

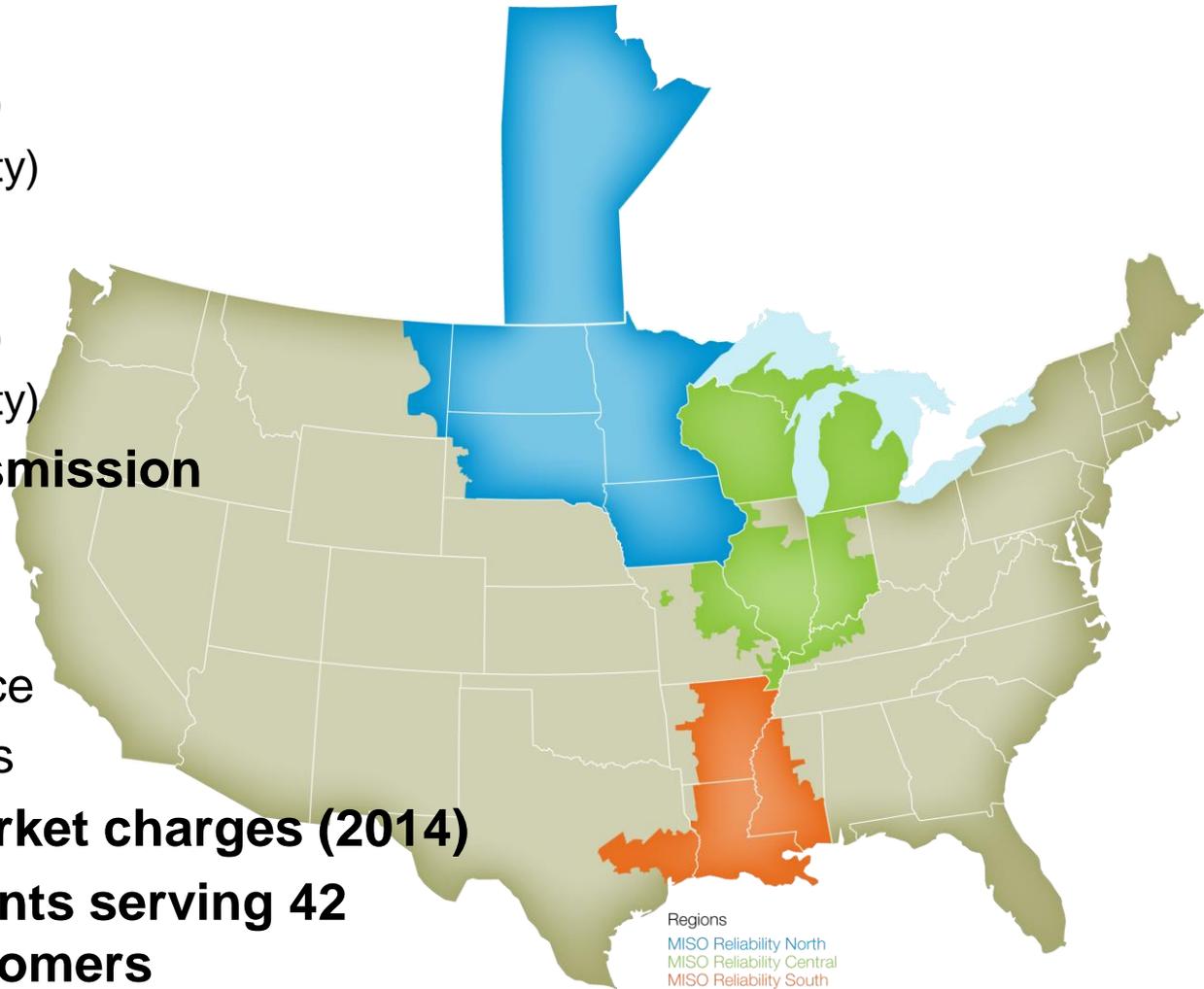
A large, light gray sunburst graphic is positioned on the left side of the slide, extending from the top left towards the center. It consists of numerous triangular rays of varying lengths radiating from a central point.

