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

SPP Southwest Power Pool

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

SPP Southwest Power Pool

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

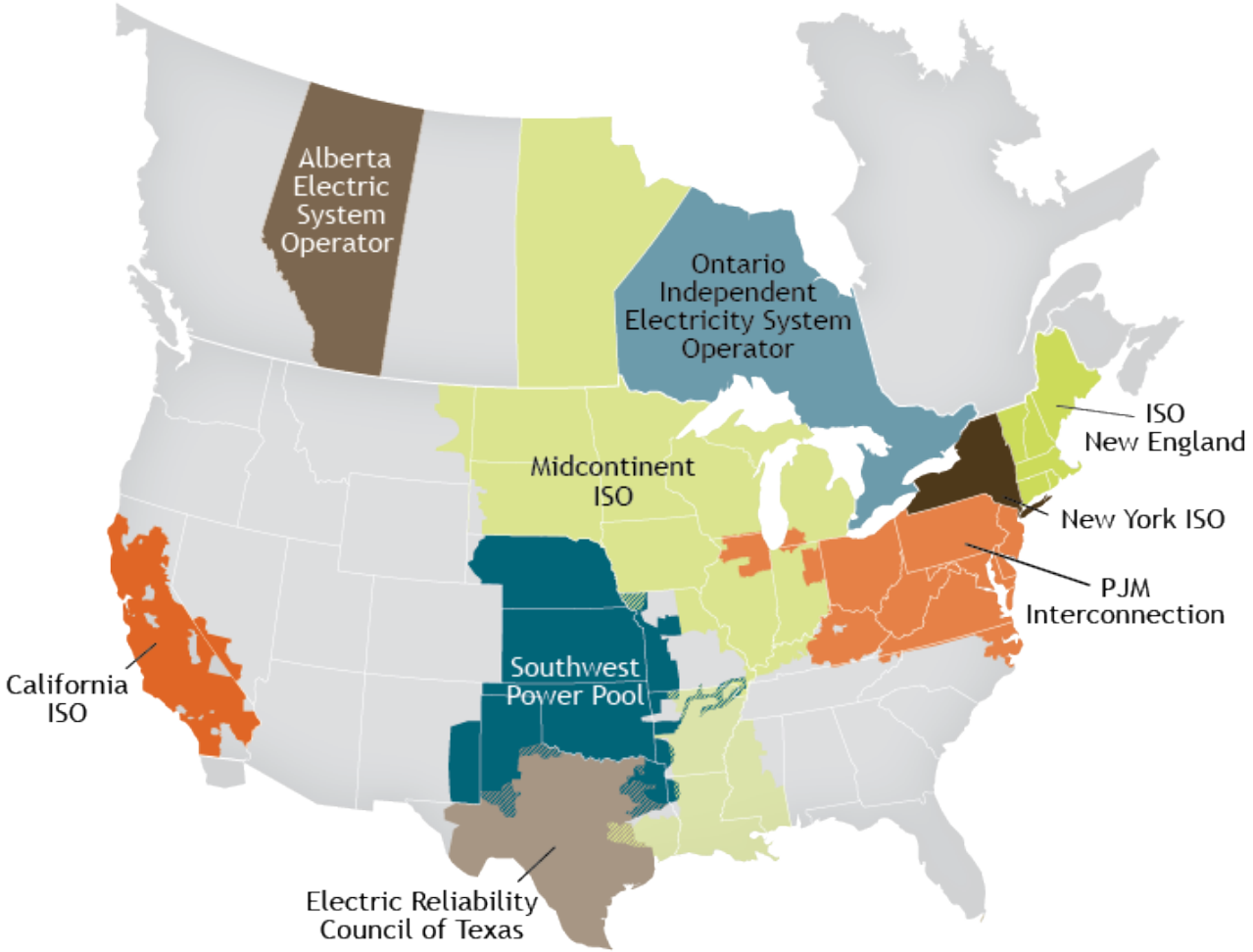
Regulatory Environment

- 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
TOTAL	**80**

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

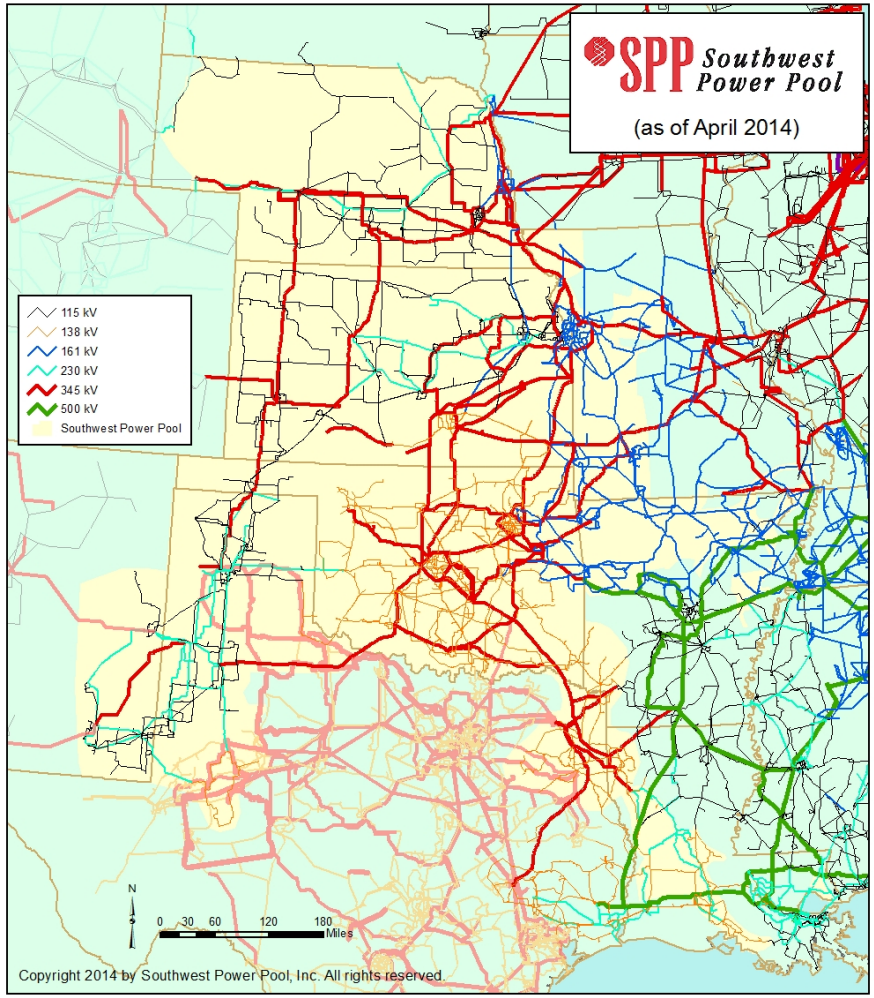
- **A utility has three ways to serve its customers:**
  1. Generate its own power
  2. Buy power from another provider
  3. Buy from the SPP market
- **An energy market enables comparison of real-time prices to make the most cost-effective decision**
  - Companies can sometimes buy power for less than 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

