RTOs and ISOs: Uniformity, Regionalization, and Future Challenges

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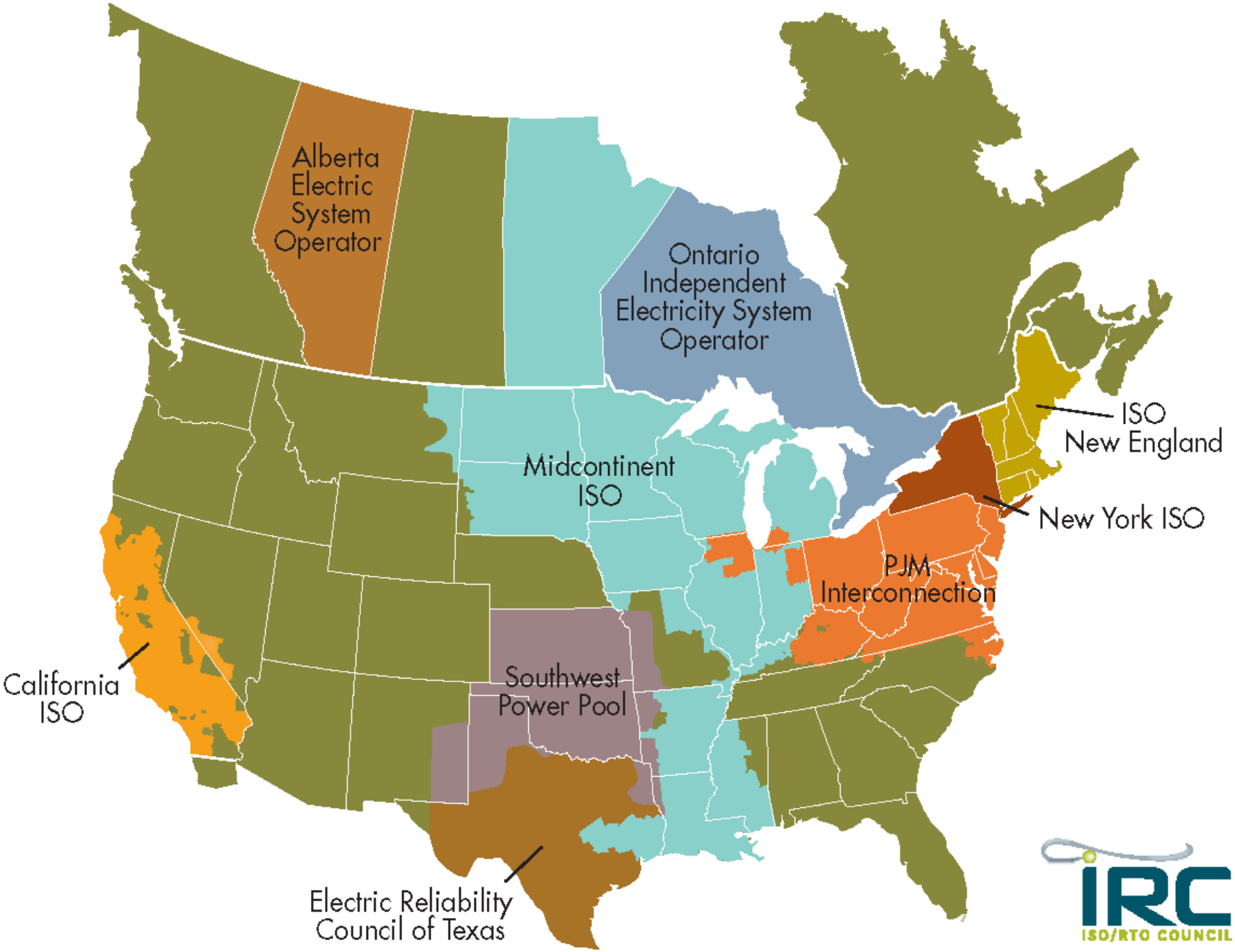
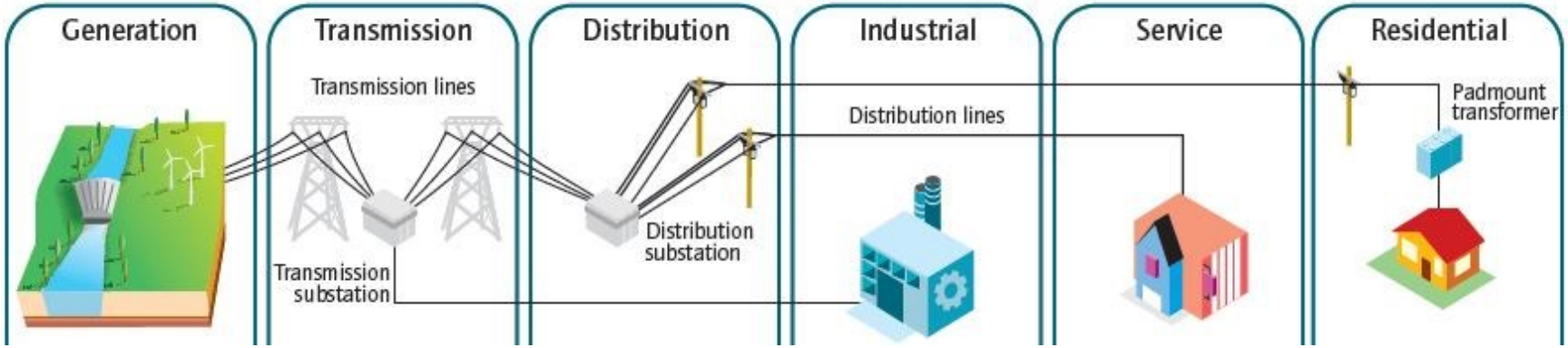

Alberta Electric System Operator
Ontario Independent Electricity System Operator
ISO New England
New York ISO
Midcontinent ISO
PJM Interconnection
California ISO
Southwest Power Pool
Electric Reliability Council of Texas
IRC
ISO/RTO COUNCIL

