacy risks?
  - Are there transmission adequacy risks?
  - What are the impacts on the energy markets?
  - What are the impacts on capital costs to the system?

- A multi-step study methodology was applied
  - Performed 400 sensitivity screens which identified nearly 13,000 MW at risk of retirement
  - Considered at-risk units in the regional resource forecast model to determine whether retirement or retrofit was the more economic option
  - Evaluated localized impacts to system reliability from unit retirement
  - Estimated impacts to energy prices from generation portfolio changes

# Overview of Impacts

- 12.6 GW of Coal Capacity Identified as at-risk, with 2.9 GW of capacity identified as likely to retire under more likely scenarios ($4.50 natural gas price and $0/ton carbon cost)

- Capital Investment of $31.6 to $33.0 Billion will be required to retrofit and/or replace units
    - 12.6 GW of retirement will require replacement of 10 GW to maintain reserve margins through year 2016

- Energy Prices will increase from $1/MWh to as high as $5/MWh

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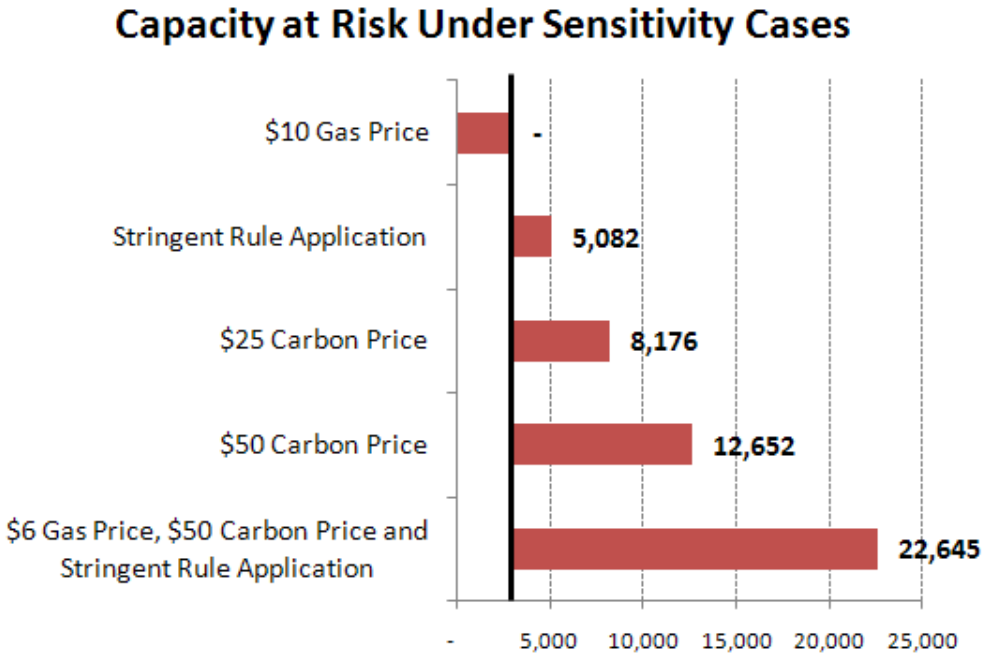
# Uncertainties Could Drive Higher Numbers of At Risk Units and Increased Cost Impact

- 3 of the 4 rules have not been finalized
  - Cross State Air Pollutants final rule more aggressive than initial proposal
- Energy prices could increase with a higher natural gas price or a carbon cost
- Carbon constraints, if implemented and significant, will result in fleet configuration changes
- Total system costs difference is only 1.1% between 2.9 GW and 12.6 GW retirements



