


# Introduction to SPP & EPA's Clean Power Plan – Impacts to Reliability in SPP



A nighttime photograph of a city skyline reflected in a body of water. The skyline includes several tall buildings with lit windows, and a bridge is visible on the left. The lights from the buildings and the bridge are reflected in the calm water.

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

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# Our Beginning

- Founded 1941 with 11 members
  - Utilities pooled electricity to power Arkansas aluminum plant needed for critical defense
- Maintained after WWII to continue benefits of regional coordination



# SPP at a Glance

- Located in Little Rock
- About 600 employees
- Primary jobs — engineering, operations, settlements, and IT
- 24 x 7 operation
- Full redundancy and backup site







# Regulatory Environment

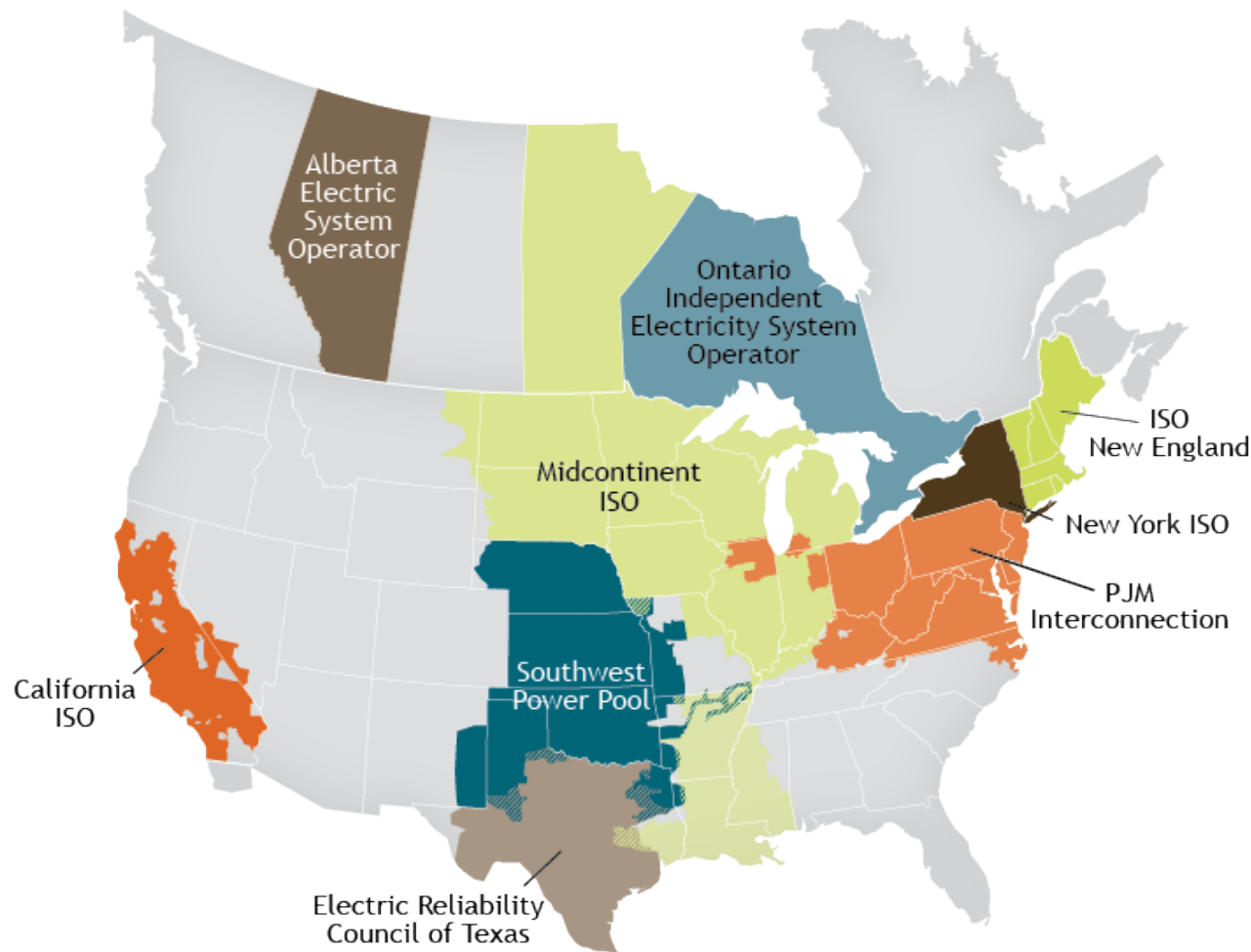


- Incorporated in Arkansas as 501(c)(6) non-profit corporation
- FERC - Federal Energy Regulatory Commission
  - Regulated public utility
  - Regional Transmission Organization
  - Must comply with applicable FERC Orders and SPP's approved transmission tariff
- NERC - North American Electric Reliability Corporation
  - Founding member
  - Regional Entity
  - Must comply with applicable NERC Reliability Standards

# What is an RTO?

- **Regional Transmission Organizations (RTOs) are independent, non-profit organizations that ensure transmission grid reliability, provide non-discriminatory access to the transmission system, and optimize supply and demand bids for wholesale electric power**
- **Minimum characteristics and functions of an RTO are specified in FERC's Order 2000**
- **Participation by electric utilities in RTO encouraged by FERC but not mandated**
- **Services provided in accordance with a FERC approved transmission tariff**
- **Reliability functions performed in accordance with mandatory FERC approved reliability standards**

# Independent System Operator (ISO) / Regional Transmission Organization (RTO) Map





# Our Membership Profile



Category	Number
Investor Owned Utilities	14
Cooperatives	13
Marketers	12
Municipals	11
Independent Power Producers/ Wholesale Generation	13
Independent Transmission Companies	10
State Agencies	7
<b>TOTAL</b>	<b>80</b>

As of October 28, 2014





# Our Major Services

- Reliability Coordination
- Transmission Service/  
Tariff Administration
- Transmission Planning
- Market Operation
- Standards Setting
- Compliance Enforcement
- Training
- Balancing Authority

## Our Approach

- Regional
- Independent
- Cost-effective
- Focus on reliability

# How we benefit the consumer

- **A utility has three ways to serve its customers:**
  1. Generate its own power
  2. Buy power from another provider
  3. Buy from the SPP market
- **An energy market enables comparison of real-time prices to make the most cost-effective decision**
  - Companies can sometimes buy power for less than it would cost to generate its own energy
  - We manage financial transactions between members who buy and sell power
- **Our cost to Members equals about 67.5 cents for every \$100.00 of a residential utility bill**

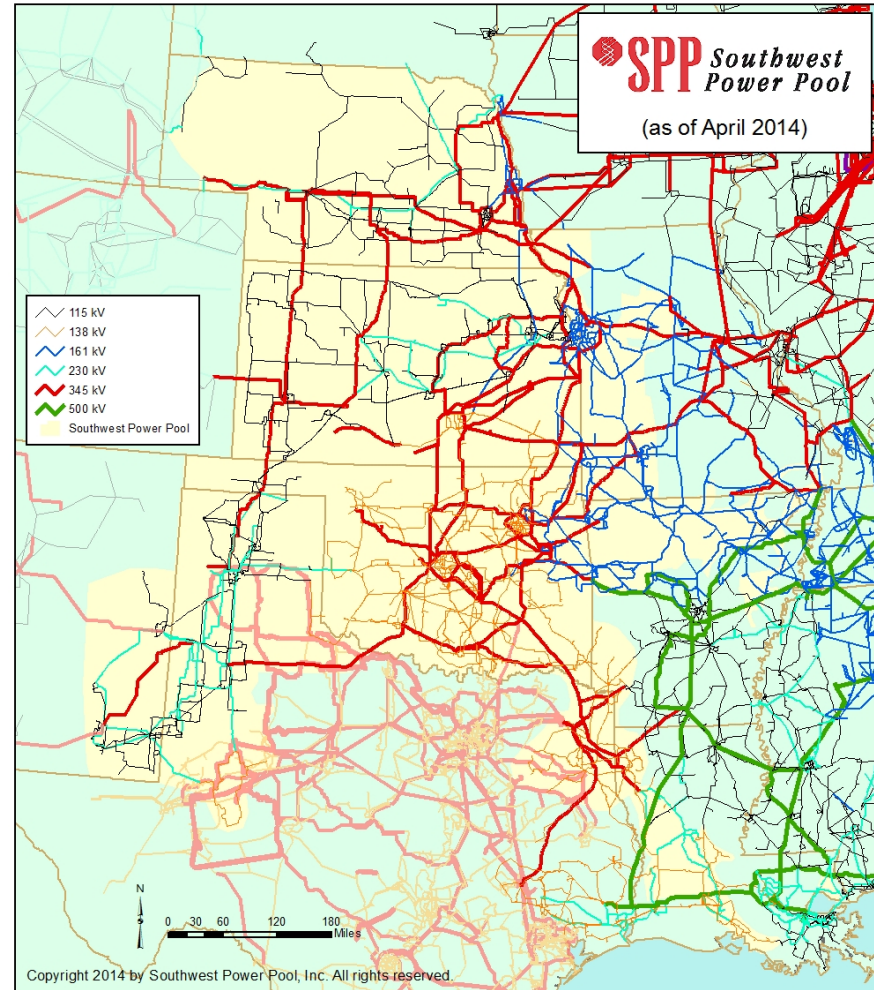


# How we benefit the consumer

- As a RTO SPP works with our Members to build transmission lines where they are needed
- Transmission is only 10% of retail electric rates
- Benefits
  - Increases reliability
  - Reduces congestion, which lowers costs
  - Addresses state policy expectations for renewable energy sources

