Free markets. Real solutions.

RTO Expansion

The Evolving Industrial View and Southeast Developments

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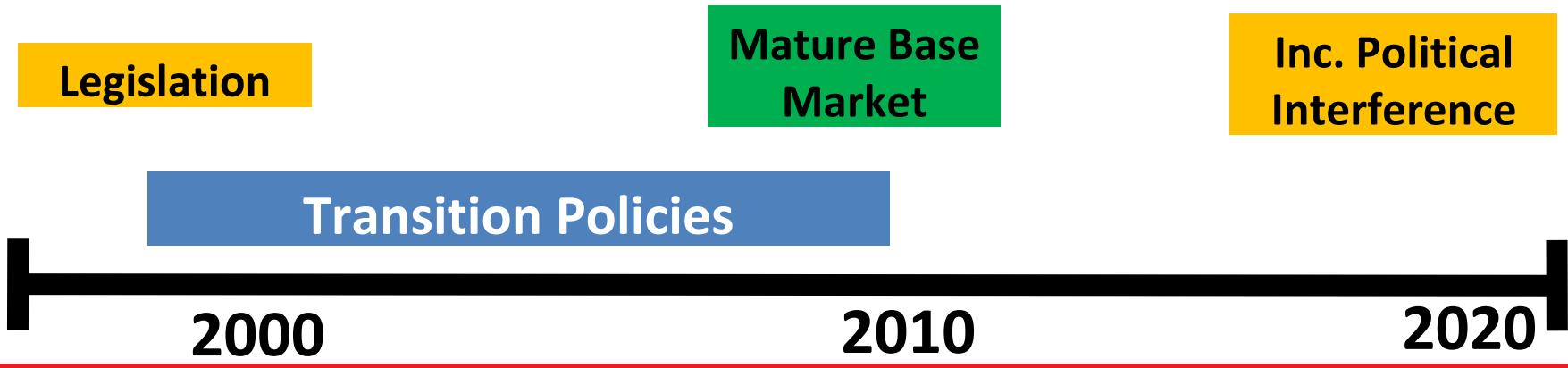
Overview

I. Industrial View of RTOs (Devin)
   - Evolution of position
   - Contemporary conditions
   - Outlook

II. Southeast Developments (Jennie)
   - Competition options
   - Cost savings and transparency
   - Renewables access and integration

Evolution of Industrial Views on RTOs

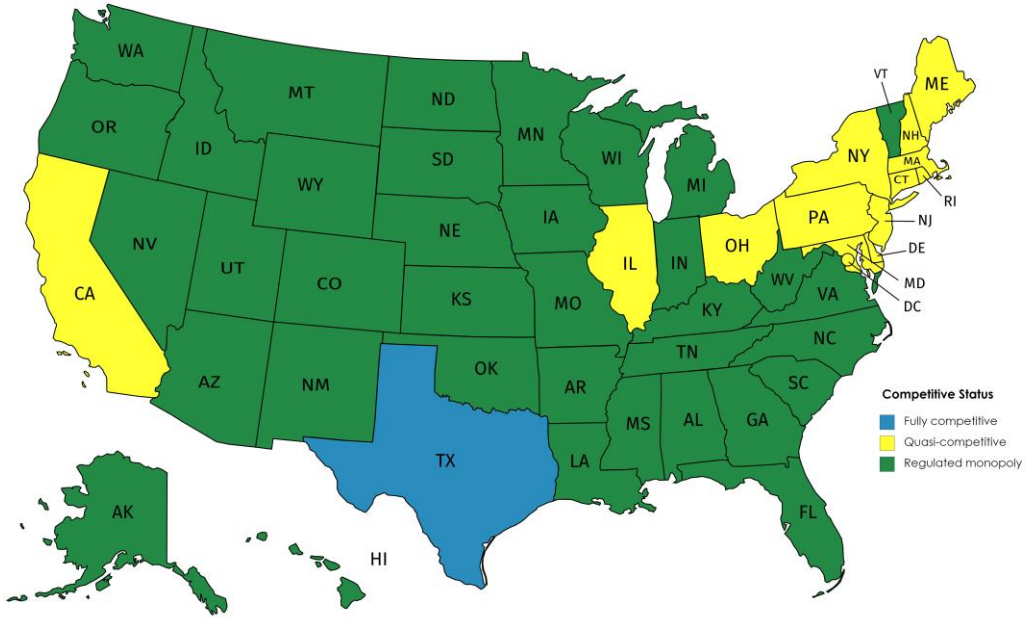
- 80s/90s/00s led state pro-market reforms
  - Bilateral-only advocacy, opposed RTOs
- Late 2000s-2015: RTO resentment common
- Late 2010s: realize RTO benefits > costs

