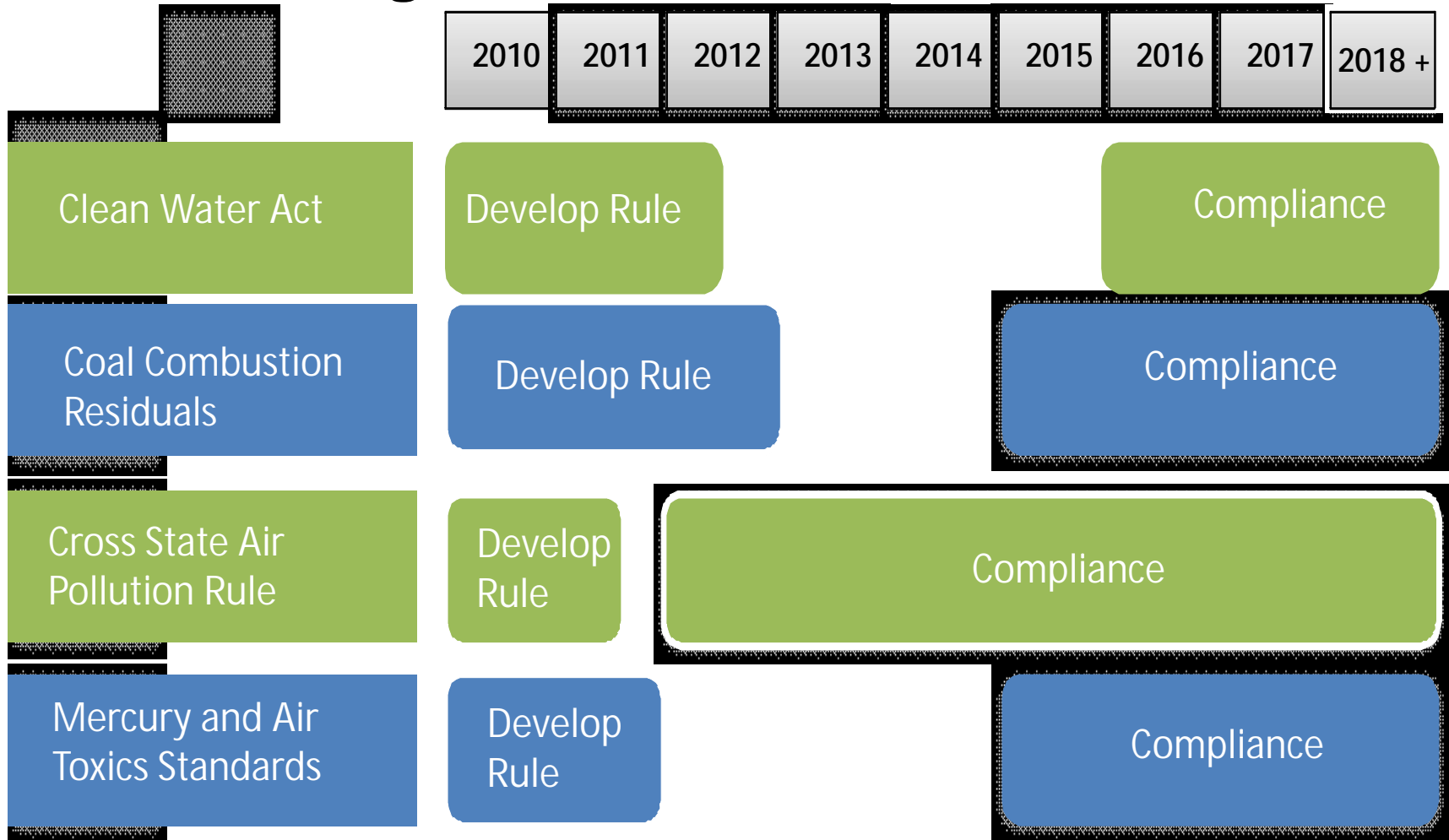


EPA Impact Analysis

September 27, 2011

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

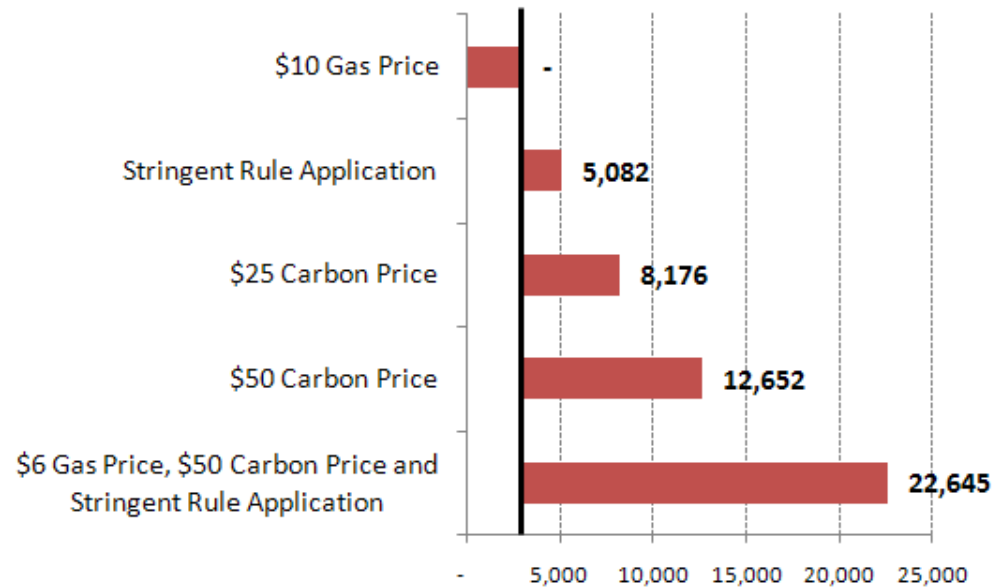
