

A large, light gray, stylized sun graphic is positioned on the left side of the slide. It consists of a semi-circle at the top with rays extending downwards, transitioning into a larger, more complex shape at the bottom that resembles a stylized sun or a fan. The graphic is composed of several overlapping, semi-transparent shapes.

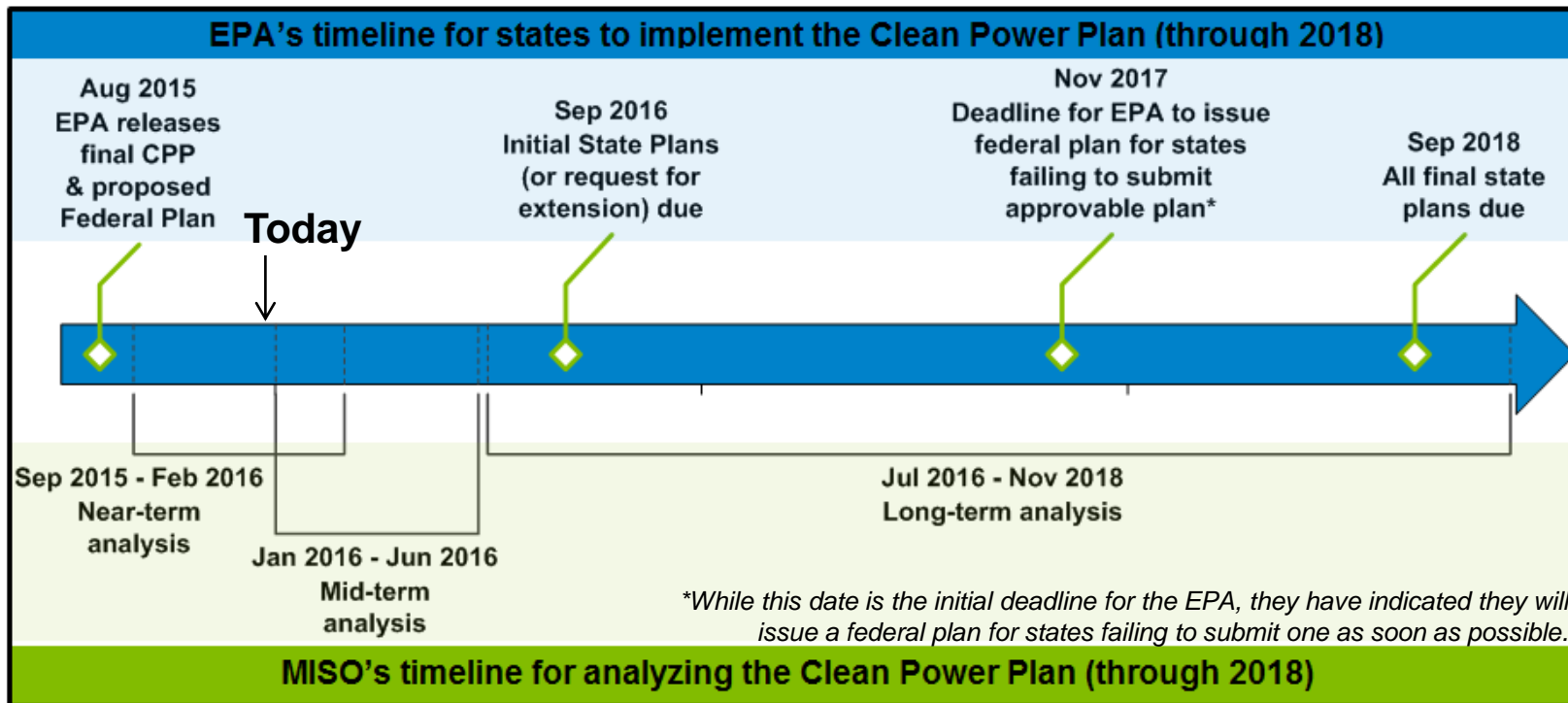
Initial Results for MISO's Near-Term Analysis of EPA's Final Clean Power Plan