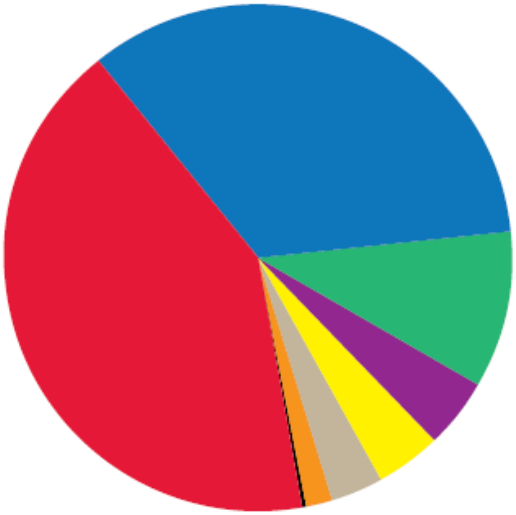
SPP's Current Operating Region

- 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



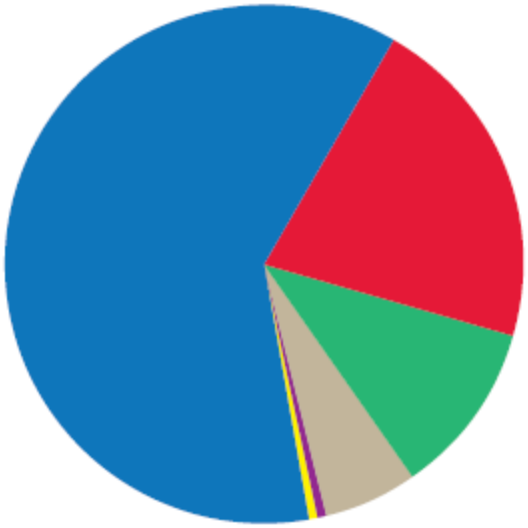
2013 Energy Capacity and Consumption

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%

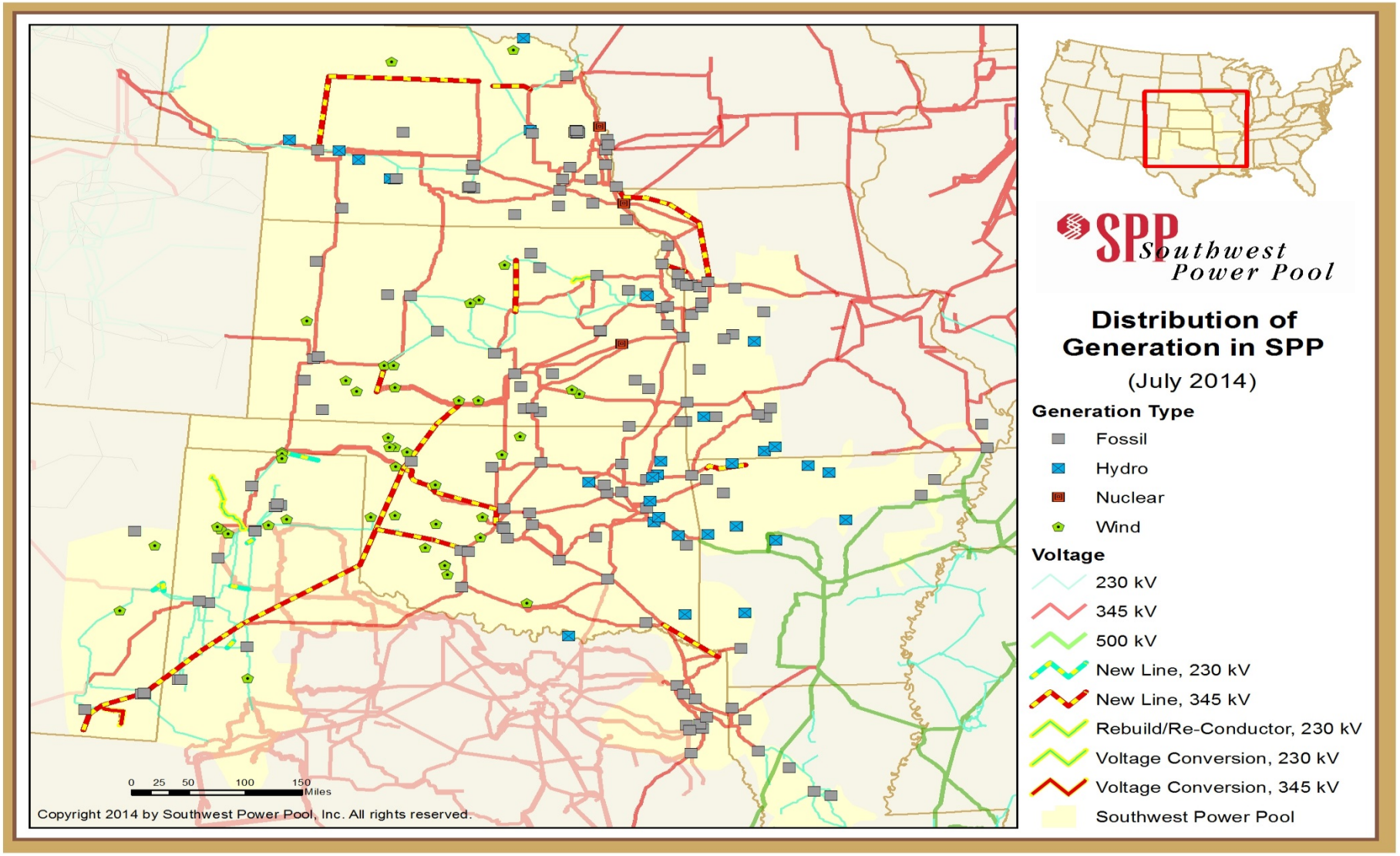
Consumption



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

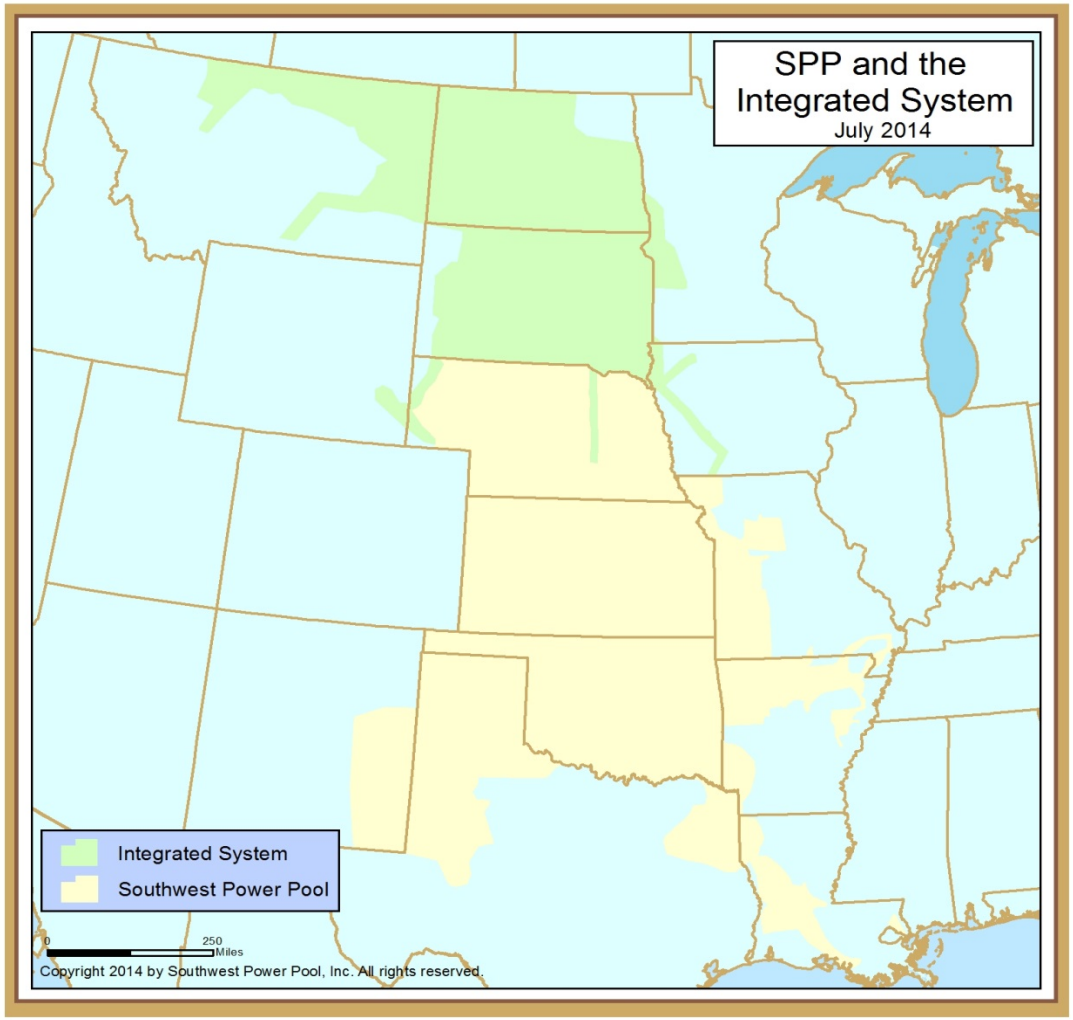
12% annual planning capacity requirement