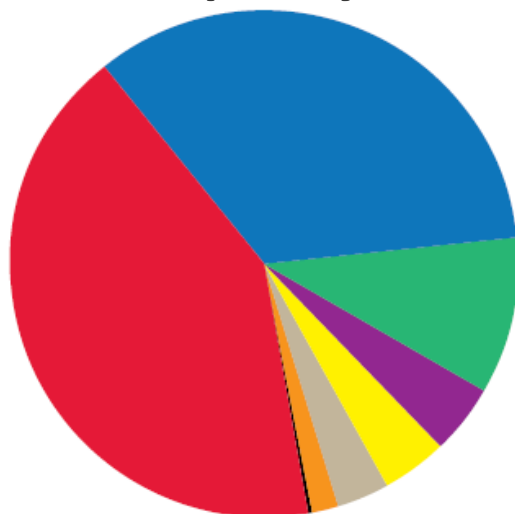
# SPP's Current Operating Region

- 370,000 miles of service territory
- 627 generating plants
- 77,366 MW of generating capacity
- 46,136 MW of peak demand
- 4,103 substations
- 48,930 miles transmission:
  - 69 kV – 12,569 miles
  - 115 kV – 10,239 miles
  - 138 kV – 9,691 miles
  - 161 kV – 5,049 miles
  - 230 kV – 3,889 miles
  - 345 kV – 7,401 miles
  - 500 kV – 93 miles



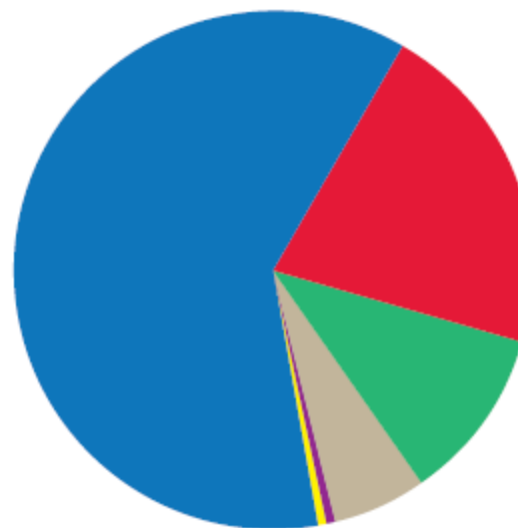
# 2013 Energy Capacity and Consumption

## Capacity



Gas	42.04%
Coal	34.08%
Wind	10.01%
Hydro	4.55%
Dual Fuel	4.06%
Nuclear	3.34%
Fuel Oil	1.83%
Other	0.08%

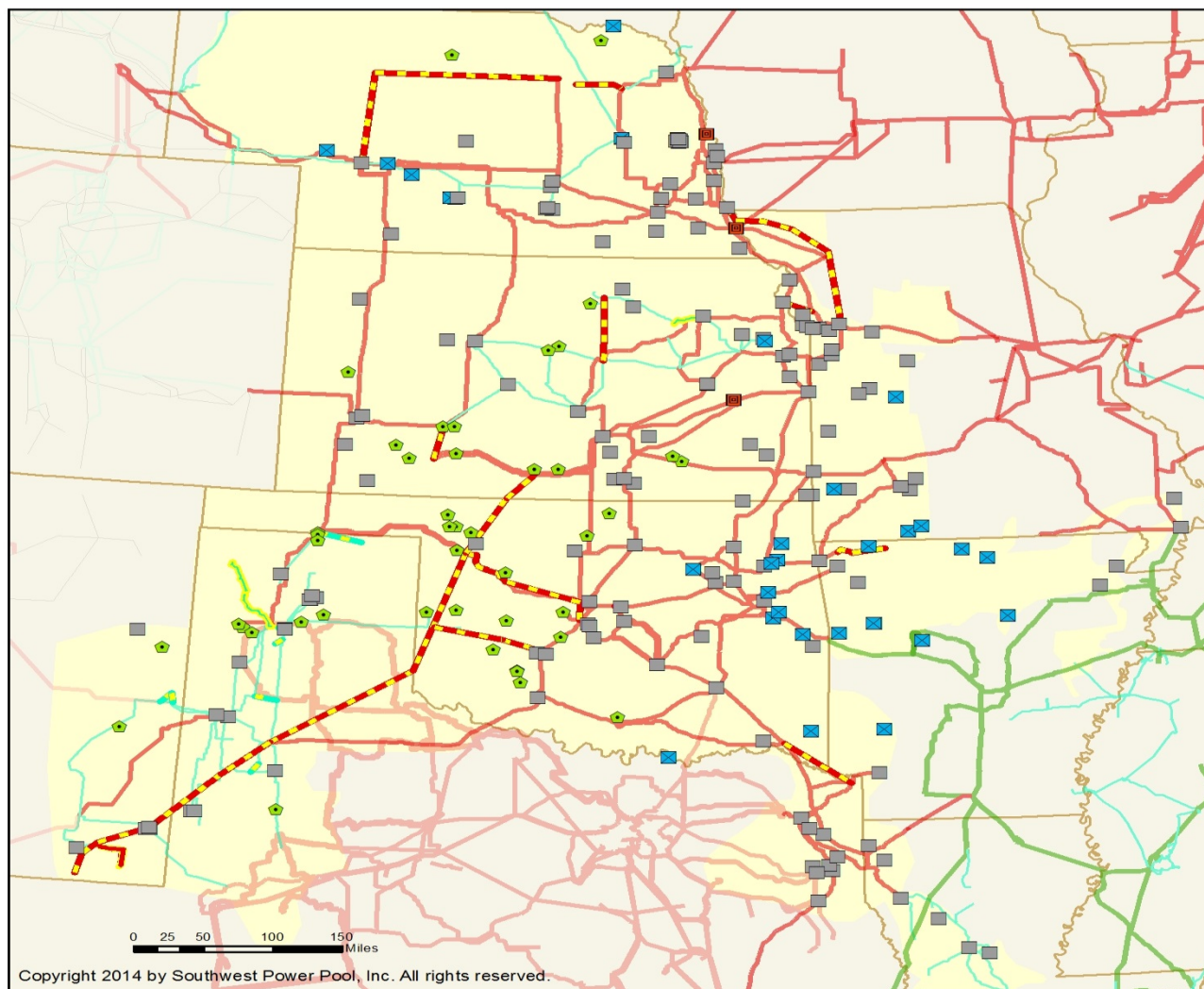
## Consumption



Coal	61.2%
Gas	21.2%
Wind	10.8%
Nuclear	6.0%
Hydro	0.6%
Diesel Fuel Oil (DFO)	0.3%