Planning Advisory Committee
December 16, 2015

MISO will report key findings ahead of the coming deadlines that states must meet

MISO's Goals:

- Inform policymakers as they formulate compliance strategies
- Enable the reliable, efficient implementation of CPP-related policy decisions made by our member-states and asset-owners

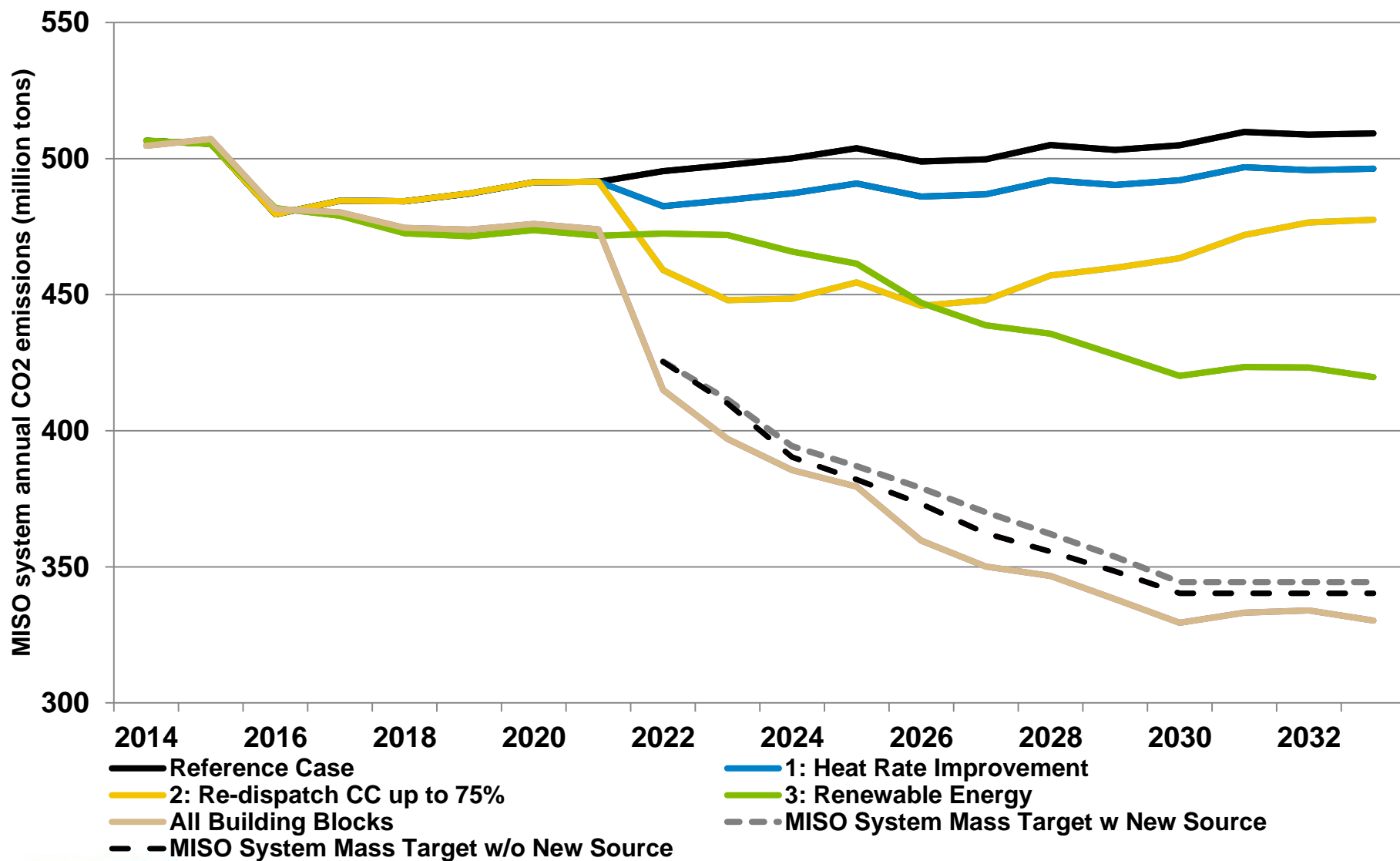


Near-Term Modeling
Understanding compliance pathways

Mid-Term Modeling
Preparing for transmission overlay development

Long-Term Modeling
Developing transmission overlay

