Missouri PSC - August 18, 2014
Clean Air Act - 111(d) Update

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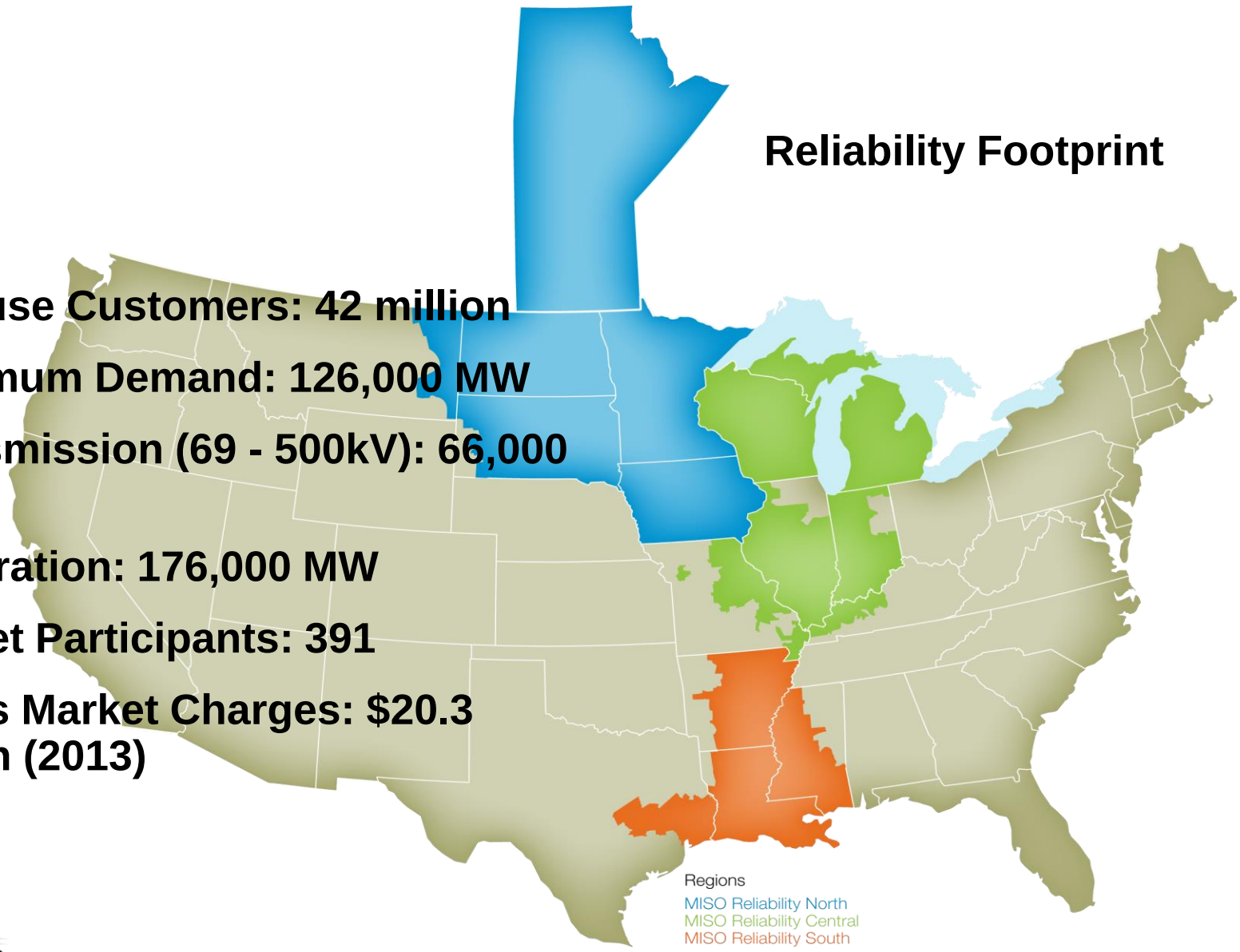
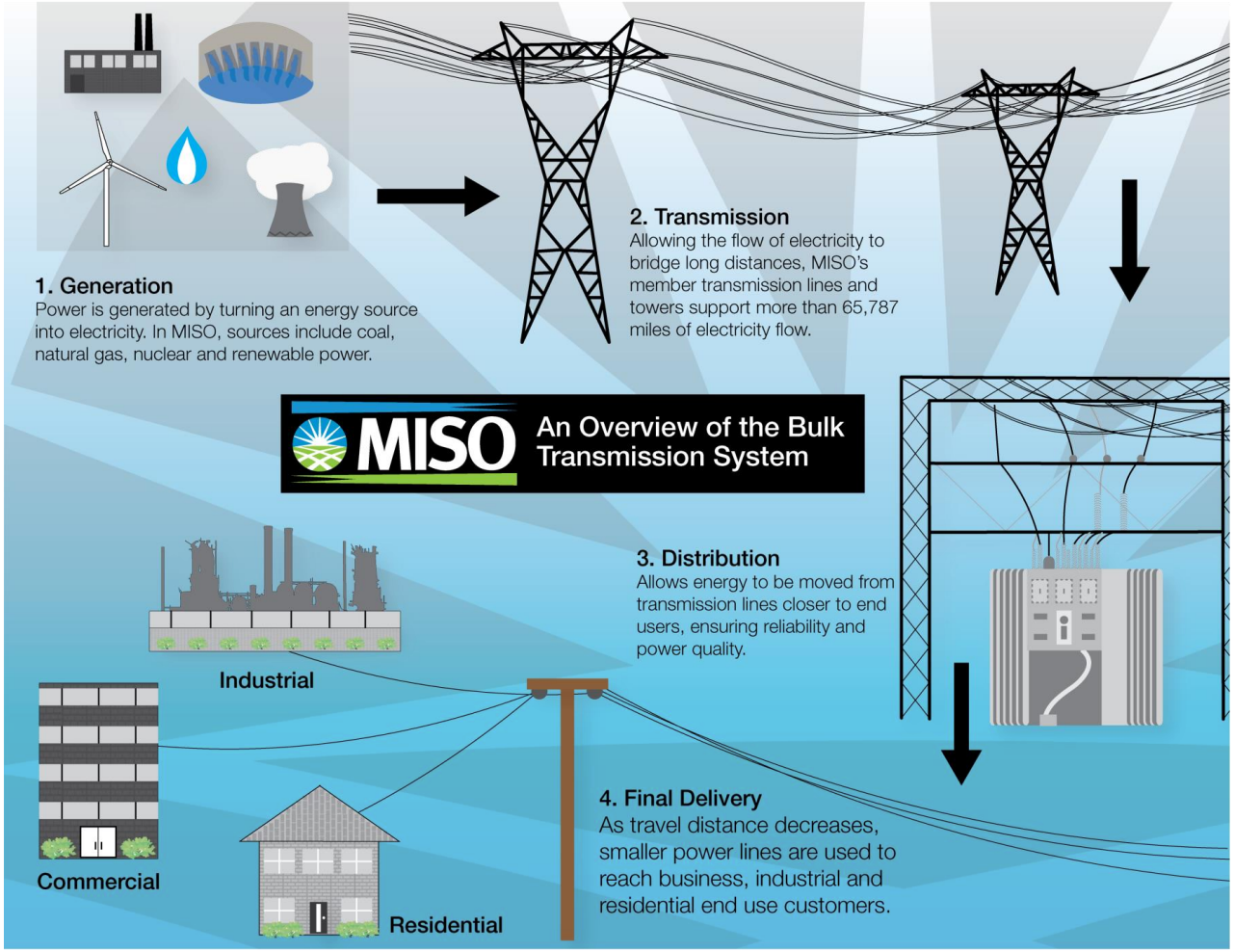
Midcontinent Independent System Operator (MISO)