**12% annual planning capacity requirement**

# Generating Resources in SPP



## Distribution of Generation in SPP (July 2014)

### Generation Type

- Fossil
- Hydro
- Nuclear
- Wind

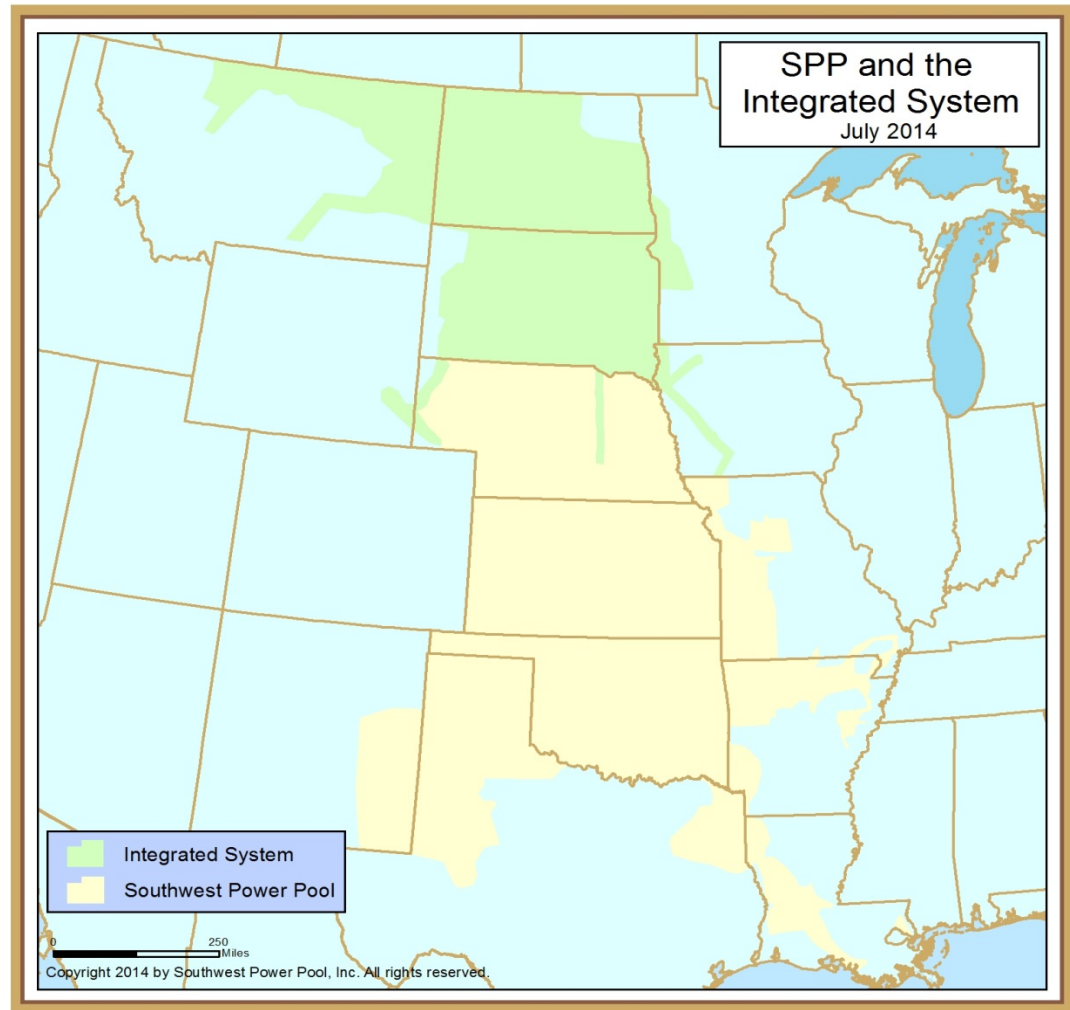
### Voltage

- 230 kV
- 345 kV
- 500 kV
- New Line, 230 kV
- New Line, 345 kV
- Rebuild/Re-Conductor, 230 kV
- Voltage Conversion, 230 kV
- Voltage Conversion, 345 kV
- Southwest Power Pool



# SPP's Future Expanded Operating Region

- Adding 3 new members in fall 2015: Western Area Power Administration, Basin Electric Cooperative, and Heartland Consumers Power District
- Adds approximately 5-6,000 MW of peak demand
- Adds about a 50% increase in SPP's current hydro capacity
- Reduces costs for SPP members



# **EPA'S CLEAN POWER PLAN – IMPACTS TO RELIABILITY IN SPP**

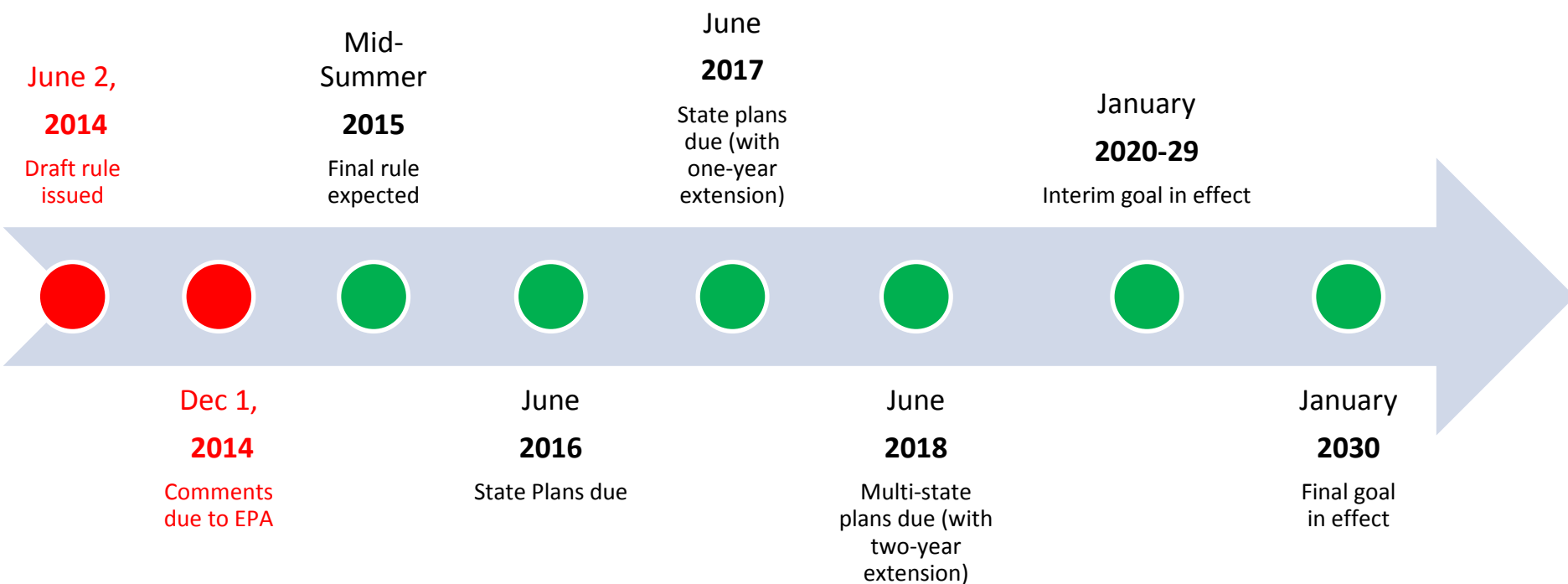
# EPA Clean Power Plan Overview

- EPA's proposed performance standards to reduce CO<sub>2</sub> emissions from existing fossil fuel-fired generators
- Promulgated under authority of Section 111(d) of the Clean Air Act
- Achieves nationwide 30% reduction of CO<sub>2</sub> from 2005 levels by 2030
- Proposes state-specific emission rate-based CO<sub>2</sub> goals
  - Based on EPA's interpretation and application of Best System of Emission Reduction (BSER)
  - Must be met by 2030

# EPA Clean Power Plan Overview

- States goals and flexibility
  - Interim goals applied 2020-2029 that allows states to choose trajectory
  - Offers guidelines and allows states flexibility to develop and submit State Implementation Plans
  - States may adopt an equivalent mass-based goal
- States can develop individual plans or collaborate with other states
- If state does not submit a plan or its plan is not approved, EPA will establish a plan for that state

