

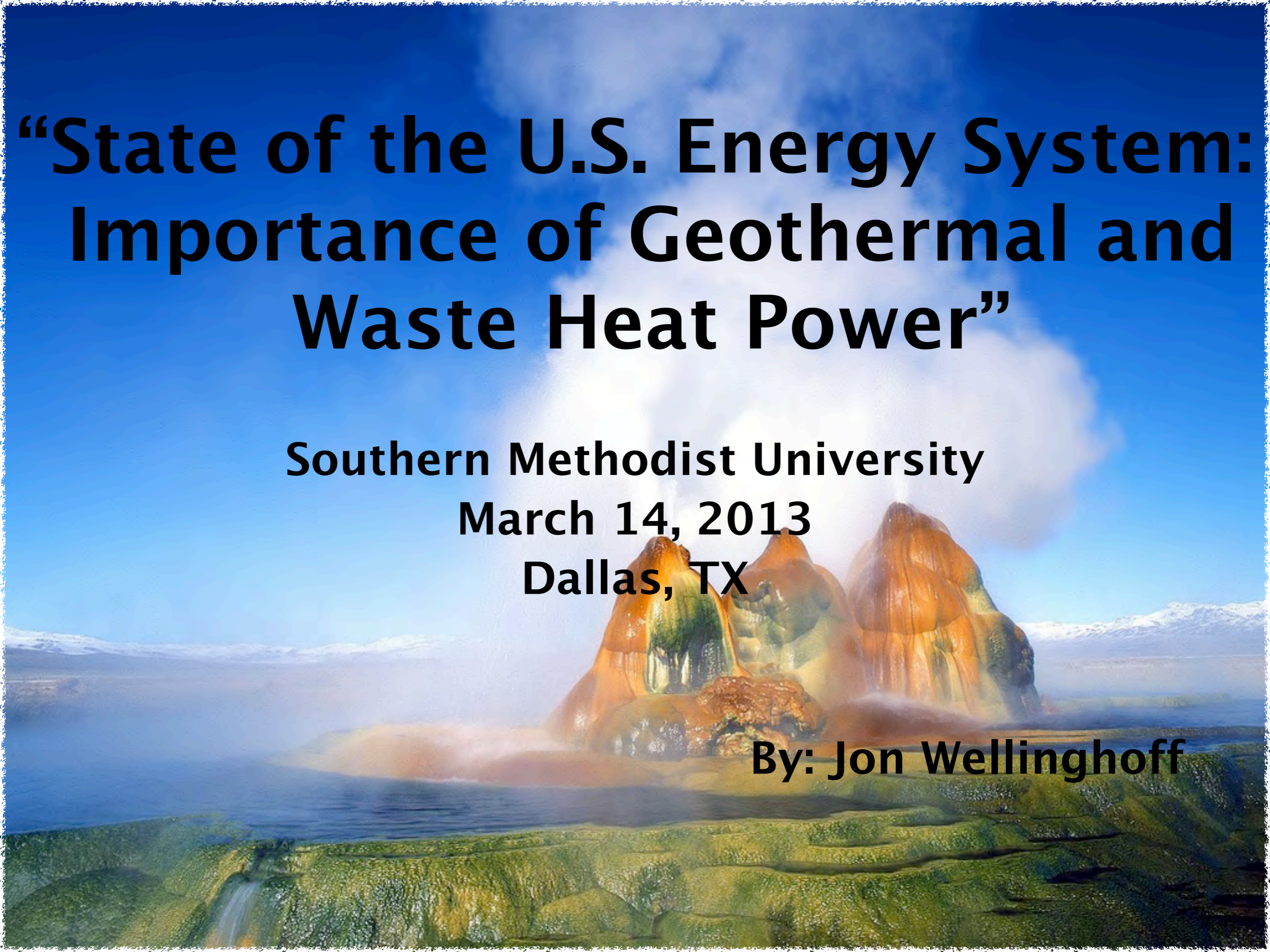
# **“State of the U.S. Energy System: Importance of Geothermal and Waste Heat Power”**

