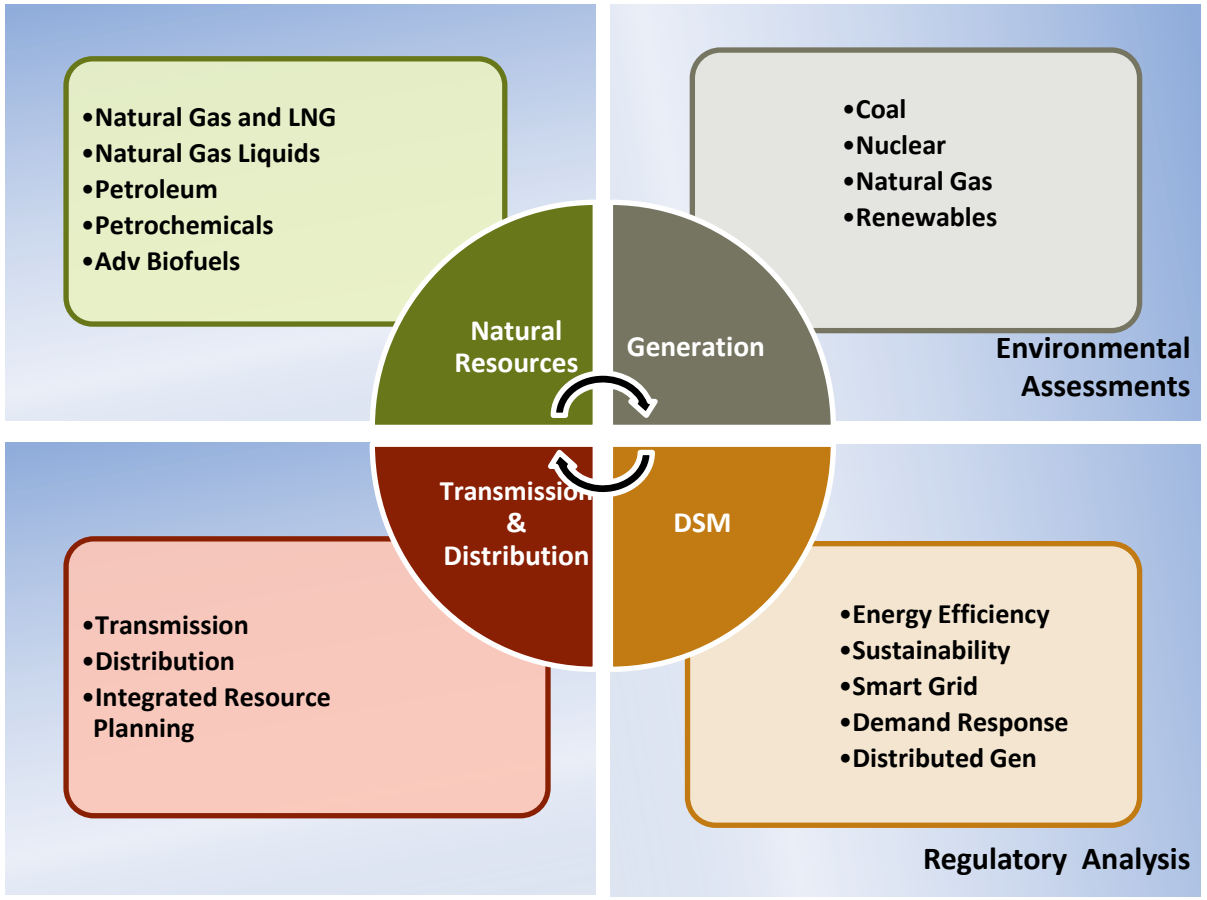
Regional 111D/CPP and Infrastructure Thoughts

Presented to: Gulf Coast Transmission Summit, New Orleans, LA

October 16, 2014

Diverse Consultancy with Domain Expertise in Energy Markets

- Global presence—60+ offices; headquartered in the Washington, DC area
- More than 4,500 employees
- 2012 revenue of $937 million
- World-class domain expertise across energy, environment, transportation, and health care sectors
- Diverse client base—US federal, state, and local agencies, utilities, commercial clients
- One of America's Best Small Companies, Forbes 2005-2011
- Best Global Environmental Consultancy in 5 of 6 categories, Environmental Finance Magazine
- Largest Energy Efficiency Consultancy/Implementation Firm in North America