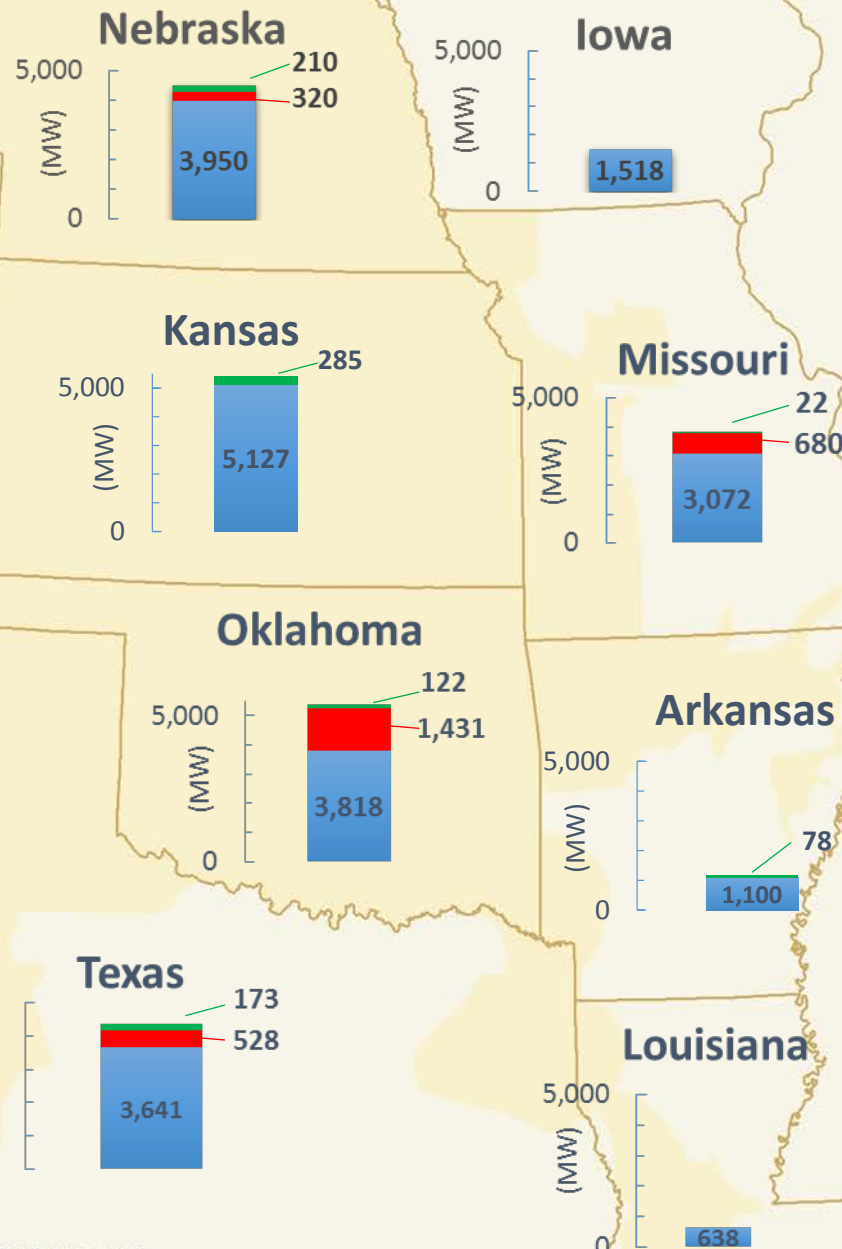
# Clean Power Plan Milestones



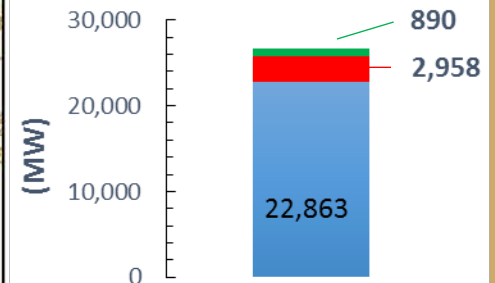
# SPP's Current Coal Status for 2018

## LEGEND

- Derated Capacity
- Retired Capacity
- Remaining Capacity



## Total Generation and Losses of Coal Units by 2018



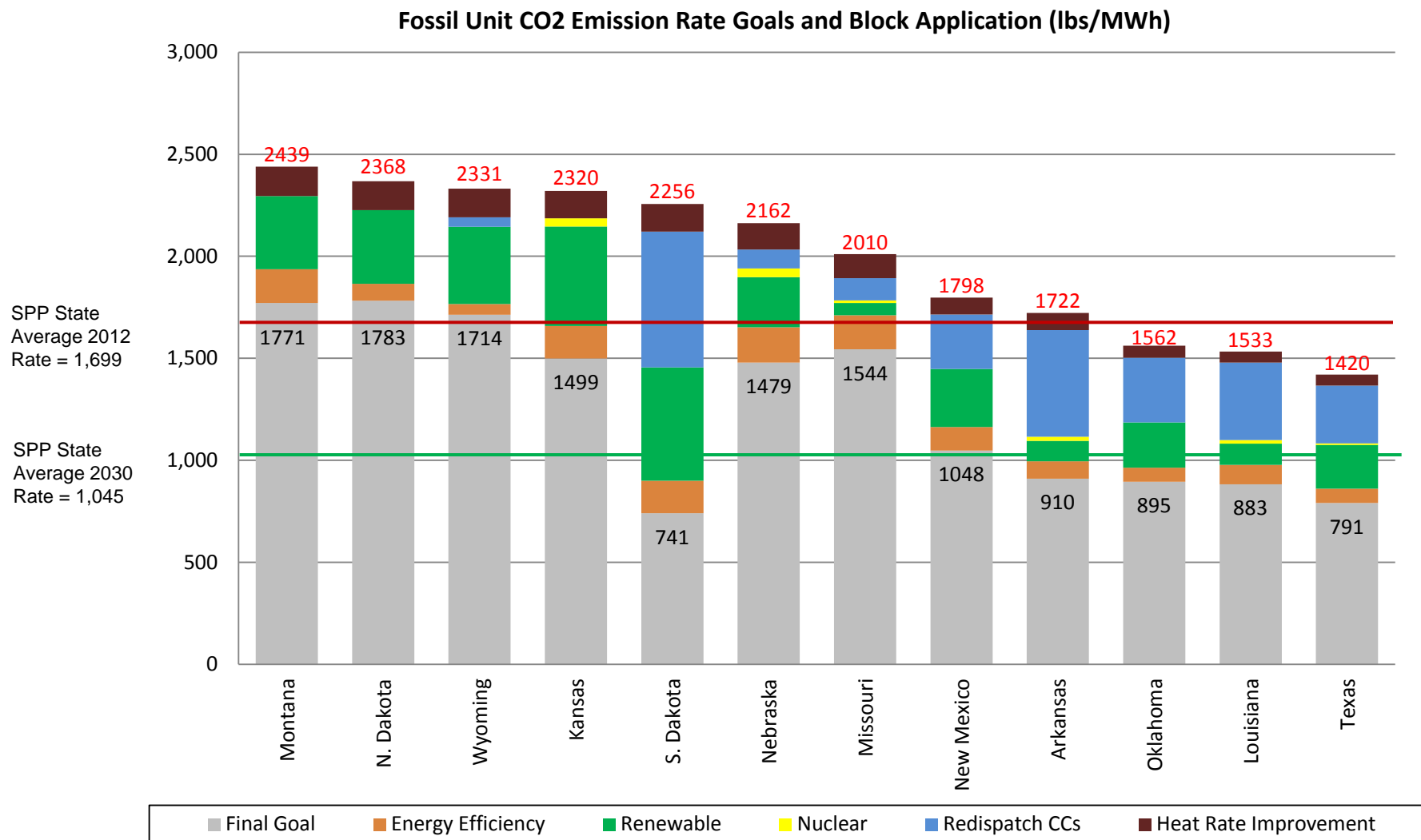


# BSER is Based on Four Building Blocks

Block	Assumption
1. Improve efficiency of existing coal plants	6% efficiency improvement across fleet, assuming best practices and equipment upgrades
2. Increase reliance on CC gas units	Re-dispatch of Natural Gas CCs up to a capacity factor of 70%
3. Expand use of renewable resources and sustain nuclear power production	Meet regional non-hydro renewable target, prevent retirement of at-risk nuclear capacity and promote completion of nuclear capacity under construction
4. Expand use of demand-side energy efficiency	Scale to achieve 1.5% of prior year's annual savings rate

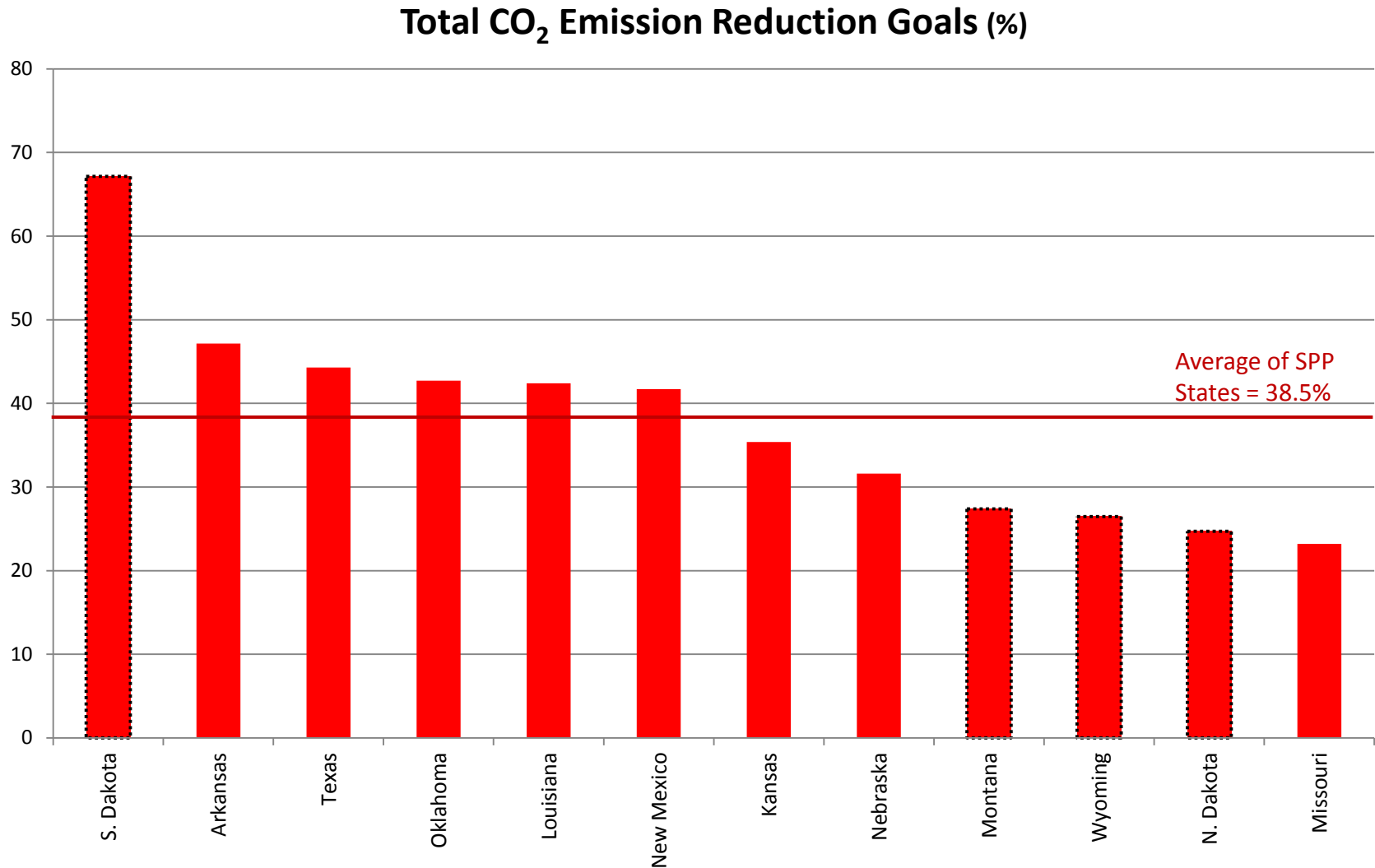
\*Uses 2012 data for existing units and estimated data for units under construction.