The Changing Mix: Reliability and Infrastructure Needs

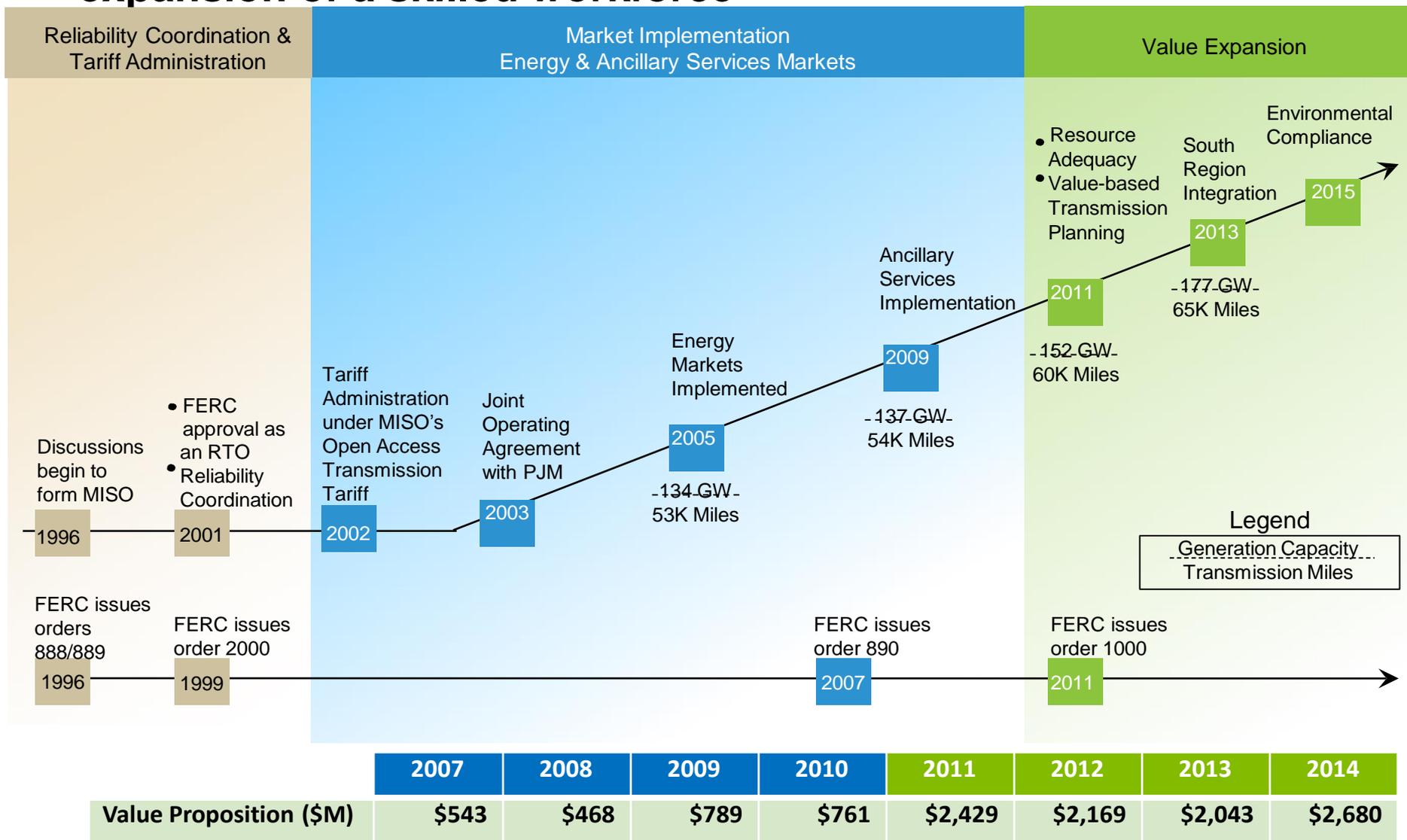
**National Conference of State Legislatures
Clean Power Plan Policy Workshop**
November 10, 2015