**Southern Methodist University**

**March 14, 2013**

**Dallas, TX**

**By: Jon Wellinghoff**

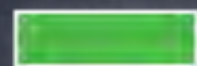
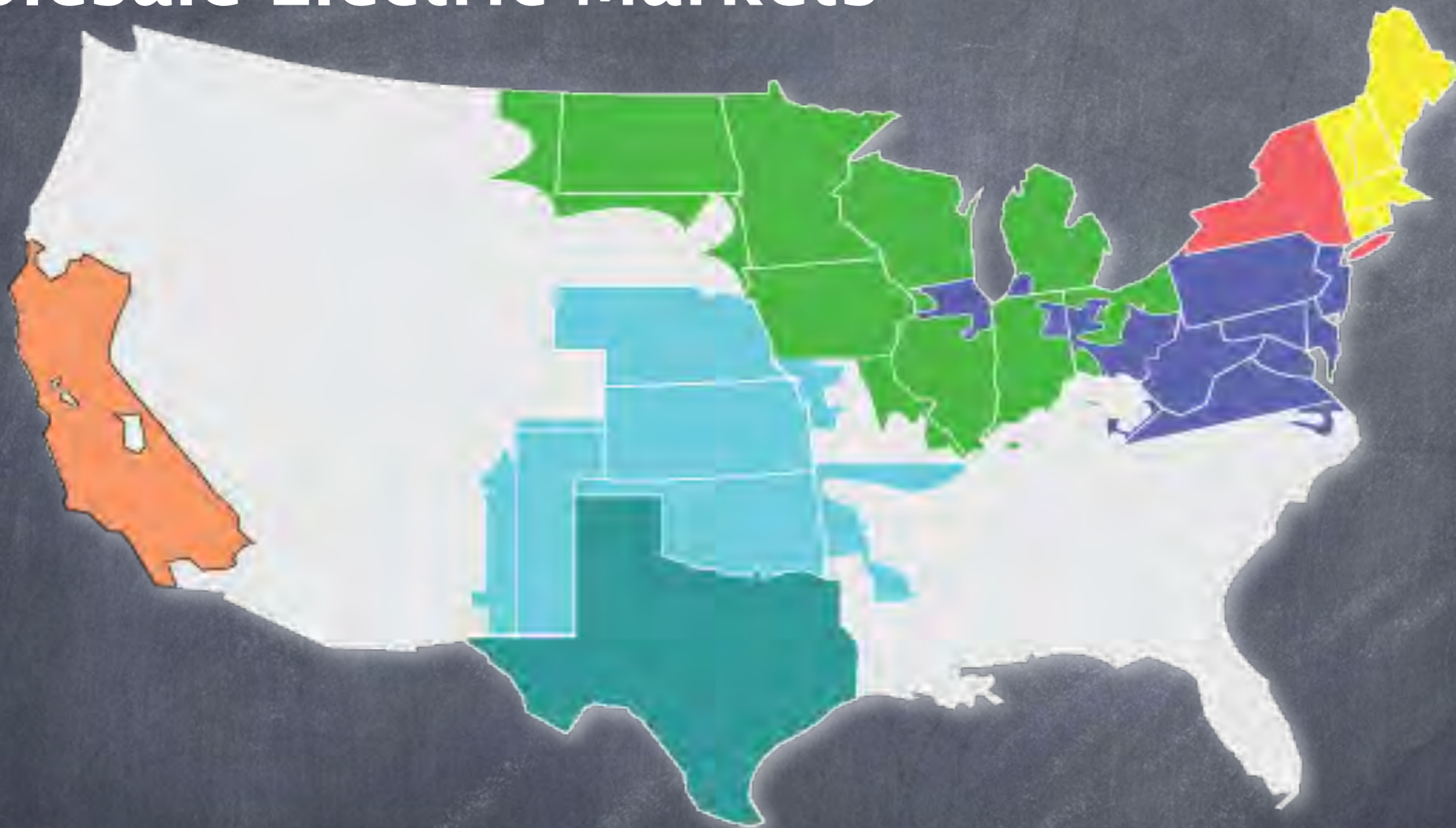




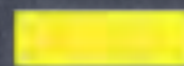




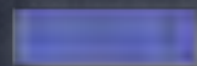
# FERC Independent Organized Wholesale Electric Markets