Regional Transmission Organization	Jurisdiction	Customers	Generation capacity	Miles of Transmission Lines
PJM	Multi-state	61 million	183,000 MW	63,000
ISO-NE	Multi-state	14 million	32,000 MW	8,000
MISO	Multi-state	48 million	205,759 MW	65,000
SPP	Multi-state	15 million	77,366 MW	48,000
ERCOT	Single state	23 million	84,000 MW	40,530
CA-ISO	Single state	30 million	59,000 MW	25,865
NYISO	Single state	19.5 million	37,925 MW	11,005

Key Actors in RTO Decision Making

Electric System



Stakeholders

RTO/ISO

Generation Utilities

Distribution Utilities

State- PUC, Energy Office (Policies &Planning), Environmental Office (Siting)

Industrial, Commercial & Residential Consumers

FERC

Federal and State Courts

Civil Society Stakeholders

Stakeholder Classes

PJM (5)

- Transmission Owners
- Generation Owners
- Electricity Distributors
- End Use Sectors
- Others

CAISO (6)

- Transmission Owners
- Generation Owners
- Transmission Dependent Utilities
- End Users & Retail Energy Providers
- Alternative Energy Providers
- Public Interest Groups
- Marketers

MISO (10)

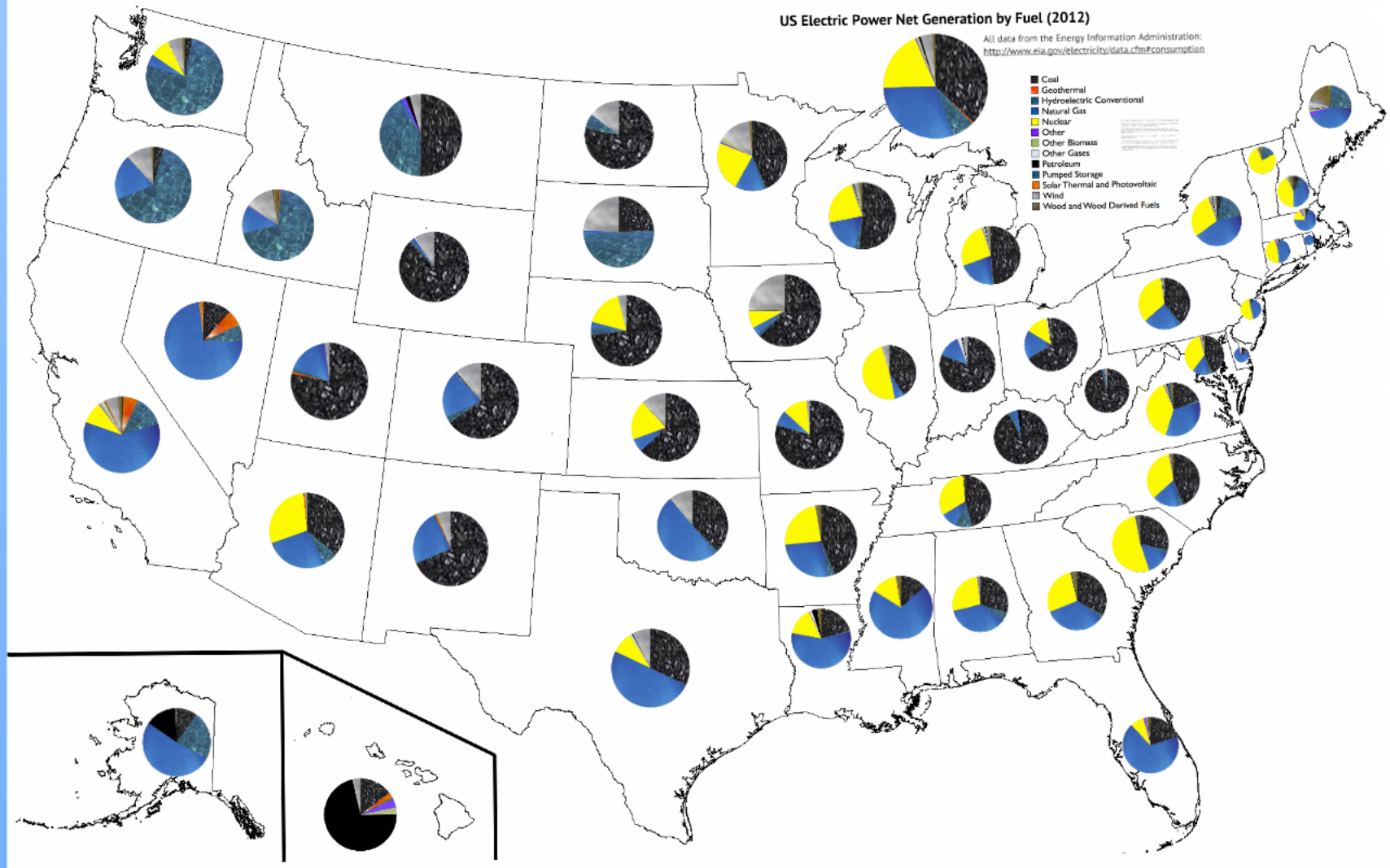
- Transmission Owners
- Generation Owners/Independent Power Producers
- Power Marketers
- Transmission Dependent Utilities (munis/co-ops)
- Eligible End Use Customers
- Coordinating Members
- Transmission Developers
- State Regulators (OMS)*
- Consumer Advocates*
- Environmental/Other*

