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National Association of Regulatory Utility Commissioners

Southeast Europe Electricity Market Coupling (SEE-MC) Initiative

The Value Proposition of Market Integration

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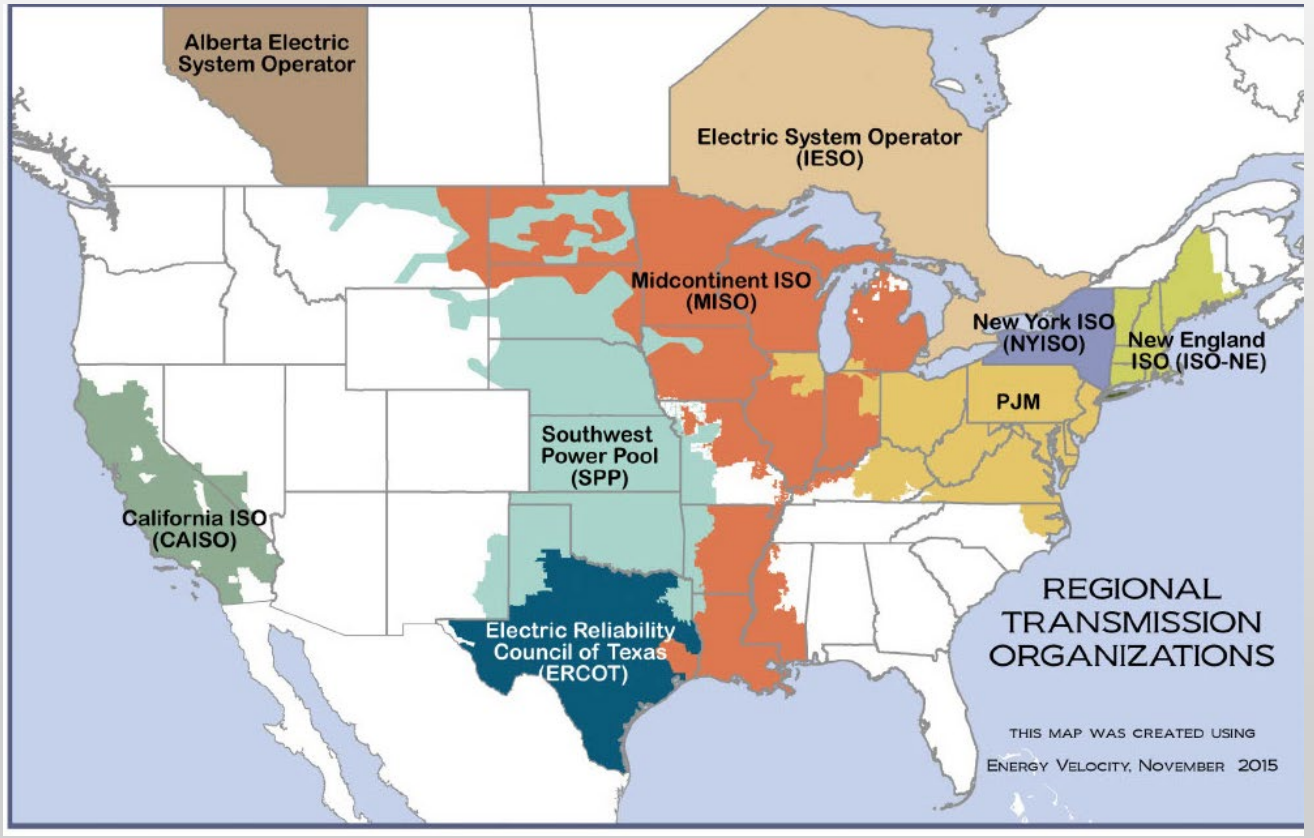
National Association of Regulatory Utility Commissioners

State Utility Forecasting Group (SUFG)