Generating Resources in SPP



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

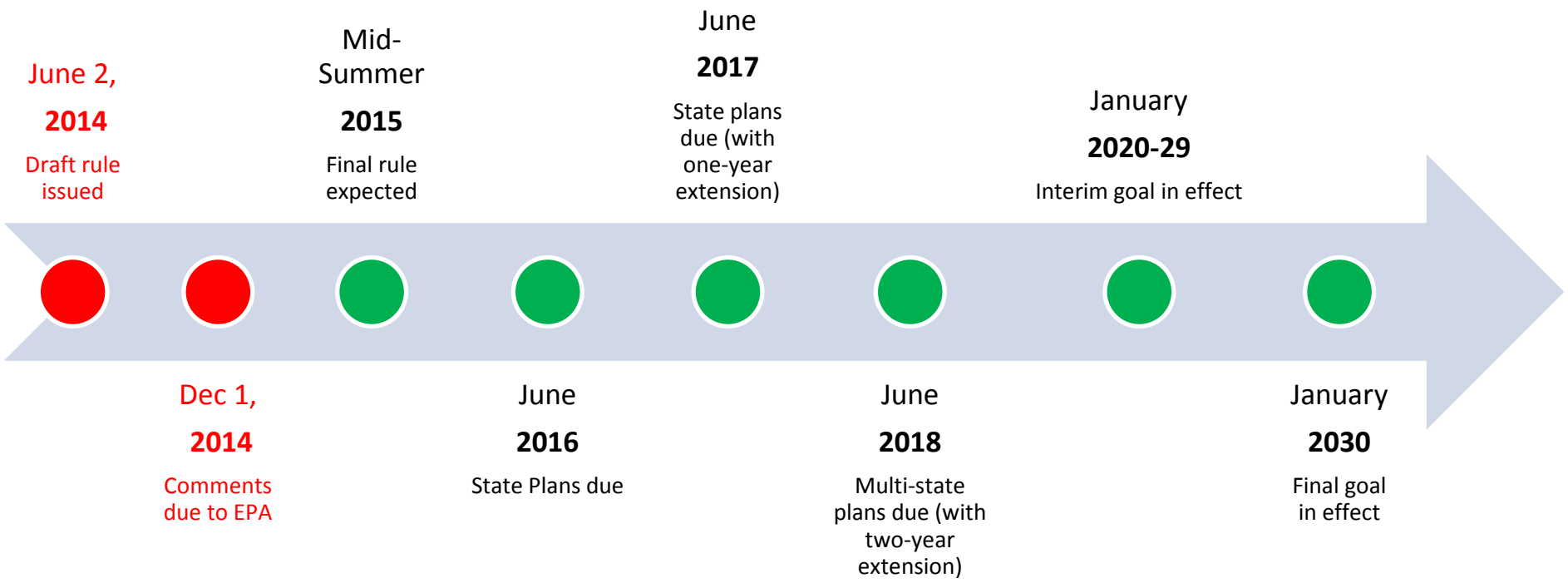
EPA Clean Power Plan Overview

- EPA's proposed performance standards to reduce CO_2 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_2 from 2005 levels by 2030
- Proposes state-specific emission rate-based CO_2 goals
  - Based on EPA's interpretation and application of Best System of Emission Reduction (BSER)
  - Must be met by 2030