* Non Paying

Critical dimensions of RTO/ISO differences

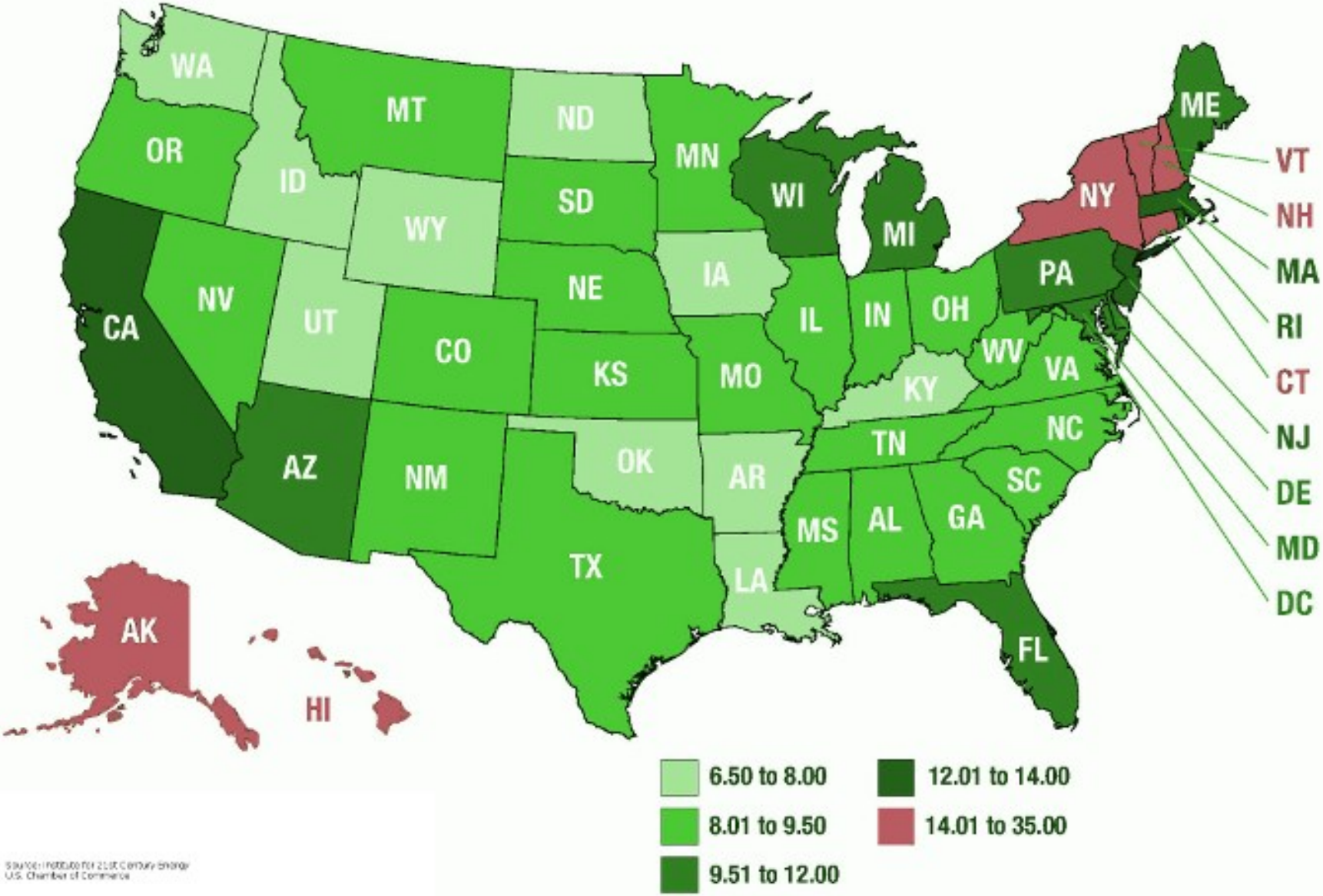
- Single or multi-state
- Member state politics/interests
- Traditionally structured or restructured markets
- RTO member, voting and advisory structure
- RTO stakeholder interests, power and opportunities
- Role of FERC (and shifting politics of FERC)
- Dominant fuel source with state/RTO/ISO

Electric Power Net Generation by State (2012)

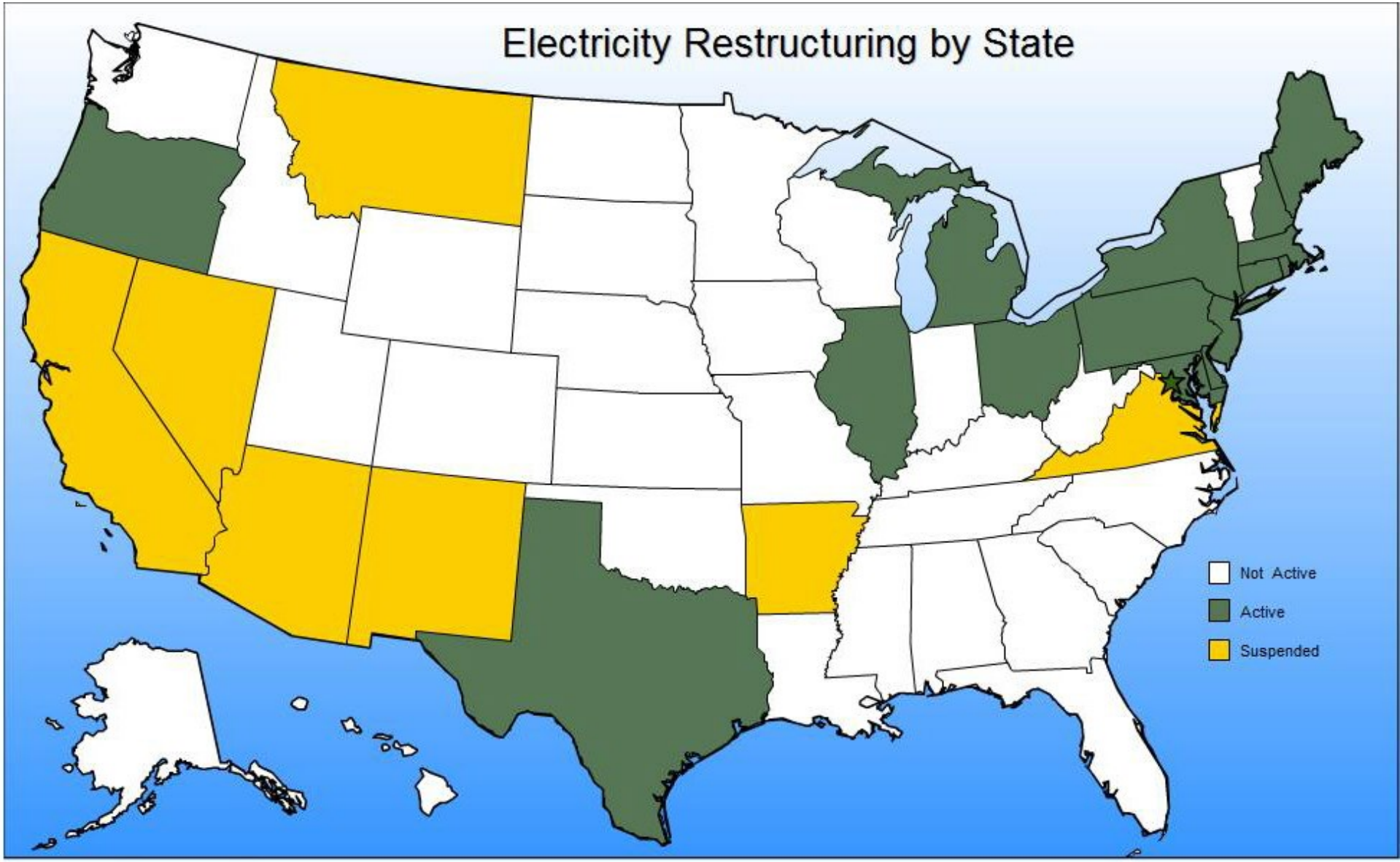


2012 U.S. Average Electricity Retail Prices

(cents per kilowatt hour)