Industry-best modeling and analytical capabilities

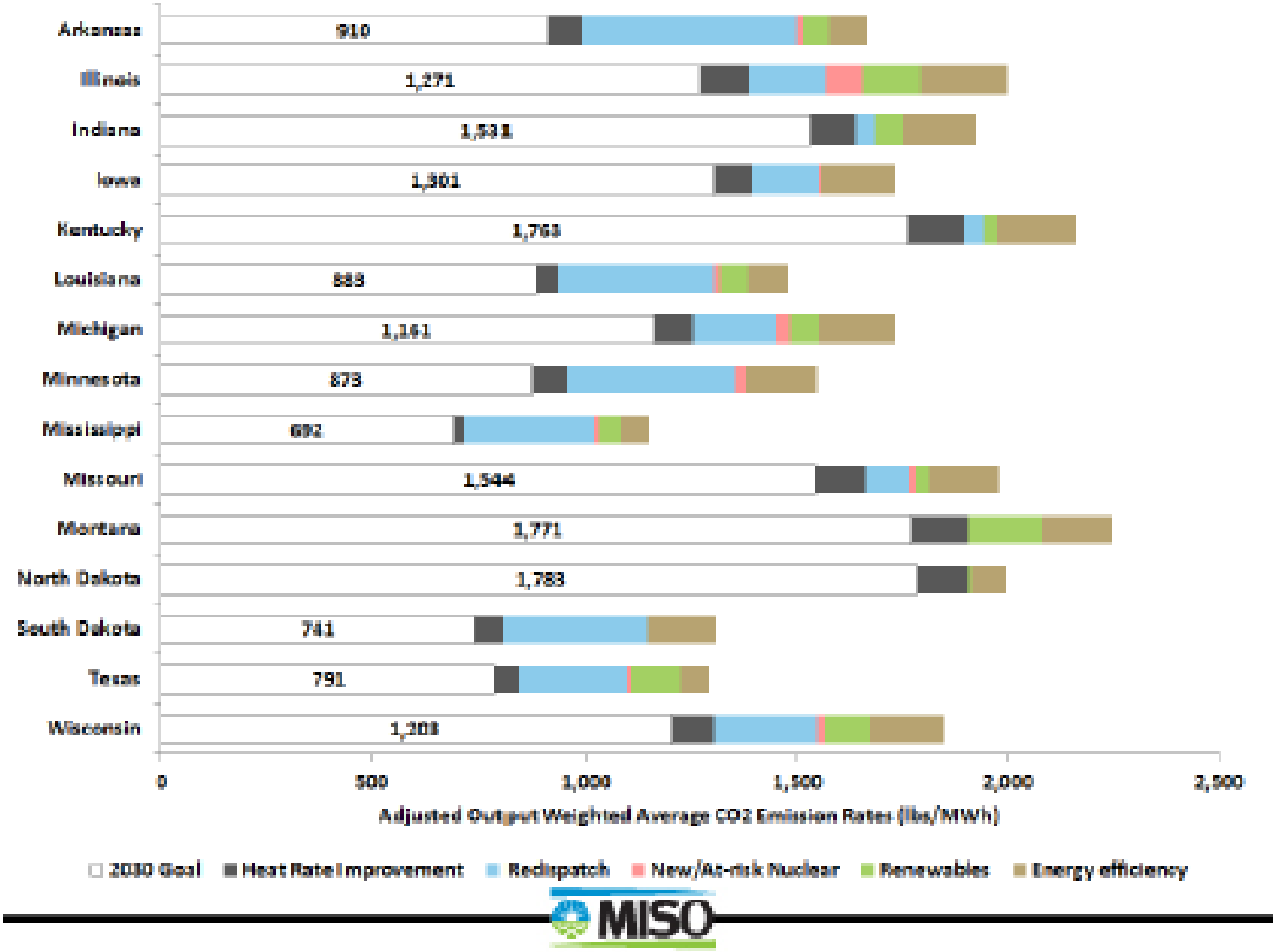
Discussions Are Currently Taking Place, Comments Due

- **EPA's proposal poses many questions and challenges.**
- Proposal asks for comments on critical components, including derivation of rate standard and conversion to mass standard.
- States have flexibility in designing state plans, but that flexibility may have come at the cost of tighter standards.
- States and stakeholders need to determine the form and components of a program that will make the most sense Economic perspective – comply at lowest cost.
  - Regulatory perspective – feasible and measurable.
  - Stakeholder perspective – reasonable and transparent .
- States and affected sources will have to make progress on plans in face of regulatory and legal uncertainty.

Building Blocks Are An Important Consideration

- Building Blocks drive down state standards.
- The Clean Air Act calls on EPA to define the Best System of Emission Reductions (BSER) to develop emission performance standards.
- In proposal, EPA defined BSER as a combination of measures available to states, which it referred to as “Building Blocks”.
- – Block #1: EPA assumed 6% average savings from unit-level efficiency improvements for coal-fired units (4% best practices, 2% new equipment).
- – Block #2: Redispatch/fuel switching, assuming CCs can run to 70% on average to displace coal-fired generation.
- – Block #3: Renewable energy (RE) and “preserved” nuclear, based on an assumed growth factor for RE and 6% of existing nuclear generation (based on EIA projections).
- – Block #4: Demand-side EE potential, based on savings of up to 1.5% per year, inclusive of existing state EE program requirements.
- • EPA used assumptions for each building block to assess reduction options in each state, beginning with each state’s 2012 fossil emission rate.