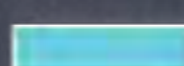
Midwest ISO



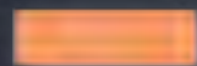
ISO New England



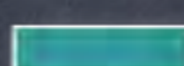
PJM Interconnection



Southwest Power Pool



California ISO



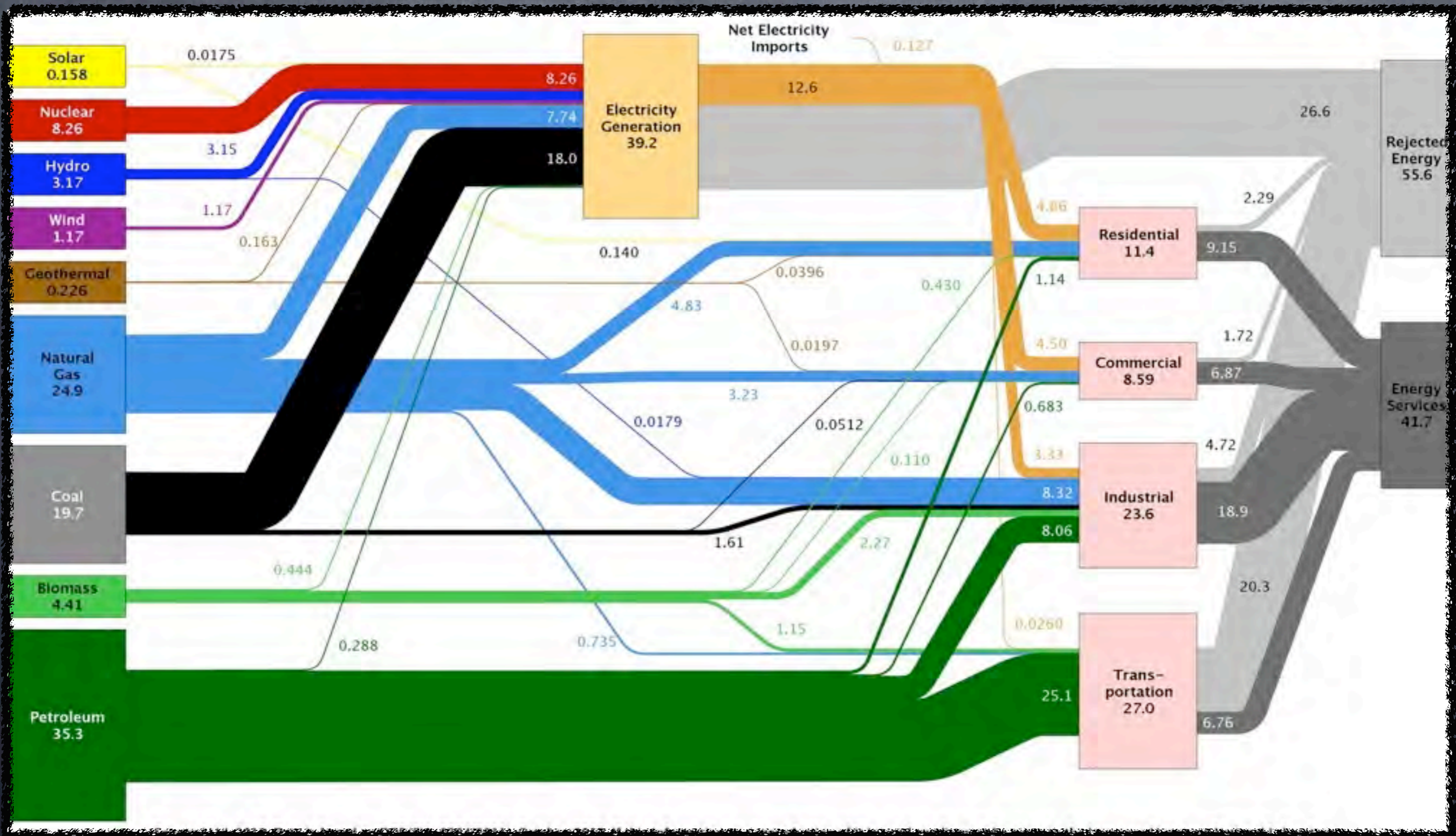
Electric Reliability Council of Texas