Reliability Footprint

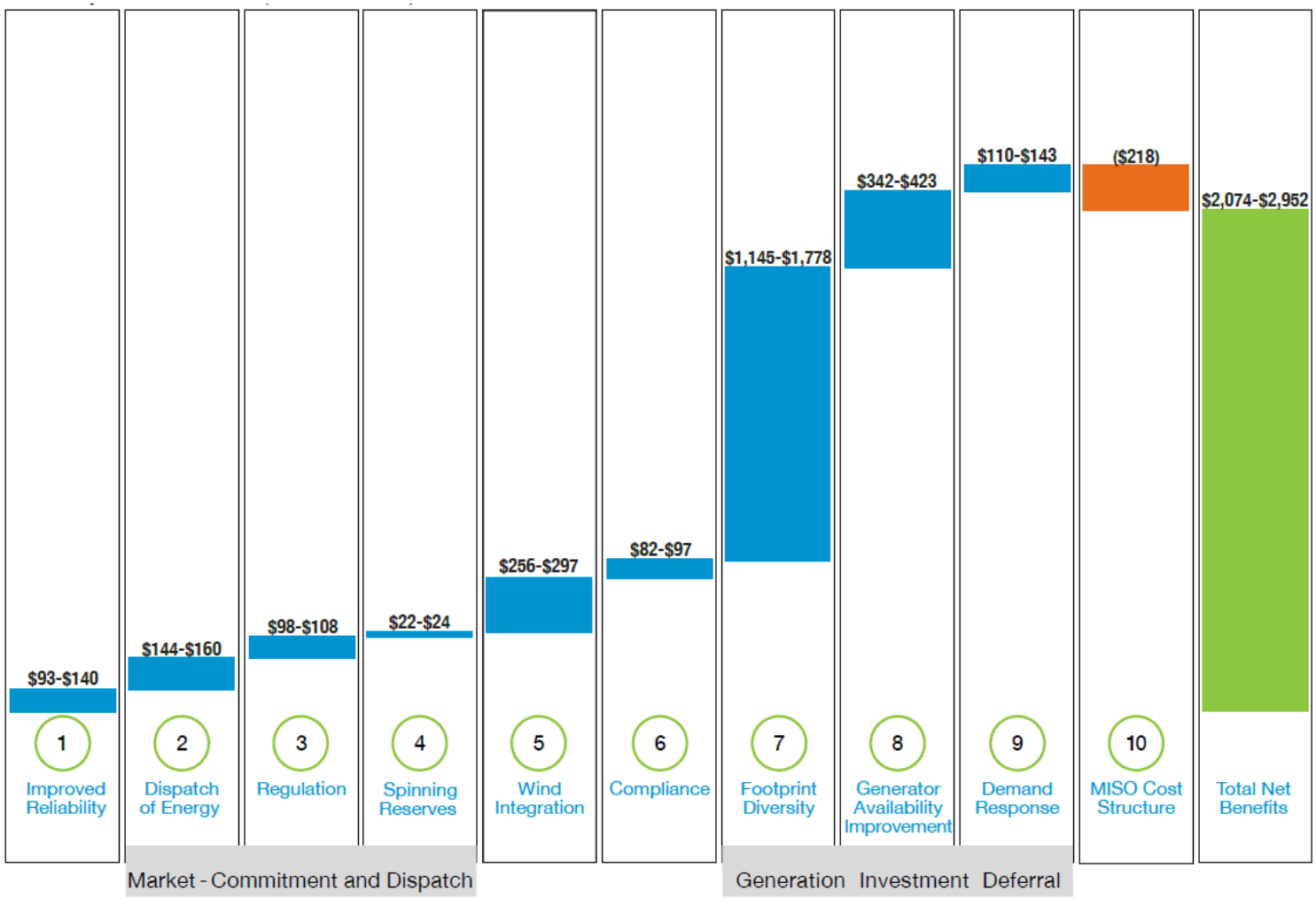
- **End-use Customers: 42 million**
- **Maximum Demand: 126,000 MW**
- **Transmission (69 - 500kV): 66,000 miles**
- **Generation: 176,000 MW**
- **Market Participants: 391**
- **Gross Market Charges: $20.3 billion (2013)**



To assess the impacts of carbon regulations on the electric transmission system, we first need an understanding of impacts on load and generation



MISO's regional scope provides benefits to stakeholders as illustrated by the Value Proposition



2013 Value Proposition Benefits by Value Driver ($M)

Promulgated under the authority of Section 111(d) of the Clean Air Act, the EPA's carbon emissions rule for existing power plants:

- Proposes state-specific emission rate-based CO_2 goals with various options for flexibility in compliance.
- Offers guidelines for the development, submission and implementation of state plans to address greenhouse gas (GHG) emissions from existing fossil-fired electric generating units (EGUs).
- Reflects the emissions reduction that can be achieved by the application of the Best System of Emission Reduction (BSER)…adequately demonstrated.