# EPA's 2030 Goals for States in SPP



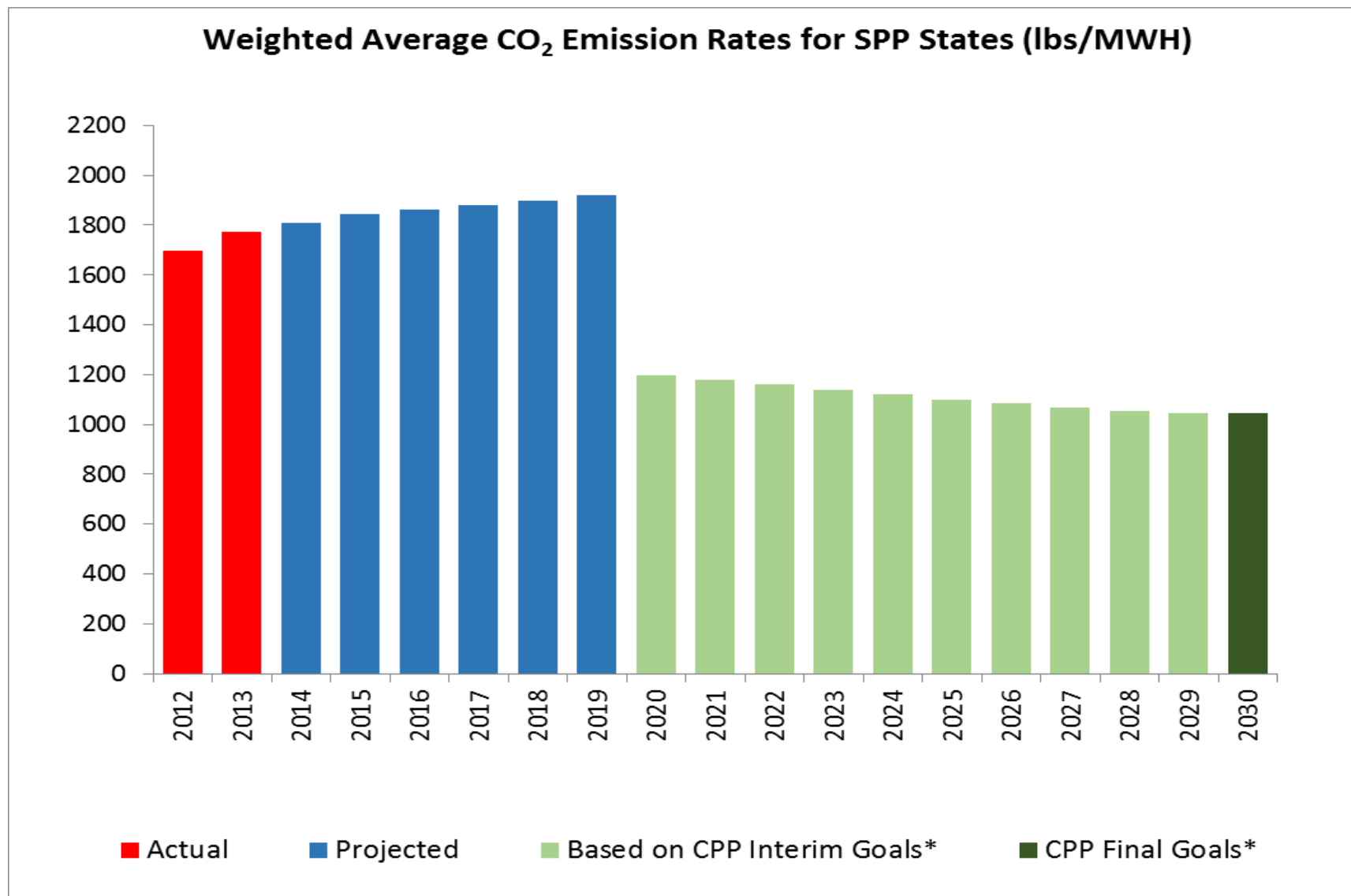
\*Includes Future States with IS Generation in SPP (N. Dakota, S. Dakota, Montana, and Wyoming)

# % Emission Reduction Goals for States in SPP



\*Includes Future States with IS Generation in SPP (N. Dakota, S. Dakota, Montana, and Wyoming)

# EPA's Proposed Glide Path



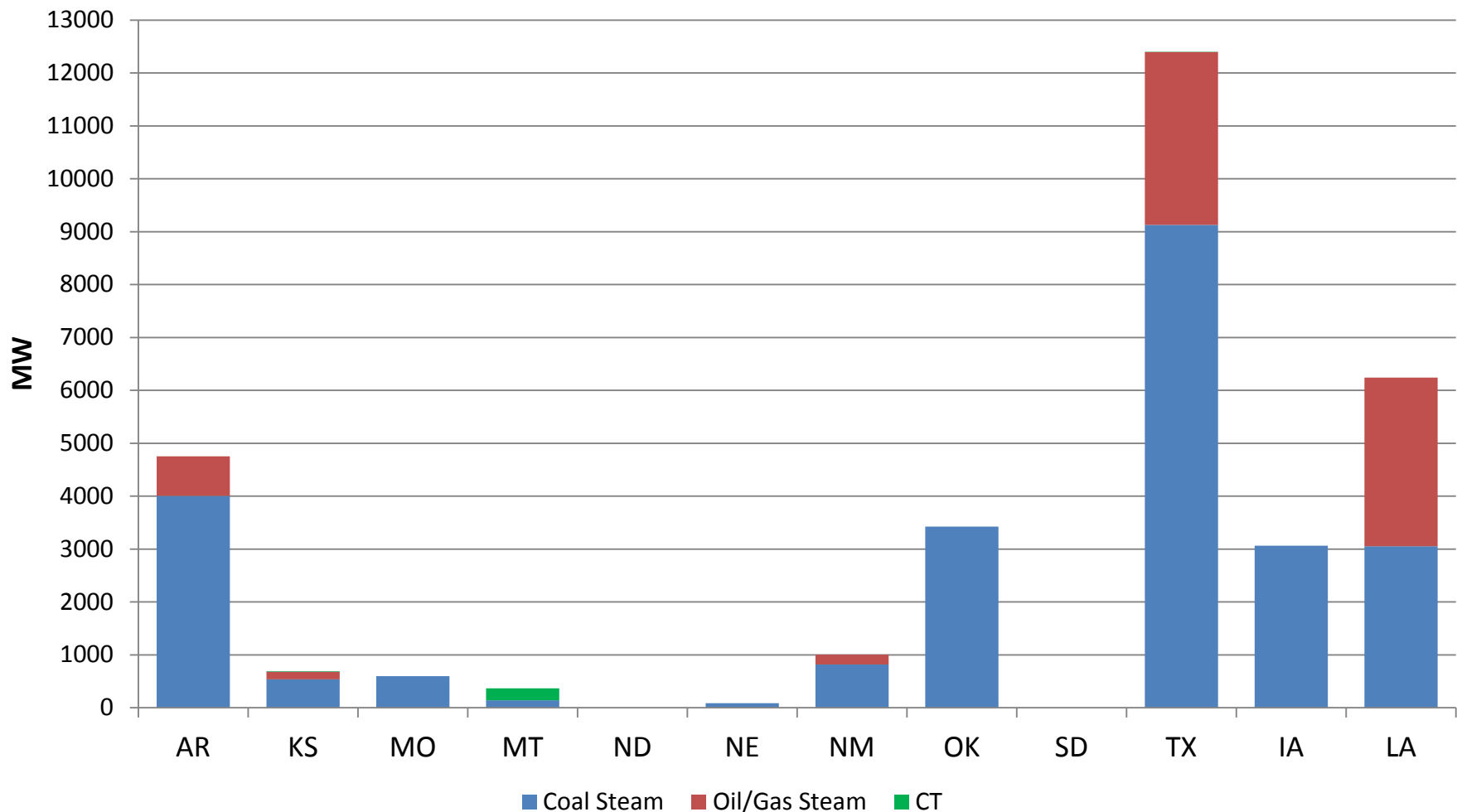
\*Includes states with IS generation that will be in SPP by 2015 (N. Dakota, S. Dakota, Montana, and Wyoming)

# SPP's CPP Impact Assessments

- SPP performed two types of assessments
  - Transmission system impacts
  - Reserve margin impacts
- Both assessments modeled EPA's projected EGU retirements within the SPP region and surrounding areas
- Transmission system impact assessment performed in two parts
  - Part 1 assumed unused capacity from existing and currently planned generators would be used to replace retired EGUs
  - Part 2 relied upon both currently planned generation and additional new generation needed to replace retired EGUs

# EPA Projected 2016-2020 EGU Retirements

(For SPP and Select Neighboring States)



\*Extracted from EPA IPM data

\*\*THESE RETIREMENTS ARE ASSUMED BY EPA – NOT SPP!