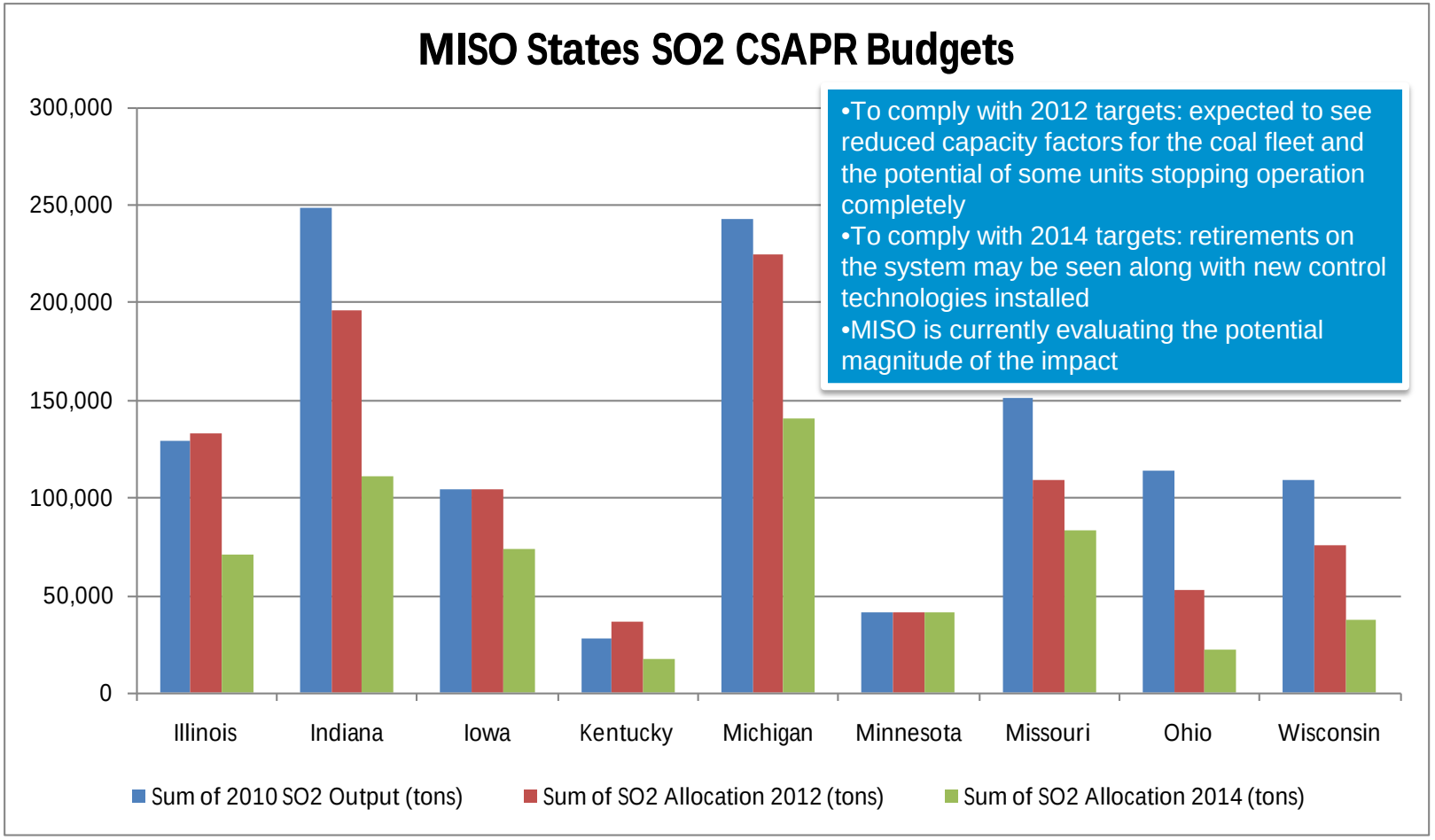
# Impacts on Resource Adequacy

| | No Capacity Retirements due to EPA Compliance | | 3 GW Coal Generation Retirements | | 12.6 GW Coal Generation Retirements | |
|---|---|---|---|---|---|---|
| | 2016 | 2021 | 2016 | 2021 | 2016 | 2021 |
| Projected Reserve Margin (percent) | 22.5 | 18.6 | 19.2 | 15.5 | 8.3 | 5.1 |
| **Reserve Requirement (percent)** | **17.4** | **18.2** | **17.4** | **18.2** | **17.4** | **18.2** |