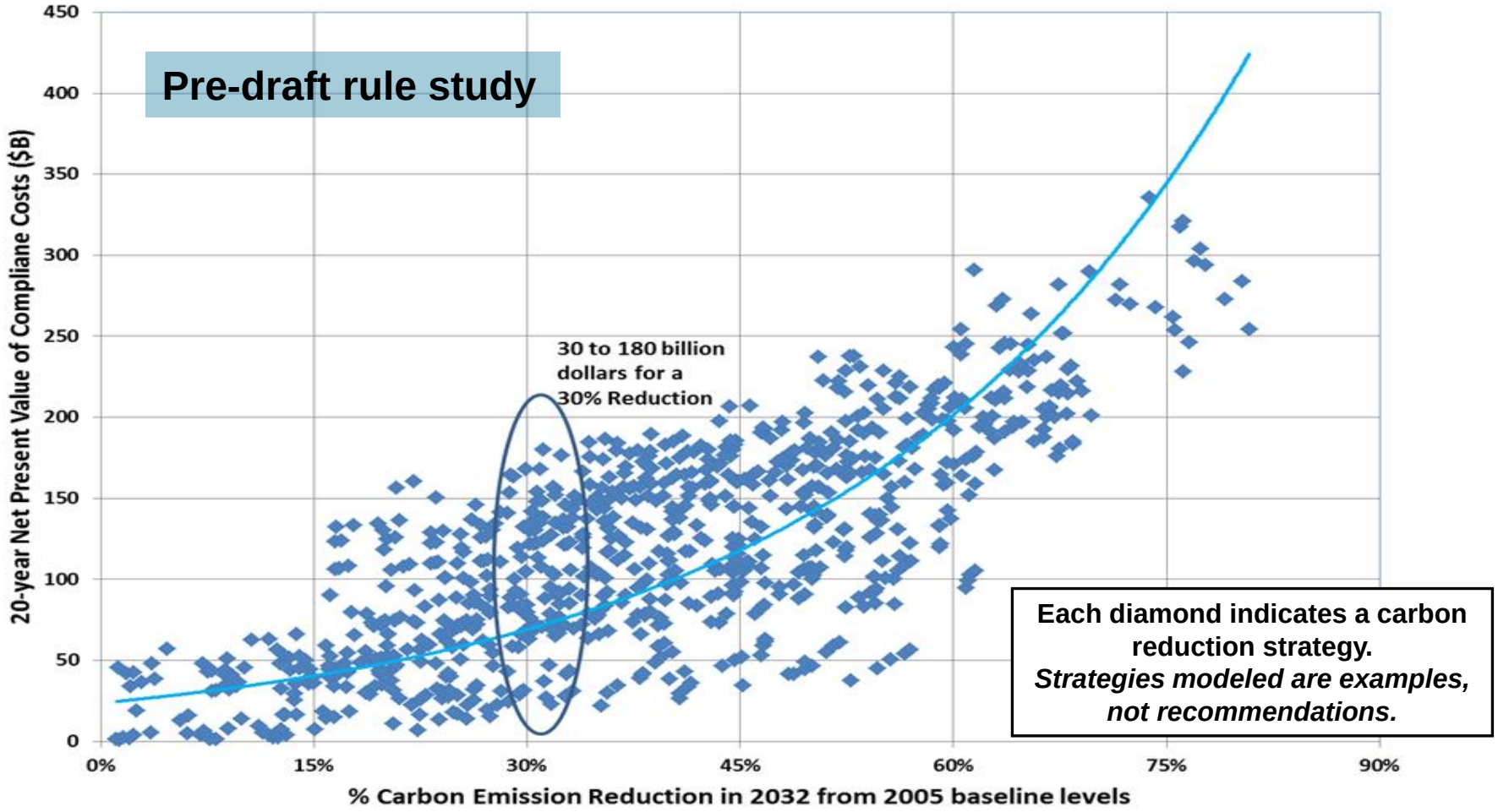
The EPA's definition of BSER is based on four "building blocks" of emissions reduction…

Building Blocks			
1. Improve efficiency of existing coal plants	2. Increase reliance upon CC gas units	3. Expand use of renewable resources and sustain nuclear power production	4. Expand use of demand-side energy efficiency
EPA Calculations/Assumptions in the Proposed State Goal Development			
6% efficiency (heat rate) improvement across the fleet, assuming best practices and equipment upgrades	Re-dispatch of NGCCs up to a capacity factor of 70%	Meet regional non-hydro renewable target, prevent the retirement of at-risk nuclear capacity and promote the completion of nuclear capacity under construction	Scale to achieve 1.5% of prior year's annual savings rate