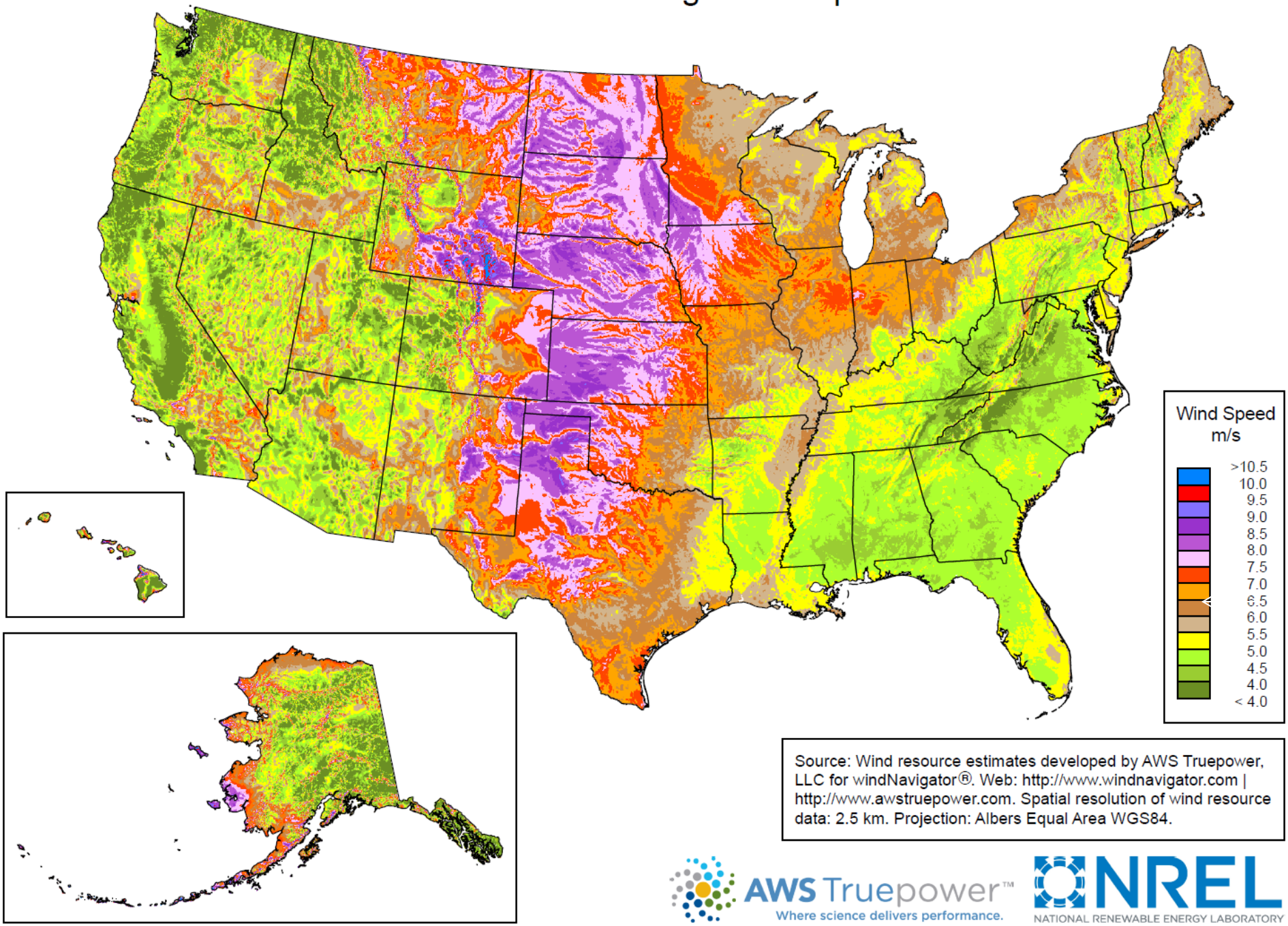


Source: Institute for 21st Century Energy
U.S. Chamber of Commerce



Source: Energy Information Administration

United States - Annual Average Wind Speed at 80 m



Source: Wind resource estimates developed by AWS Truepower, LLC for windNavigator®. Web: http://www.windnavigator.com | http://www.awstruepower.com. Spatial resolution of wind resource data: 2.5 km. Projection: Albers Equal Area WGS84.