Overview of Impacts

- 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

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

Capacity at Risk Under Sensitivity Cases



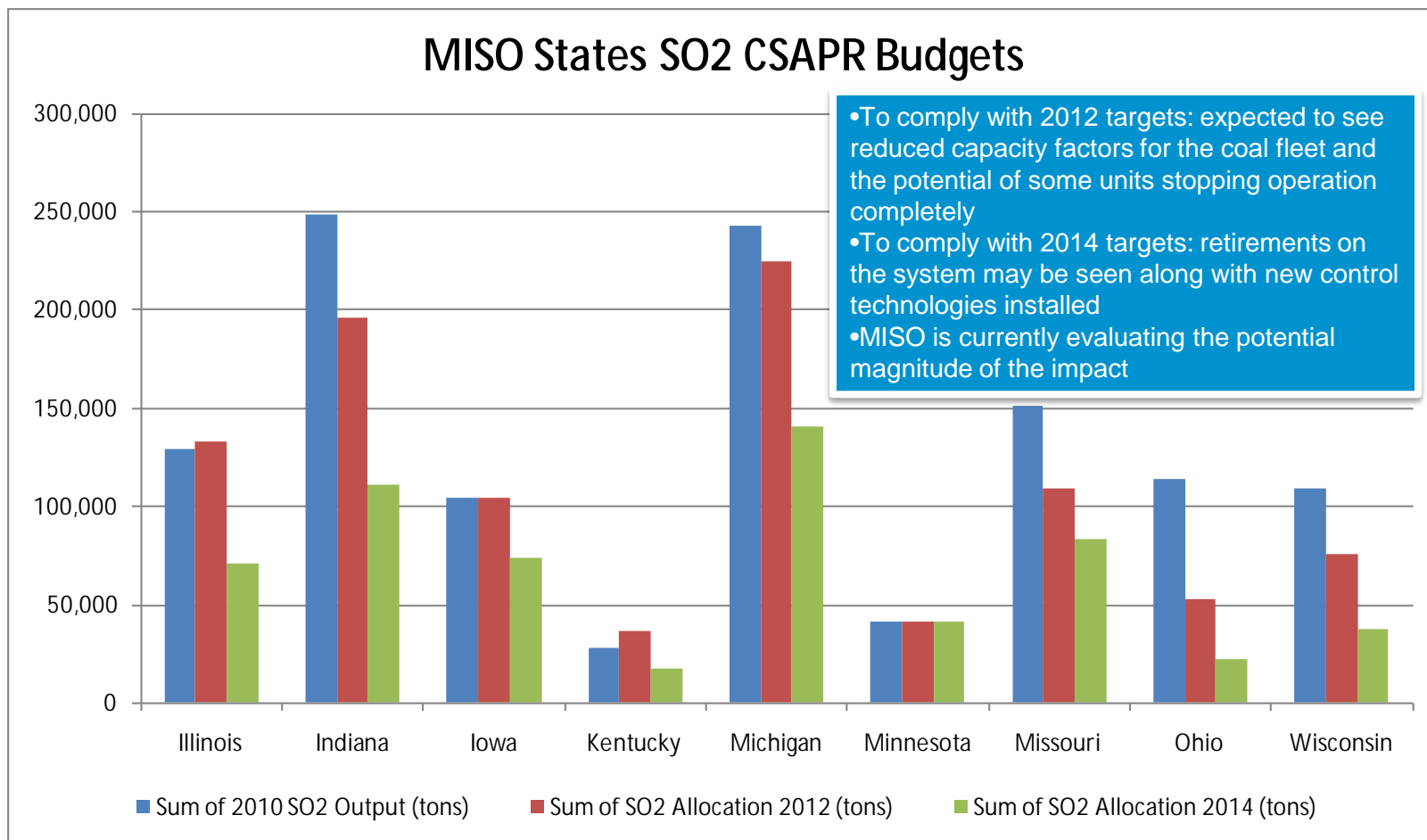
Impacts on Resource Adequacy

	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

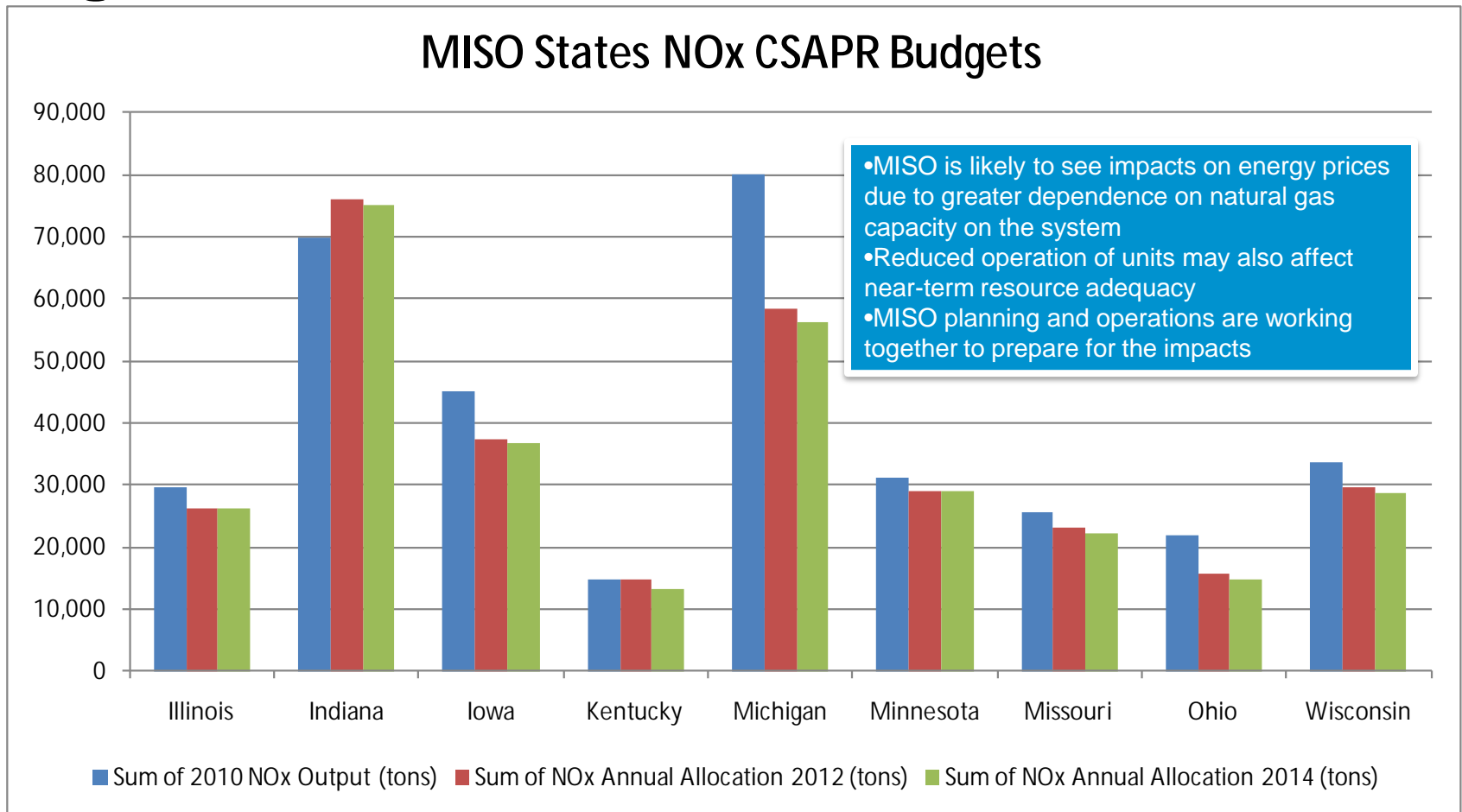
Cross States Air Pollutant Rule (CSAPR)