New York ISO

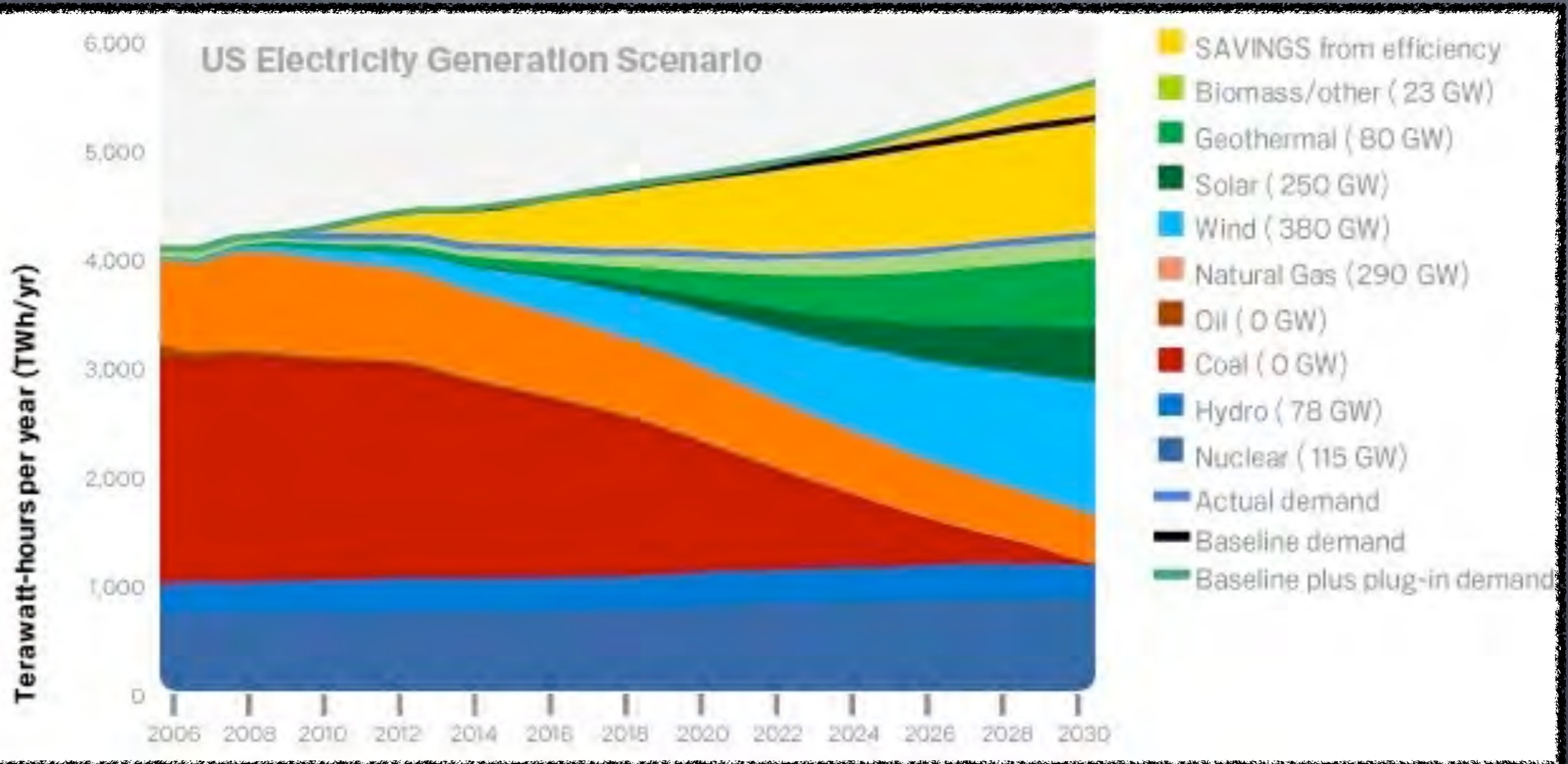


# Estimated U.S. Energy Use 2011- ~97.3 Quads





# Google Electric Future



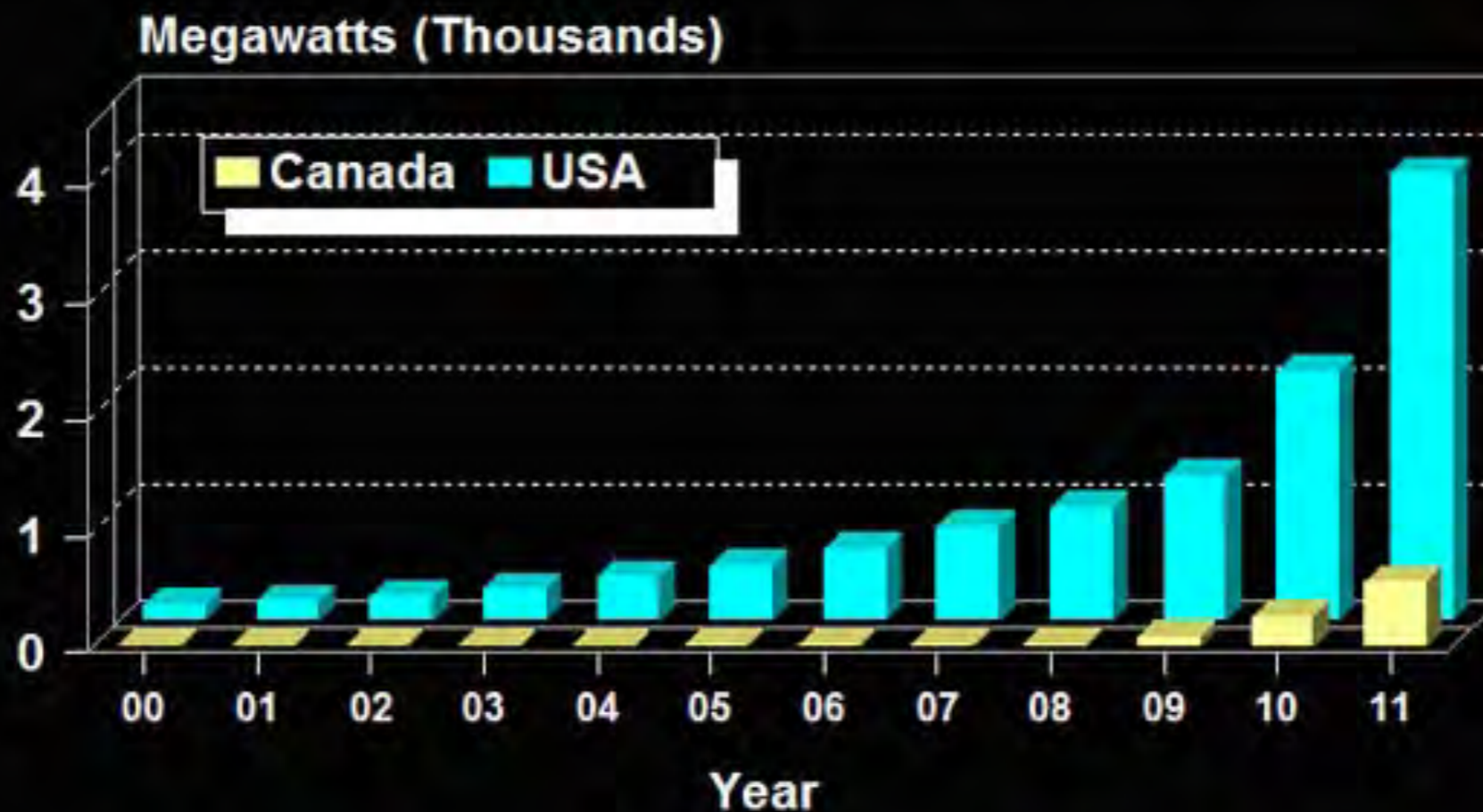




Source: SunPowerCorp.com First Phase of 250 MW California Valley Solar Ranch Energized