Current Scope of Operations

- **Generation Capacity**
 - 180,711 MW (market)
 - 195,231 MW (reliability)
- **Historic Peak Load**
(July 20, 2011)
 - 127,125 MW (market)
 - 133,181 MW (reliability)
- **65,800 miles of transmission**
- **Footprint**
 - 15 States
 - 1 Canadian Province
 - City of New Orleans
- **\$37 billion gross market charges (2014)**
- **425 Market Participants serving 42 million end-use customers**



MISO's growth and value expansion has been driven by the expansion of a skilled workforce



The Clean Power Plan is just one of several major EPA regulations affecting the electric power industry



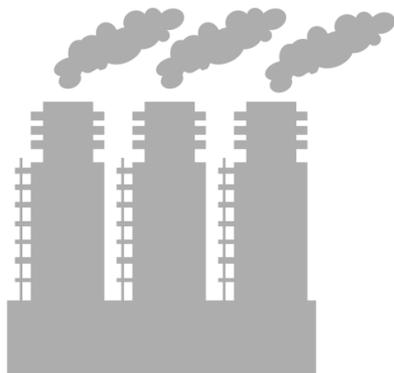
Regulation	MATS	CSAPR & CWIS	Clean Power Plan & New Source CO ₂ Standards	Ozone
Regulation	Mercury and Air Toxics Standards	Cross State Air Pollution Rule & cooling water intake structure rule (316(b))	CO ₂ limits for existing & new power plants	National Ambient Air Quality Standard (NAAQS) for ozone
Compliance Dates	In effect	Both in effect	Existing: Beginning 2016 ¹ New: Beginning in 2015	In effect; EPA finalized a more stringent version in Oct. 2015
Impacts	<ul style="list-style-type: none"> • Significant coal retirements • Outage coordination challenges • Shrinking reserve margins around MISO • Growing dependence on natural gas 	<ul style="list-style-type: none"> • NOx requirements tightened • Higher compliance costs influence plant retirement decisions 	<ul style="list-style-type: none"> • Significant coal retirements • Greater dependence on gas and CO₂-neutral resources • Possible impacts on economic dispatch • New coal builds much more expensive & unlikely 	<ul style="list-style-type: none"> • Existing units could have to install new controls or modify their operations • Possible retirement of coal and/or gas units • Harder to build new coal & gas-fired generation in 'nonattainment' areas

¹ – States must submit “initial” implementation plans by Sept. 6, 2016, and final plans by Sept. 6, 2018.

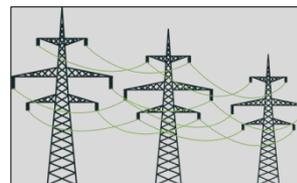
EPA's Clean Power Plan will have multiple impacts on the MISO region and the electric utility industry as a whole

Generation Impacts

- Less coal generation
- More gas generation
- Siting questions: Near existing transmission, or gas pipelines?
- More renewables & energy efficiency



Infrastructure Impacts



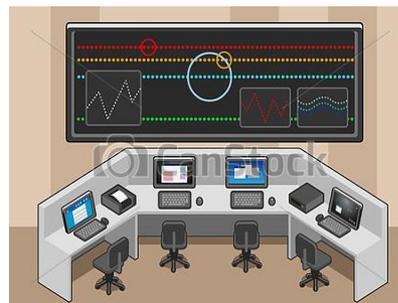
- More transmission and gas pipeline capacity likely needed
- Siting of infrastructure driven by location of new generation & other factors
- Cost-allocation issues

Reliability Impacts

- Will the rule jeopardize resource adequacy at a local/regional level?
- Will states and utilities have enough time to build & permit new resources?
- Will ancillary services continue to be sufficient?