- 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



Impact of Cross State Air Pollutants Rule NOx Budgets



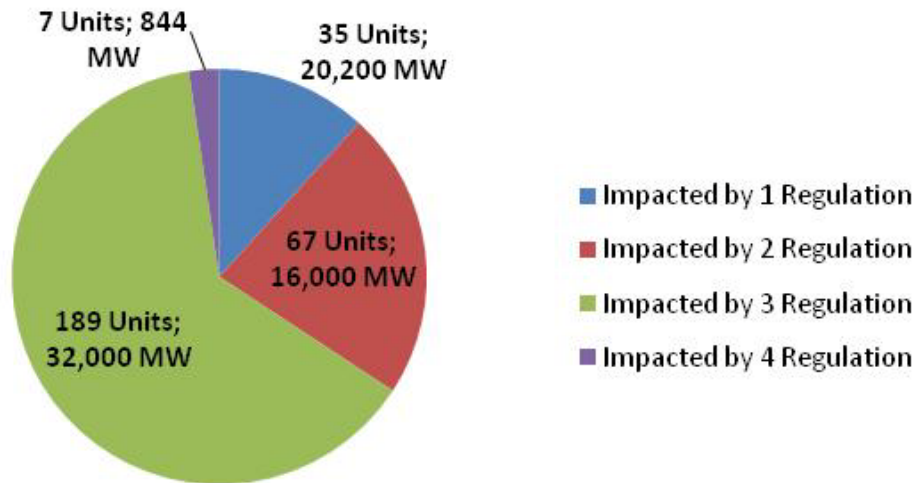
Next Steps

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

APPENDIX

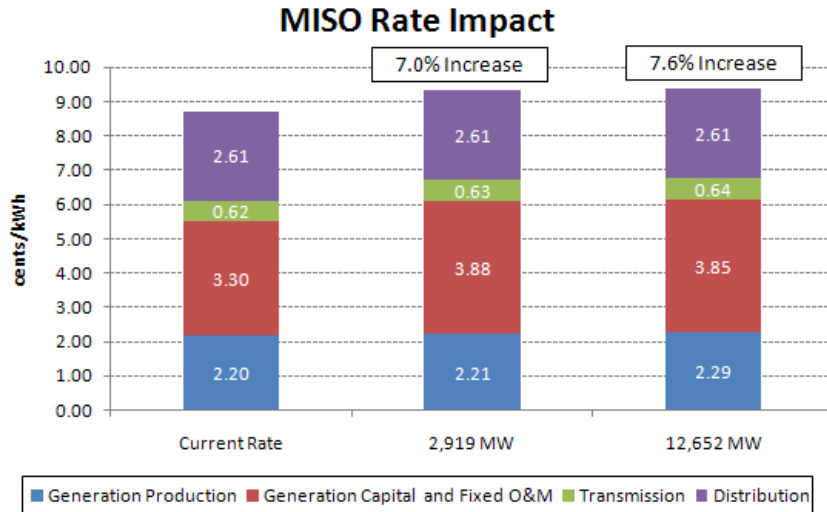
EPA Regulations Will Impact MISO Coal Fleet

Units Impacted by EPA Regulations

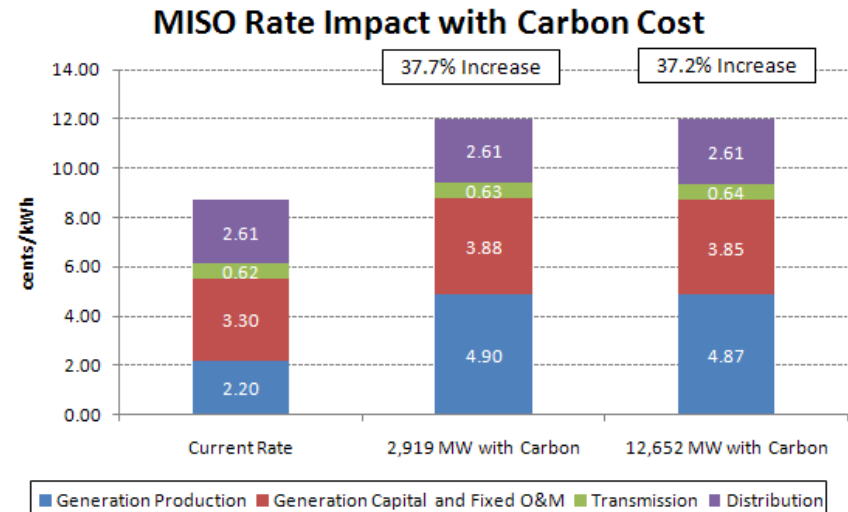


- 298 Coal Units totaling 68,000 MW- 100% of the MISO coal fleet - will be impacted by one or more of the proposed regulations
- Impacts will range from installation of control equipment to redispatch to retirement

Rate Impact Evaluation



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



Study Process