# Transmission System Impact Assessment Results

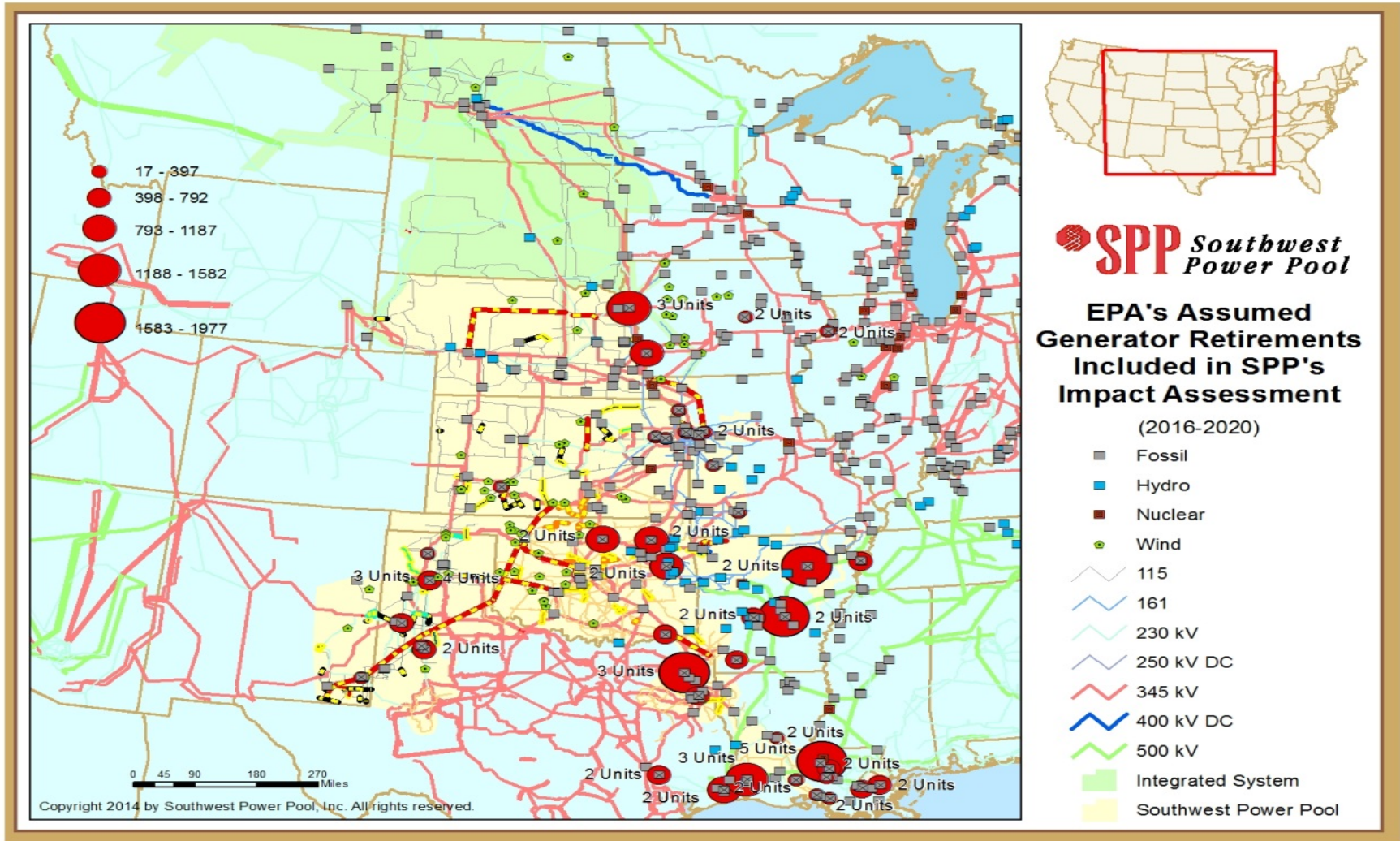
## Part 1

- “what happens if CPP compliance begins and EGU retirements occur before generation and transmission infrastructure is added”
  - Extreme reactive deficiencies of approximately 5,200 MVAR across SPP system
  - Will result in significant loss of load and violations of NERC reliability standards

## Part 2

- “what happens during CPP compliance after replacement generation capacity is added but before requisite transmission infrastructure is added”
  - Loading on 38 facilities in SPP exceeds equipment ratings
  - Some overloads so severe that cascading outages would occur
  - Would result in violations of NERC reliability standards