The intent of MISO's preliminary analysis is to inform stakeholders on the potential impacts of carbon regulations

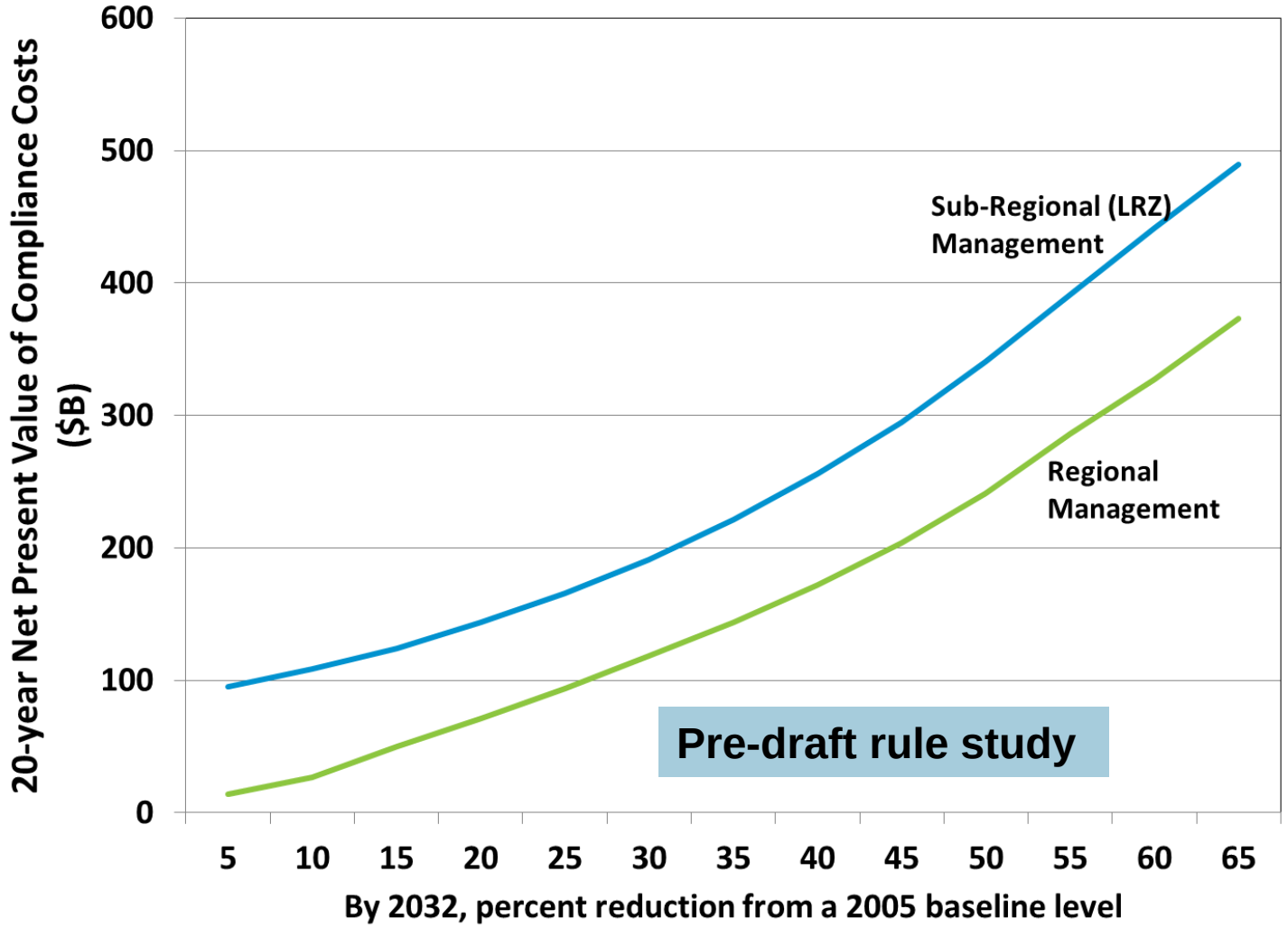
- It is not intended to recommend any specific compliance plan or to enable support or opposition to the regulation.
- It is a first look, with delivery of results targeted prior to the comment period deadline of October 16th; findings may lend to further analysis, as appropriate and determined in collaboration with stakeholders.