Economic Dispatch Impacts



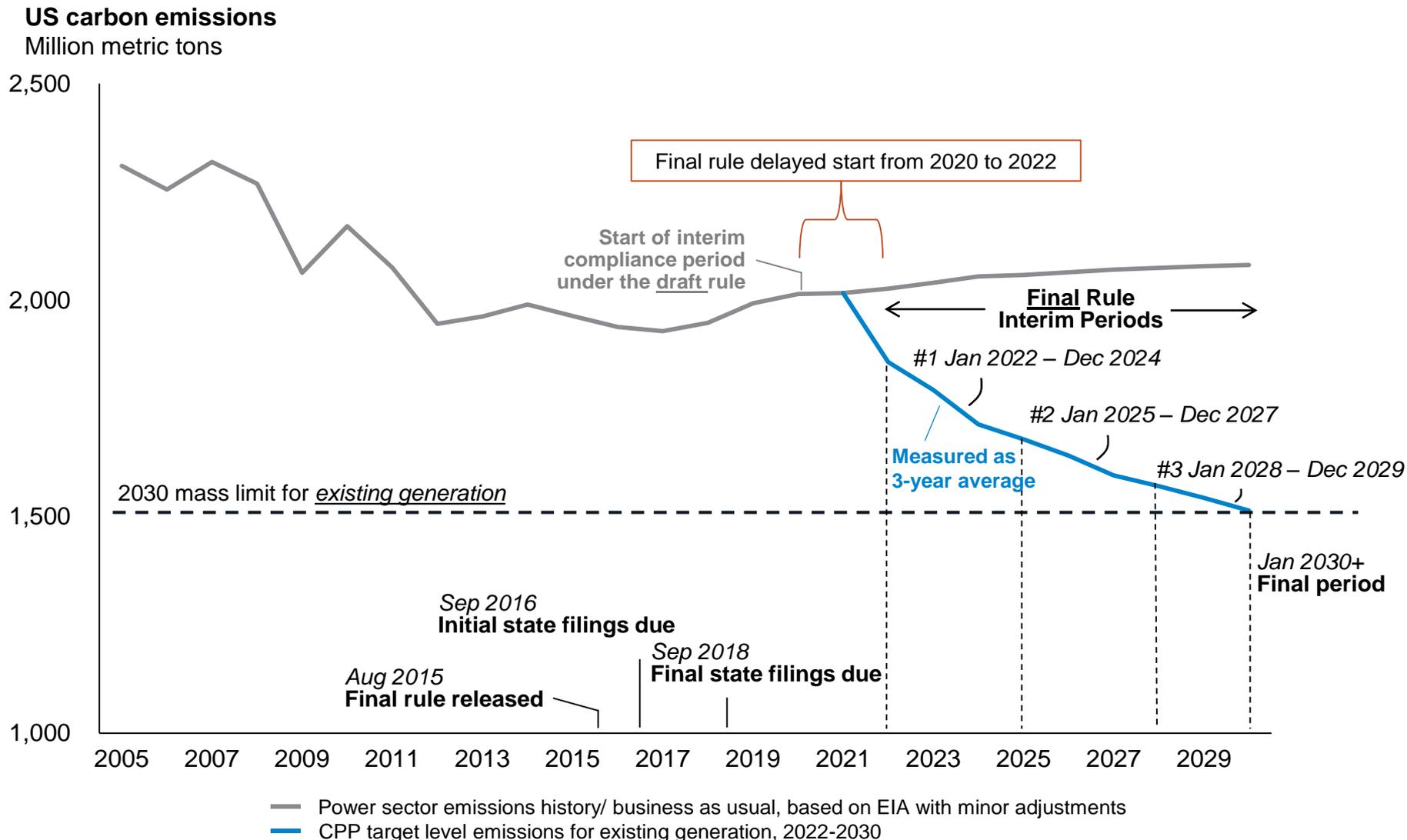
- Which compliance approaches would preserve economic dispatch cost savings?
- How can load growth be accommodated in rate and mass-based compliance plans?
- How can compliance costs best be monetized?