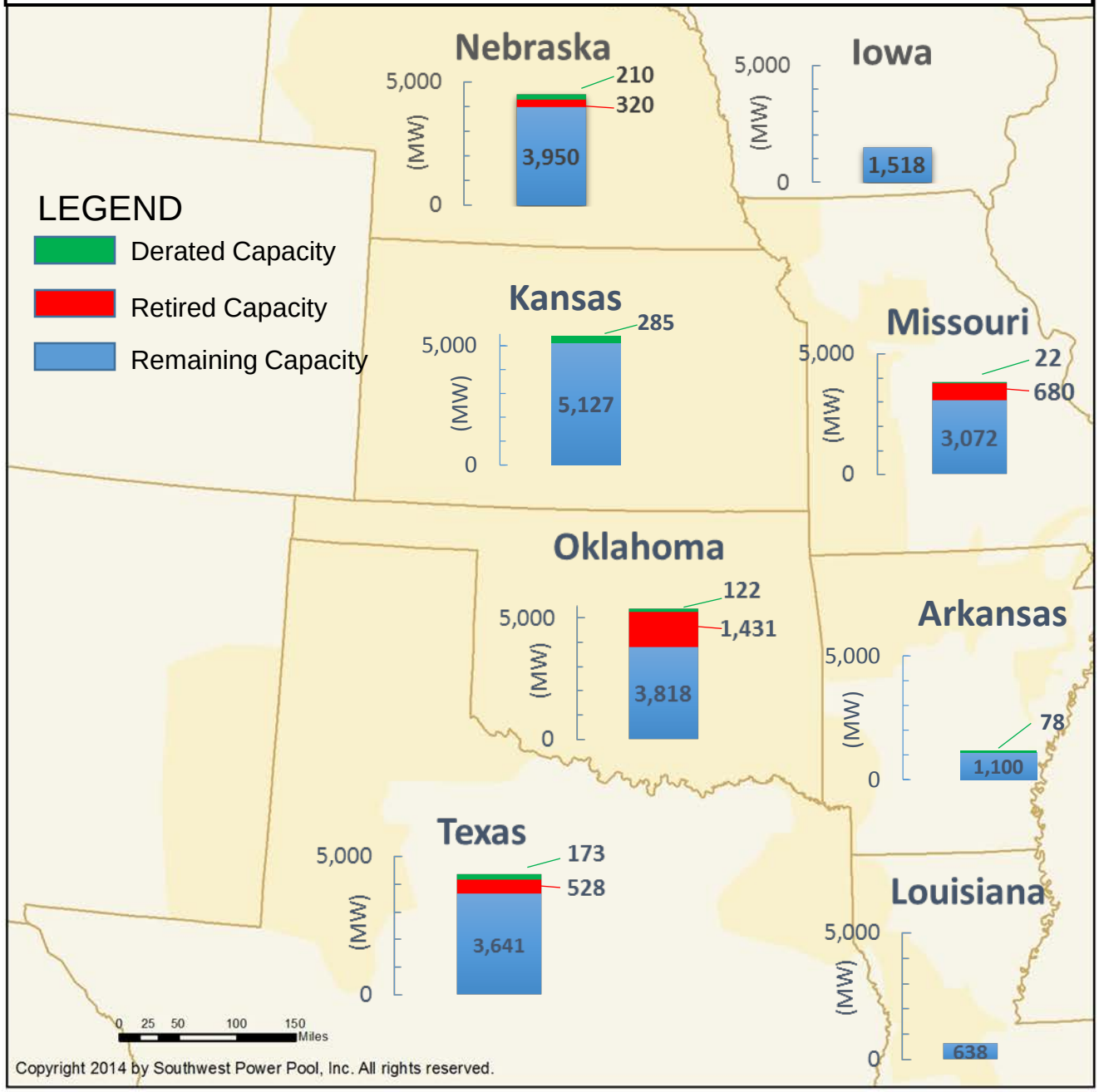
EPA Clean Power Plan Overview

- 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

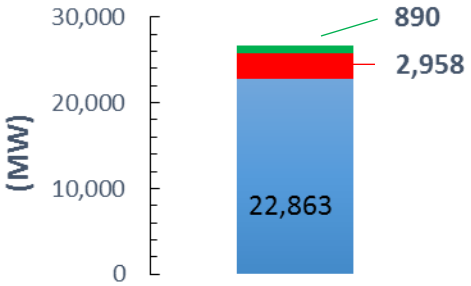


SPP's Current Coal Status for 2018



SPP Southwest Power Pool