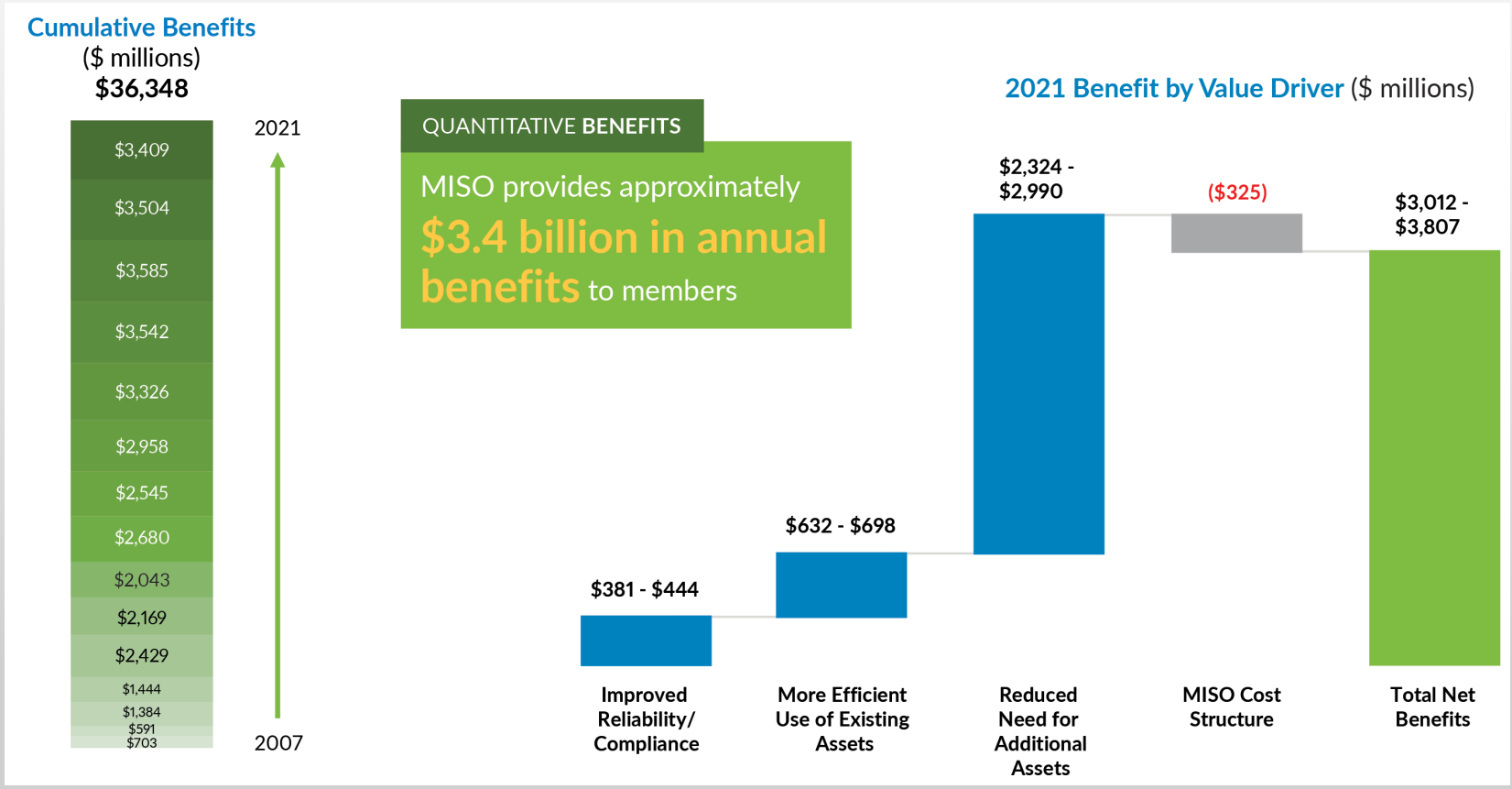
- SUFG is an independent research and analysis group at Purdue University.
- We have been providing analytical support to the Indiana Utility Regulatory Commission and the state legislature since 1985.
  - Long-term forecasts of electricity usage, resource needs, and prices
  - Annual reports on renewable and clean energy resources
  - Impact analyses of various policy options (environmental, retail competition, energy efficiency)
- We also produce long-term load forecasts for the Midcontinent Independent System Operator (MISO).
- We are staffed by five analysts and a director, with support for graduate student studies and University faculty.

Regional transmission organizations

- Indiana utilities are members of either MISO or PJM.