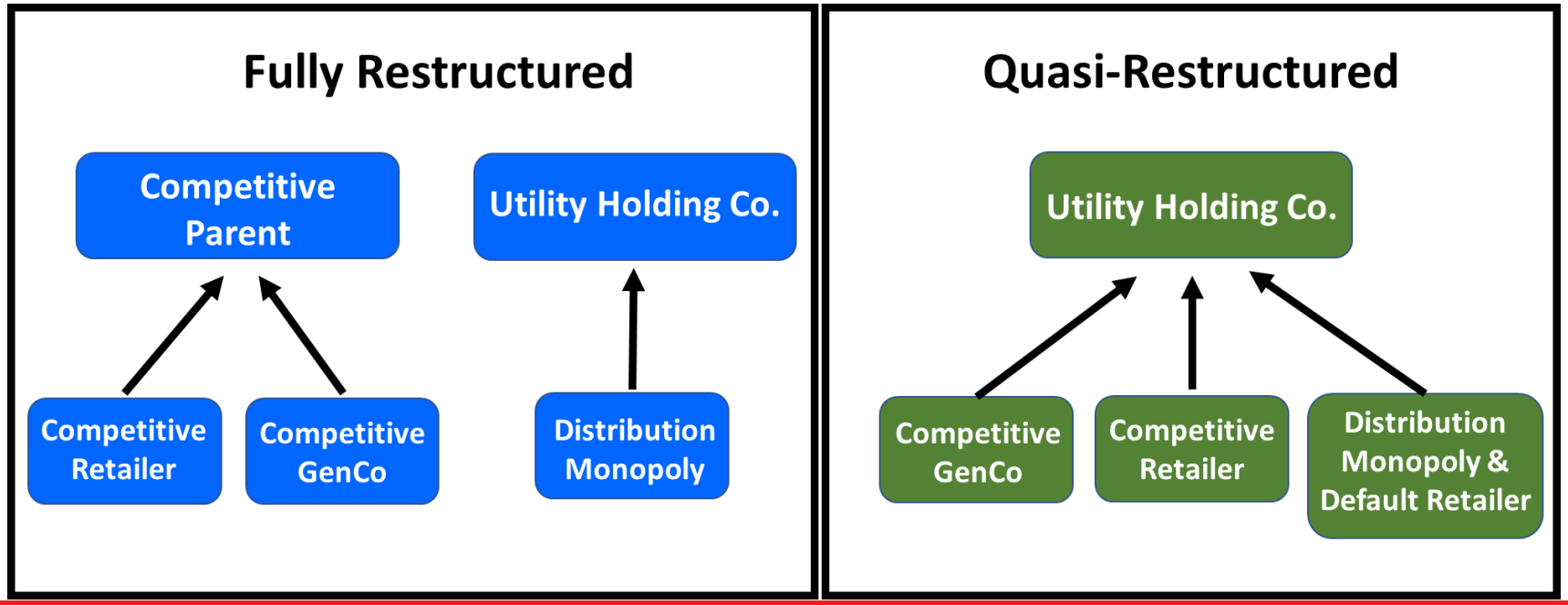


Implementation Quality Matters

- Wholesale performance varies by:
  - Market design
  - Transmission policy
  - Governance
- Healthy retail required
  - Proper restructuring (e.g., Texas)
    - Wholesale benefits flow to all consumers
  - Flawed restructuring (e.g.,Ohio)
    - Inverse relationship b/t wholesale and retail
    - Some industrials benefited