MISO validated its CPP modeling by confirming the CO₂ reduction potential of EPA's building blocks



A range of sensitivities was modeled to provide insight into various compliance strategies

Modeling Parameter	Sensitivities Modeled
Demand and energy growth rates	0.8% (reference)
Natural gas prices* (\$/MMBtu)	4.30 (reference), +/- 2.00
Renewable Portfolio Standards	Existing RPS mandates (reference, ~14%), 20% Regional RPS, 30% Regional RPS
CO ₂ costs (\$/ton CO ₂)	0 (reference), 10, 25, 50, 100
Incremental coal retirements** (% of nameplate capacity)	No additional retirements (reference), 12.5% (7 GW), 25% (14 GW), 37.5% (21 GW), 50% (28 GW)
Energy efficiency (as a % of total energy sales)	Base (reference, EE mandates and goals), economic EE potential in BAU, economic EE potential in CPP

*Every combination of the above sensitivities was modeled, totaling **675** simulations.*

* Will be updated with current forecasts in mid-term modeling

**Beyond 12.6 GW of assumed MATS retirements

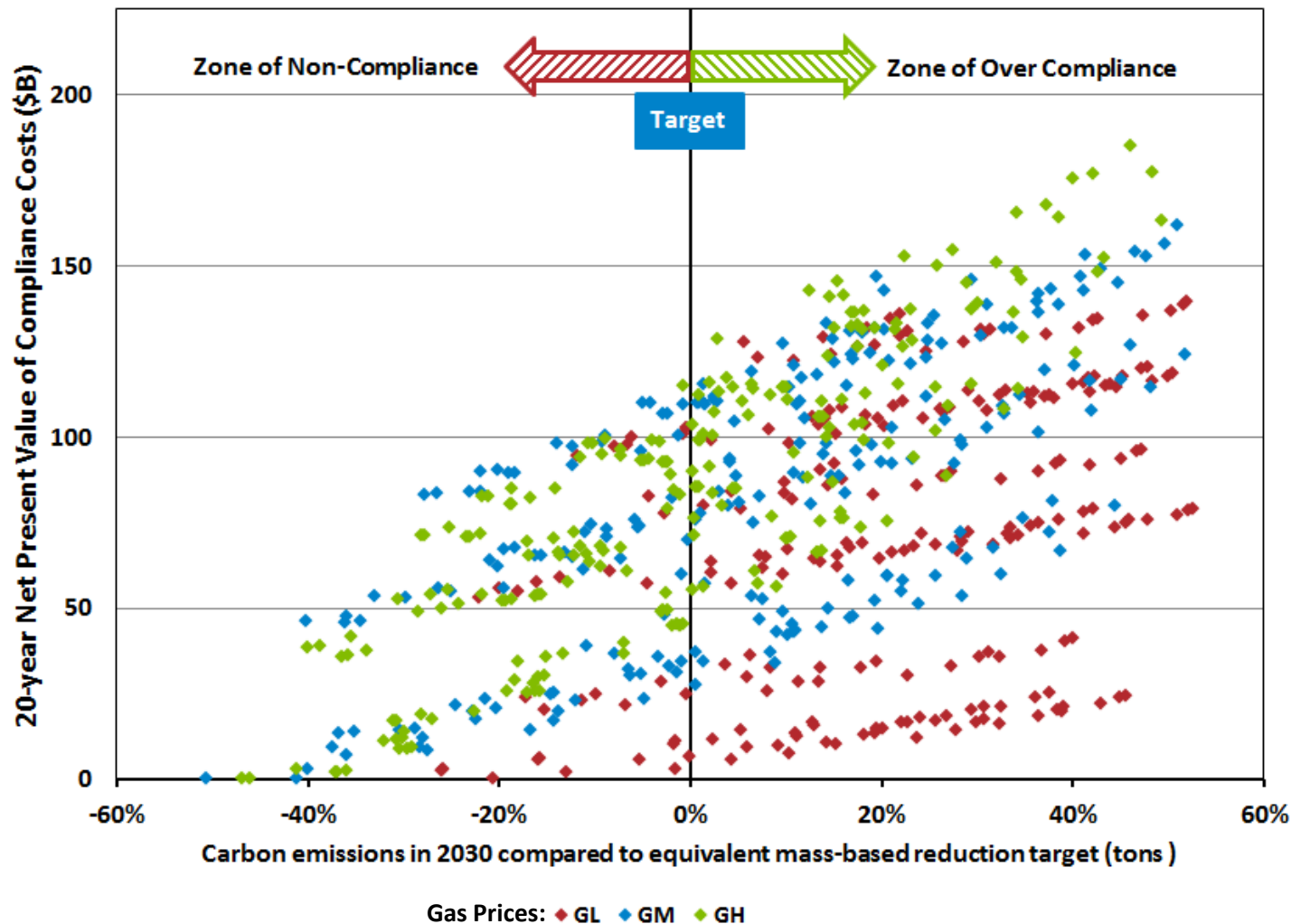
Results indicate flexibility in compliance strategies allows for lower compliance costs*