# EPA's Projected 2016-2020 EGU Retirements

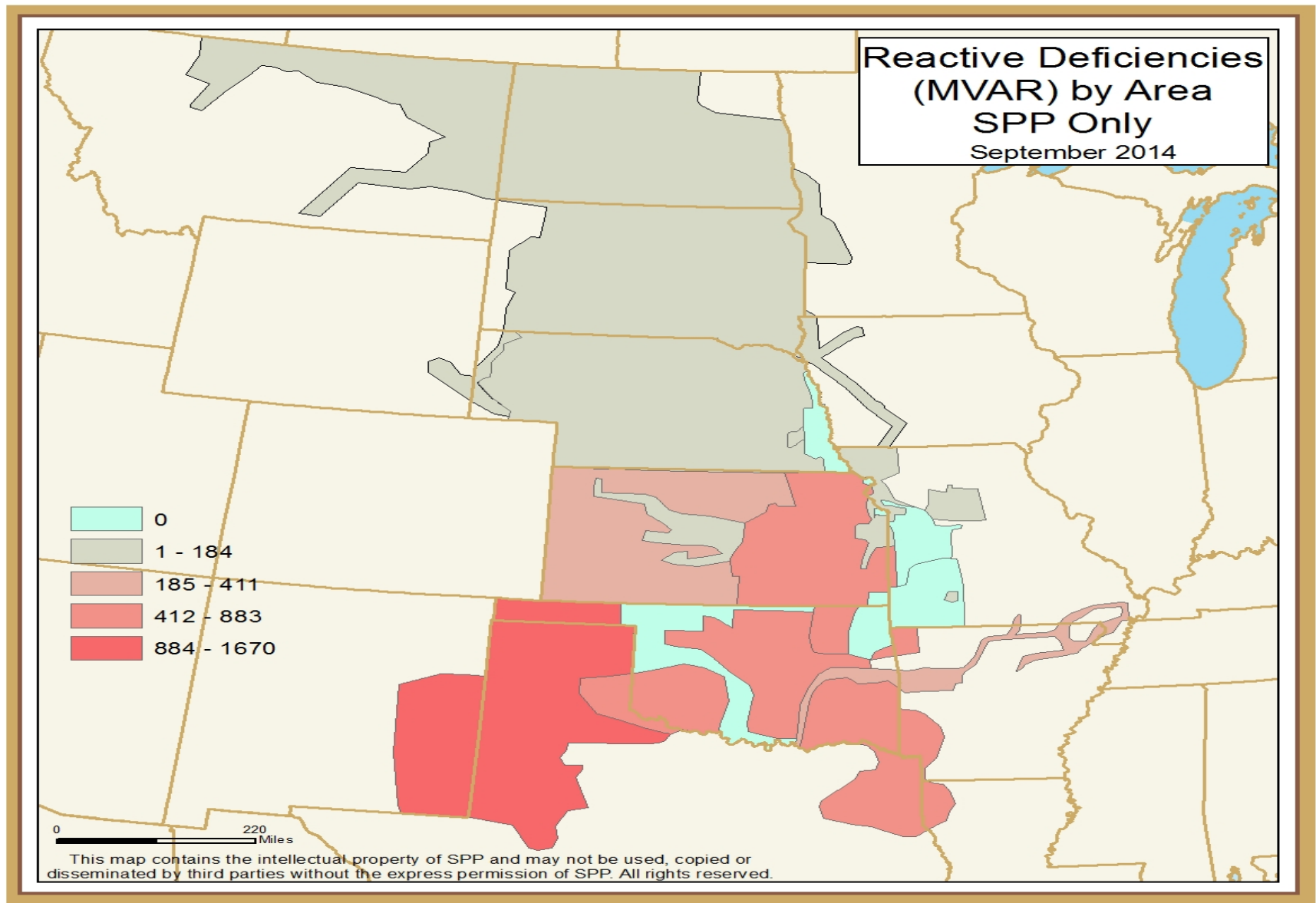


\*Excludes committed retirements prior to 2016

\*\*Extracted from EPA IPM data

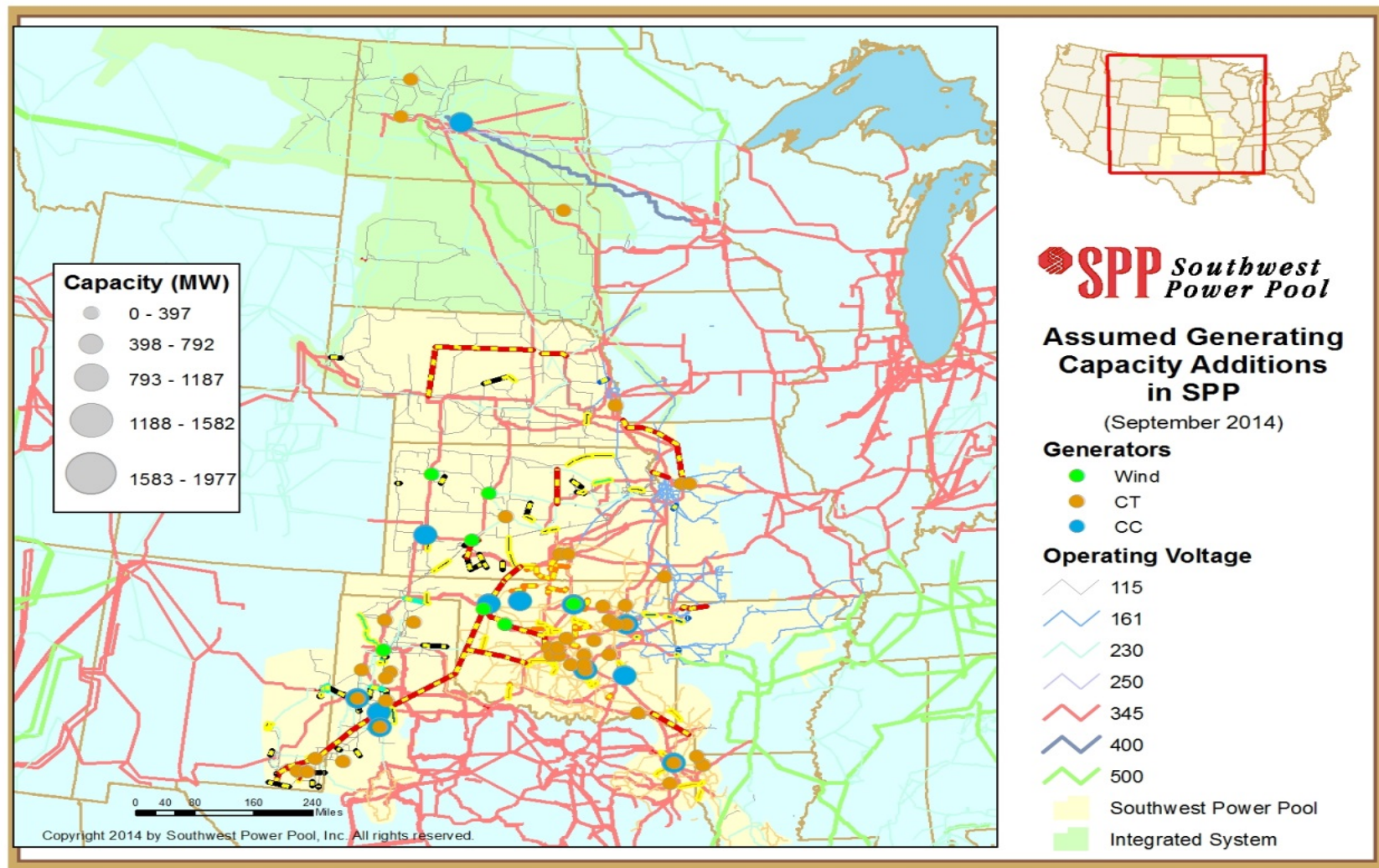
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# Reactive Deficiencies Observed in Part 1 of TSIA