MISO Analysis: 111D/CPP Impact By State From EPA Data

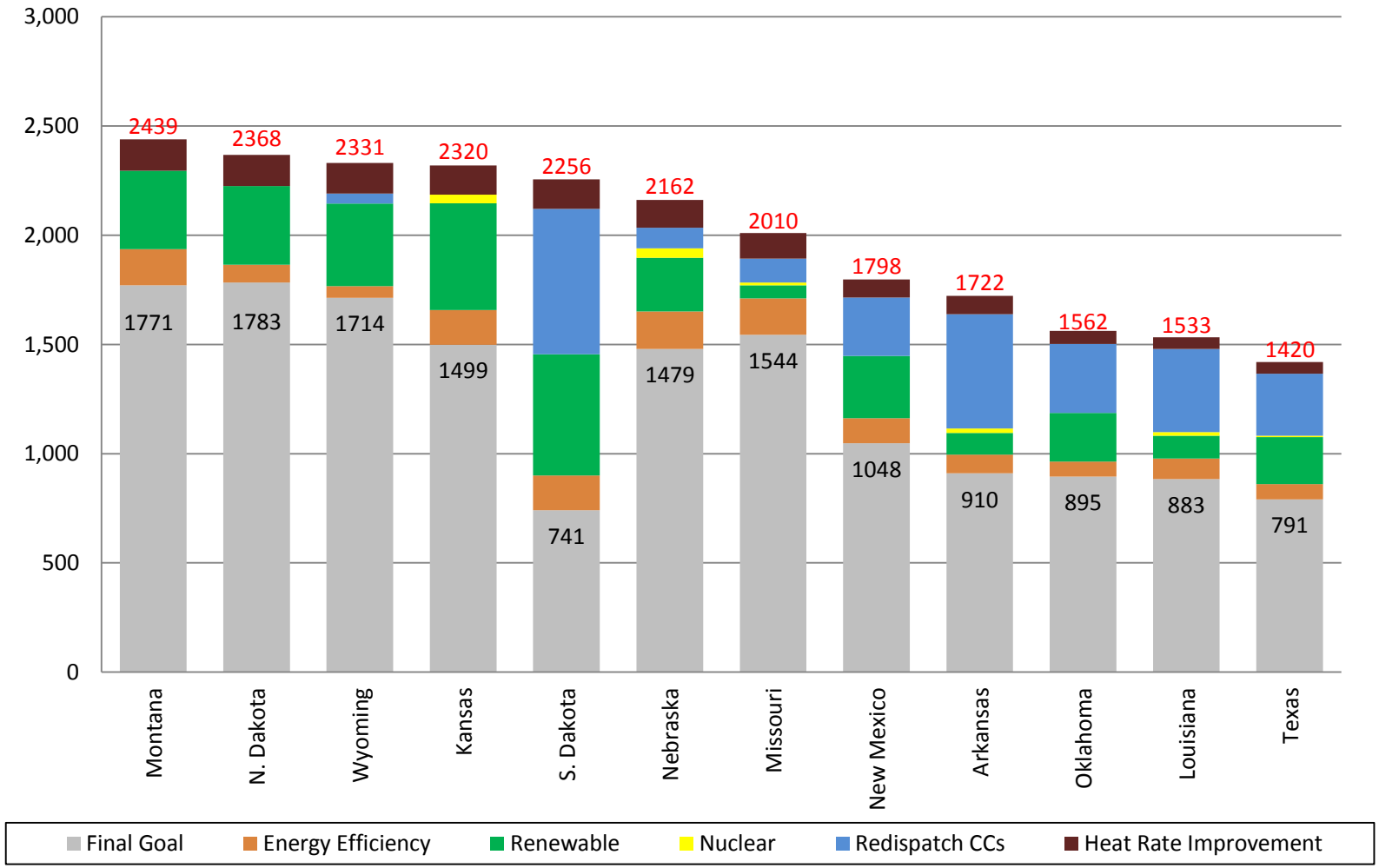


Source: MISO "GHG Regulation Impact Analysis – Initial Study Results" September 17, 2014