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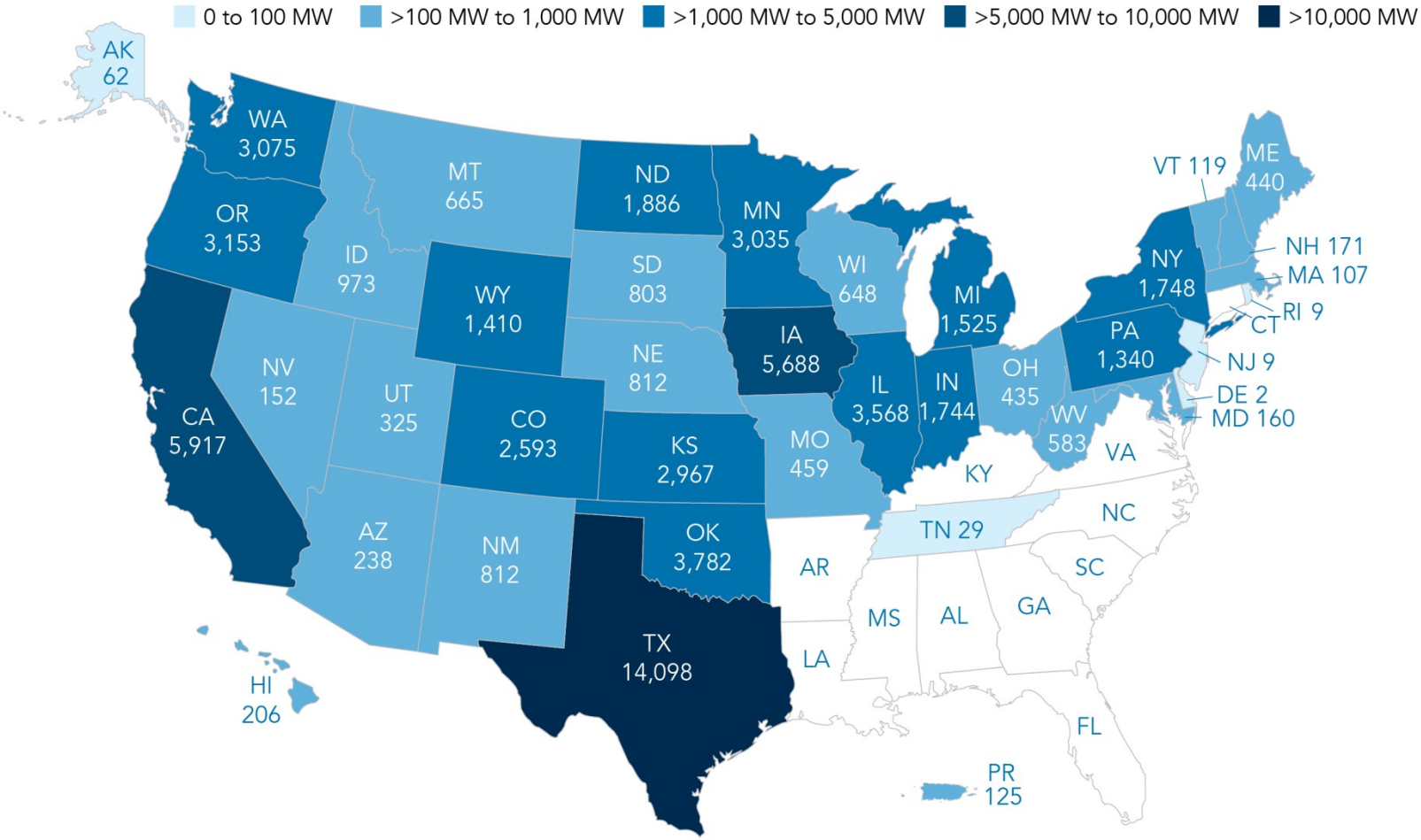
U.S. Wind Power Capacity Installations by State American Wind Energy Association, Fourth Quarter 2014



Composite Wind Resource Map

Existing 765 kV
New 765 kV
AC-DC-AC Link

Transmission Lines
Voltage (kV)
345 - 499
500 - 699
700 - 799
1000 (DC)

Source: POWERmap, powermap.platts.com, ©2007 Platts, a division of the McGraw-Hill Companies

The remaining states use data from the 1987 "Wind Energy Atlas of the United States".

Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m²	Wind Speed [a] at 50 m m/s	Wind Speed [a] at 50 m mph
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

[a] Wind speeds are based on a Weibull k value of 2.0

U.S. Department of Energy
National Renewable Energy Laboratory

NREL

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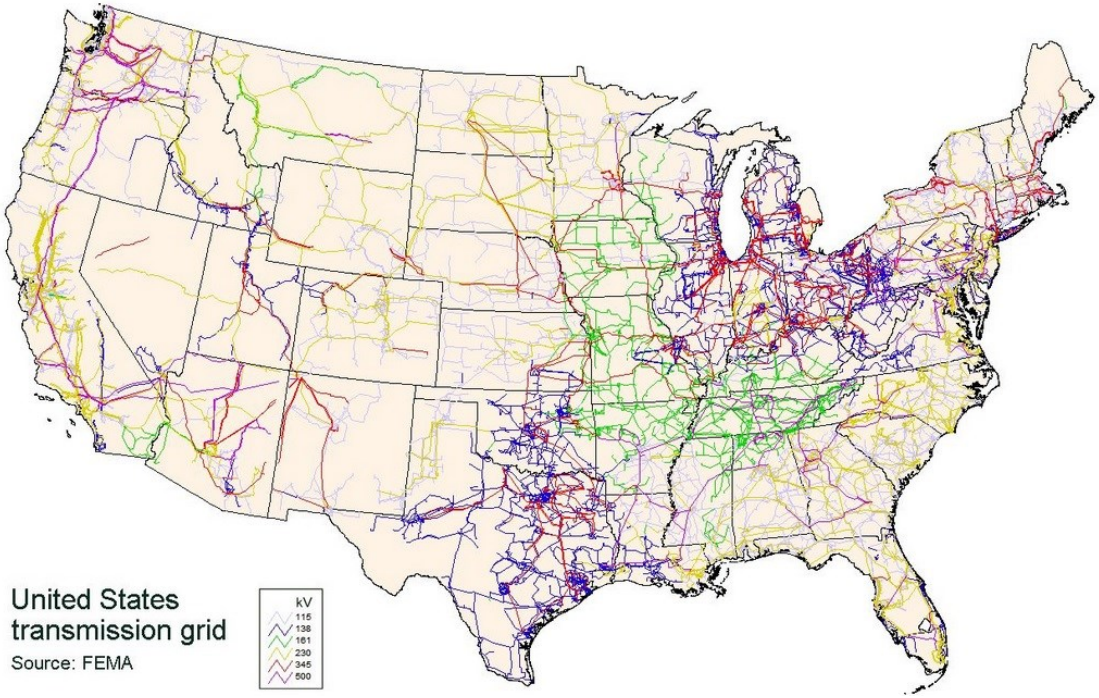
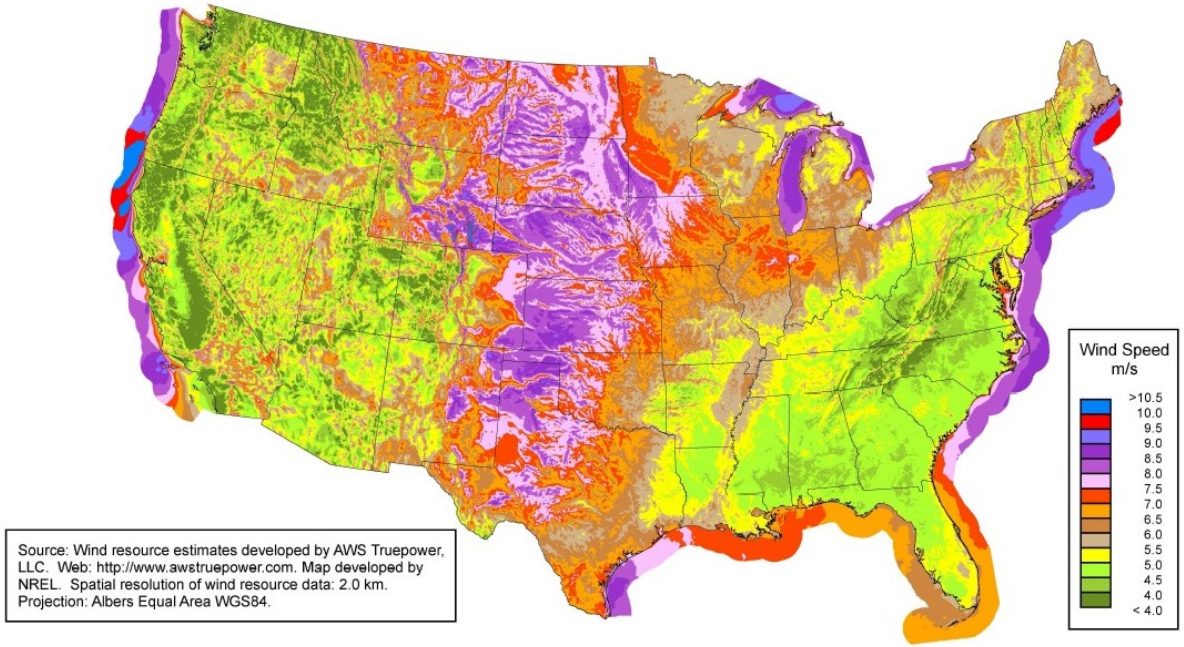