# Solar PV Development in North America



Paul Gipe, wind-works.org

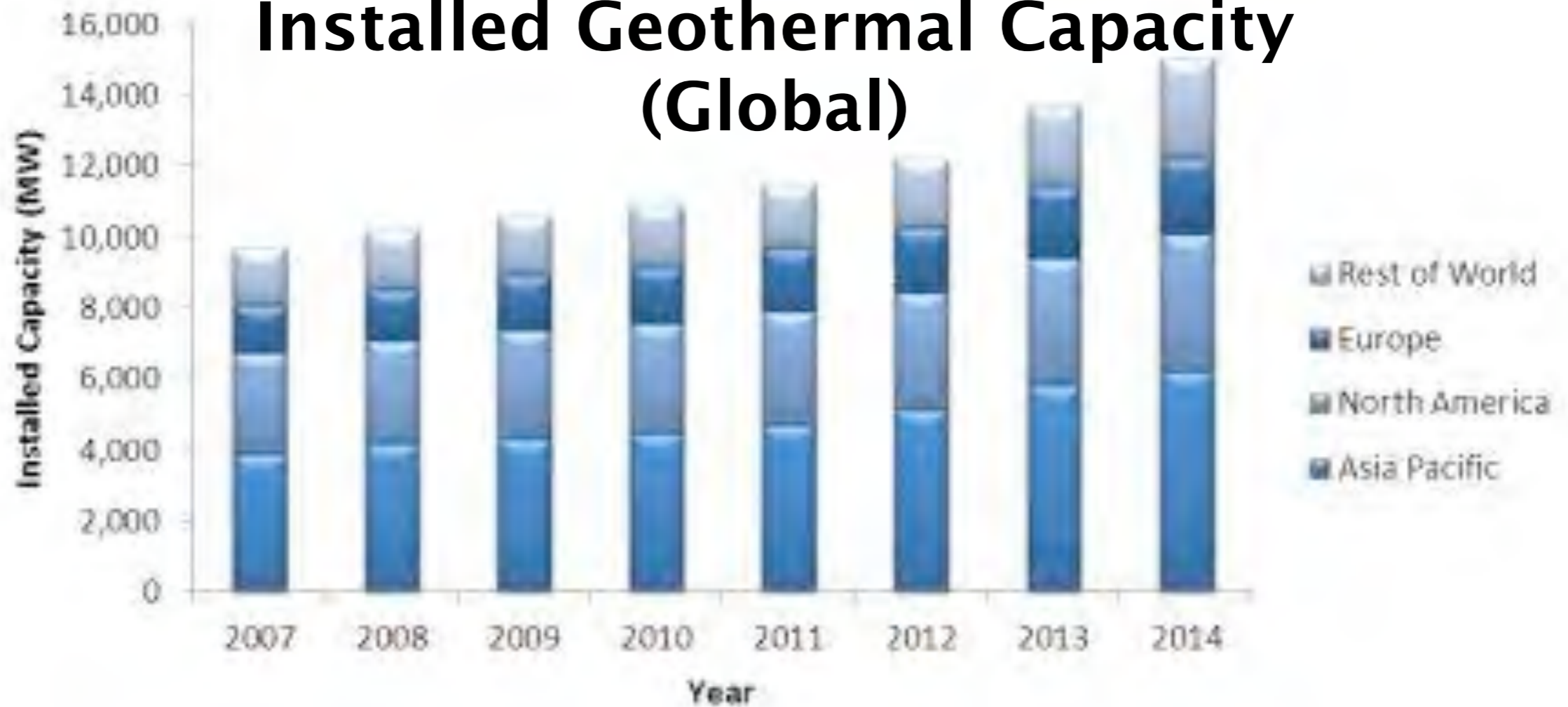




Source: The Sretch Blog

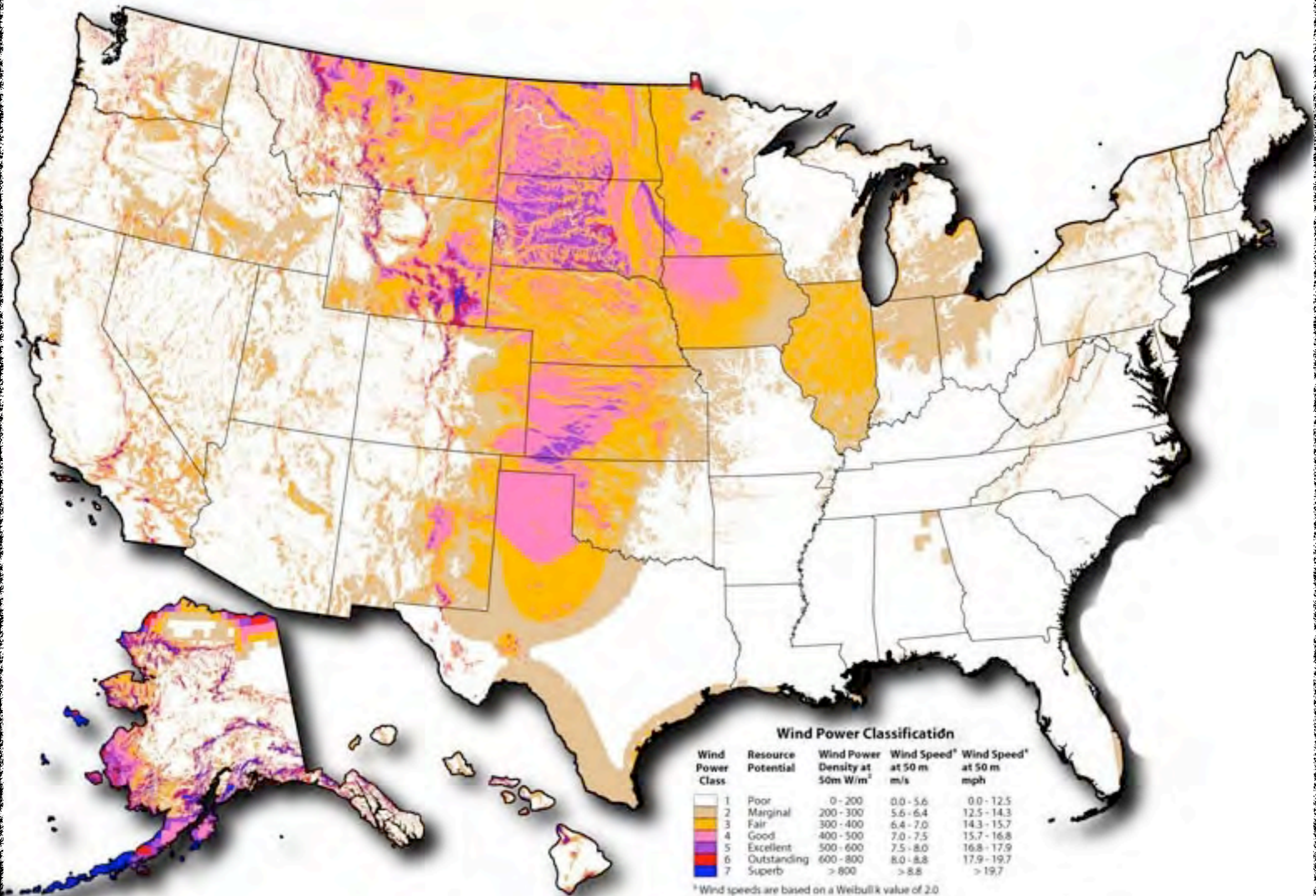


# Installed Geothermal Capacity (Global)



Source: Green.tmcnet.com



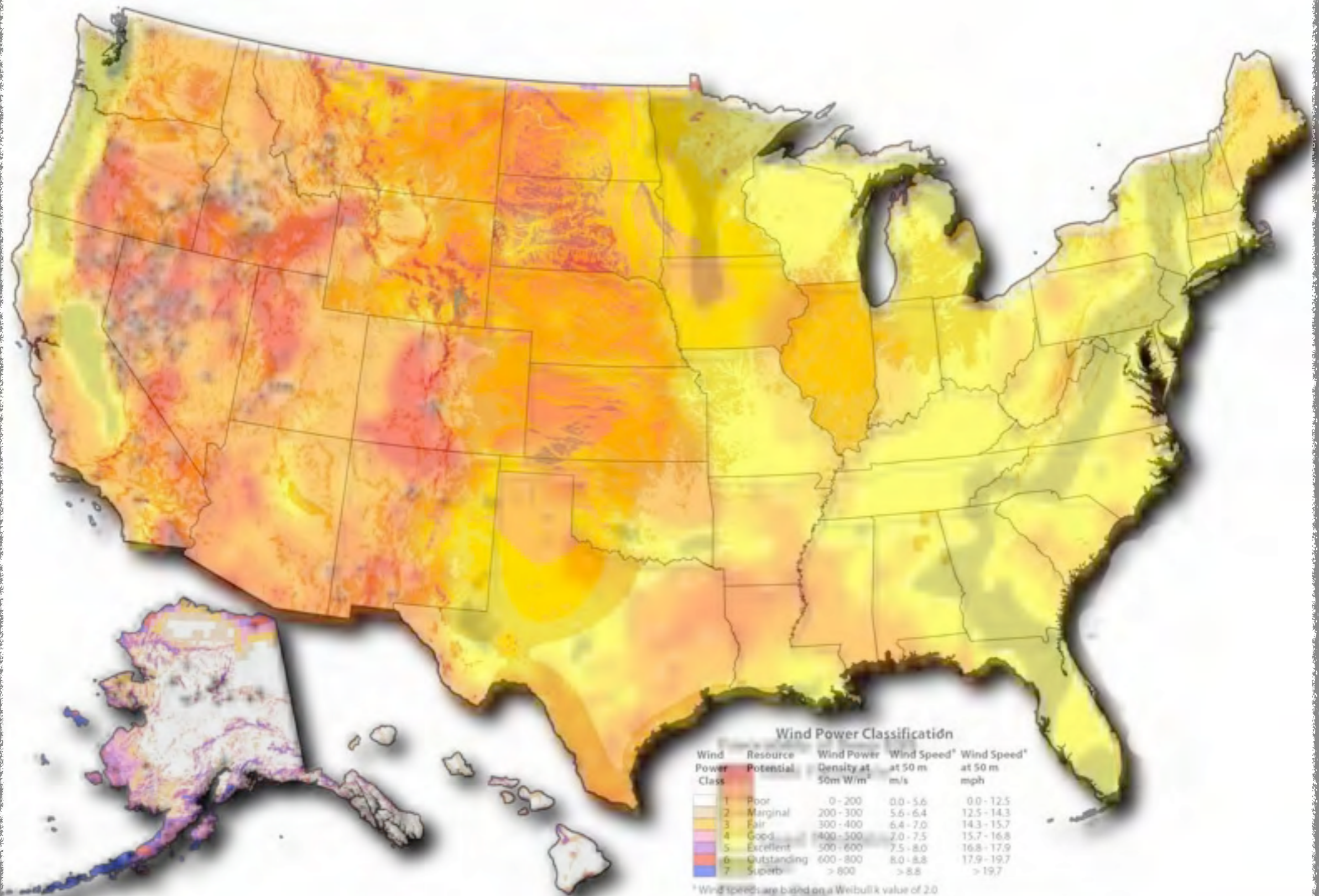


**Wind Power Classification**

Wind Power Class	Resource Potential	Wind Power Density at 50m W/m <sup>2</sup>	Wind Speed* at 50 m m/s	Wind Speed* at 50 m mph
1	Poor	0 - 200	0.0 - 5.6	0.0 - 12.5
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	> 8.8	> 19.7