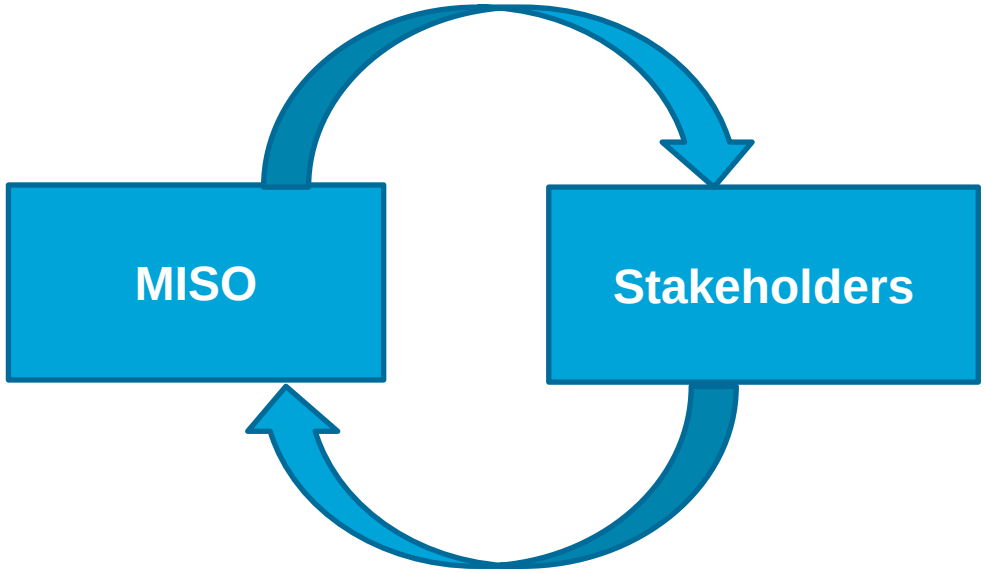
MISO's preliminary analysis points to the importance of flexibility in compliance



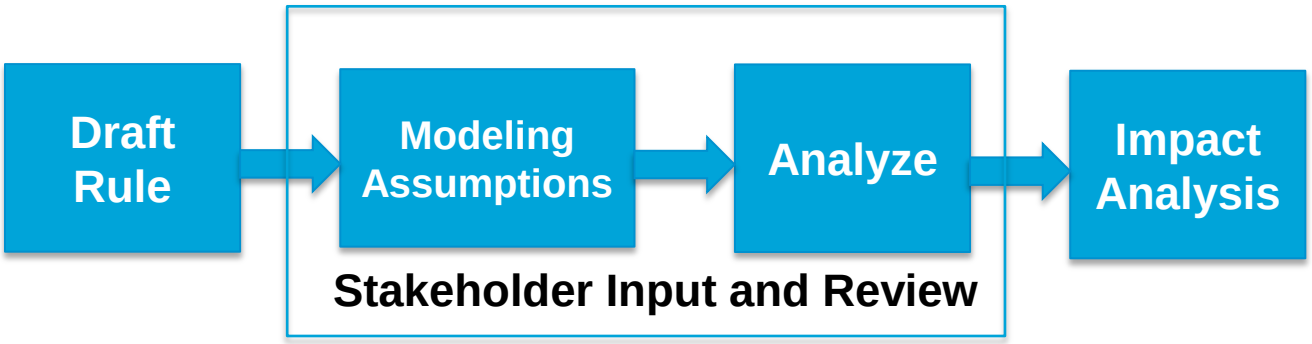
Preliminary results show that, for given policy and economic conditions, certain combinations of carbon reduction strategies are more cost effective than others. Strategies modeled do *not* represent an exhaustive range of compliance options.