Total Generation and Losses of Coal Units by 2018

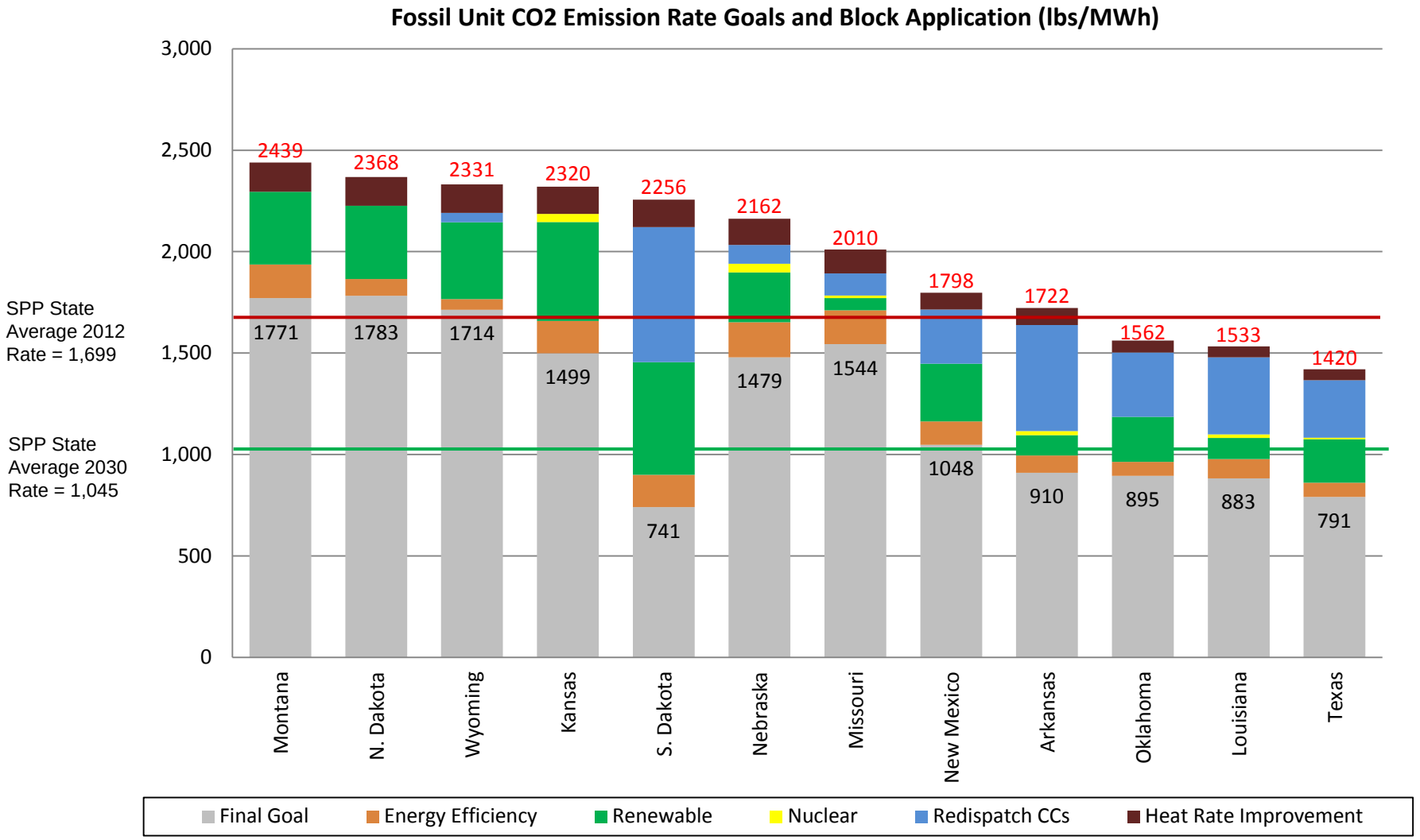


BSER is Based on Four Building Blocks

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

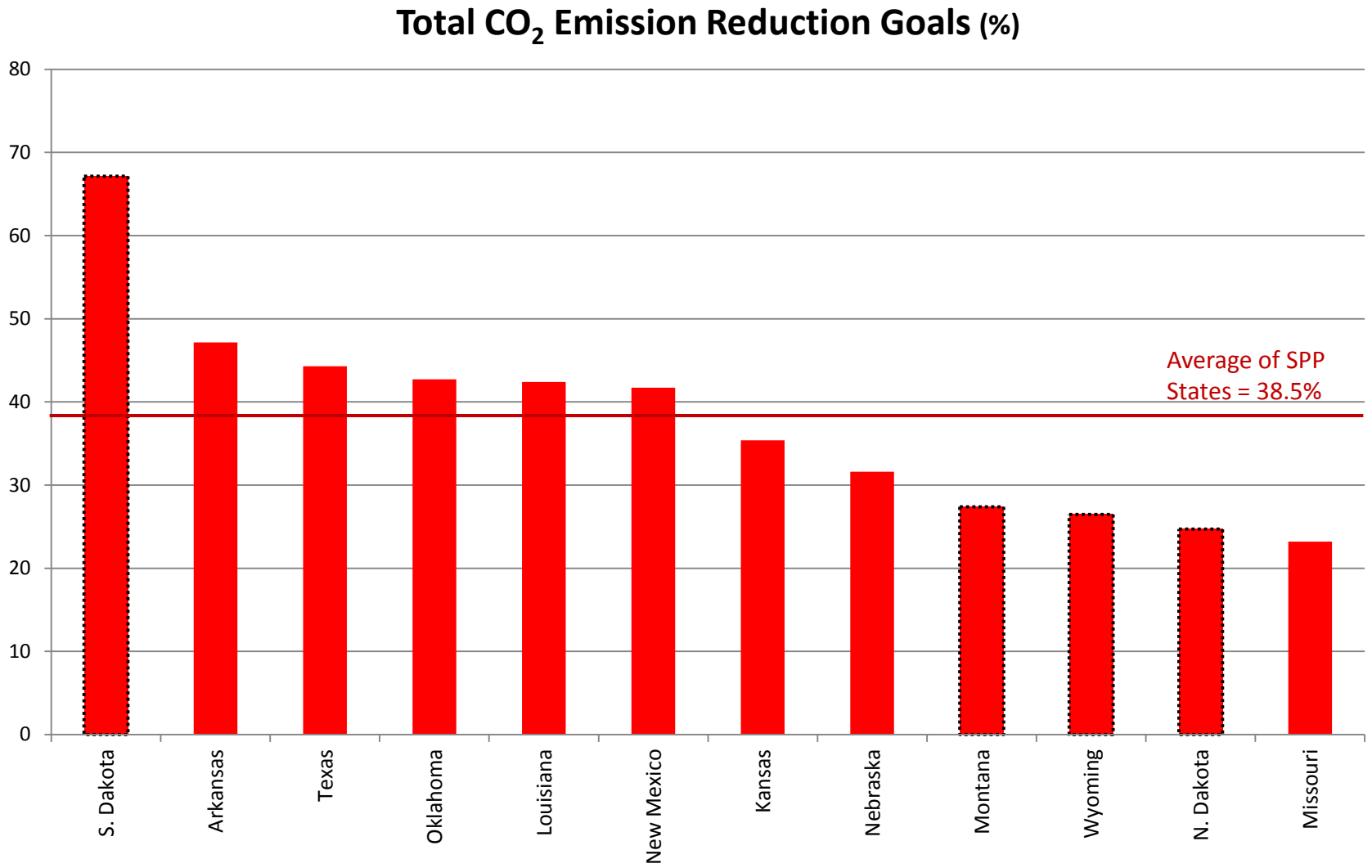