RTO Benefits Vary by Regulated, Quasi- and Fully Restructured Status

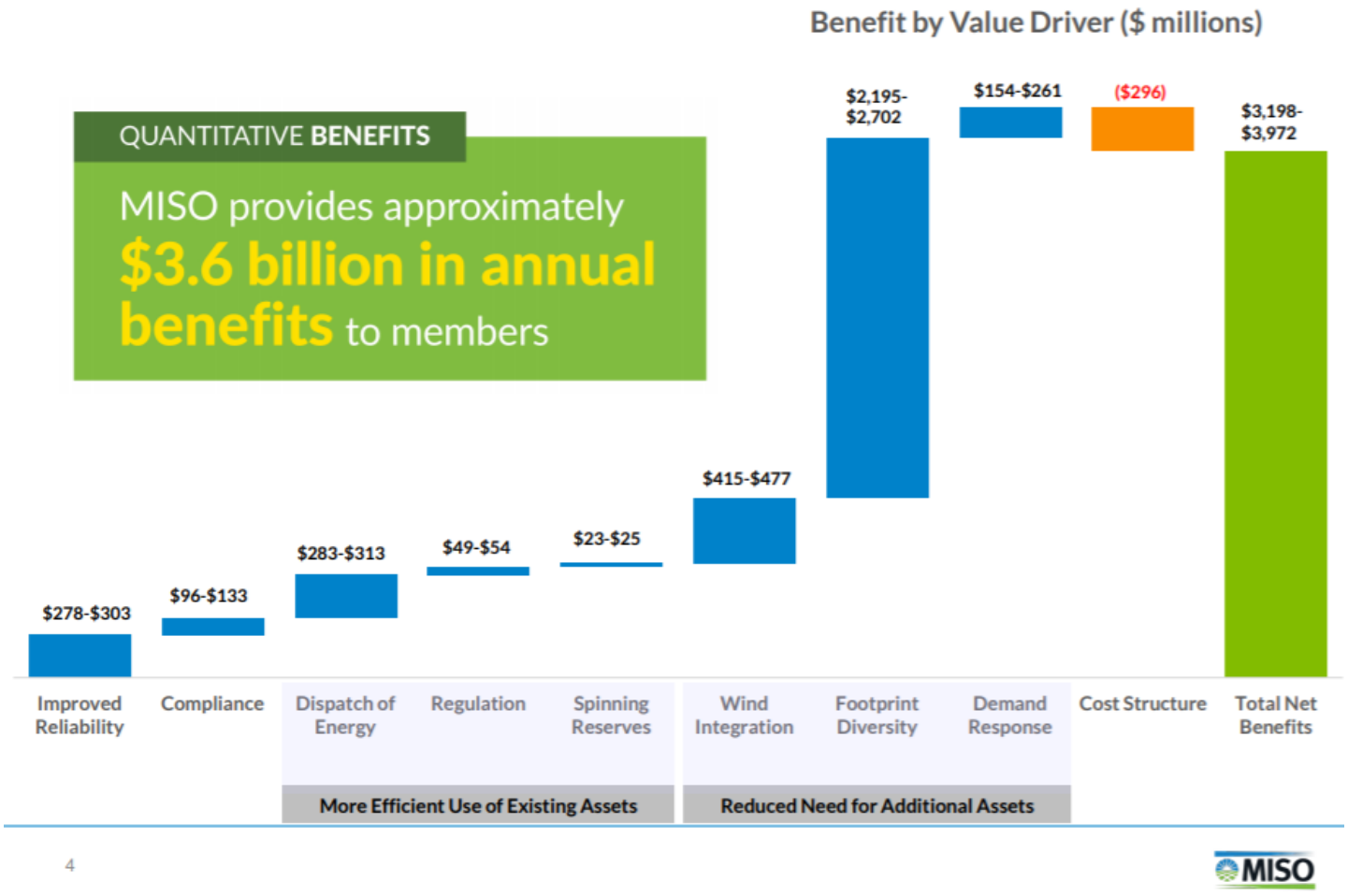




	RTO Advantages	RTO Disadvantages
Costs	Clear energy and ancillary service advantage. Capacity markets better than IRP.	Representation costs. RTO overhead costs.
Reliability	Better power quality and outages frequency/ duration. Opportunity for differentiated reliability; consumers pay for service level that they value.	
Customer Autonomy	Enables superior demand response and self-supply optionality. Enhances value of market access, retail policy permitting.	Potential to alter unique negotiations with utility.
Transmission	Better economic planning. Potential for better system oversight.	Reliability projects expensive. G&T synergies. Cost allocation concerns.
Governance	Ability for fair representation. Some consolidated compliance.	Complexity + concentrated vs. dispersed interests → consumers outgunned.

Net Benefits Categorical Variation

MISO 2019 Value Proposition



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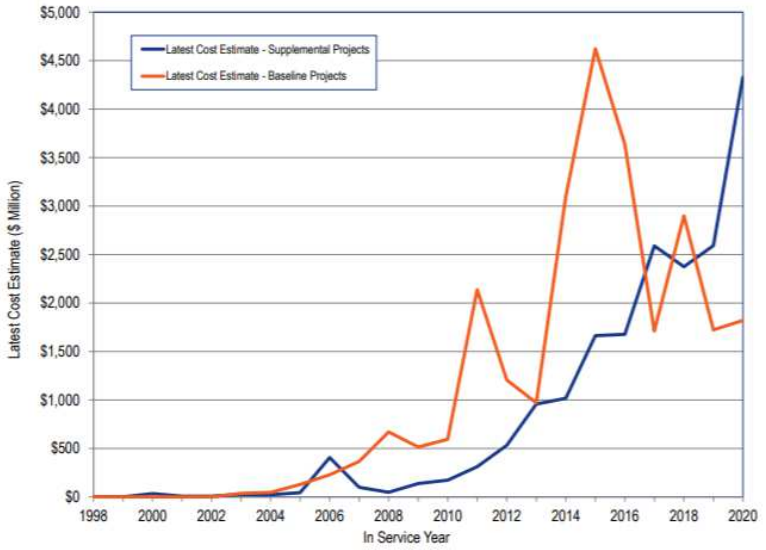
MISO

Industrial Frustrations With RTOs

1. Capacity markets
   - ERCOT's "energy-only" gold standard
   - Critical: markets better than IRP for capacity planning
2. Transmission policy
3. Stakeholder governance

Figure 12-3 Cost estimate of baseline and supplemental projects by expected in service year: 1998 through 2020