# Cross States Air Pollutant Rule (CSAPR)

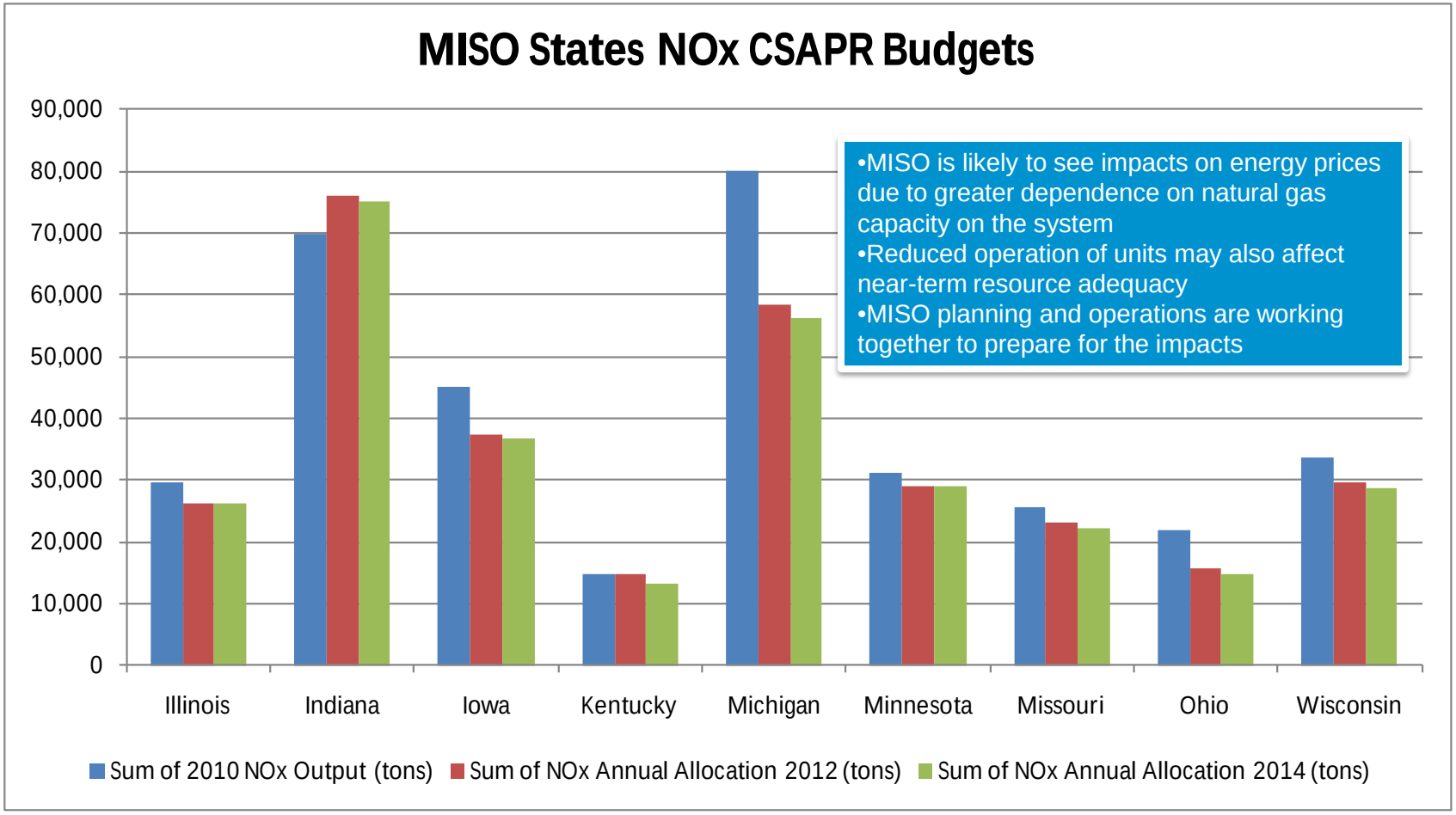
- Rule finalized in July, 2011, with compliance beginning January 2012
  - In general, final rule is more aggressive for state limitations than the initially proposed Clean Air Transport Rule
- The Cross State Air Pollutant Rule will likely result in greater impacts than presented in current study
  - Expect higher energy market offers driven by participant need to reduce dispatch hours
  - The potential for capacity removal in the near term could accelerate the removal of the current resource surplus

