SPP Update: Nebraska Wind and Solar Conference

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Discussion Topics

- SPP Overview
- Integrated System (IS) Integration
- Wind and Solar in SPP
- Clean Power Plan

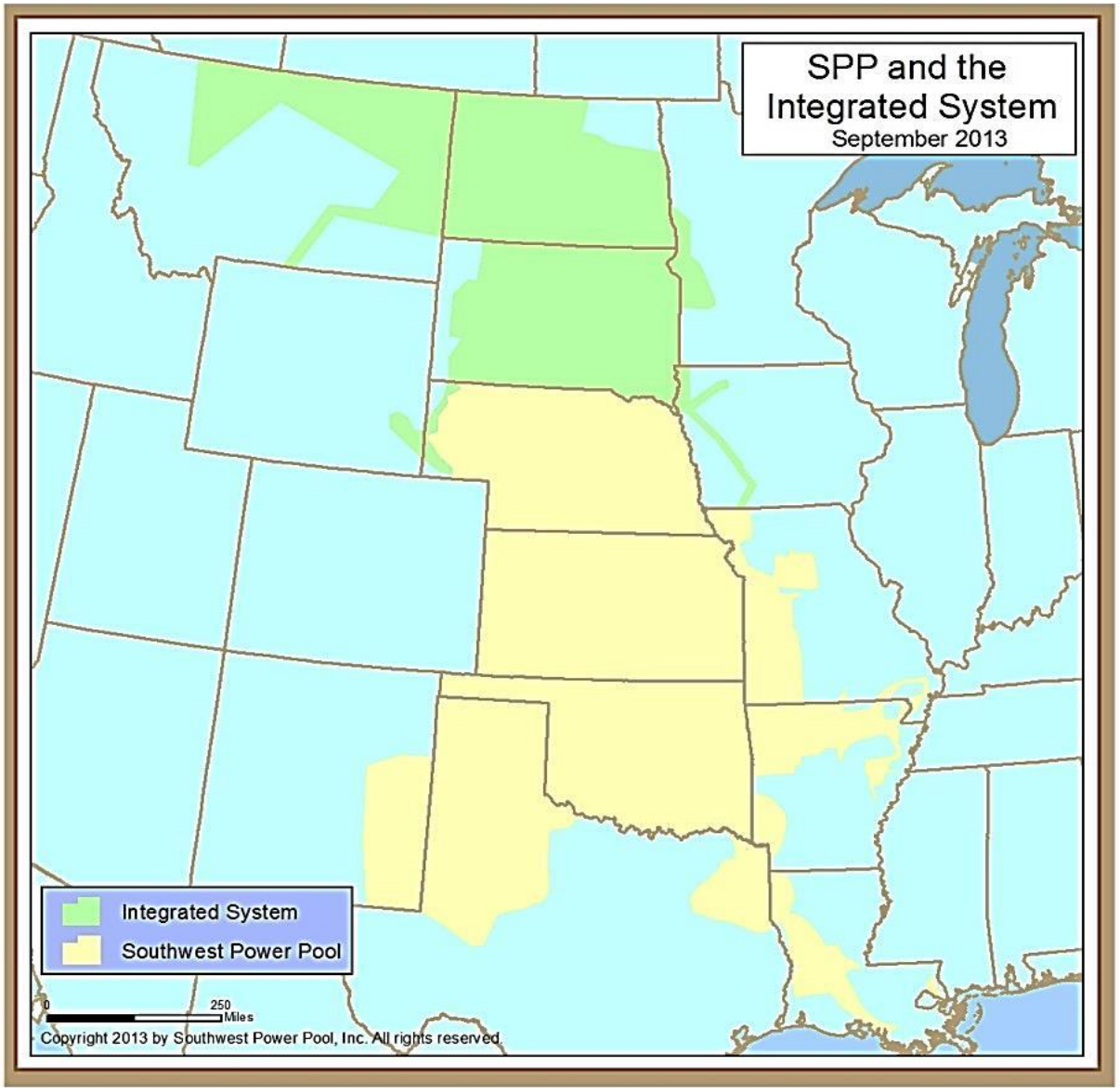
SPP Overview

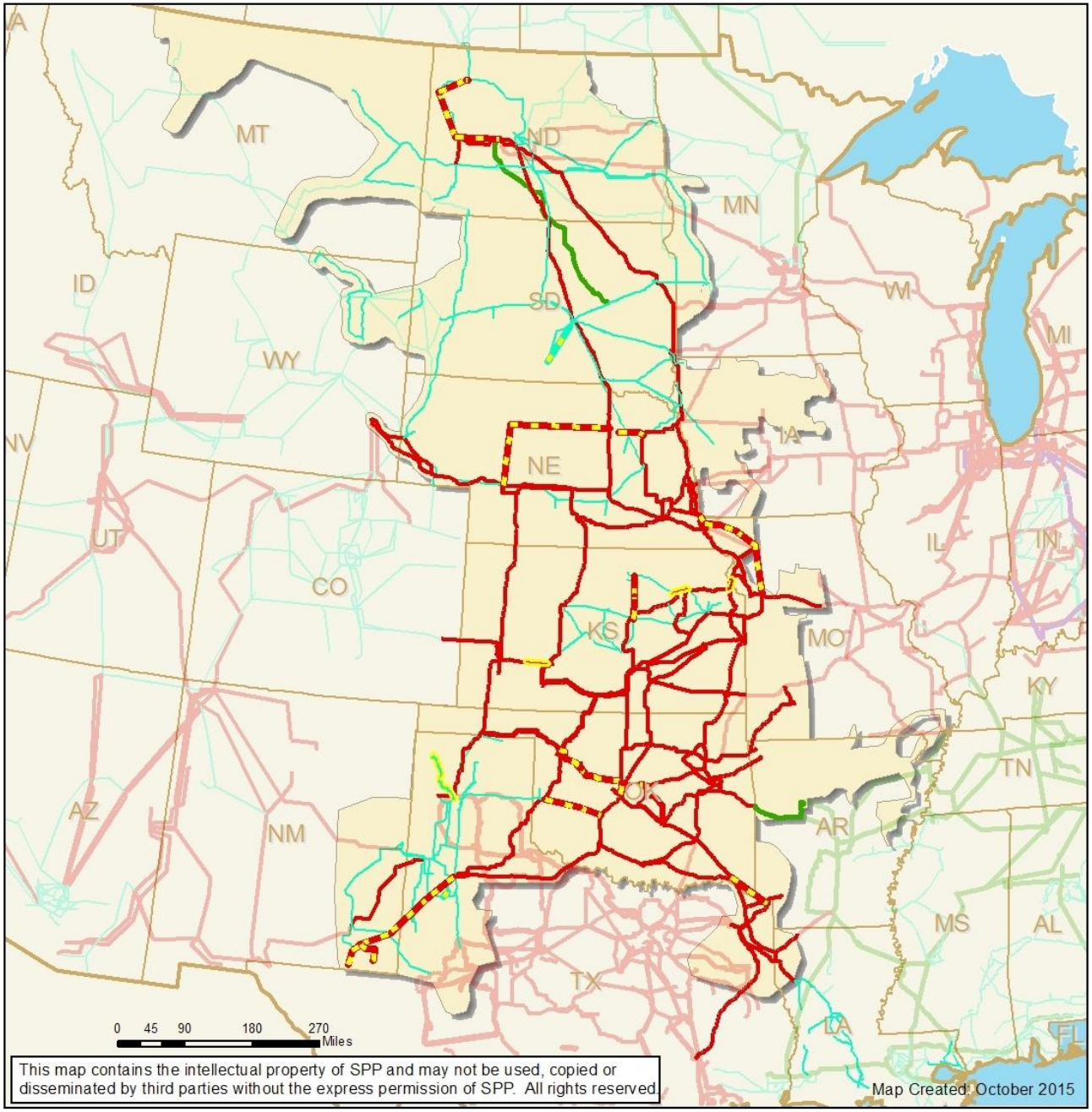
- Regional Tariff and Reliability Coordinator for almost 20 years
- Regional RTO since 2004
- Energy Imbalance Market implemented in 2007
- Integrated NPPD, OPPD and LES in 2009
- Full Day 2 market called Integrated Marketplace implemented in March of 2014
  - Day Ahead Market
  - Consolidated Balancing Authority and Real-Time Market
- Integrated System joins SPP on October 1, 2015