\* Wind speeds are based on a Weibull k value of 2.0



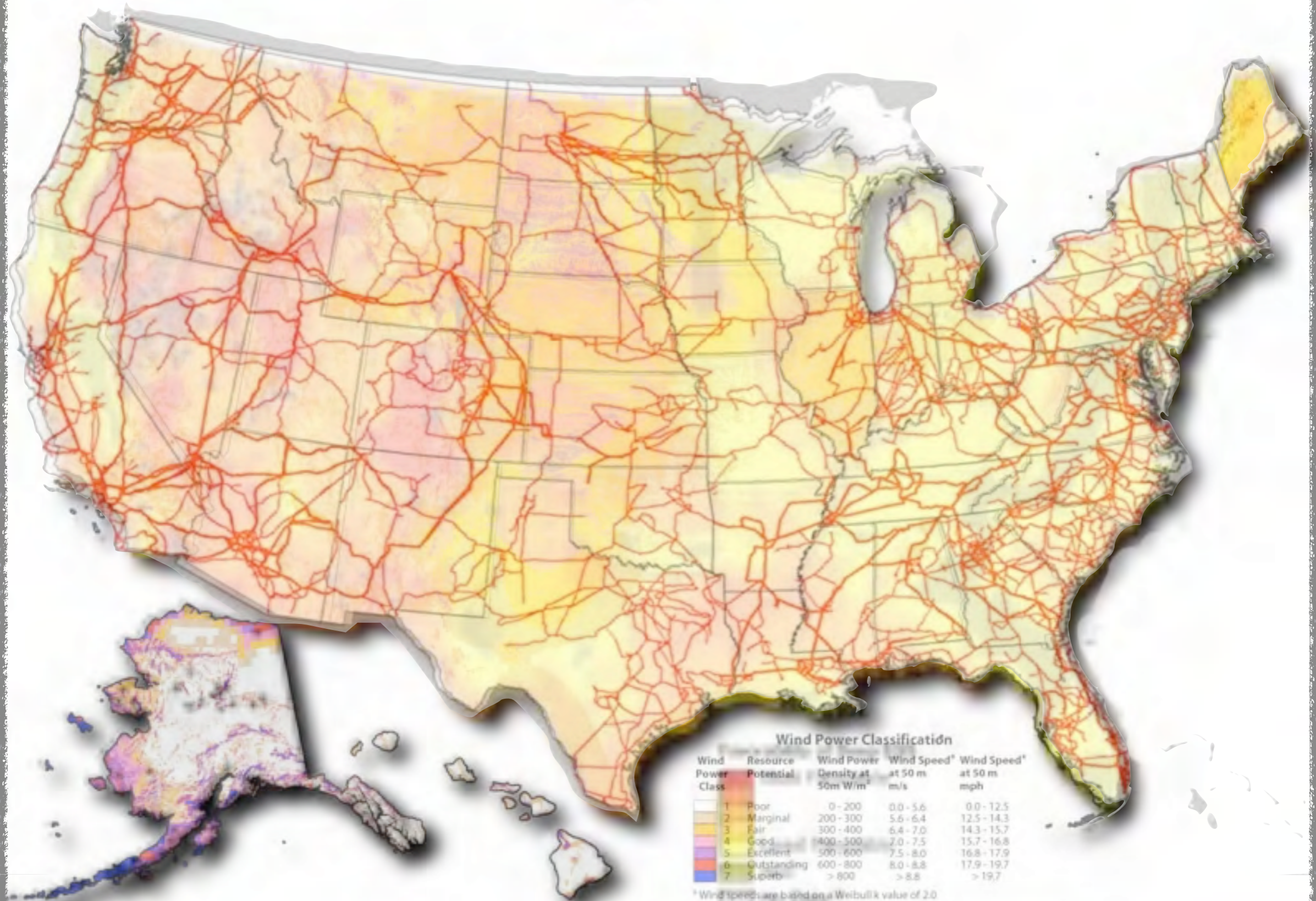


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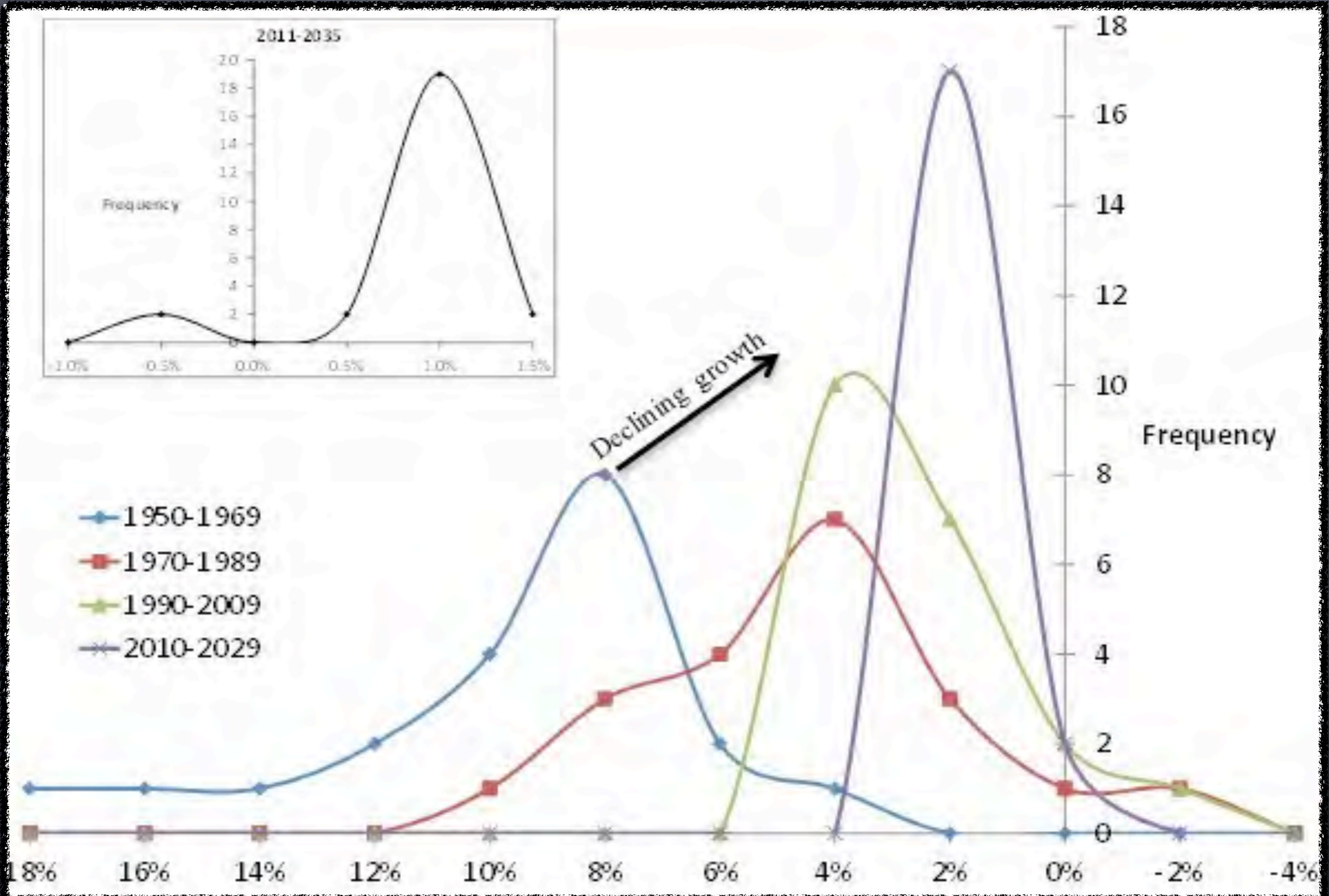
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# Distribution of Electric Load Growth