# Impact of Cross State Air Pollutants Rule SO2 Budgets




MISO designated unit allocation and production only

# Impact of Cross State Air Pollutants Rule NOx Budgets



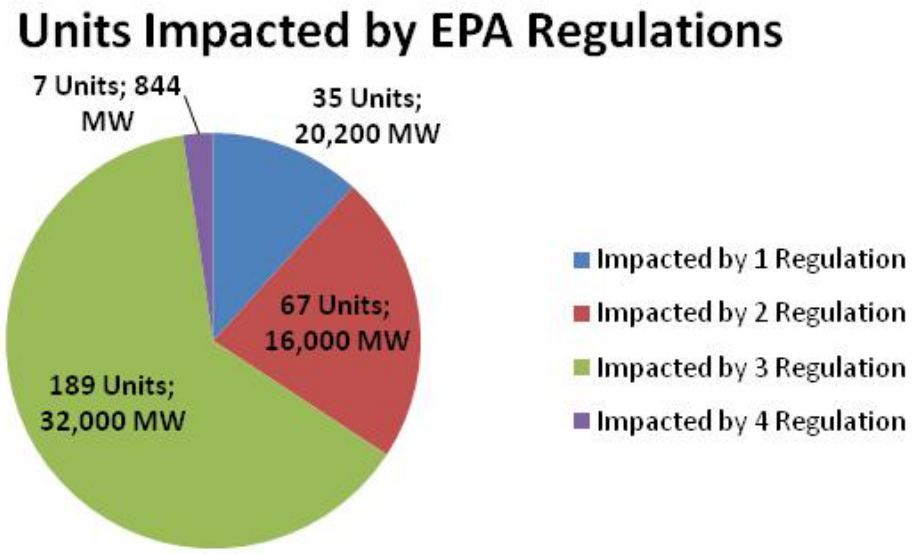

MISO designated unit allocation and production only

# Next Steps

- Update impacts to reflect final Cross State Air Pollution Rule
- Evaluate adequacy of natural gas infrastructure

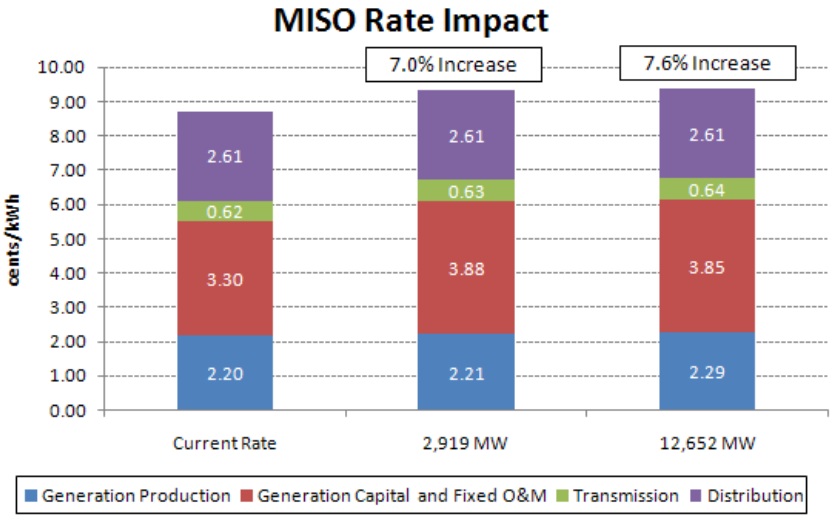
# APPENDIX

# EPA Regulations Will Impact MISO Coal Fleet

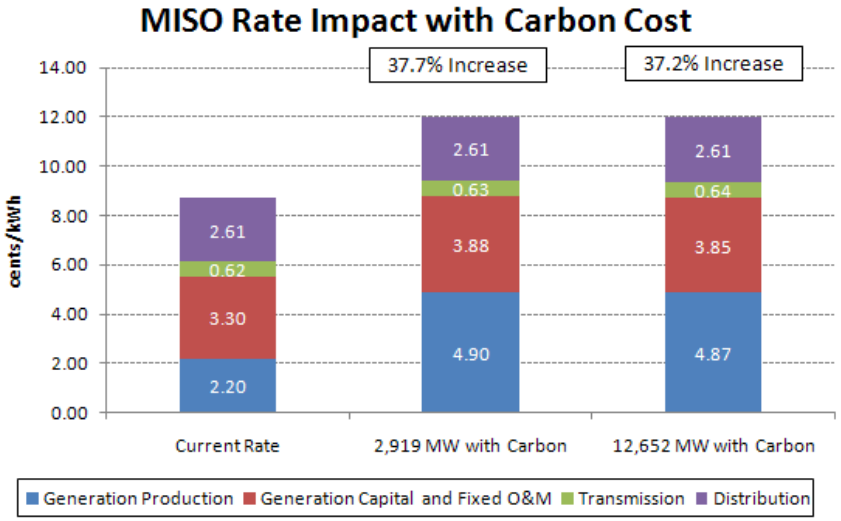



- 298 Coal Units totaling 68,000 MW- 100% of the MISO coal fleet - will be impacted by one or more of the proposed regulations
- Impacts will range from installation of control equipment to redispatch to retirement

# Rate Impact Evaluation




•At $4.50 gas, the potential impact to rates is similar at both the lower and higher retirement levels



# Study Process