IS Integration Highlights

- IS Reliability Coordination Services began June 1, 2015
- IS fully integrated in SPP market on October 1, 2015
  - 18 month project to prepare for transition
  - Implemented on schedule
- SPP is summer peaking and IS winter peaking
  - Both systems have diverse fuel resources
  - Marginal Energy Cost averages for 5 days before/after integration dropped from $22.70 to $18.92
  - Opportunity for more efficient operations

SPP and the Integrated System





Map Created: October 2015

SPP Southwest Power Pool

EHV Transmission

(Existing and Planned with NTC)

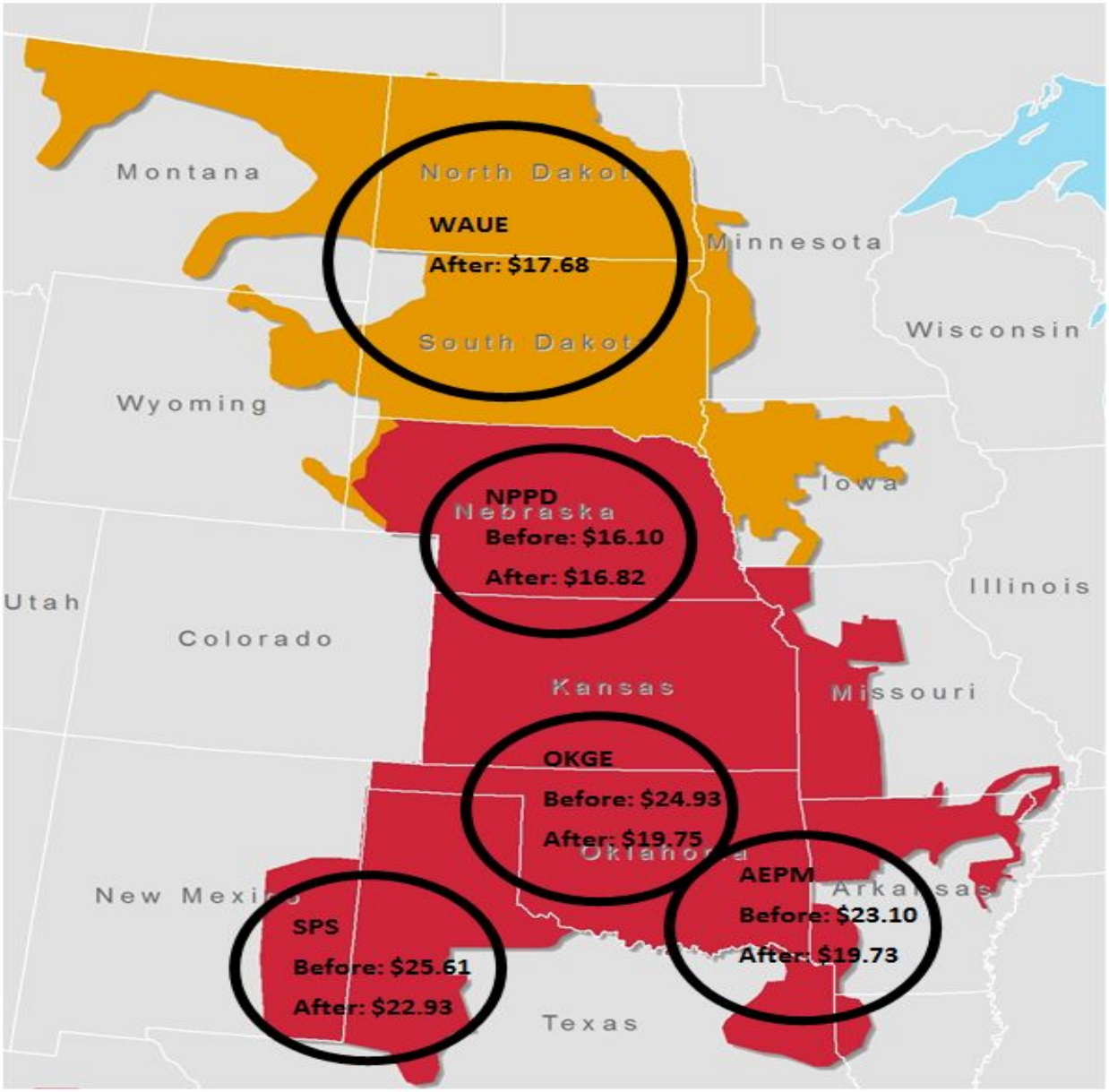
Voltage

- 230 kV
- 345 kV
- 500 kV

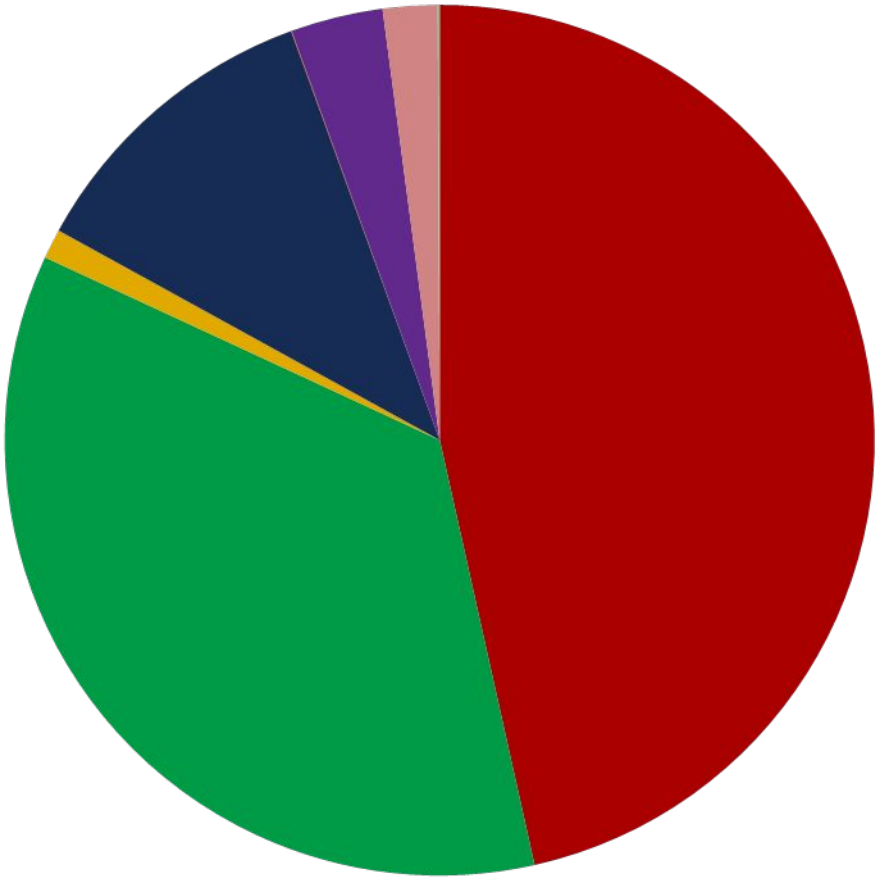
Project Type

- New Line
- Line Updgrade

LMP Impact - IS



SPP 2014 Energy Capacity (MW)



Gas	46.50%
Coal	35.40%
Hydro	1.10%
Wind	11.45%
Biomass	.02%
Nuclear	3.43%
Fuel Oil	2.03%
Solar	.07%