# Rapid Expansion of Distributed Generation



# Rapid Expansion of Distributed Generation





# Rapid Expansion of Distributed Generation



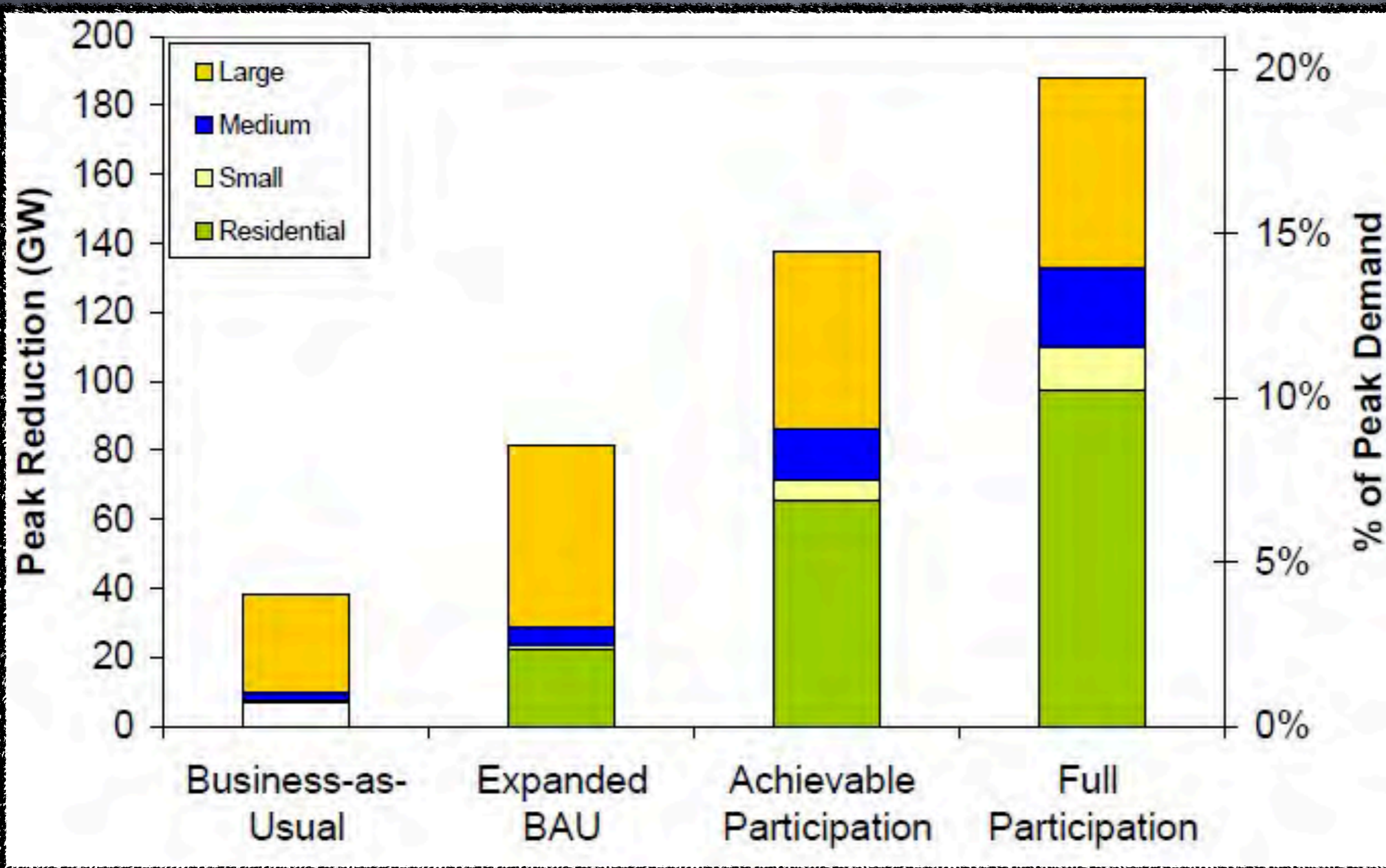
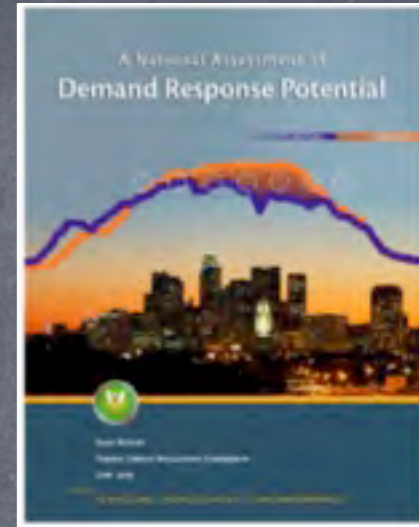


# Rapid Expansion of Distributed Generation





# FERC Assessment of DR Potential – at 2020









# Geothermal Systems







Source: Wikipedia



Source: EnergyBoom.com