EPA made some changes to the final rule that reflect “asks” that MISO and other industry players made in public comments

“Asks” in MISO’s public comments on the <i>proposed</i> rule	How EPA addressed these “asks” in the final rule
Eliminate the 2020-2029 “Interim Performance Period”	Delayed the start of the interim period by two years, from 2020 to 2022.
Give states more time to develop and submit their implementation plans	Gave states one more month to submit their “initial” implementation plans, and one more year to submit their “final” plans
Allow use of multi-state & regional compliance strategies	Encouraged states to develop “trading-ready” implementation plans
Consider including a “reliability safety valve” (RSV) in the final rule	Included an RSV; also required states to consider reliability concerns when developing their implementation plans
Retain and expand on the flexible compliance options in the proposed rule	Expressed states’ CO ₂ -reduction requirements in both rate and mass forms (among other things)

While the CPP will present challenges, these changes are steps in the right direction in terms of preserving reliability and the benefits of regional operations.

The final rule delayed the start of the interim compliance period by two years, and set a more gradual glide path to final compliance



Source: History and projection without CPP per EIA Annual Energy Outlook 2015 Early Release

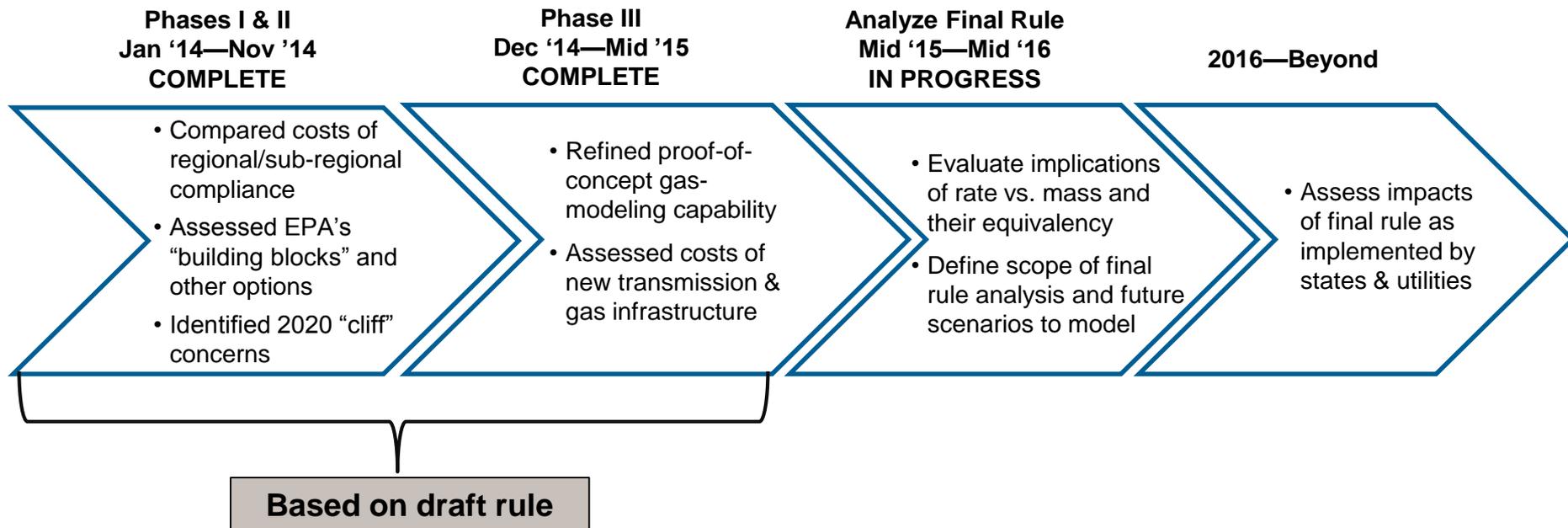
EPA made other changes to the final rule that could make compliance even more costly and/or otherwise difficult

EPA Change from the Draft Rule to the Final Rule	Potential Implications for the MISO Region
Nationally, the rule's aggregate CO ₂ -reduction requirement is more stringent.	Additional burden due to the relatively high CO ₂ emissions in the MISO footprint.
A new EPA methodology set tougher CO ₂ -reduction requirements for states that are heavily reliant on coal.	Additional burden, as the requirements for some MISO-member states became much more stringent.
EPA promotes renewable energy and energy efficiency over new gas-fired generation as a compliance option.	Most likely moot, due to the favorable market conditions associated with the shale-gas boom.