*Uses 2012 data for existing units and estimated data for units under construction.

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



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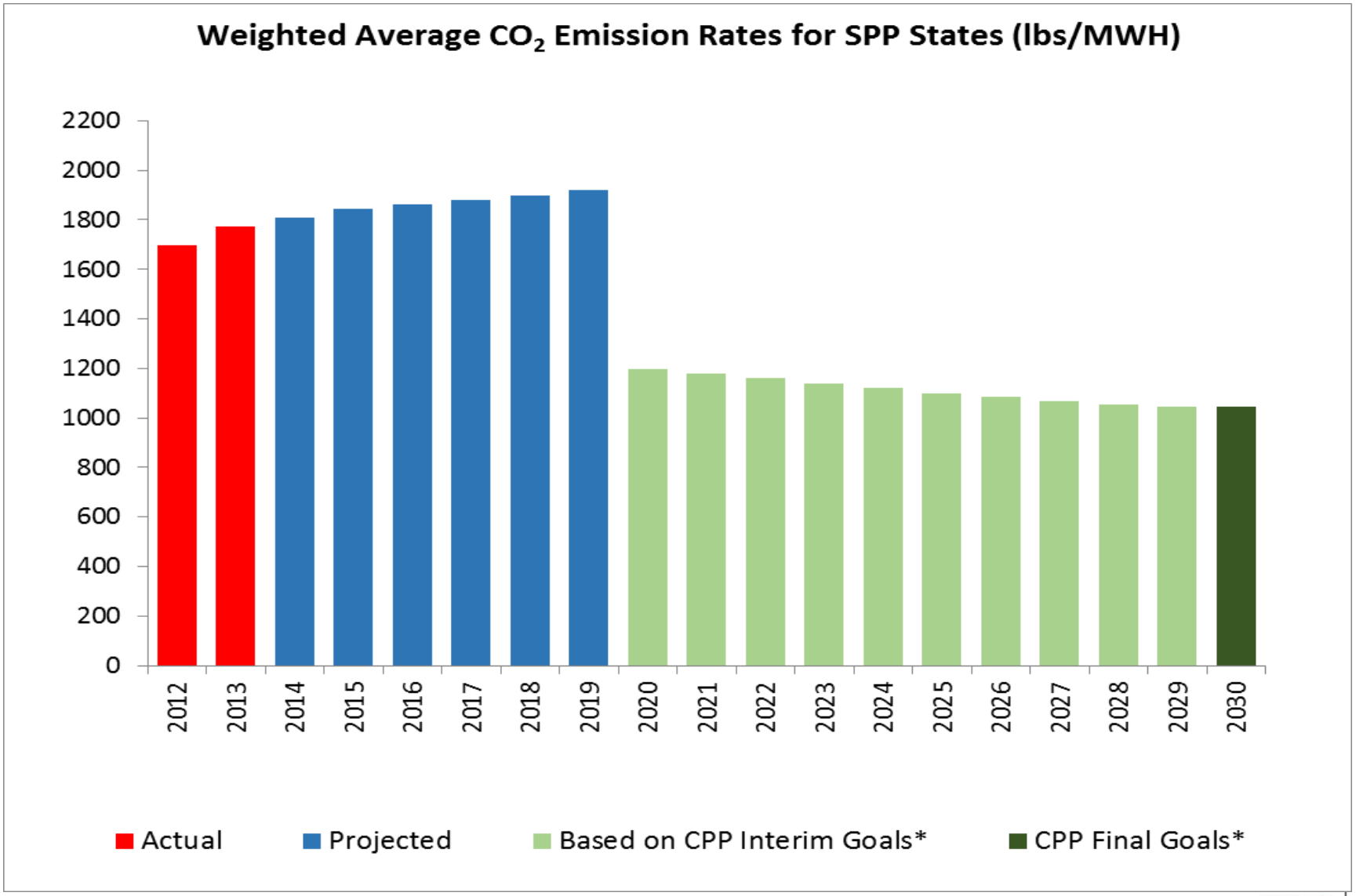
EPA's Proposed Glide Path