SPP Analysis: 111D/CPP Impact By State From EPA Data

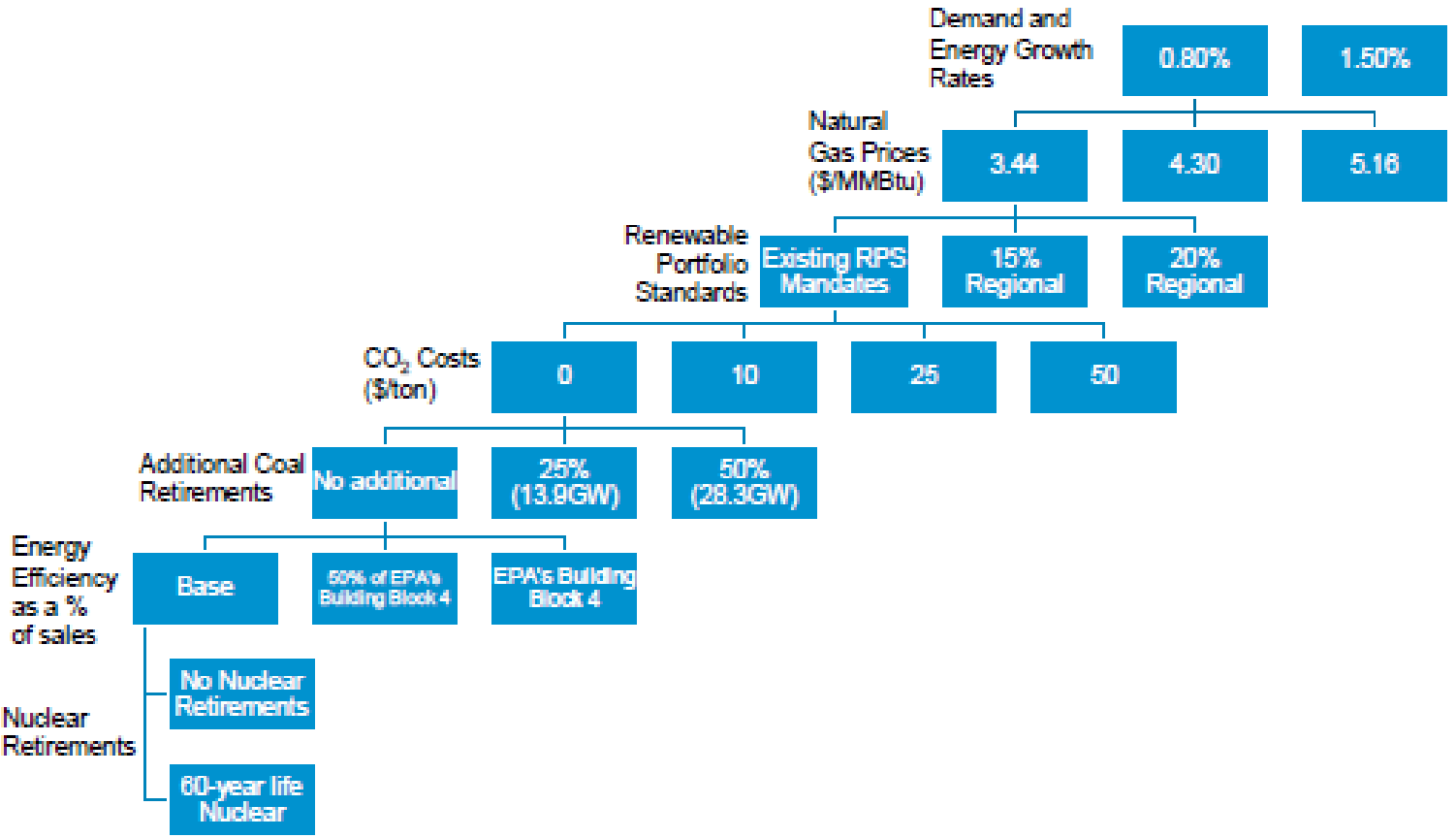
SPP State Average 2012 Rate = 1,699

SPP State Average 2030 Rate = 1,045



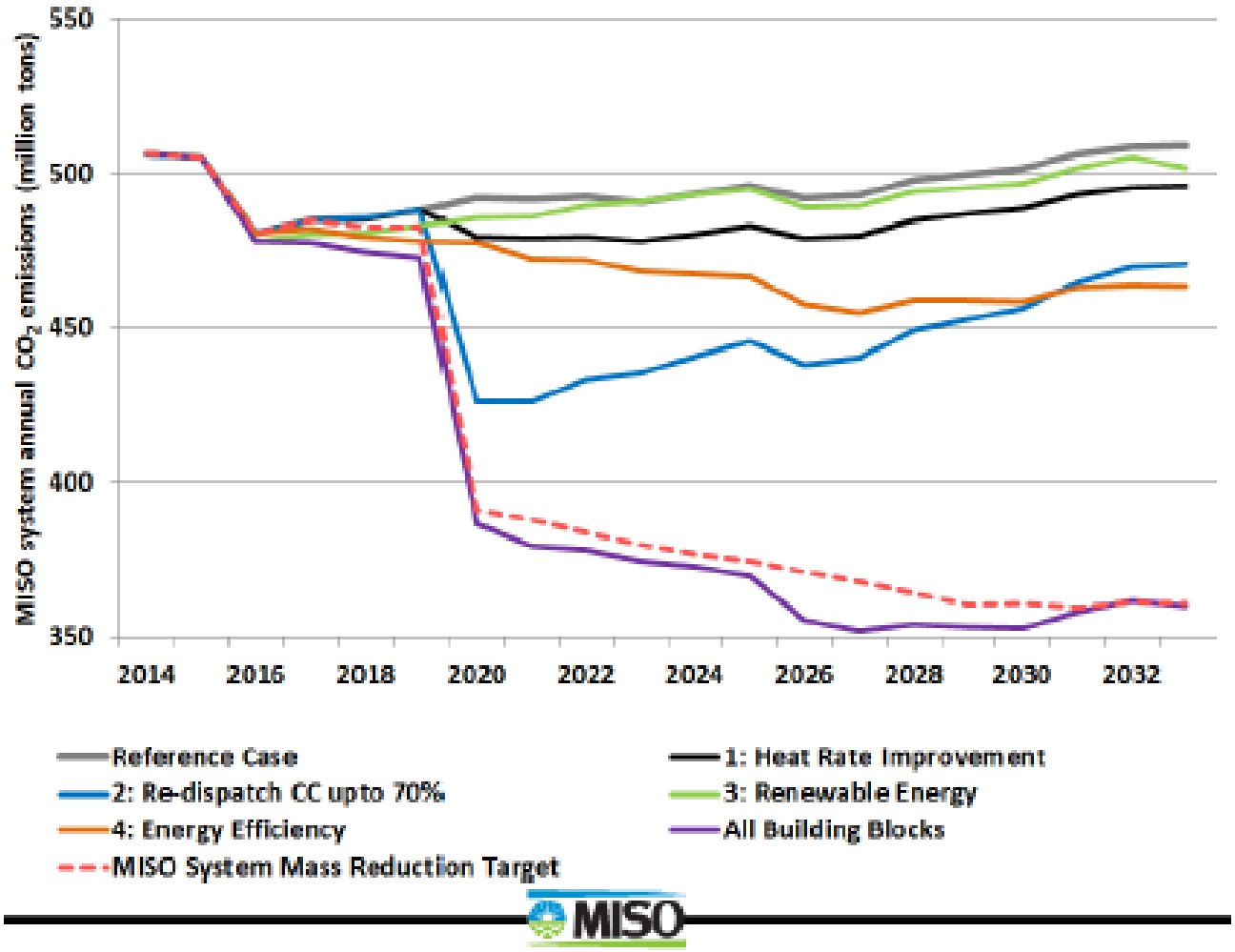
Source: SPP CPP Impact Assessment, October 8, 2014 http://www.spp.org/section.asp?group=3305&pageID=27