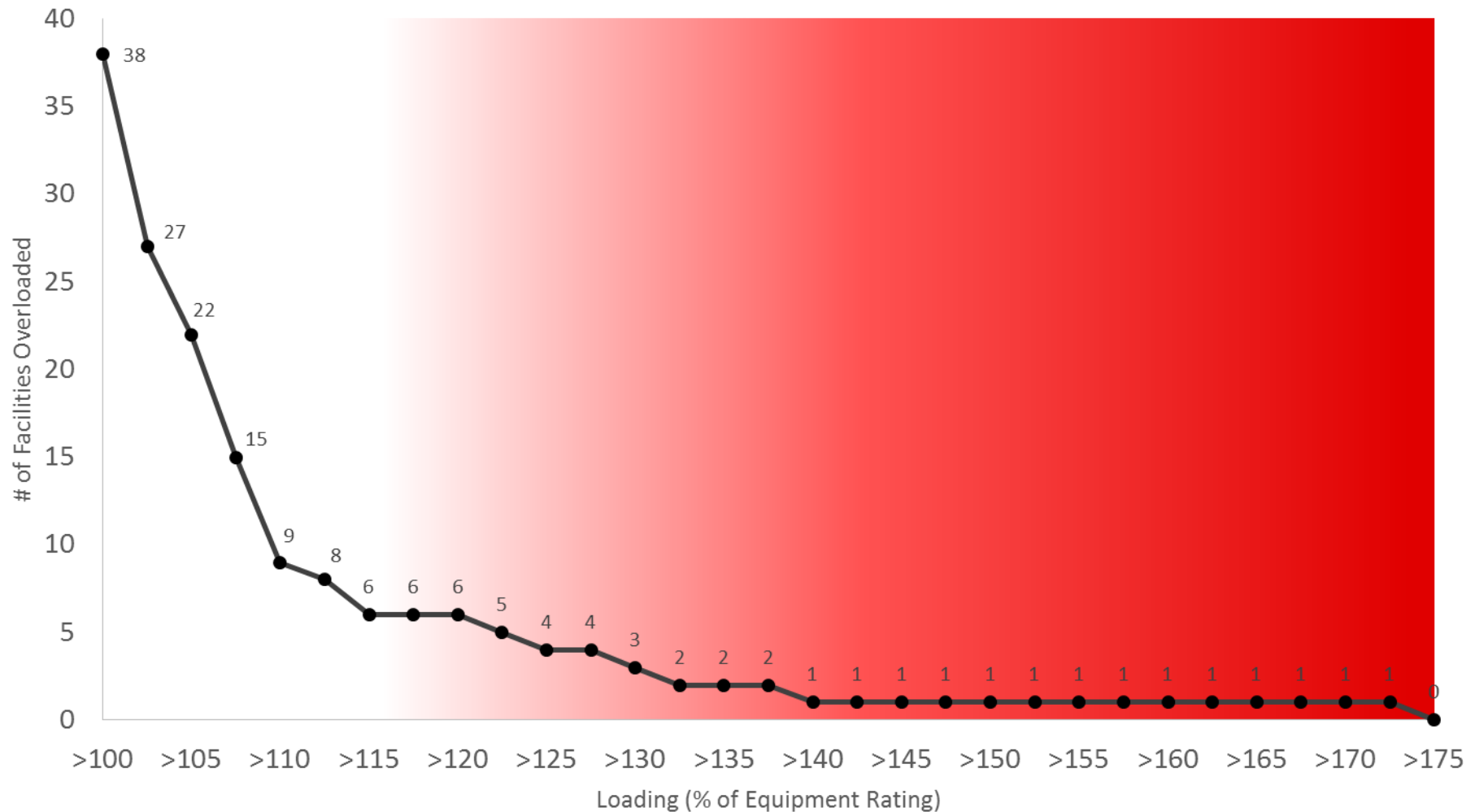


# New Generating Capacity Added in Part 2 of SPP's TSIA

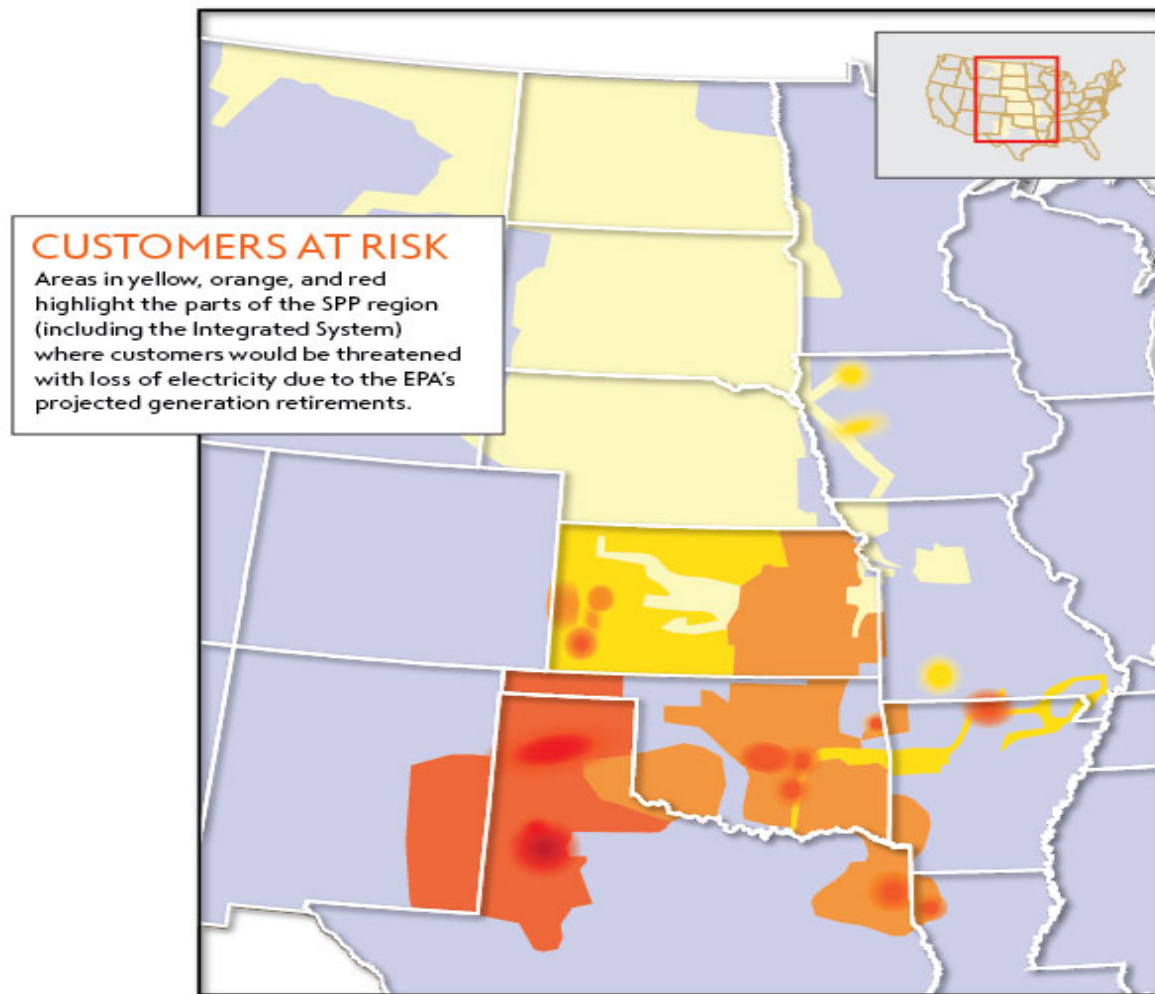


# Transmission Overloads Observed in Part 2 of TSIA

Overloads in SPP Caused by EPA's Projected EGU Retirements



# Reliability Risks Identified by TSIA



## RELIABILITY RISK ASSESSMENT

SIGNIFICANT

SEVERE





# SPP Reserve Margin Assessment

- Used current load forecasts supplied by SPP members, currently planned generator retirements, currently planned new generator capacity with GIAs, and EPA's assumed retirements
- SPP's minimum required reserve margin is 13.6%
- By 2020, SPP's anticipated reserve margin would be 4.7%, representing a capacity margin deficiency of approximately 4,600 MW
- By 2024, SPP's anticipated reserve margin would be -4.0%, representing a capacity margin deficiency of approximately 10,100 MW
- Out of 14 load serving members assessed, 9 would be deficient by 2020 and 10 by 2024
- SPP members are discussing the Reserve Margin requirements for updating

# Impact of EPA's Retirements on Reserve Margin

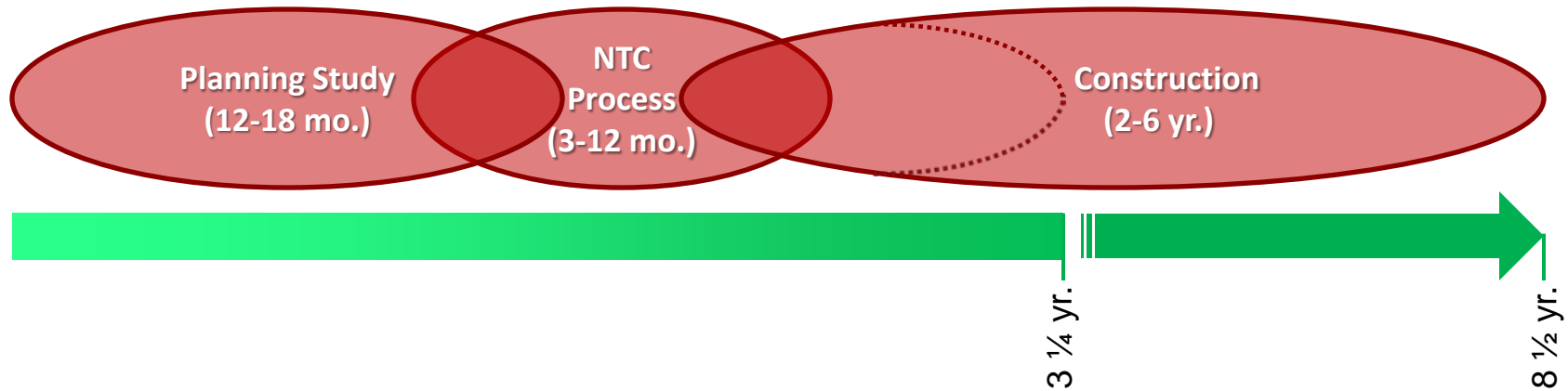
## Reserve Margin Percentage By Area



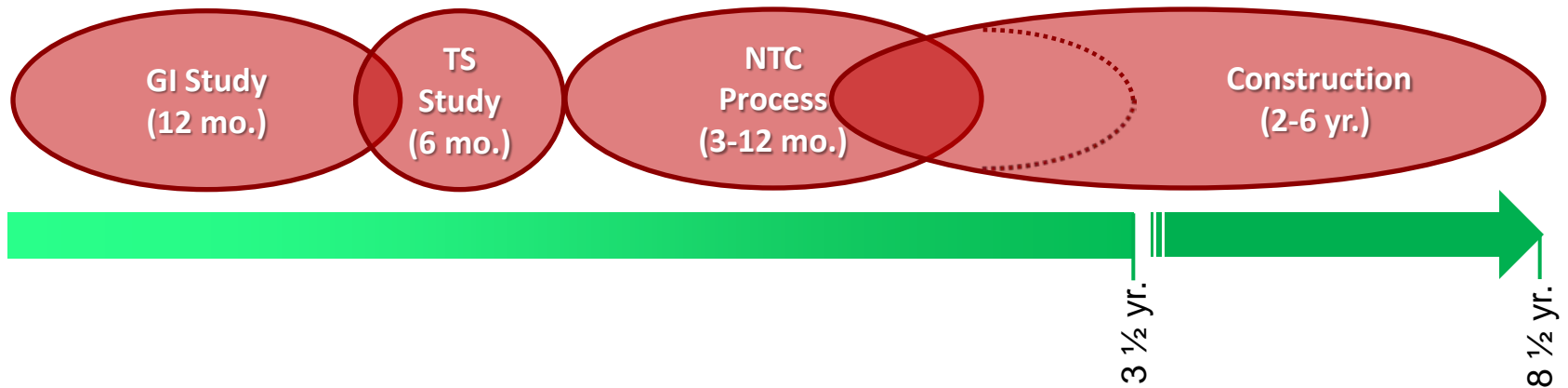
\*Includes current load forecasts, current planned generator additions and retirements, and EPA's projected retirements

# Transmission Build Cycle in SPP

## Transmission Planning Process



## GI and Transmission Service Process



# SPP's Conclusions

- Significant new generating capacity not currently planned will be needed to replace EPA's projected retirements
  - EPA projects about 9,000 MW of retirements in the SPP region by 2020 – almost 6,000 MW more than SPP is currently expecting!
- New transmission infrastructure will be needed, both to connect new generation to grid and to deliver energy reliably
  - Currently takes up to 8.5 years to study, plan, and construct transmission in SPP
  - Up to \$2.3 million per mile for 345 kV transmission construction
- More comprehensive reliability analysis is needed before final rules are adopted
- Sufficient time is needed to comply in a reliable fashion

# SPP's Recommendations to EPA

- Technical conferences jointly sponsored by FERC and EPA to discuss
  - Reliability impacts
  - Impacts on regional markets
  - How to move forward to accomplish both reliability and environmental objectives
- Comprehensive nationwide analysis of reliability impacts before final rule issued
- Extension of schedule for compliance – at a minimum, interim goals extended at least 5 years
- Adoption of “reliability safety valve”



## **Additional Information**

### *Assessment Report*

<http://www.spp.org/publications/CPP%20Reliability%20Analysis%20Results%20Final%20Version.pdf>

### *Letter to EPA*

[http://www.spp.org/publications/2014-10-09\\_SPP%20Comments\\_EPA-HQ-OAR-2013-0602.pdf](http://www.spp.org/publications/2014-10-09_SPP%20Comments_EPA-HQ-OAR-2013-0602.pdf)

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