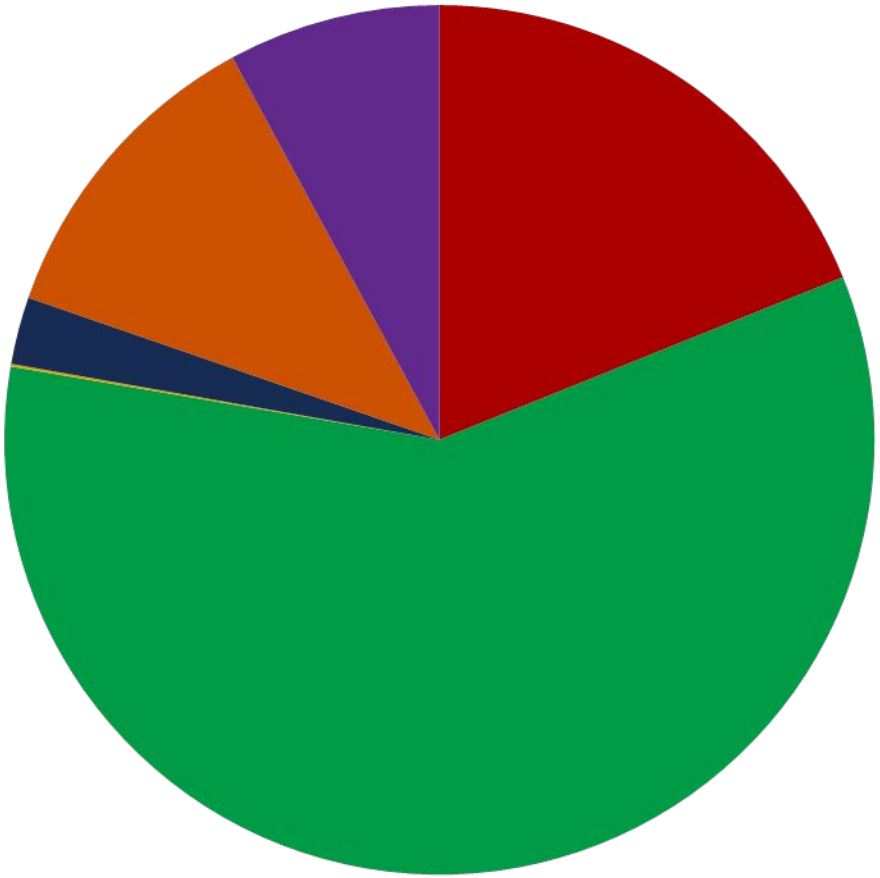
12% annual planning capacity requirement

CAPACITY BY FUEL TYPE

"New"