MISO Analysis: Scenario-Based Process



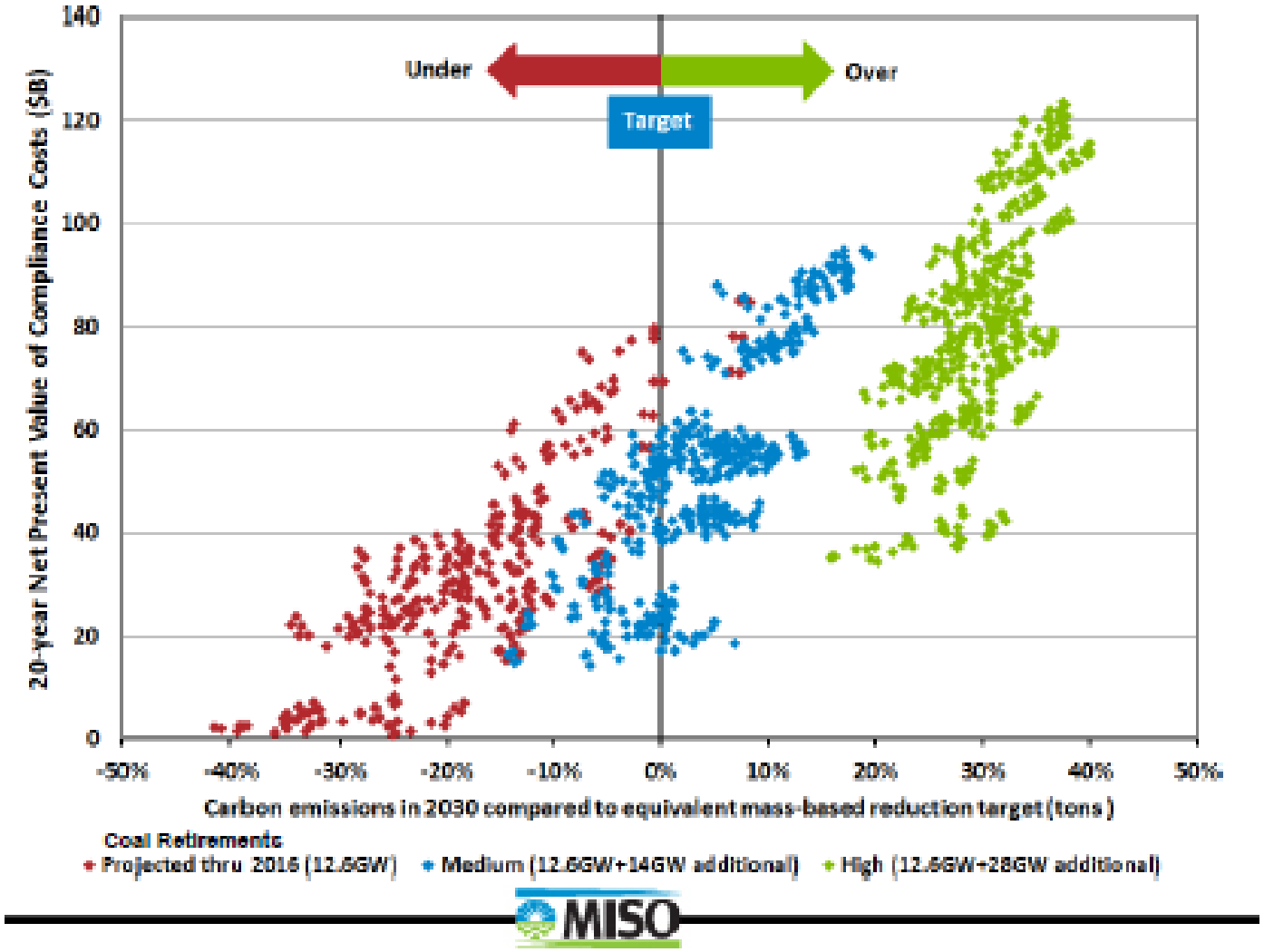
Source: MISO "GHG Regulation Impact Analysis – Initial Study Results" September 17, 2014