Source: PJM IMM

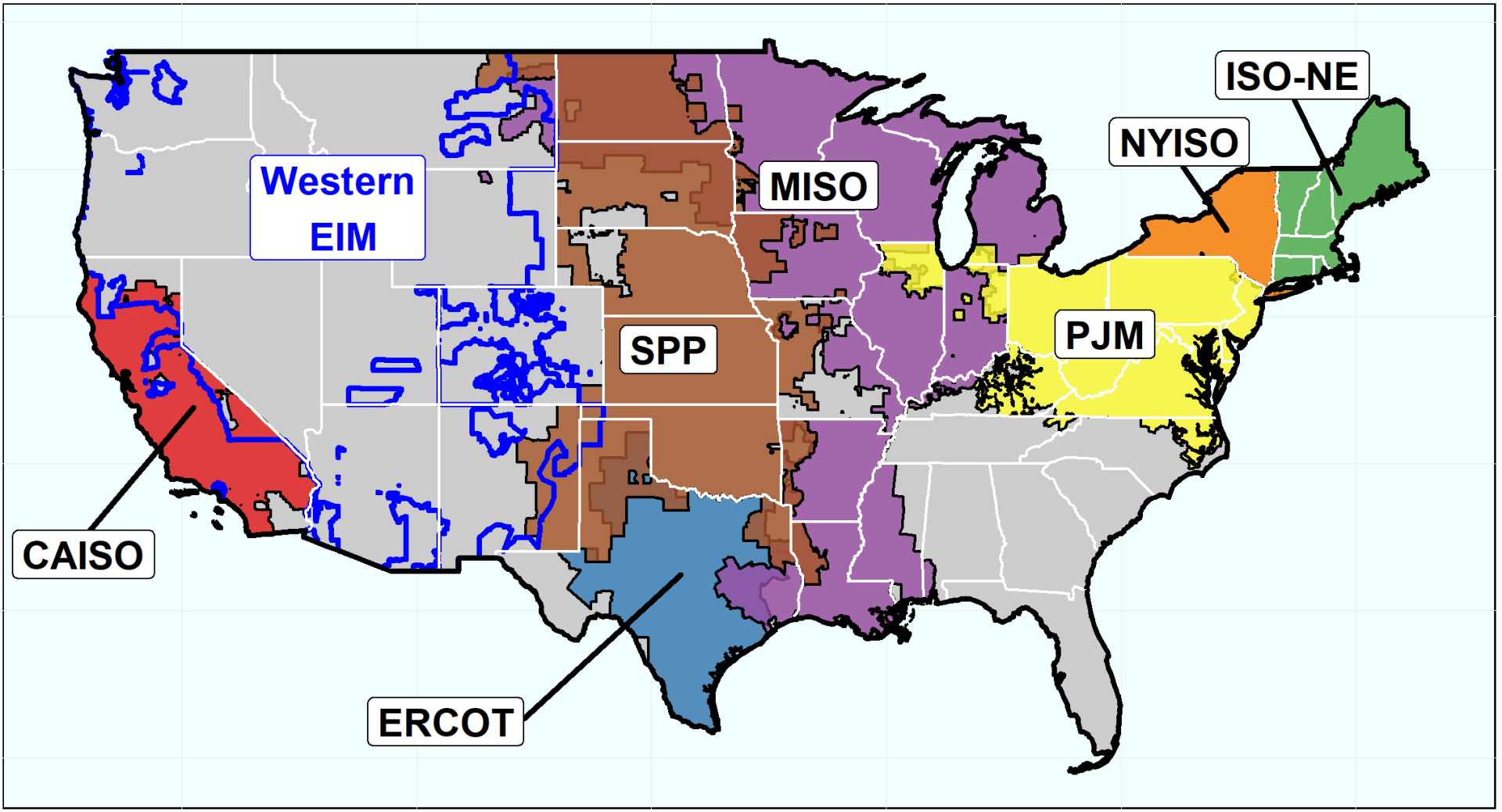
Industrial Outlook: RTO Net Benefits

- Core value proposition increases
  - Emerging industrial preferences like ESG
  - Evolving resource mix: market advantage explodes
- Mission creep risk
  - E.g., MOPR, parochial stakeholder favoritism
- Regional Variances
  - West
    - Ghosts of Enron
    - Hydro advantage
  - SE
    - FERC skepticism
    - Model: ERCOT, MISO South, EIM, SEEM, other?
- Don’t forget retail policy quality!

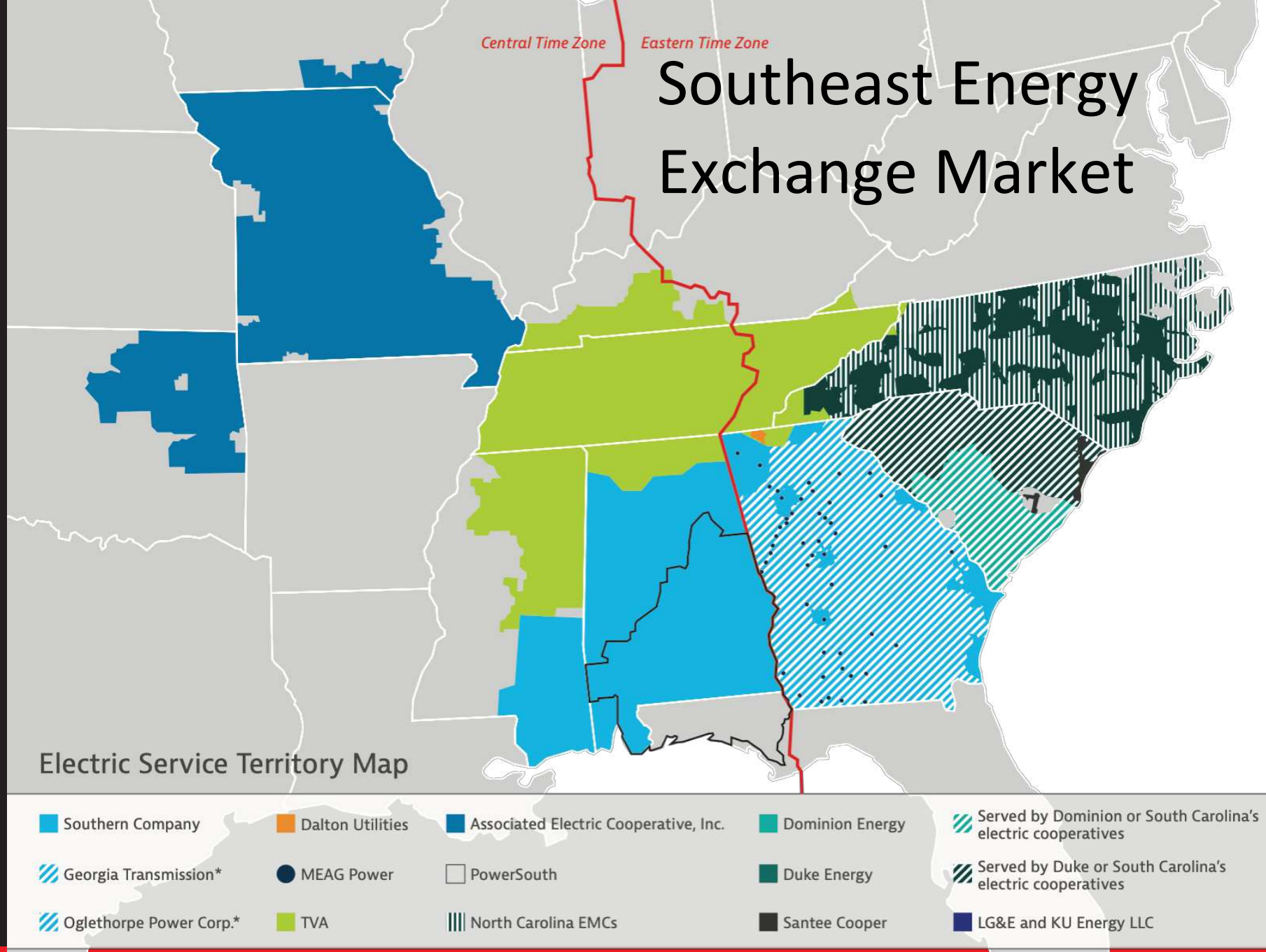
Regional wholesale competition options and implications for the SE