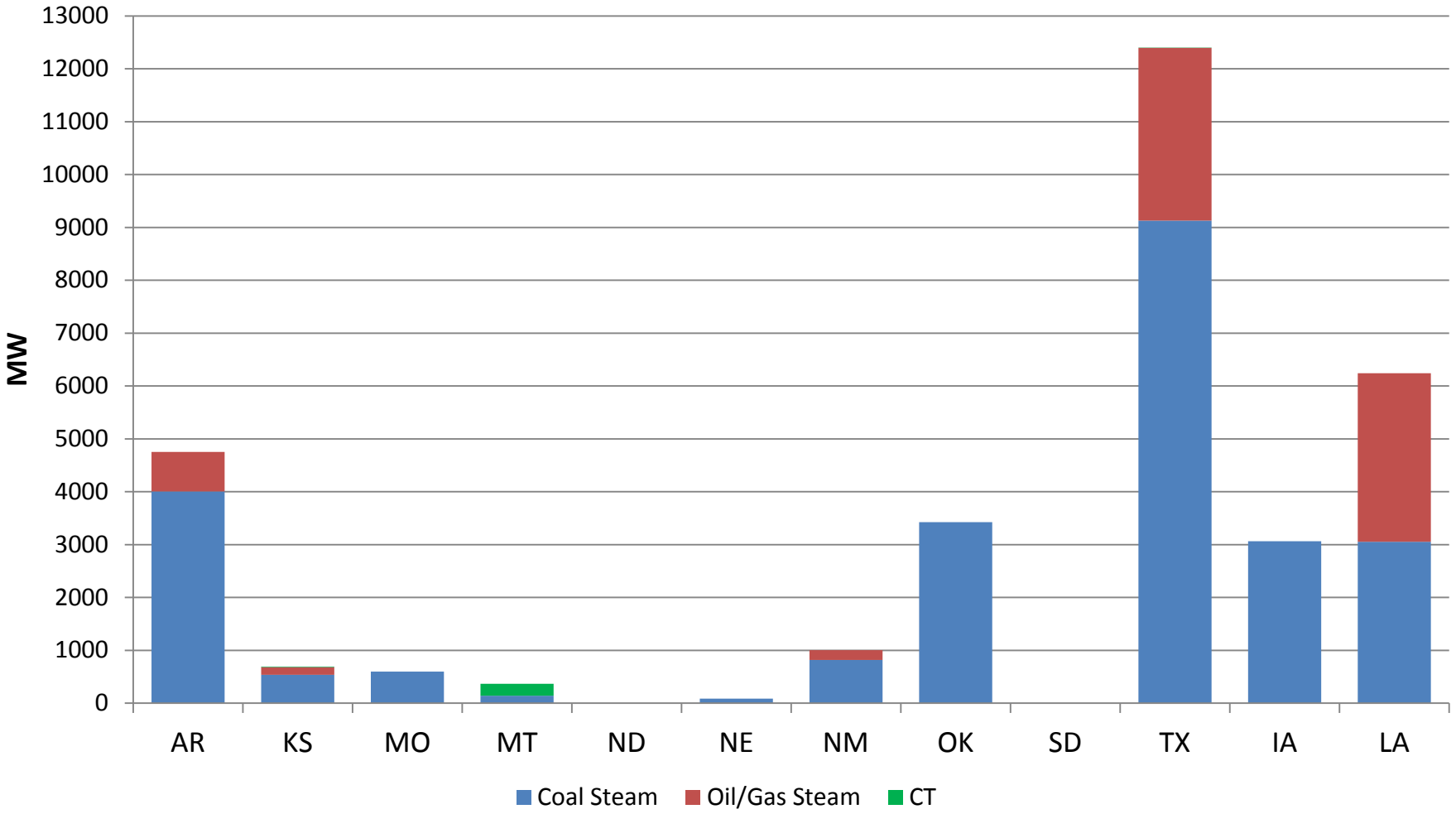
*Includes states with IS generation that will be in SPP by 2015 (N. Dakota, S. Dakota, Montana, and Wyoming)