Phase 1: MISO CO2 Emission Initial Analysis



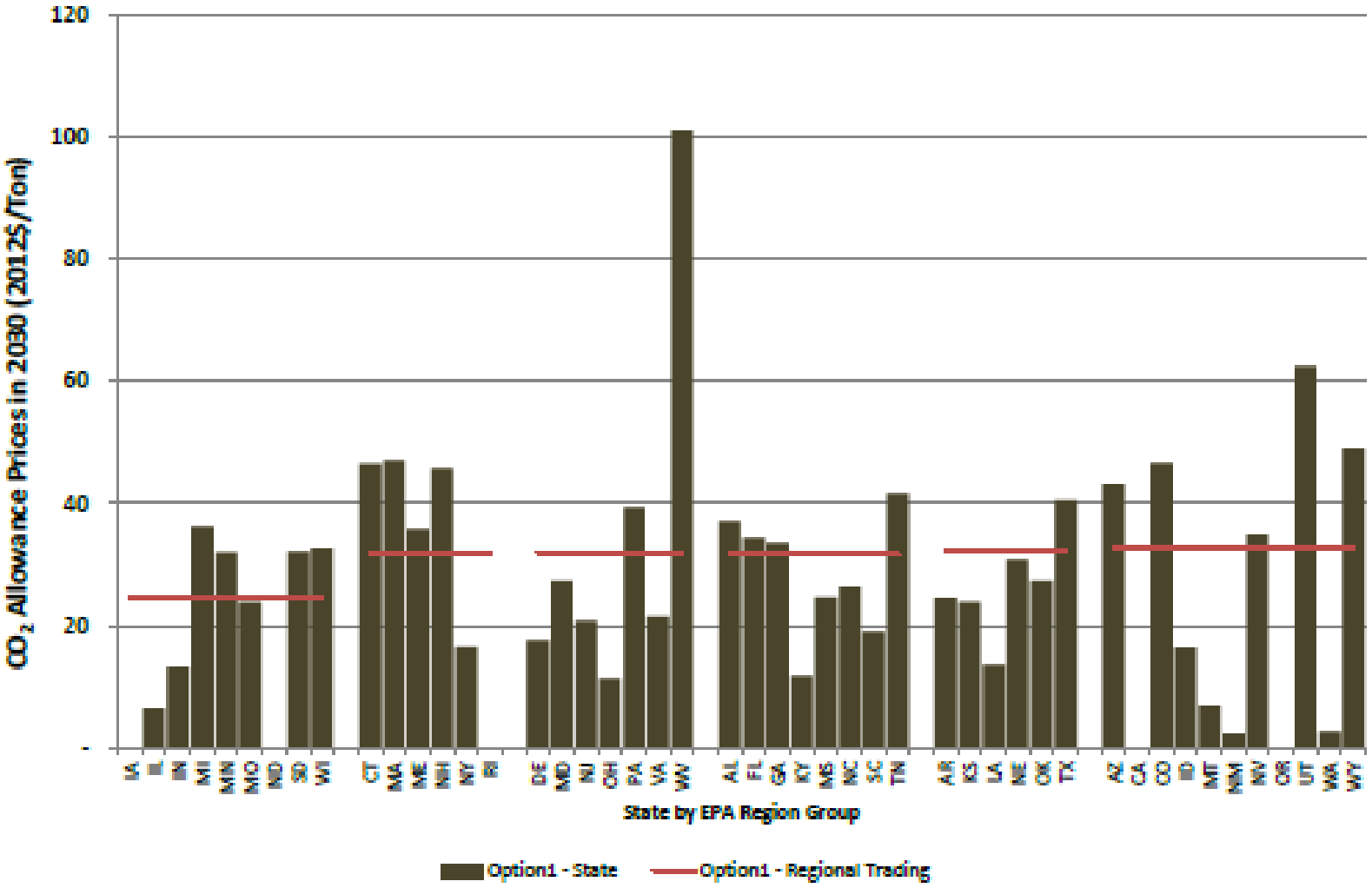
Source: MISO "GHG Regulation Impact Analysis – Initial Study Results" September 17, 2014

MISO: Phase 2 Results, Coal Generation At Risk Region-Wide



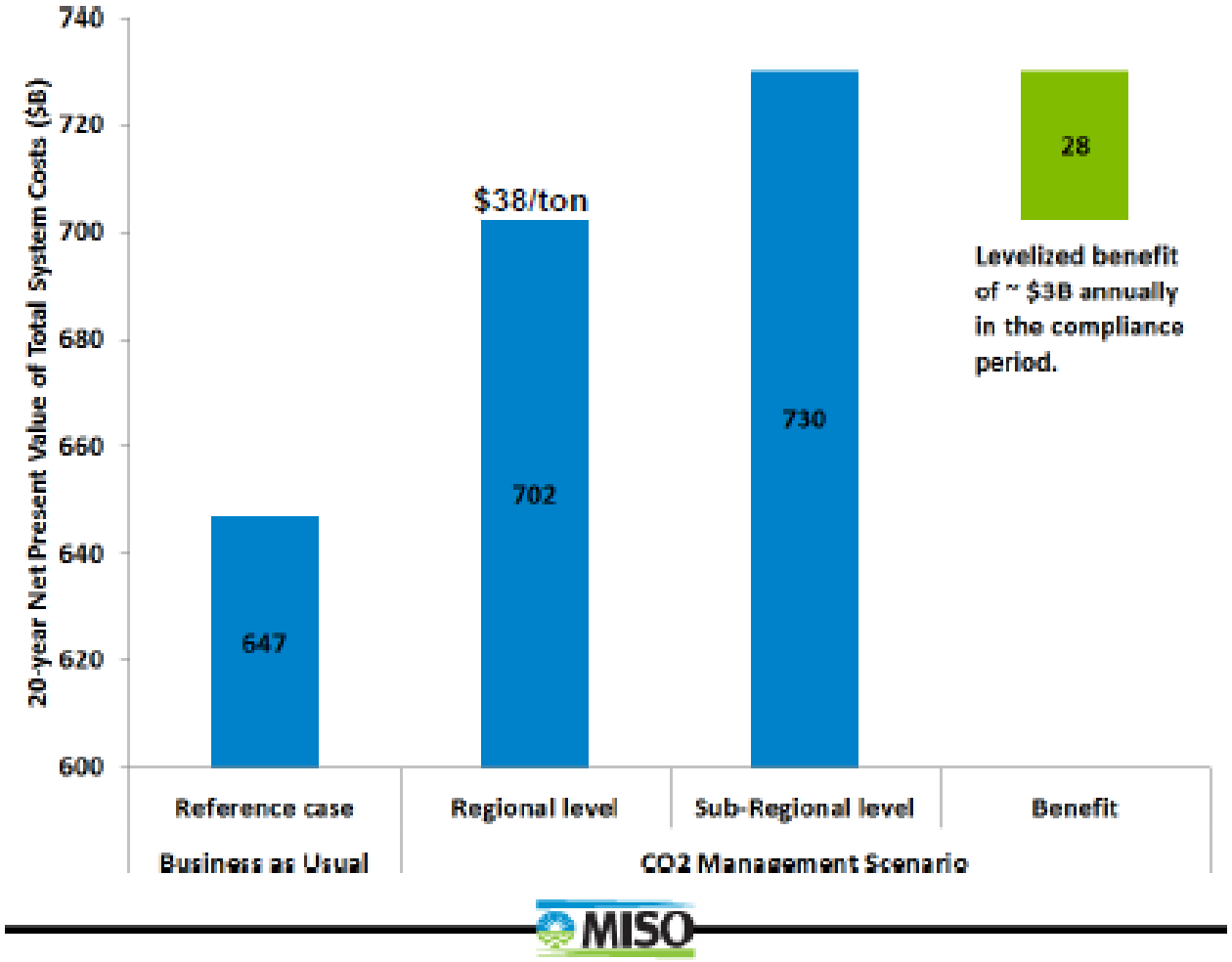
Source: MISO "GHG Regulation Impact Analysis – Initial Study Results" September 17, 2014