MISO value proposition



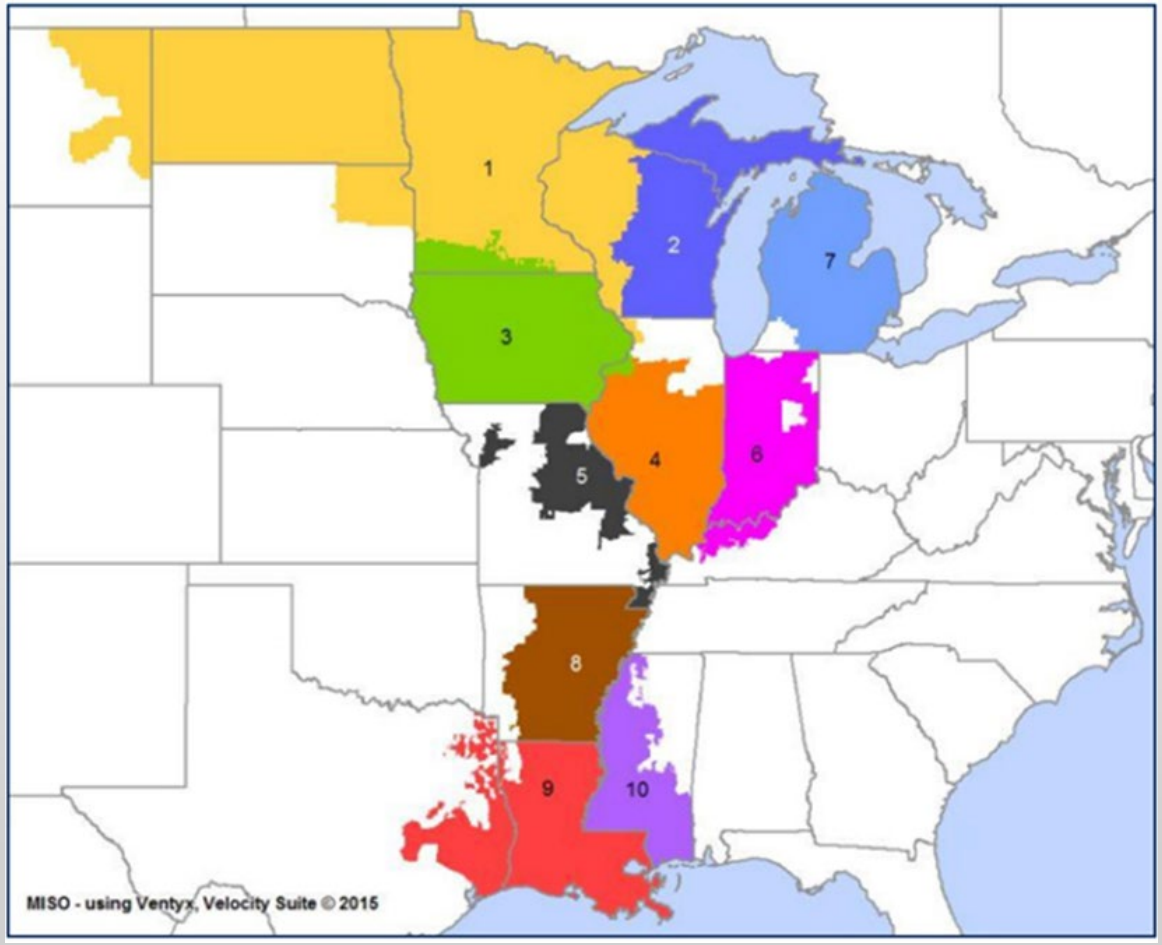
Source: MISO

MISO value proposition

- Improved reliability/compliance includes higher transmission availability and compliance activities that MISO performs on behalf of its members.
- More efficient use of existing assets includes centralized economic dispatch of energy, frequency regulation, and spinning reserves.
- Reduced need for additional assets includes more efficient integration of wind energy, reduction in reliability reserves due to increased load diversity, and deferment of new generation resources through the incorporation of demand response.

MISO South integration

- The MISO South region was added in December 2013.
- Prior to the integration of the MISO South region (zones 8, 9 and 10), Entergy, the largest utility in that region, estimated that it would save its customers $1.4 billion over the first 10 years.



PJM value proposition

- PJM estimates an annual benefit between $3.2 billion and $4 billion (note: unlike MISO, PJM does not subtract their costs from these numbers).
- Reliability improvements through regional planning efficiencies: $300 million
- Generation investment savings through lower reserve margin and competition from alternative resources: $1.2-1.8 billion
- Replacement of less efficient resources through PJM interconnection process: $1.1-1.3 billion
- Reduced energy production costs through expanded dispatch area: $600 million
- Additional benefits
  - Reduction in CO2 emissions of more than 10 million tons
  - Training, compliance, and innovation

MISO – PJM Seams

PJM/MISO Joint & Common Market Initiative

- There are some inefficiencies where the two RTOs meet (the seams), so PJM and MISO work together to improve communication and coordination.
- Joint meetings are held every six months to review ongoing projects and initiate new ones.
- Focus areas include:
  - Market operations
  - Transmission & resource planning

State regulators

- The Indiana Utility Regulatory Commission monitors and participates in decision-making process for the RTOs.
- Activities include participation in stakeholder committees and work groups as an individual entity and as part of a larger group of utility regulators.
- The Organization of MISO States (OMS) and the Organization of PJM States, Inc. (OPSI) represent utility regulators in the MISO and PJM regions, respectively.
- OMS/OPSI members collaborate on policy issues, coordinate on data and analysis, and share resources.
- OMS/OPSI members maintain individual autonomy and decision-making authority.