- Options for enhancing competition
  - RTO
  - EIM
  - Southeast Energy Exchange Market (SEEM)
  - Compared to current status of electricity trading in SE
- How do they help fulfill your goals?
  - Cost savings, price transparency
  - Sustainability: Connecting RE with customers, RE integration, emissions reductions

RTO-operated markets



Southeast Energy Exchange Market



*Oglethorpe Power is a Georgia Transmission member and power supplier that serves the 38 member systems

Costs/Benefits

Example: APS joining WEIM*

- Size ~7 GW
- Startup cost ~$13-$19 M: metering upgrades, communications software, business process changes and tariff changes
- Ongoing cost ~$4 M annually
- $42 M/year actual benefits
- ~**$5.45 M/yr/GW** net benefits after initial costs paid

SEEM

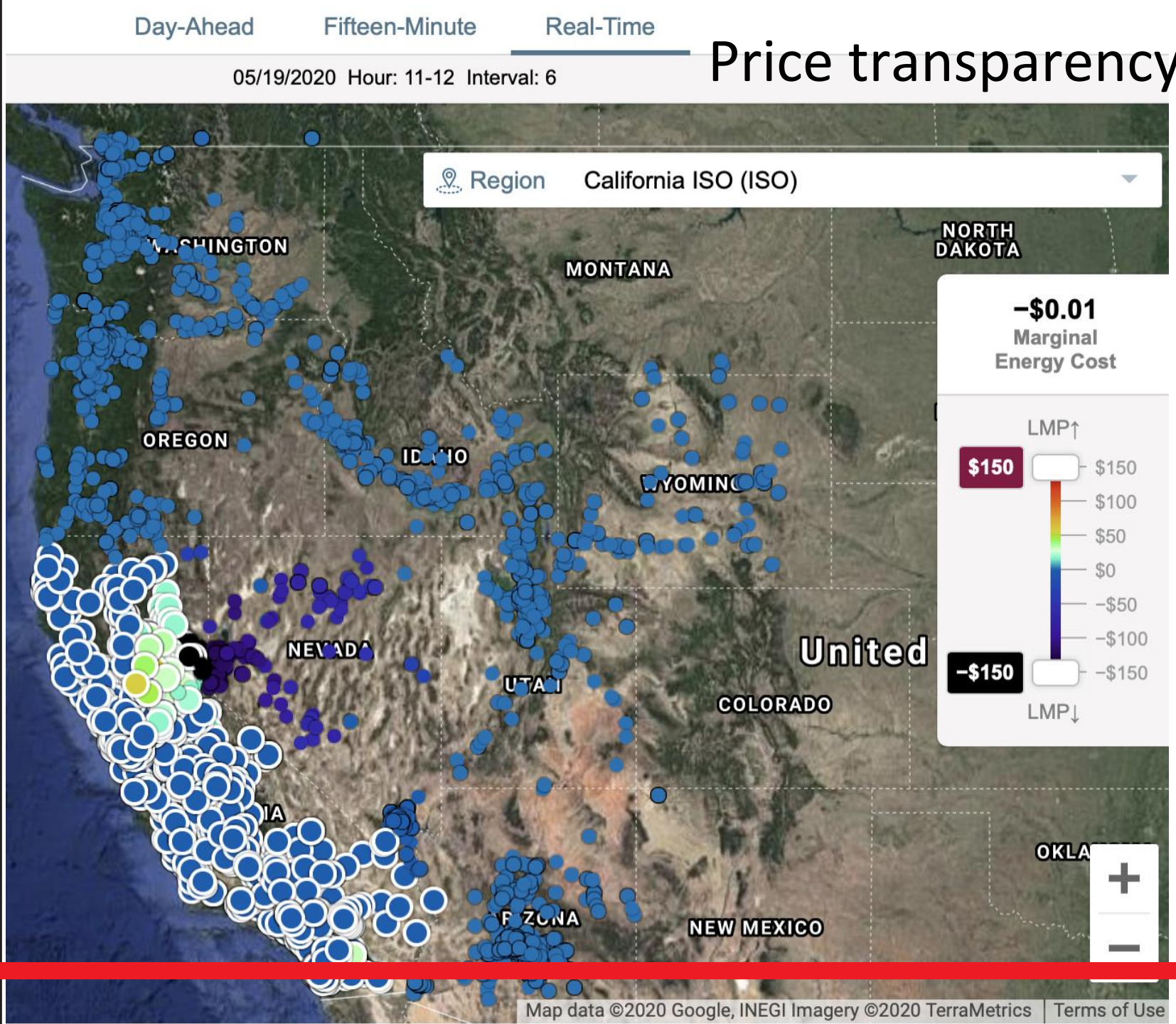
- ~160 GW size
- ~$37-58 M/yr saving (base case)
- ~$121-151 M/yr savings for region in 2037 (carbon constrained)
- ~$3 M/year for region, non centralized costs
- **~ $0.28M/yr/GW net benefits (base case)**
- **~ $0.83 M/yr/GW net benefits (carbon constrained)**