State and Regional Costs May Vary – EPA View



Source: EPA

Phase 1 MISO Analysis - Regional Compliance May Hold Benefits

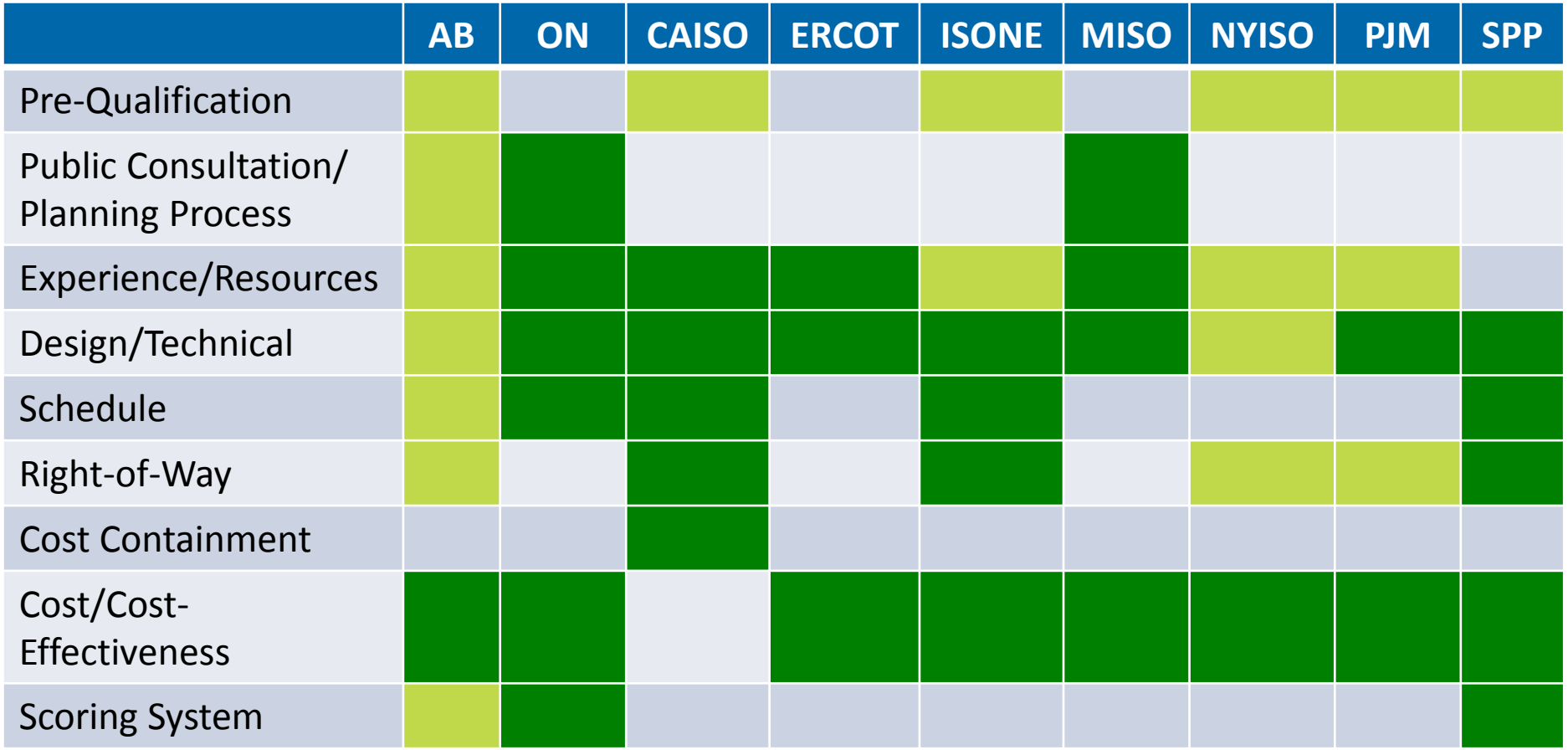


Source: MISO "GHG Regulation Impact Analysis – Initial Study Results" September 17, 2014

Each ISO/RTO Have Individual Concerns and Comments

- "…by 2020… anticipated reserve margin would be 4.7%, representing a capacity margin deficiency of approximately 4,600 MW…"
- "…by 2024… anticipated reserve margin would be -4.0%, representing a capacity margin deficiency of approximately 10,100 MW…"
- "What happens if CPP compliance begins before generation and transmission infrastructure can be added?"
  - "...extreme reactive deficiencies…"
  - "…significant loss of load and violations of NERC reliability standards…"

Criteria For Competitive Solicitation Varies By Region



Note: Dark Green indicates selection criteria, Light Green indicates a key criteria.
Several RTOs require non-incumbent participation in regional planning process.
Selection criteria for innovative solutions may vary by project.