*Compliance costs are the difference between production and supply/demand side resource costs from reference case costs. This does not include electric and gas infrastructure costs. CO₂ costs are used solely as dispatch modifiers and are not included here.

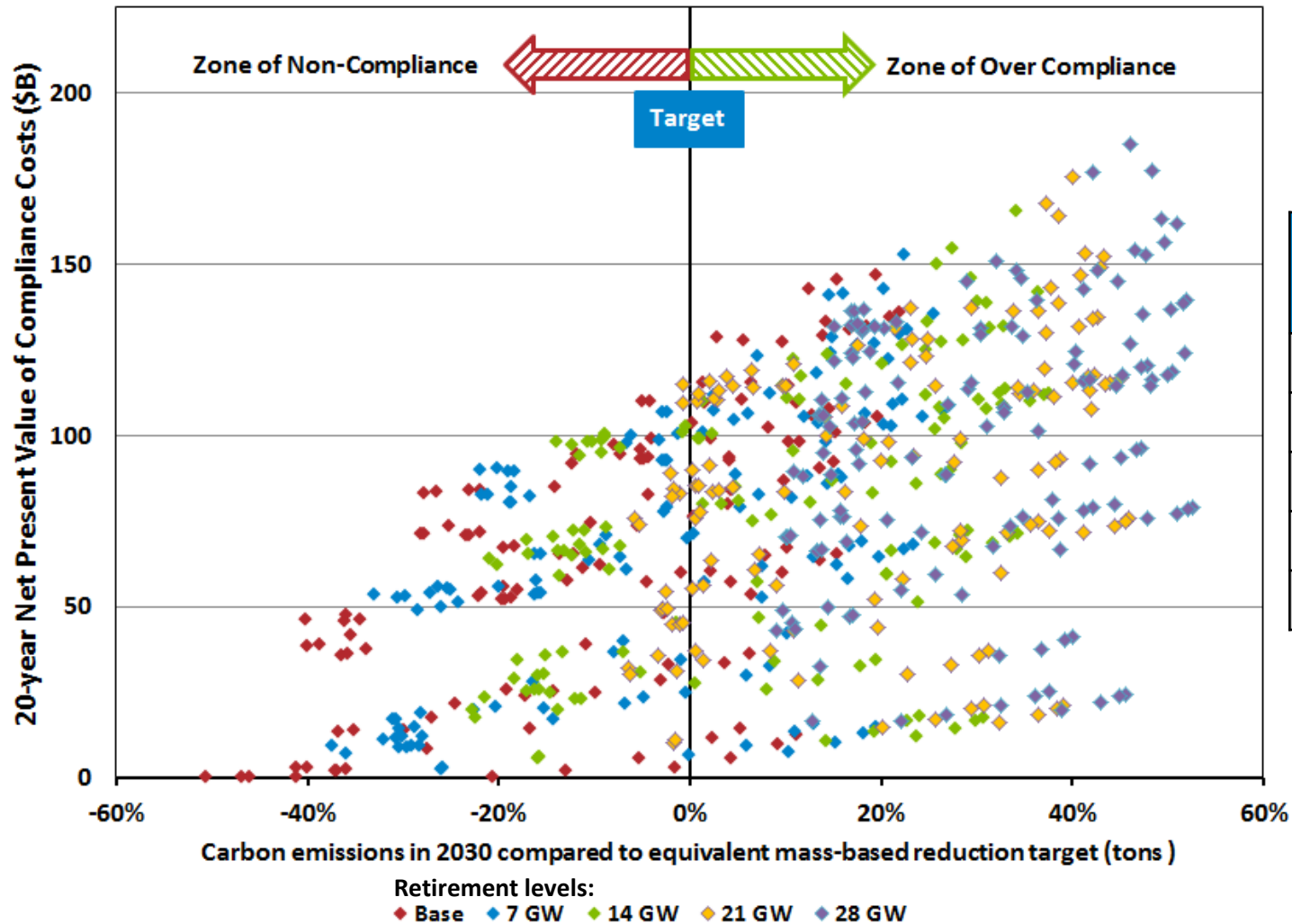


Costs of compliance strategies are greatly influenced by natural gas prices



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Coal capacity retirements may be likely, but depend significantly on other variables



Average compliance cost per retirement level (\$B)	
Base	90.74
7 GW	87.29
14 GW	87.62
21 GW	92.20
28 GW	97.40

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Next steps

- January PAC
 - Present additional near-term analysis results

Contact info

- **EPA regulations webpage**

[https://www.misoenergy.org/WhatWeDo/EPARegulations/Pages/111\(d\).aspx](https://www.misoenergy.org/WhatWeDo/EPARegulations/Pages/111(d).aspx)

- **Additional questions? Please contact:**

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APPENDIX

The final rule study will evaluate CPP compliance pathways and inform the transmission planning process

Near-Term Modeling (Understanding compliance pathways)

- Rate vs. mass comparison
- Rate and mass interactions
- State vs. regional compliance
- Trading options
- Federal plan
- Range of compliance sensitivities
- Relative compliance costs

Using Existing PLEXOS and EGEAS models*

**Existing draft rule models will be updated with final rule parameters.*

Mid-Term Modeling (Preparing for transmission overlay development)

- Potential generation retirements
- Optimal resource expansion
- Wind/solar zones
- Renewables penetration/mix
- Renewables siting
- Thermal siting with new ozone rule