MISO is taking these changes into account as we study the final rule

MISO's Analysis of the Clean Power Plan

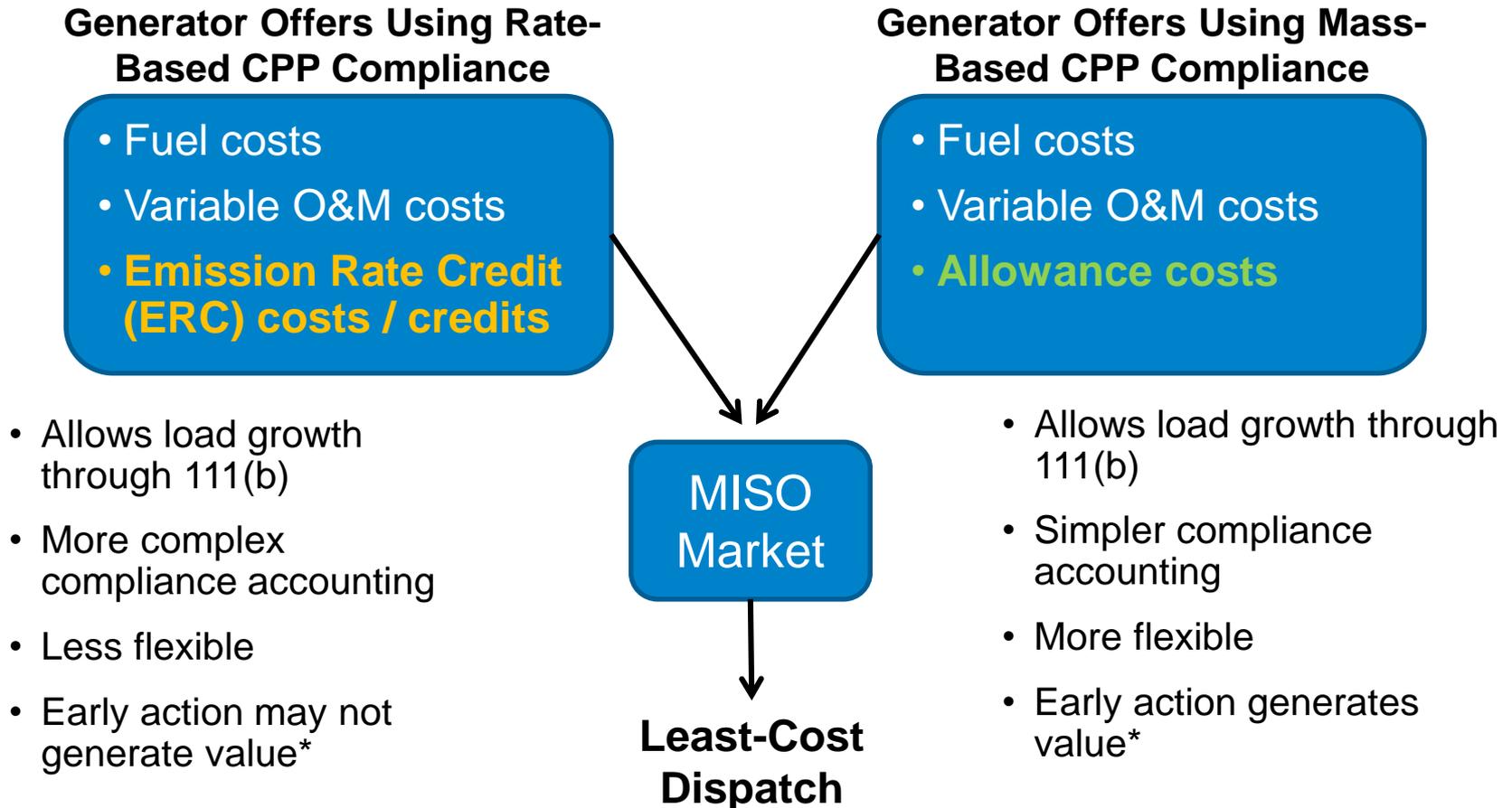
We are working with stakeholders to define the best scenarios to study in order to capture an appropriate range of outcomes possible through 2030 and beyond