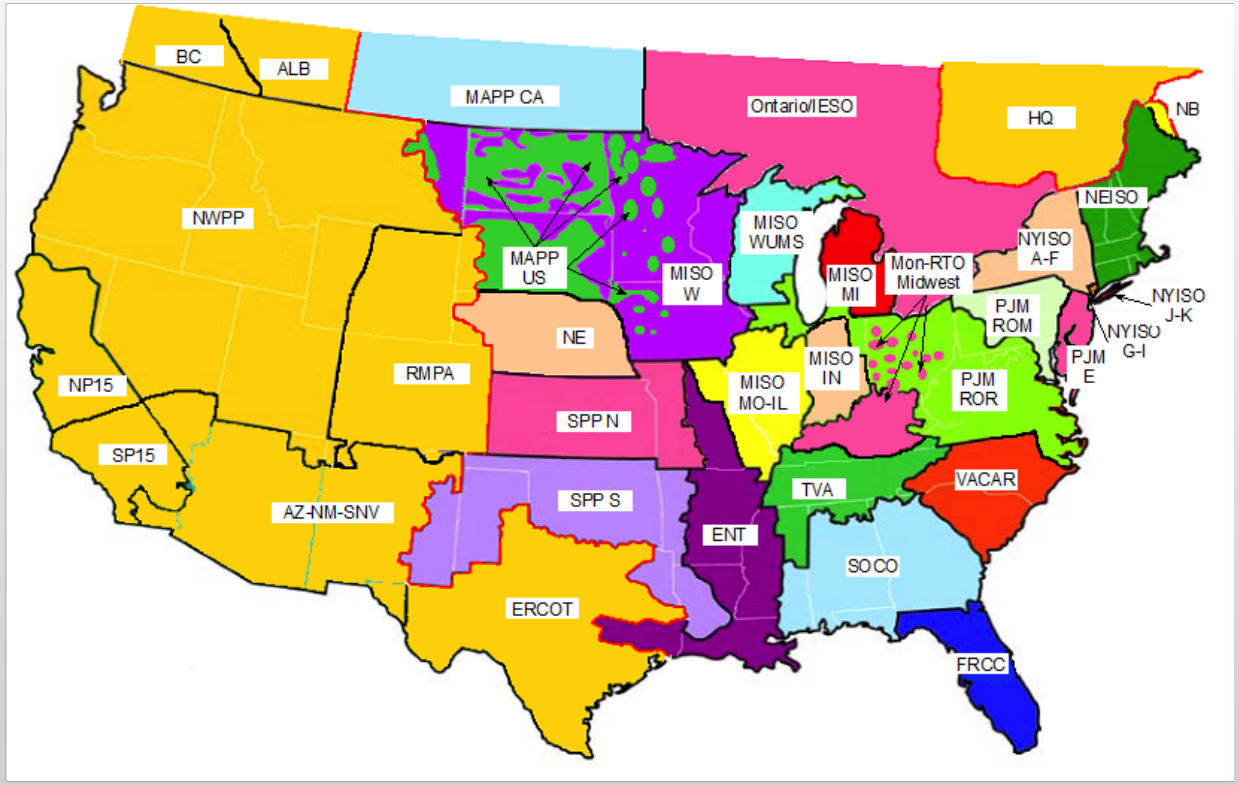
OMS & OPSI

- While the two organizations perform similar functions, there are differences.
- OMS has formal voting rights in the MISO stakeholder process; thus, they work more to develop unified positions to present to MISO and the federal regulators (FERC).
- Differences in what and how states regulate create differences in participation in the RTO processes; while most MISO states are traditionally regulated, many PJM states have retail restructuring.
- Issues evolve over time, with much of the early work involving the development of day-ahead and real-time markets; now much of the time is spent planning and cost allocation of transmission investments.