United States - Land-Based and Offshore Annual Average Wind Speed at 80 m



Conceptualizing RTOs/ISOs

- Agents of FERC: Entity delegated regulatory power from FERC
- Monopolists: Entities with monopoly power over transmission operations/markets that must be regulated by FERC
- Hybrids: Created by FERC regulation and market participants in region
- Agents of transmission owners in a region
- Regional planning entity for transmission

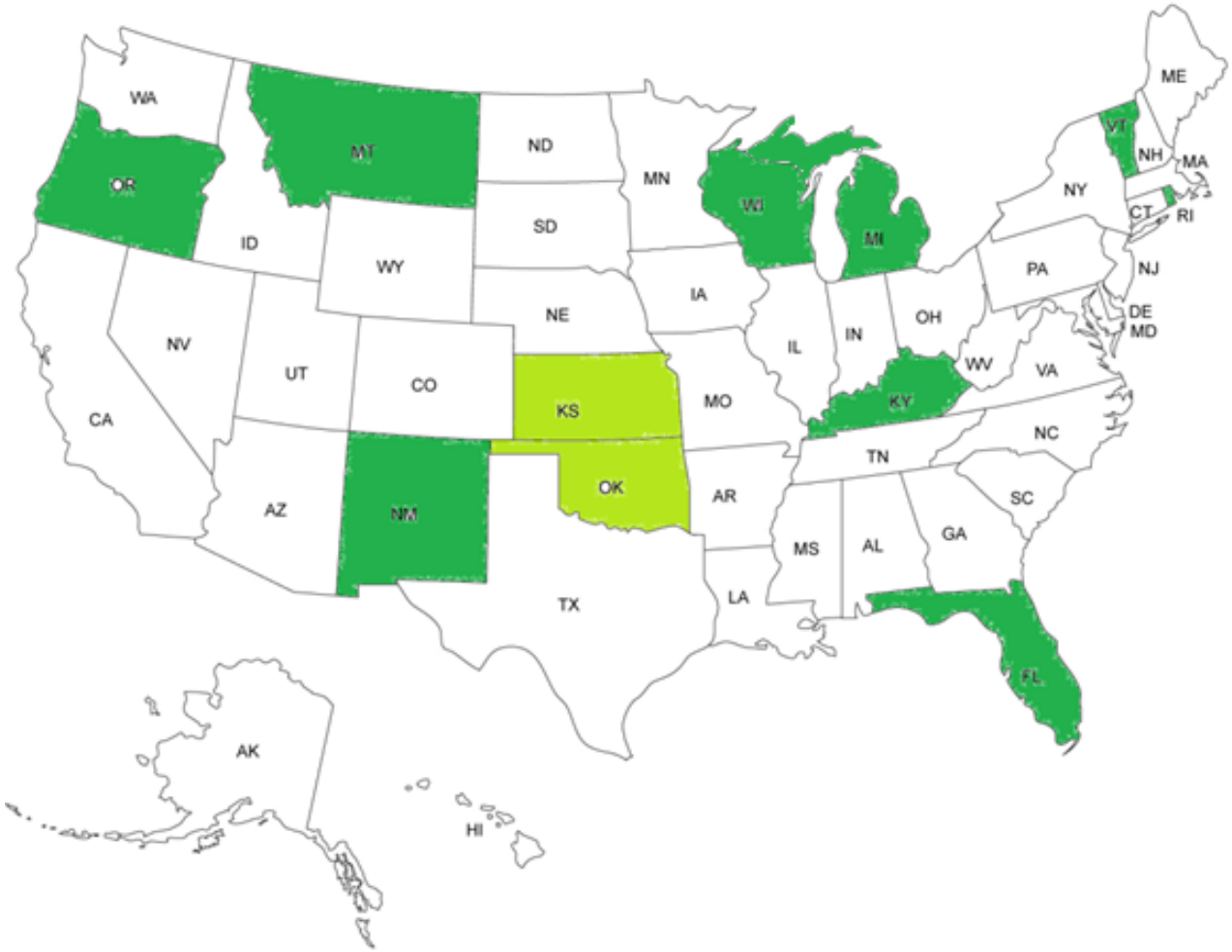
(Dworkin & Goldwasser, 2007)

Future Challenges for RTOs/ISOs

- Regional approaches to EPA's Clean Power Plan
- Enhanced Transmission Planning Role
- New Regional Transmission Permitting/Siting Role???