111D/CPP And Order 1000

- 111D/CPP analyses evaluating state level responses, regional possibilities, changes.
  - State implementation plans are an important focus (and uncertainty).
- 111D/CPP program design elements complicate price signals.
  - Mass Cap vs. Rate-Based Trading.
- Long lead times needed for generation and transmission development; regional differences in project evaluation.
  - Scale and scope varies - lead times may be on the order of 4-8 years .
- System operators concerned about reliability impacts and costs of new generation.
  - Early evaluations have largely suggested natural gas investment.
  - Renewable and transmission technology changes complicate the analyses.
  - Long-term PPAs for utility scale wind and solar resources interesting data-points.
  - Distributed renewable generation represents additional complexity.
- Discussion and harmonization of regional differences in planning and response may be of increasing importance.

Professional Staff

PROFESSIONAL STAFF

Strategy, Commodity, and Enterprise Risk Management

With our broad commodity experience, ICF is an effective partner to help address your strategy and enterprise risk questions. We believe that a thorough understanding risk leads to more effective and actionable strategies to reduce costs or grow a business. While some firms emphasize risk management to facilitate "control", we use value-chain assessments, commodity, and enterprise frameworks to aid in prioritizing costs, programs and investments. This leads to better and more effective decisions.

We utilize a framework that considers issues through a risk identification process. These are captured in risk registries as to severity, potential impact, and propensity to change (or volatility). Our proprietary value chain, simulation, and decision analysis tools help firms decide on things like: where and how much energy to transact, how to manage a portfolio of transaction and asset obligations, whether to invest in a new asset, and how to quantify a firm's risk tolerance. Regardless of the type of risk (market, operational, legal, regulatory, credit, business, or political), our experienced development, technical, financial, policy, regulatory, and market experts that can address your issue with help in portfolio design; risk identification; risk mapping; risk registry delineation; risk reporting; policies, processes, and procedures; organization redesign; ETRM implementation; as well as hedge strategy and execution.

Team members have worked with heads of Strategic Planning, CFOs, Treasurers, CROs, and CCOs to evaluate asset and transaction portfolios independently or after combination together; assess commercial protocols, developing independent valuations; test markets to verify; guide market design and rule changes; develop regulatory strategies to manage commodity related issues and risks.; support these strategies with expert testimony; analyze innovative financing structures; provide services in support of mergers and acquisitions.

Manitoba Hydro

SunCoke Energy

Dominion

nationalgrid

Peter K. Nance

Peter K. Nance has directed over 200 consulting projects for power, refined products, liquids metals and agricultural clients in strategic planning, commodity trading risk management, and marketing,. He has served as an Executive Director of Research and publishing analyst for a money-center investment bank; in business and project development; providing third party opinions; market design; in market supply and demand assessment; in business and integrated resource planning; on institutional reform; and, in financial and economic evaluation. He has extensive experience with conventional and renewable technologies, He holds an MA and BS from The University of Texas and an MBA from The University of North Carolina. **peter.nance@icfi.com | +1.512.261.3363**

Electric Transmission

Over the next ten years, ICF expects to observe a rapidly changing energy generation landscape and requiring more than $1.4 trillion of new transmission development around the world. ICF helps utilities, financial firms, and independent transmission companies identify and operationalize these opportunities with an end-to-end service offering. Our analyses includes interconnection feasibility, power deliverability assessments, congestion and price forecasts, reliability and transfer capability studies. We simultaneously model the transmission systems of the US and Canada. When assessing regional issues, we employ our transmission modeling capability to help define the specific region of study based on the architecture of regional power flows. ICF's suite of robust analytical tools allows us to offer reliable insights that maximize the profitability and reliability of electric transmission assets.

Ken Collison

Ken Collison leads the transmission market analysis practice. He assists clients in various aspects of power markets assessments, including power system planning and analysis, reliability and economic studies, and transmission and ancillary services valuation. He is currently leading a study in the Northeast U.S. to review the reliability benefits of proposed backbone transmission projects and assess the viability of non-transmission alternatives to the projects. Mr. Collison also supports clients as an expert witness on electric transmission issues.

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Kiran Kumaraswamy

Kiran Kumaraswamy is an expert in transmission asset valuation, Locational Marginal Price (LMP) forecasting, merchant transmission investment assessment and power systems modeling. He also specializes in load forecasting methodologies, generation interconnection and risk assessment, estimation of transmission congestion, NERC Reliability Standards Compliance and benefits of Regional Transmission Organizations (RTO) in deregulated energy markets.

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Renewable Energy/Environment

Our Integrated Planning Model© forecasts that up to one quarter of all electricity in the US has the potential to be generated from renewable sources by 2030. For more than three decades, ICF has helped private-sector clients answer questions pertaining to large-scale renewable power plants. We deliver comprehensive renewable energy market solutions to utilities, corporations, government agencies, and public institutions. Our proprietary tools help firms decide where and how much renewable power to deploy across the country. ICF maintains a deep bench of development, technical, financial, policy, regulatory, and market experts. On behalf of project developers, our team helps evaluate technology options, determine resource adequacy and project feasibility, develop regulatory strategies, and assist with permitting. For investors, we analyze innovative financing structures and provide asset valuation and due diligence in support of mergers and acquisitions.

Steve Fine

Steve Fine is an expert on environmental markets. He has led numerous multi-stakeholder engagements, including the Edison Electric Institute, US Climate Action Partnership, Regional Greenhouse Gas Initiative (RGGI), and Clean Energy Group. His work for private sector clients has concentrated on evaluating the economics of conventional and renewable energy resources within the context of developing technology costs and environmental regulations.

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