Using new EGEAS models* and external research

**Evaluated using three proposed CPP futures.*

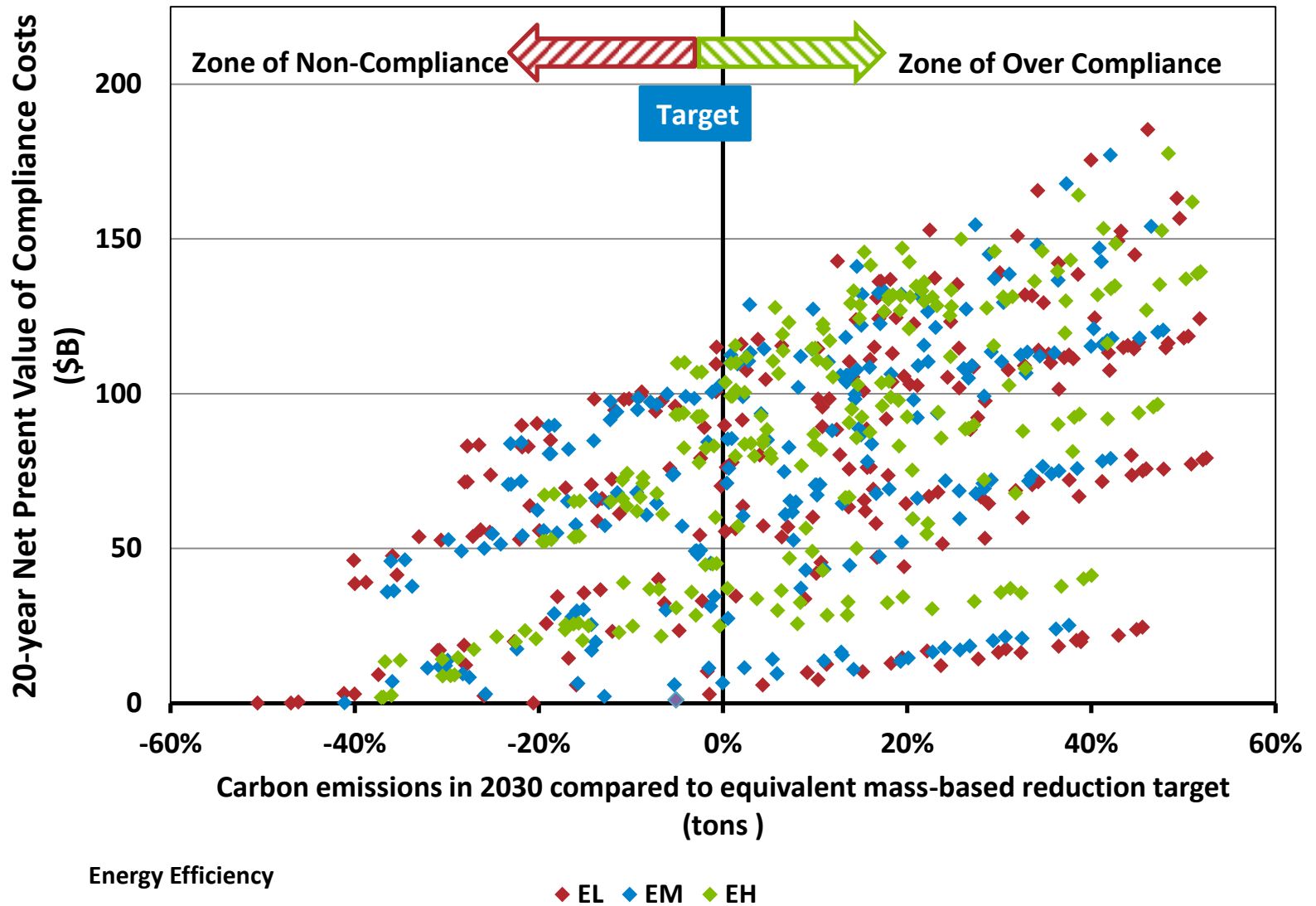
Long-Term Modeling (Developing transmission overlay)

- Will be informed by state compliance plans
- Will use futures formulated through MTEP17 process
- Updates to assumptions as needed over MTEP18 and '19 cycles