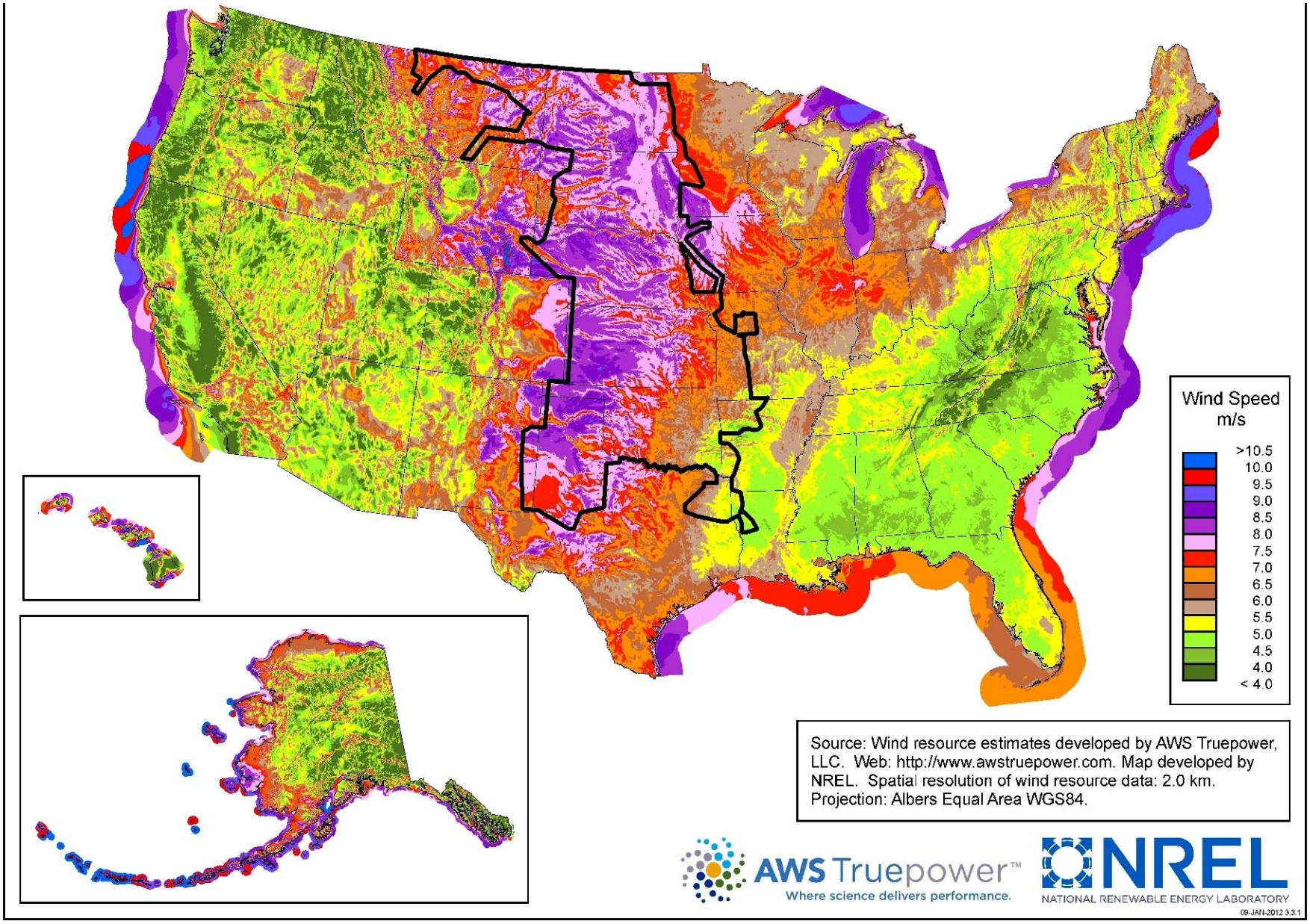
Fuel Type	SPP Capacity	IS
COAL	26541	2370
GAS	35168	1251
WIND	9267	898
NUKE	2575	60
OIL	1520	368
HYDRO	829	2598
SOLAR	51	
Other	20	53
TOTAL	75971	7598

SPP 2014 Energy Consumption (MWh)