- **Queries:**
  - What is the impact of existing RTO/ISO governance structures on addressing these challenges?
  - Do benefits of uniformity override regional needs?

States GRANTING Right of Eminent Domain to Merchant Transmission Lines

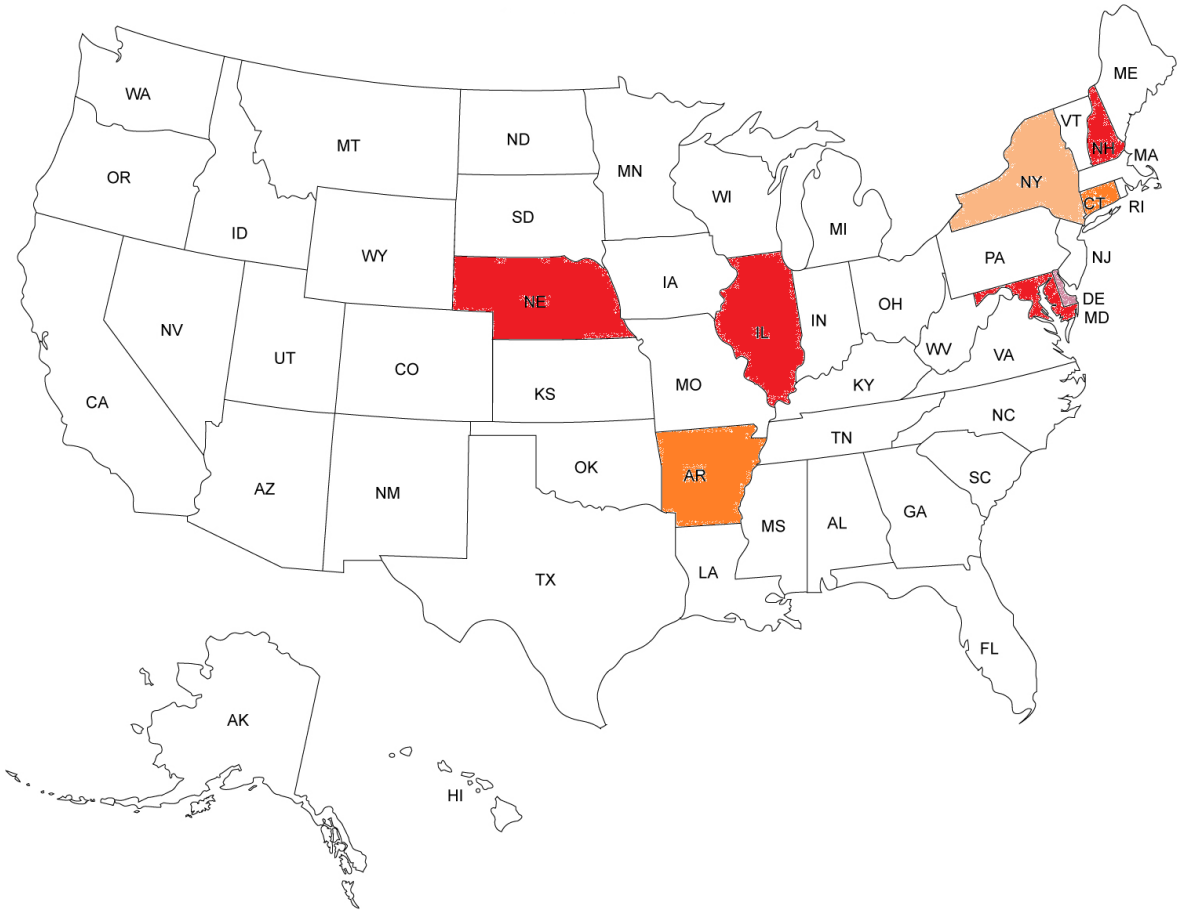


By STATUTE	**Florida, Kentucky, Michigan, Montana, New Mexico, Oregon, Rhode Island, Vermont, & Wisconsin**
By PUC Order	**Kansas & Oklahoma**

Examples:

- MICHIGAN (MICH. COMP. LAWS ANN § 486.255) - "… an independent transmission company or an affiliated transmission company shall have the power to condemn property that is necessary to transmit electric energy for public use…"
- NEW MEXICO (N.M. STAT. ANN. § 62-16A-4 (B)(8)) - The New Mexico Renewable Energy Transmission Authority may, "pursuant to the provisions of the Eminent Domain Code, exercise the power of eminent domain for acquiring property or rights of way for public use if needed for projects if such action does not involve taking utility property or does not materially diminish electric service reliability of the transmission system in New Mexico, as determined by the public regulation commission."
- RHODE ISLAND (R.I. GEN. LAWS ANN. § 39-1-2(13)) – " 'Electric transmission company' means a company engaging in the transmission of electricity or owning, operating, or controlling transmission facilities. An electric transmission company shall not be subject to regulation as a public utility except as specifically provided in the general laws, but shall be regulated by the federal energy regulatory commission and shall provide transmission service to all nonregulated power producers and customers, whether affiliated or not, on comparable, nondiscriminatory prices and terms. Electric transmission companies shall have the power of eminent domain exercisable following a petition to the commission pursuant to § 39-1-31."