Key findings and lessons learned from our earlier analysis of EPA's draft Clean Power Plan include:

- Regional (footprint-wide) compliance is less costly than state-by-state or other sub-regional compliance approaches
- Multi-billion-dollar transmission build-out would be necessary for compliance
- Generation dispatch would change dramatically from current practices
- Improved coordination between electric and natural gas industries has increasing importance
- Building out renewable resources further exacerbates the need for new transmission

Monetizing the value of CO₂ emissions in generation offers will preserve the benefits of regional economic dispatch



Mass-based compliance appears to be a simpler, more direct way of incorporating the value of CO₂ emissions into generator offers.

State-by-state implementation of the CPP could jeopardize the benefits of regional operations

MISO – Current State

Re-balkanized Grid

Planning Reserves

- Footprint diversity lowers planning reserve margin for utilities to ~9%
- Flexibility with renewable placement leads to more economical build-out; geographical dispersion dampens need for reserves

- Utility planning reserve margin requirements return to 18-20%

- Individual state build-out of renewables requires higher reserve margins – likely 25+% - and more capacity to achieve same output

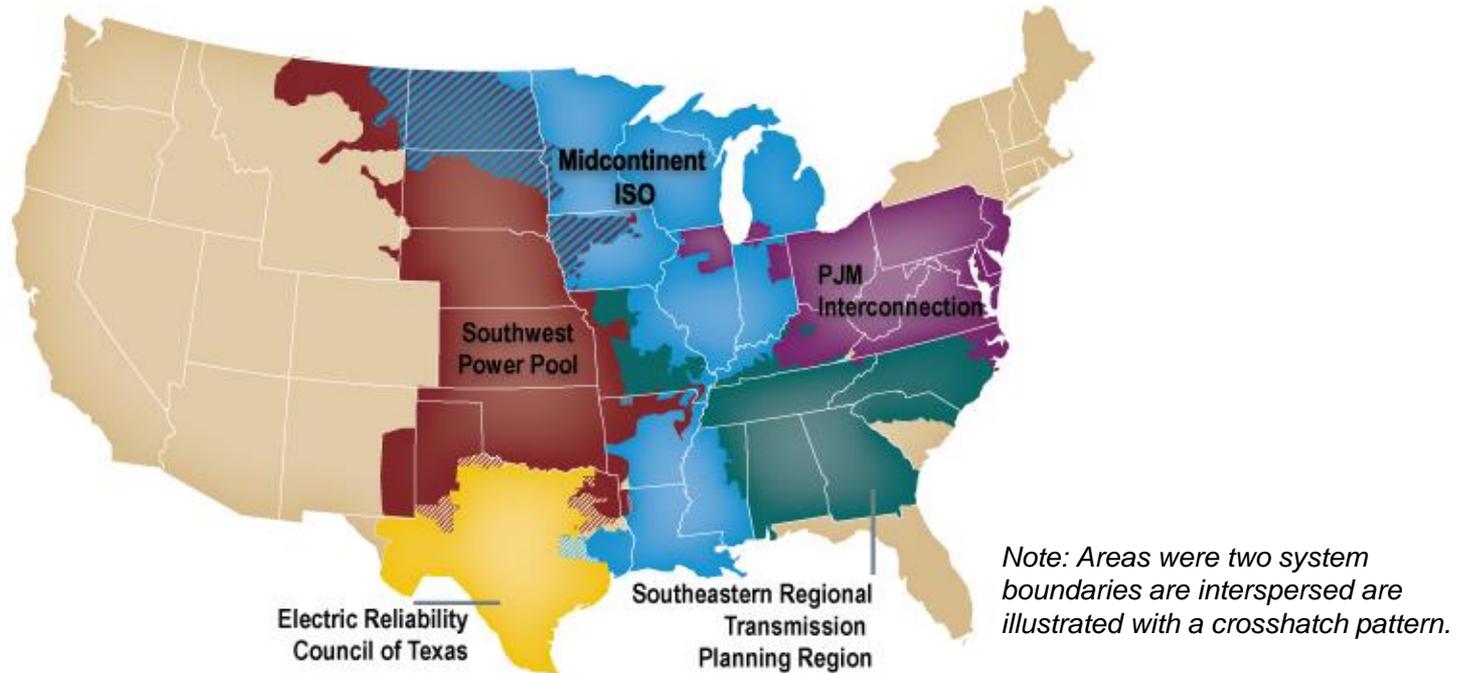
Operating Reserves

- Low regulating reserve requirement – 400 MW – due to generation being controlled to balance single area