SPP projected **EIM** trade net benefits 2005 ~$37M/yr / 40 GW

=> ~ **$0.93M/yr/GW**

*Caveat: This is not a rigorous analysis, just a back-of-envelope estimate of potential net benefits compared to

Price transparency



SoCo Energy Auction

2020

January
2020-01-09 Hourly

February
2020-02-01 Hourly
2020-02-06 Hourly
2020-02-11 Hourly
2020-02-13 Hourly
2020-02-21 Hourly
2020-02-22 Hourly

March
2020-03-11 Hourly
2020-03-14 Hourly
2020-03-15 Hourly
2020-03-16 Hourly
2020-03-22 Hourly
2020-03-23 Hourly
2020-03-27 Hourly
2020-03-28 Hourly
2020-03-29 Hourly
2020-03-30 Hourly
2020-03-31 Hourly

April
2020-04-08 Hourly
2020-04-09 Hourly
2020-04-15 Hourly
2020-04-17 Hourly
2020-04-18 Hourly
2020-04-19 Hourly
2020-04-20 Hourly
2020-04-21 Hourly
2020-04-25 Hourly
2020-04-27 Hourly

May
2020-05-02 Hourly
2020-05-03 Hourly
2020-05-06 Hourly
2020-05-10 Hourly
2020-05-20 Hourly
2020-05-26 Hourly
2020-05-27 Hourly
2020-05-28 Hourly
2020-05-31 H

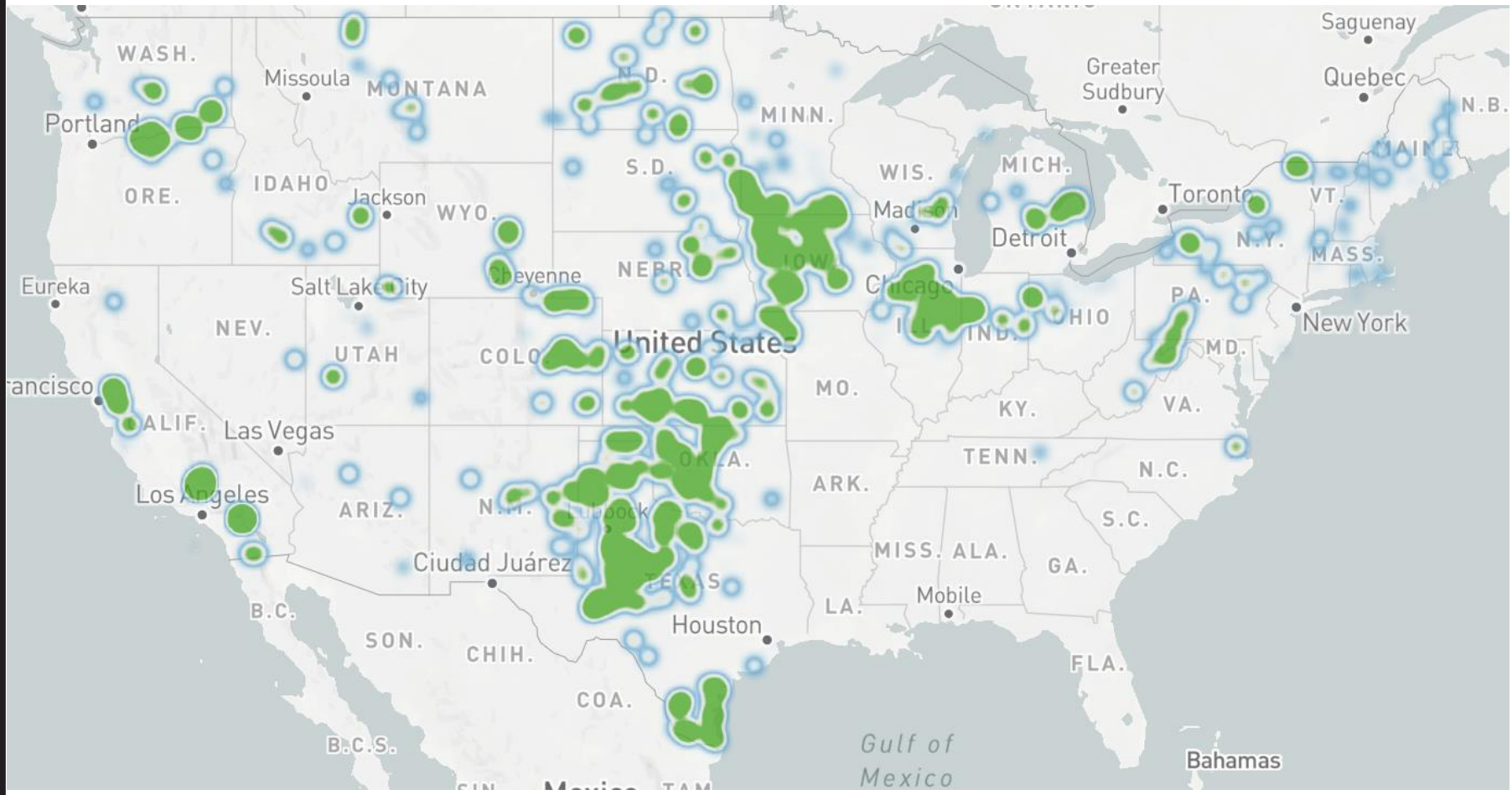
June
2020-06-02 Hourly
2020-06-05 Hourly
2020-06-06 Hourly
2020-06-22 Hourly
2020-06-23 Hourly
2020-06-26 Hourly
2020-06-28 Hourly
2020-06-30 Hourly