Using new EGEAS, PLEXOS and PROMOD models

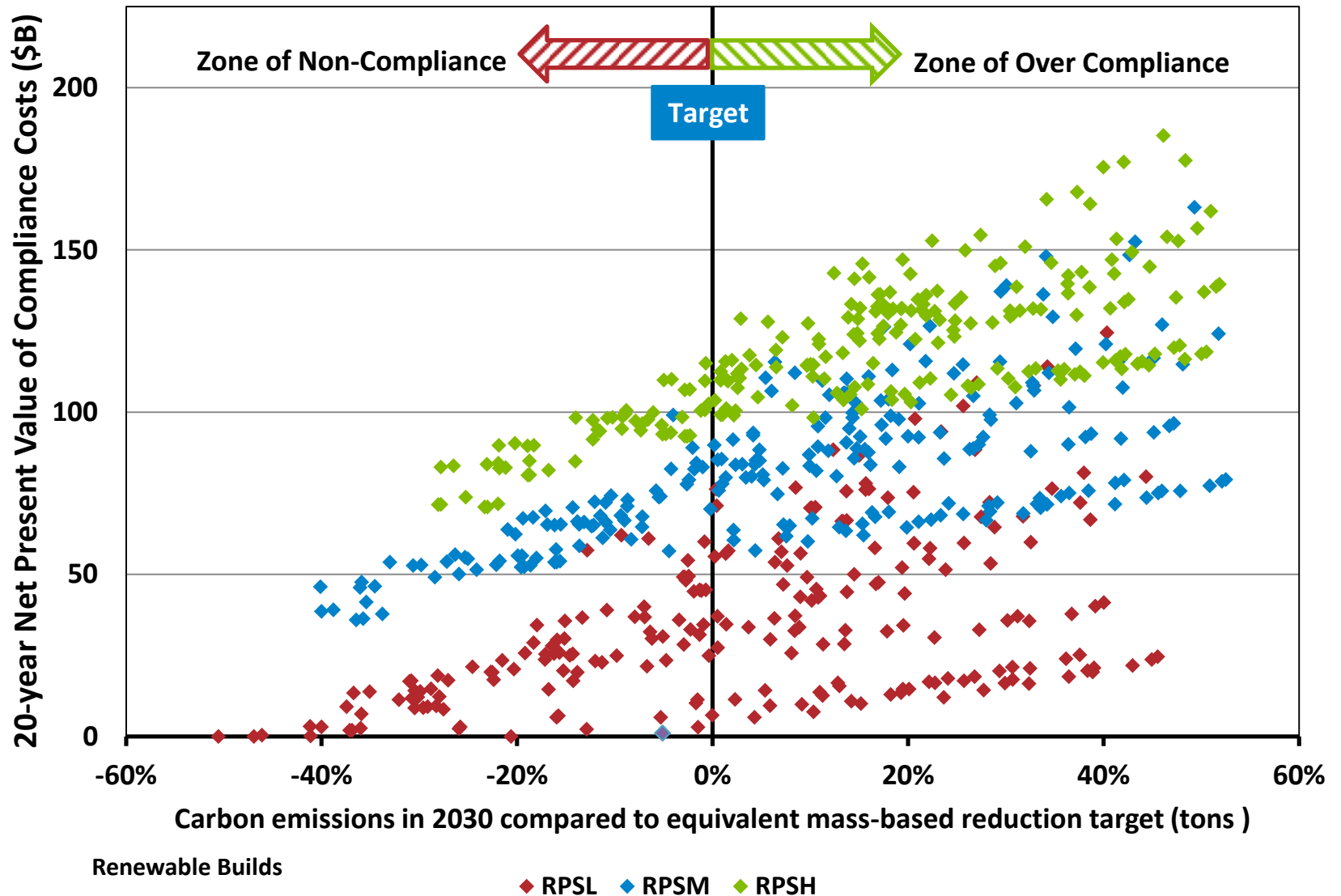
MISO's CPP Final Rule Study

EE levels by color



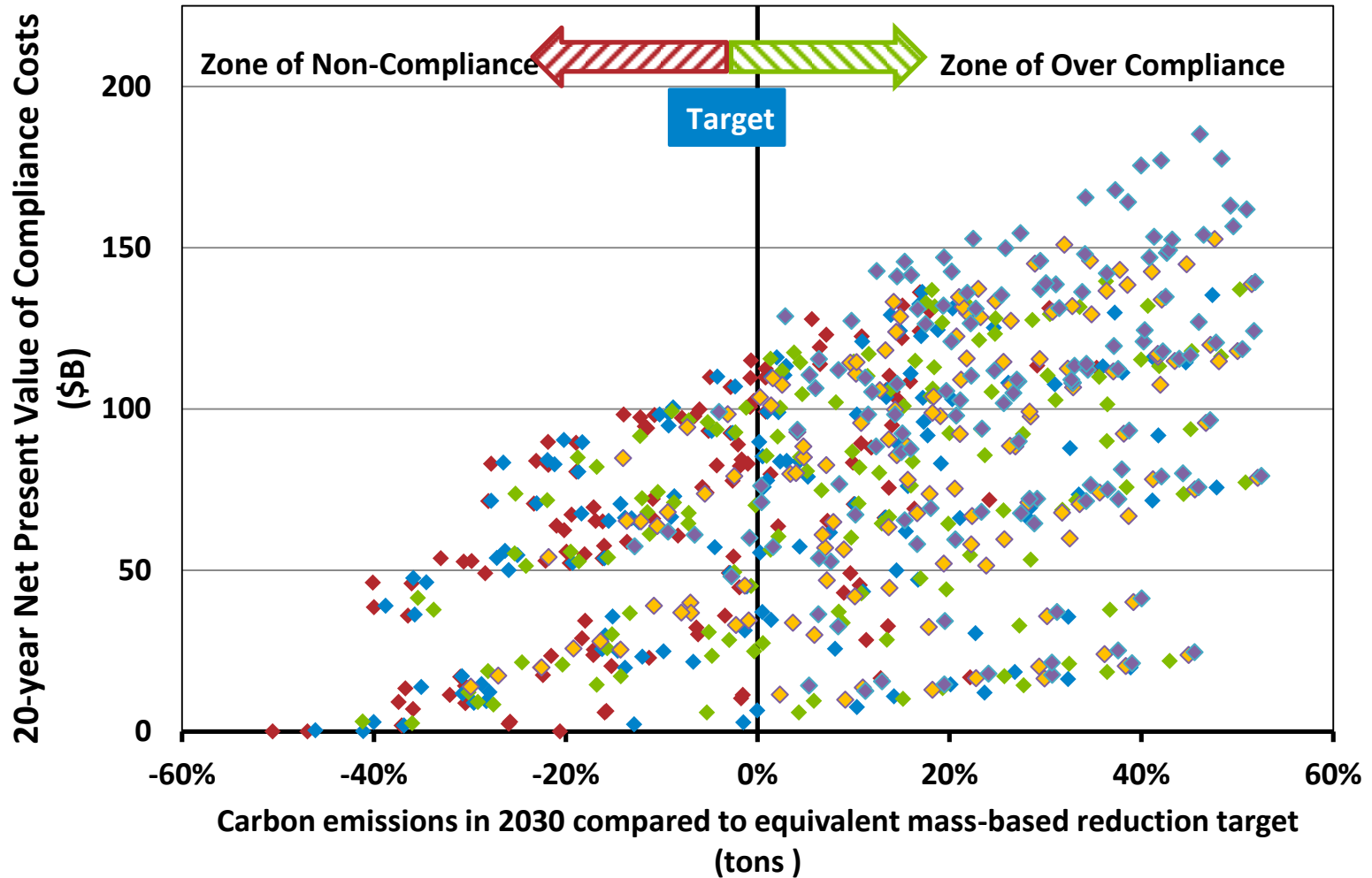
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RPS levels by color



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CO2 price by color



Carbon Prices

◆ C0 ◆ C10 ◆ C25 ◆ C50 ◆ C100

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