- Flexibility with renewable placement leads to more economical build-out; geographical dispersion dampens need for reserves

- Contingency reserves needed in each area, leading to higher requirement (1600 MW pre-MISO)

- Regulation requirement increases to account for need to balance individual areas – Varies depending on amount of renewables

MISO is talking with neighboring system operators about our collective efforts to analyze the Clean Power Plan

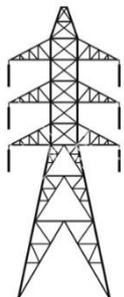


These talks reflect the following realities about the grid system and the CPP:

- Due to the interconnected nature of the grid system, conditions that affect the MISO-controlled portion of the grid may also impact neighboring system operators.
- The impacts of the CPP will be national in scope, reaching beyond MISO's borders and the borders of any other single system operator.

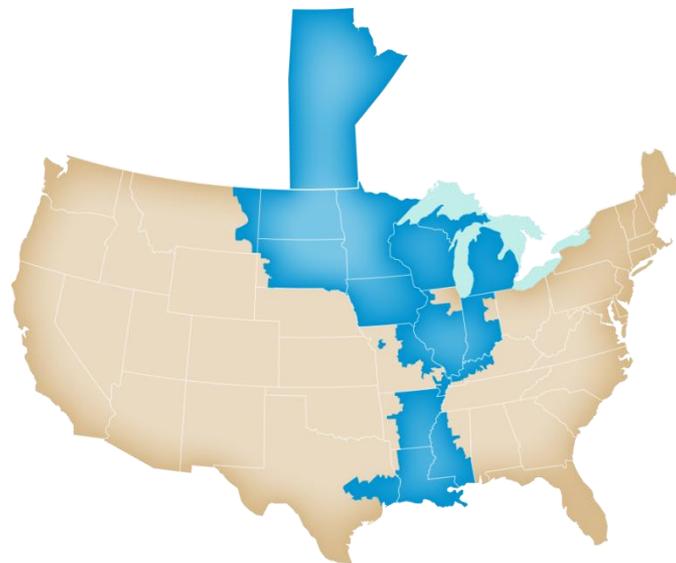
MISO plays key roles with respect to the Clean Power Plan and other forces that impact the footprint, including:

Informing Policymakers and Asset Owners



- How to analyze rate and mass to facilitate regional solutions
- Model impacts of state/regional alternatives
- Requirements of emissions-trading platforms

Enabling the Reliable, Efficient Implementation of Policy Decisions



- Evaluation of emissions-trading platforms
- Assessment of MISO system operational impacts
- Changes to market design
- Transmission planning: second round of Multi-Value Projects?
- Integration of renewables