July
2020-07-01 Hourly
2020-07-03 Hourly
2020-07-07 Hourly
2020-07-08 Hourly
2020-07-30 Hourly

2020-07-30_HOURLY_CLEARING_PRICES

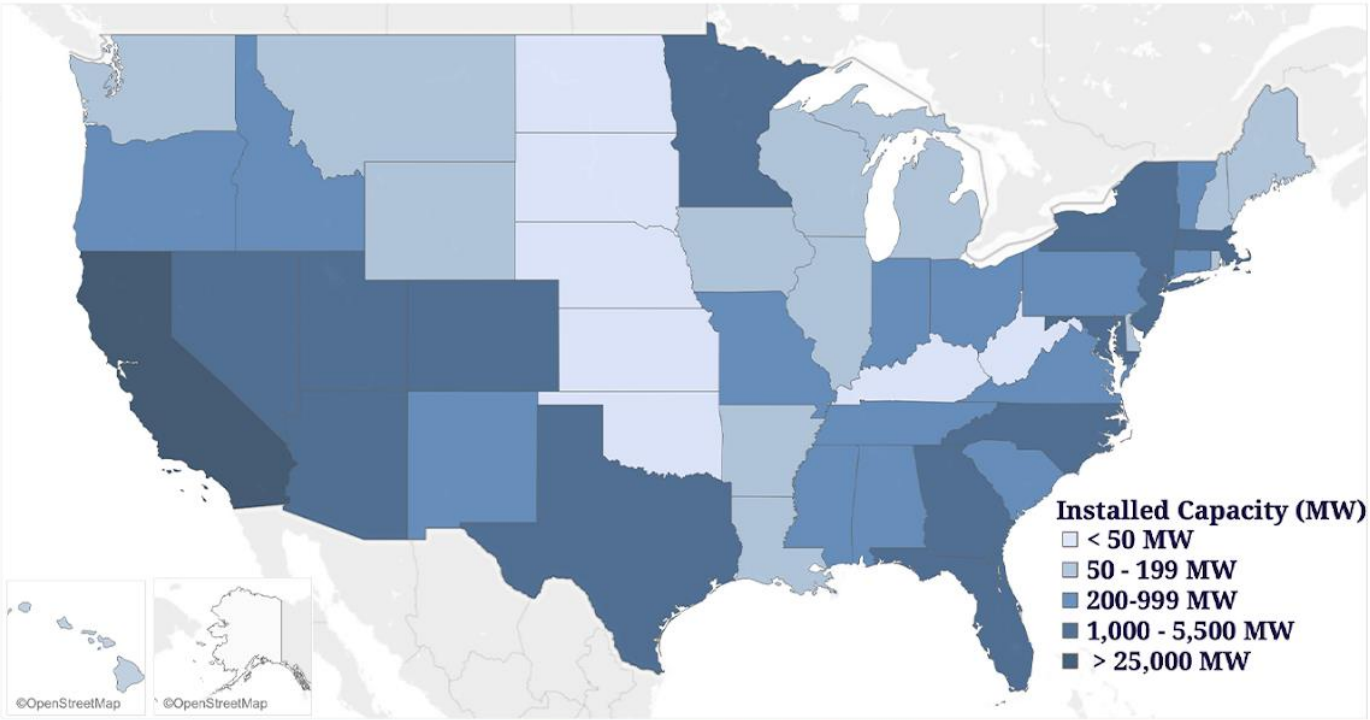
UTC_FLOW_HOUR	CPT_FLOW_HOUR	CPT_HOUR_END	PRICE	TLU
2020-07-30 10:00:00	2020-07-30 05:00:00	6	20.63	2020-07-30 08:52:08