Other examples

Eastern Interconnection Planning Collaborative (EIPC)

- Regional planning authorities worked with regulators and industry stakeholders from 2009-2014 to conduct studies of the impact of coordinated interregional planning for the eastern U.S. and Canada



Other examples – EIPC

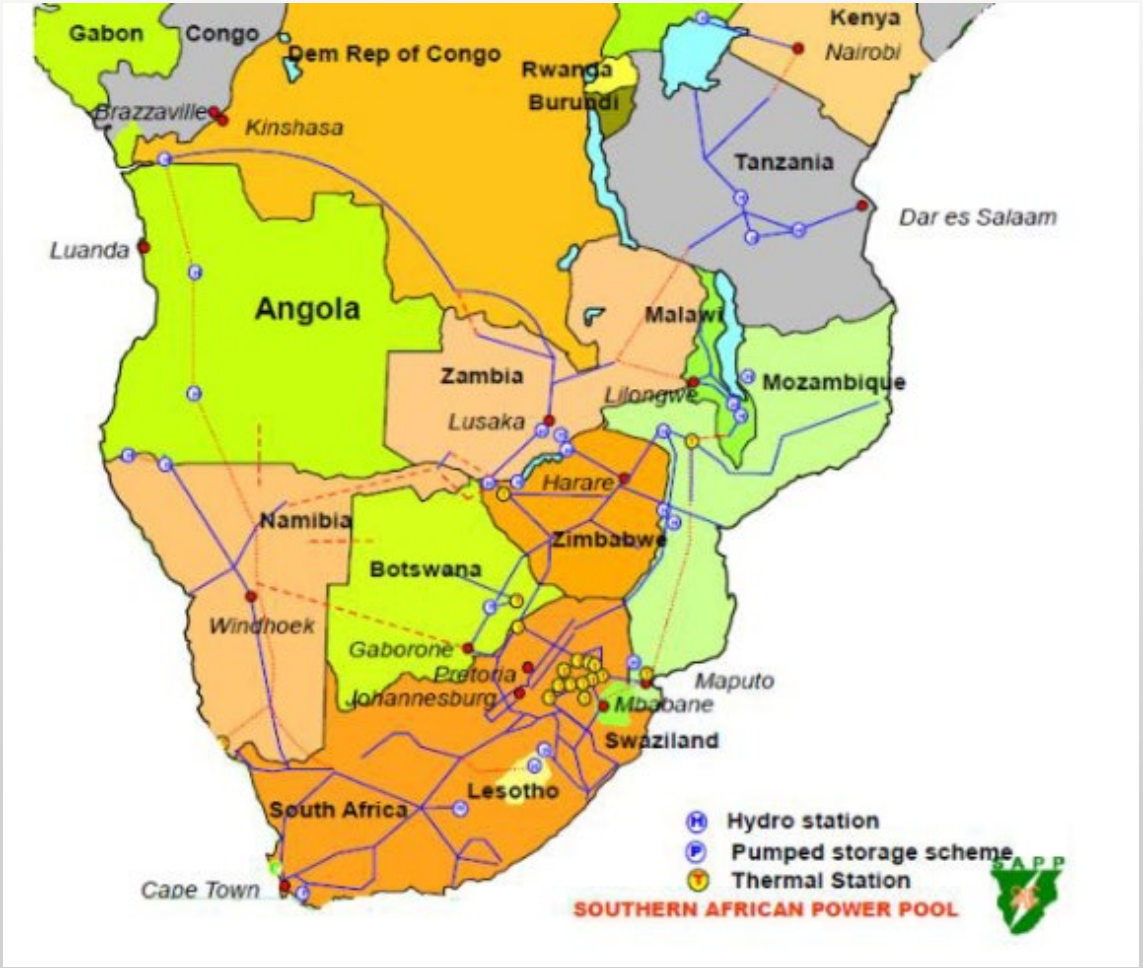
Renewable Portfolio Standard - National vs. Regional Implementation

- Due to differences in assumptions in various inputs (load growth, fuel prices, capital costs), most of the scenarios analyzed in the process do not allow direct comparisons of regional vs. interregional planning costs.
- The best direct comparison is with the analyses around the impacts of a renewable portfolio standard; scenarios were developed with both local and national implementation.
  - Costs associated with generation (capital, fuel, operations) were about $120 billion lower (net present value) for the national implementation.
  - Costs associated with transmission were about $34 billion higher for the national implementation.
  - Total costs were about $86 billion lower for the national implementation.

Other examples

Southern African Power Pool (SAPP)

- The SAPP was founded in 1995 via an Inter-Governmental Memorandum of Understanding but coordinated trading did not occur until later.



Other examples – SAPP

USAID-funded work by SUFG in the late 1990s

- SUFG built an optimization model to estimate the benefits of increased regional trade in 12 nations in the Southern African region.
- Estimated net benefits were $70-130 million per year.
- The SAPP established a short-term energy market in 2001.
- A day-ahead market was established in 2009.
- A forward physical market and an intra-day market were added in 2015.

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