States DENYING Right of Eminent Domain to Merchant Transmission Lines

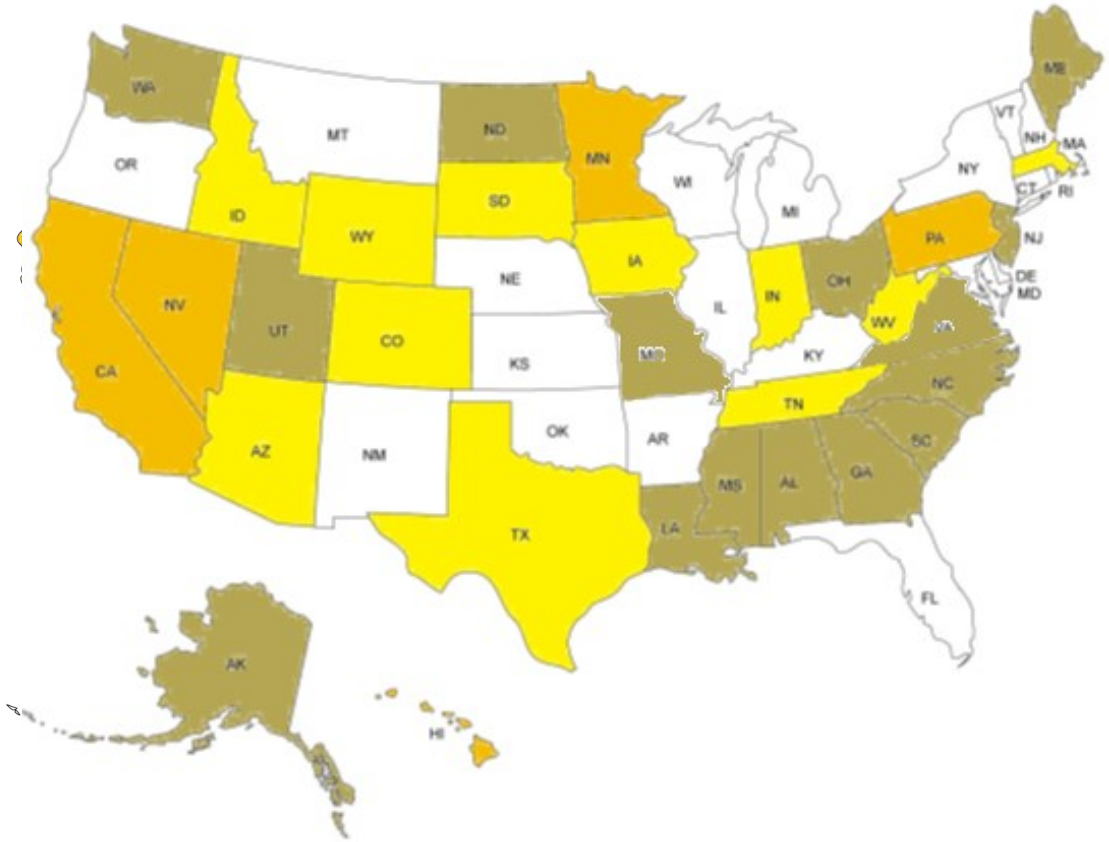


By STATUTE	**Illinois, Maryland, New Hampshire, Nebraska**
By PUC Order	**Arkansas & Connecticut**
Bans INTRASTATE merchant eminent domain ONLY	**New York**
Limited eminent domain for ANY transmission lines	**Delaware**

Examples:

- ILLINOIS (220 ILL. COMP. STAT. § 5/8-509, § 5/8-406.1(a), § 5/3-105(b)(7)): A "qualifying facility" (as defined by PURPA) is not a public utility and thus lacks eminent domain authority. (PURPA, 18 C.F.R. § 292.101(b)(i)) – A "qualifying facility" includes transmission lines that "directly and indirectly interconnect [with] electric utilities."
- NEBRASKA (NEB. REV. STAT. § 70-1014.02(6), § 70-1014.02(1)(a)): "[O]nly an *electric supplier* may exercise its eminent domain authority to acquire the land rights necessary for the construction of transmission lines and related facilities to provide transmission services for a certified renewable export facility. The exercise of eminent domain to provide needed transmission lines and related facilities for a certified renewable export facility is a public use. Nothing in this section shall be construed to grant the power of eminent domain to a private entity." "*Electric supplier* means a public power district, a public power and irrigation district, an individual municipality, a registered group of municipalities, an electric membership association, or a cooperative."
- NEW HAMPSHIRE (N.H. REV. STAT. ANN. § 371:1) – "No public utility may petition for permission to take private land or property rights for the construction or operation of an electric generating plant or an electric transmission project not eligible for regional cost allocation, for either local or regional transmission tariffs, by ISO-New England or its successor regional system operator."
- CONNECTICUT (Transenergie U.S. Ltd. 2000 WL 33121599 (Conn. D.P.U.C.) (2000)) – State P.U.C. held that merchant line Transenergie was not an "electric distribution company," and as such, lacked the right of eminent domain.

States MIGHT Grant Right of Eminent Domain to Merchant Transmission Lines



STRONGER likelihood of eminent domain authority	**Arizona, Colorado, Idaho, Indiana, Iowa, Massachusetts, South Dakota, Tennessee, Texas, West Virginia, & Wyoming**
WEAKER likelihood of eminent domain authority	**California, Hawaii, Minnesota, Nevada, & Pennsylvania**
NEUTRAL & UNCLEAR	**Alabama, Alaska, Georgia, Louisiana, Maine, Mississippi, Missouri, New Jersey, North Carolina, North Dakota, Ohio, South Carolina, Utah, Virginia & Washington.**

Examples:

- COLORADO (COLO. REV. STAT. ANN. § 38-2-101) – " If any corporation formed for the purpose of constructing a road, ditch, reservoir, pipeline, bridge, ferry, tunnel, telegraph line, railroad line, electric line, electric plant, telephone line, or telephone plant is unable to agree with the owner for the purchase of any real estate or right-of-way or easement or other right necessary or required for the purpose of any such corporation for transacting its business or for any lawful purpose connected with the operations of the company, the corporation may acquire title to such real estate or right-of-way or easement or other right in the manner provided by law for the condemnation of real estate or right-of-way."
- MINNESOTA (In re Prairie Rose Transmission, LLC, 2012 WL 258025 (Minn. P.U.C., Jan. 13, 2012)) – The Minn. PUC granted a certificate of need for a private transmission project that would connect Prairie Rose Wind Farm to the grid, but noted that the company would not have eminent domain authority. The PUC did not explain why not, or whether the company had sought eminent domain authority for the line.
- WYOMING (Bridle Bit Ranch Co. v. Basin Elec. Power Co-op., 118 P.3d 996, 998, 1003 (Wyo. 2005)) – The WY supreme court held that a wholesale electric generation and transmission cooperative was not a public utility, and therefore did not need a certificate of public necessity and convenience, but that it could exercise eminent domain regardless.

Eminent Domain For Merchant Transmission Lines