Gas	18.9%
Coal	58.8%
Other	.1%
Hydro	2.5%
Wind	11.8%
Nuclear	7.9%

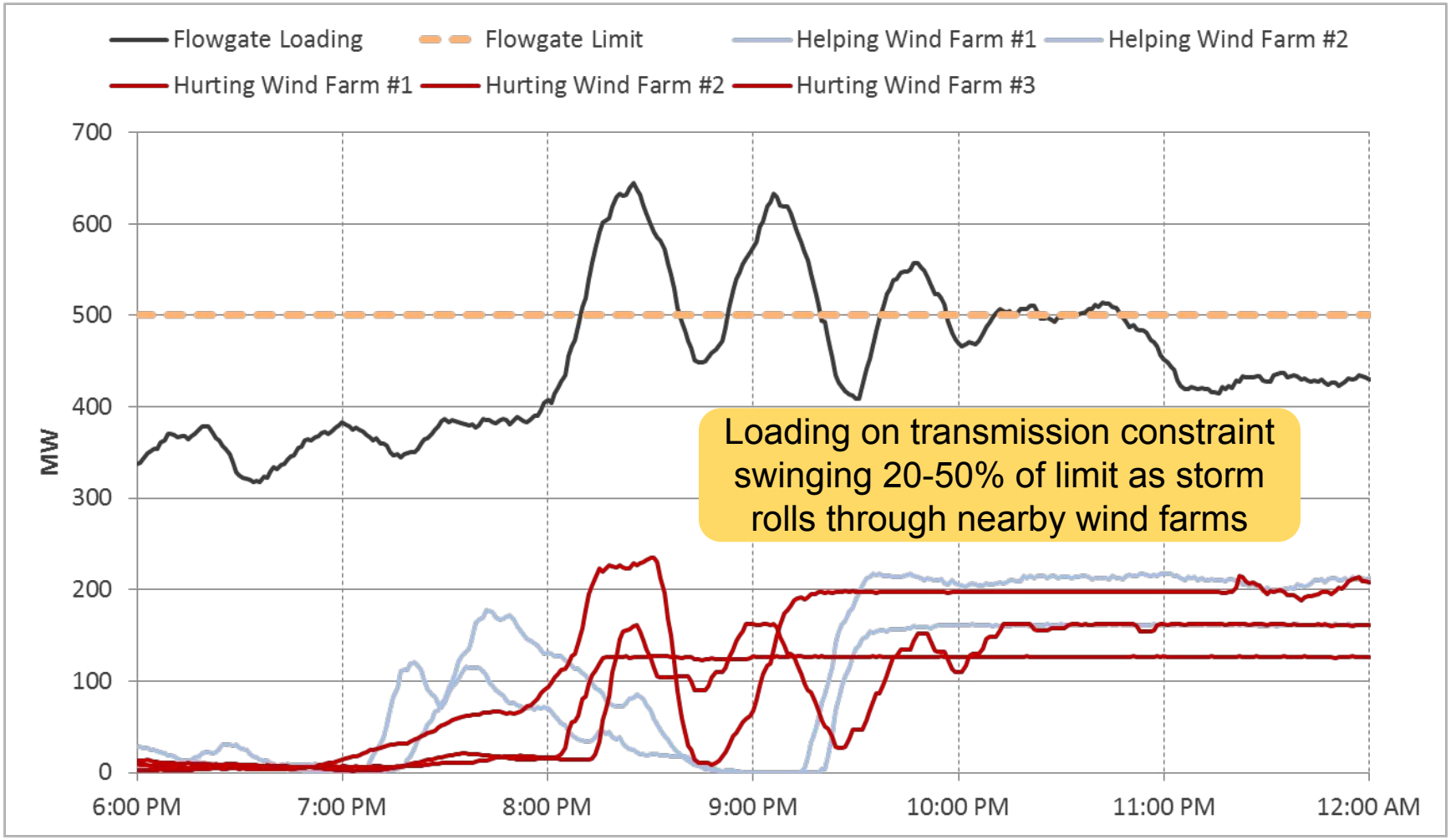
Annual Average Wind Speed



Renewables in SPP

- Wind generation continues to grow but at a slower pace than the last 5 years, other renewables limited
- About 45% of wind is Dispatchable Variable Energy Resource (DVER), rest is non-dispatchable (NDVER)
- Forecasting is key to reliable/economic operation
- Wind records so far
  - BA Wind penetration: 36.7% of load early morning 4/6/15
  - Peak BA Wind: 7,816 MW on late morning 2/1/2015
  - Peak RTO Wind: 8,412 MW on late morning 2/1/2015
- Wind sometimes is a great help other times…

Transmission System Loading



Implications of Clean Power Plan (CPP)

- Resource mix changes
  - More natural gas and renewables
  - Less coal
  - More emphasis on Energy Efficiency
- Increased congestion and reliability risks until appropriate transmission in place
- Increased costs to dispatch carbon emitting resources
- Increased uncertainty about resource availability and costs in market commitment and dispatch
- Increased uncertainty in future transmission planning

General Conclusions from SPP's Assessments

- New generation and transmission infrastructure needed to facilitate reliable compliance with CPP
- State-by-state compliance is more costly than regional compliance
- State-by-state compliance is more disruptive than a regional approach to the reliability and economic benefit provided by SPP's markets
- More new generation and transmission infrastructure likely needed for state-by-state than for regional compliance

SPP's Thoughts about Compliance Approach

- SPP studies indicate a regional or multi-state approach to compliance is better than a state-by-state approach
- Studies demonstrate merits to development of regional carbon trading markets
- States are encouraged to coordinate with each other and develop plans, even if litigating, rather than waiting for EPA's Federal Plan to be imposed on them
- SPP stands ready to assist any way that it can to ensure a reliable, cost effective approach to compliance

Our Mission

Helping our members work together to keep the lights on … today and in the future.