Heat map of every U.S. wind turbine (4/2020)



Top 10 States

California	25,016 MW
North Carolina	5,467 MW
Arizona	3,788 MW
Nevada	3,452 MW
Florida	3,156 MW
Texas	2,957 MW
New Jersey	2,829 MW
Massachusetts	2,535 MW
New York	1,718 MW
Utah	1,661 MW
Georgia	1,572 MW



Region	2019 Renewable Capacity as Percent of Total (GW)[33]	2019 Renewable Generation as Percent of Total[34]
WECC-CA	30.5% (22.6 GW)	33.6%
ERCOT	28.6% (29.6 GW)	20.7%
SPP	25.8% (22.3 GW)	27.0%
WECC (excl. CA)	16.7% (23.4 GW)	12.0%
MISO	14.8% (25.2 GW)	10.7%
ISO-NE	10.8% (3.7 GW)	11.2%
PJM	7.0% (13.7 GW)	4.1%
NYISO	6.9% (2.9 GW)	5.2%
FRCC	4.8% (2.7 GW)	2.6%
SERC	4.3% (7.1 GW)	2.1%

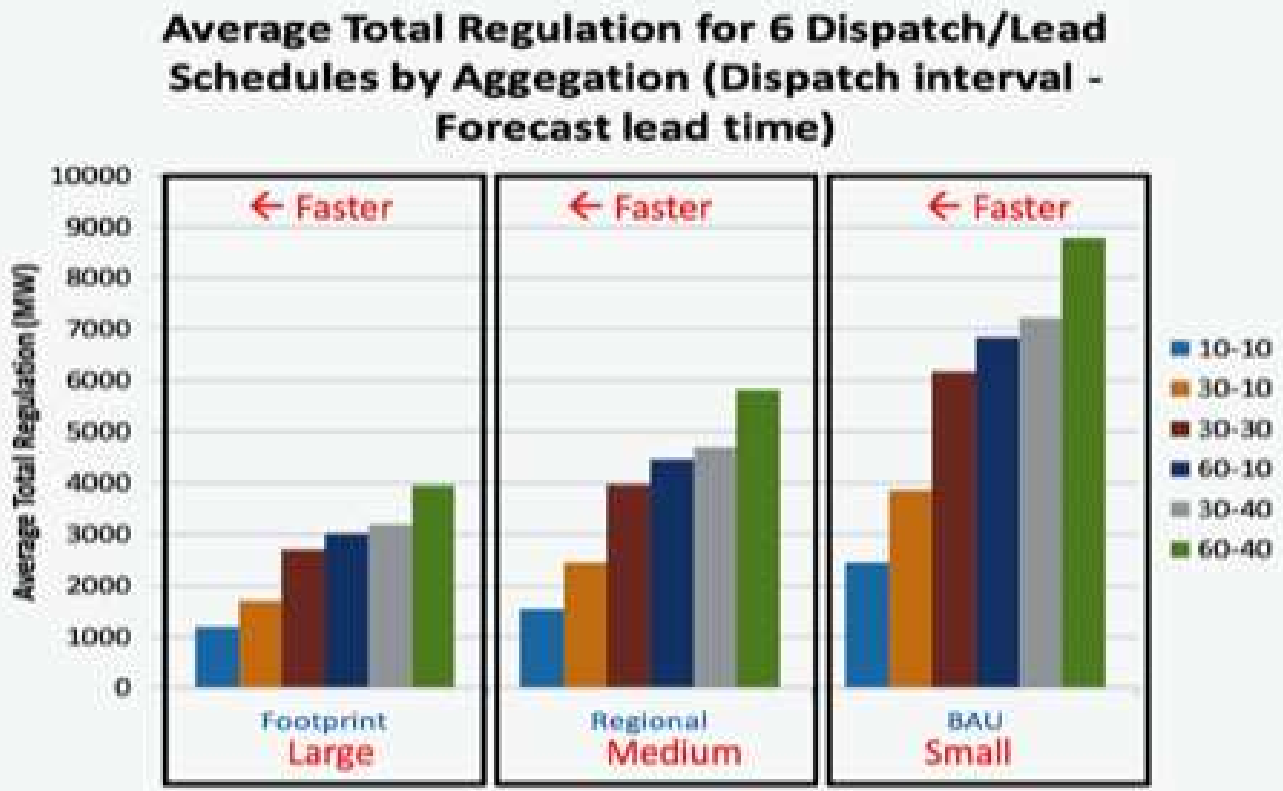


Figure 3. The size of the balancing authority area and increasing frequency of dispatch can reduce regulating reserve (Milligan et al. 2011).

Resources

- https://nicholasinstitute.duke.edu/publications/evaluating-options-enhancing-wholesale-competition-and-implications-southeastern
- https://www.rstreet.org/2020/08/26/how-voluntary-electricity-trading-can-help-efficiency-in-the-southeast/

Thank you!

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