Achieving emissions reductions regionally is economically beneficial compared to sub-regional solutions



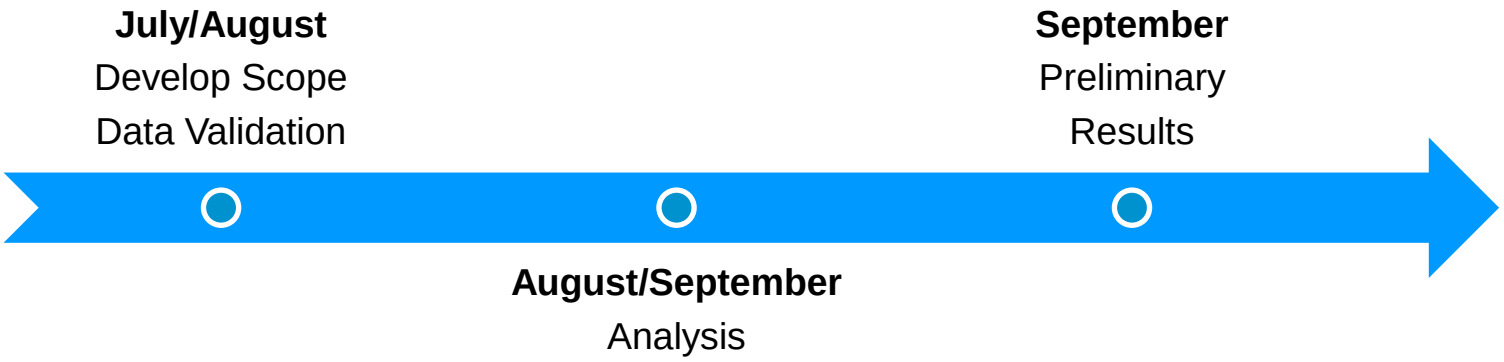


Study Scope
Comment Period Modeling

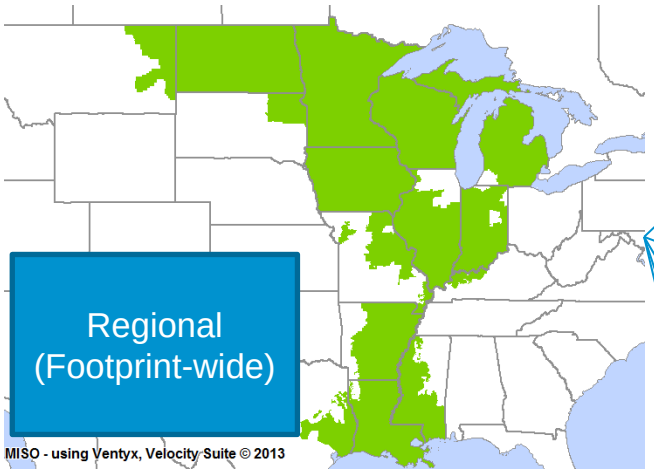


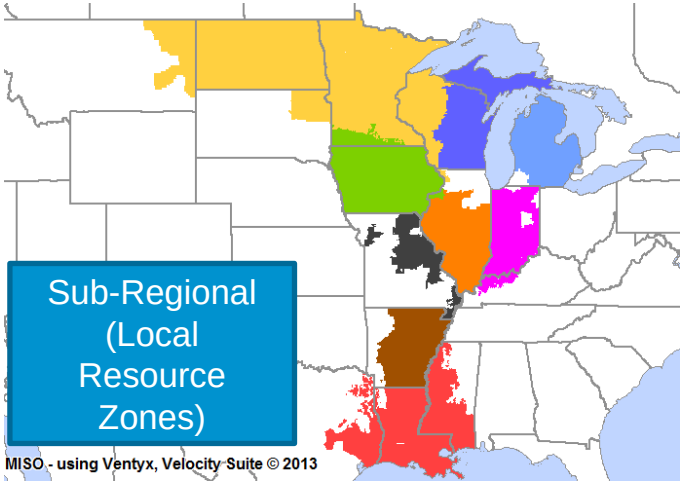
Two-part analysis using Electric Generation Expansion Analysis System (EGEAS)

- Phase 1: Calculate compliance costs for Regional (footprint-wide) vs. Sub-regional (LRZ level) carbon management
  - Using the building blocks individually and in combination as proposed in the draft regulation
- Phase 2: Based on stakeholder feedback, examine the range of reduction achievable in various sensitivities



Phase 1: An assessment of EPA's building blocks





- Building Block 1
  - Cost of Compliance
  - Emissions Reduction Achieved
- Building Block 2
  - Cost of Compliance
  - Emissions Reduction Achieved
- Building Block 3
  - Cost of Compliance
  - Emissions Reduction Achieved
- Building Block 4
  - Cost of Compliance
  - Emissions Reduction Achieved
- All building blocks
  - Cost of Compliance
  - Emissions Reduction Achieved

Phase 2: Proposed Sensitivities