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

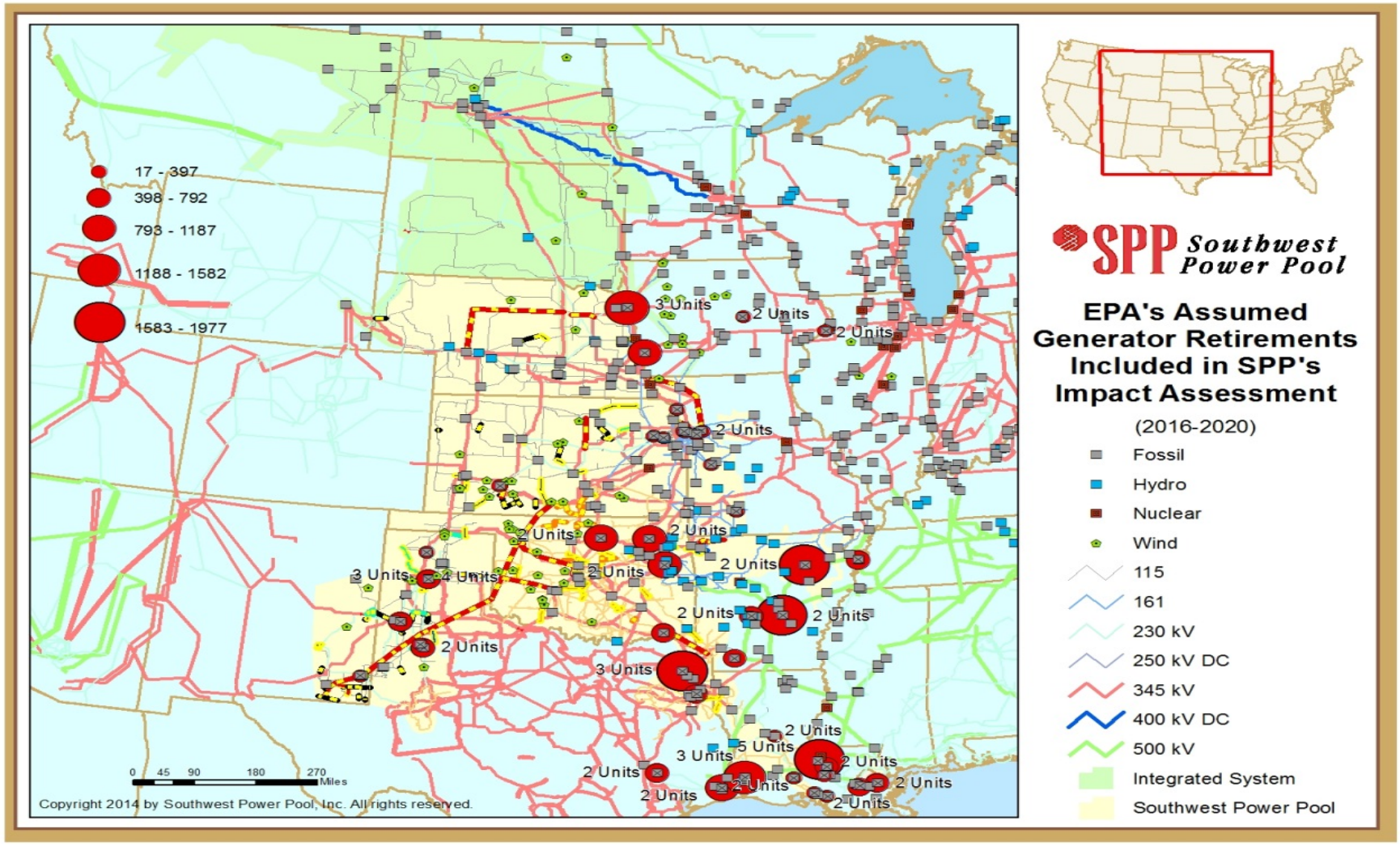
Part 1

- "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

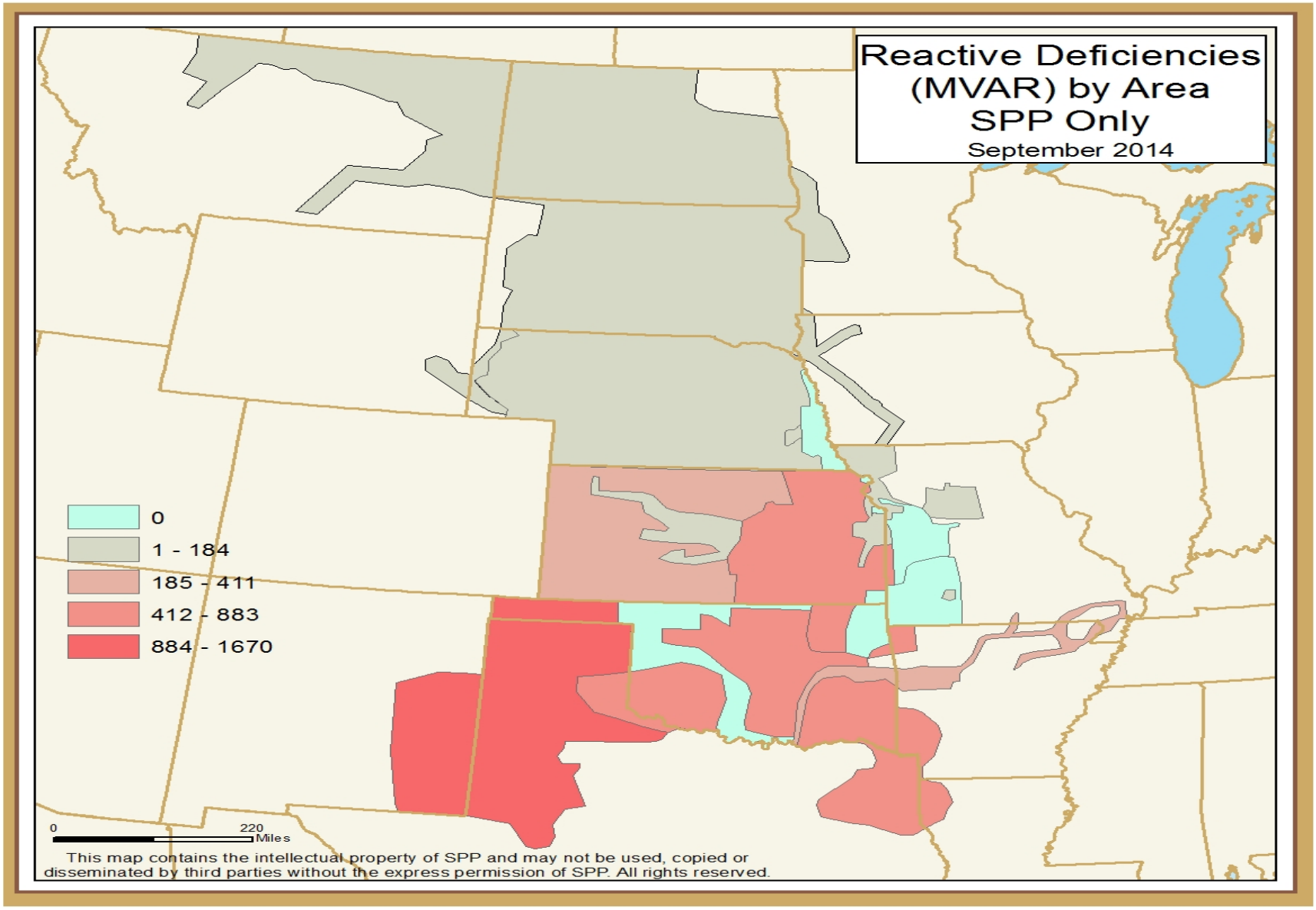
- "what happens during CPP compliance after replacement generation capacity is added but before requisite transmission infrastructure is added"
  - Loading on 38 facilities in SPP exceeds equipment ratings
  - Some overloads so severe that cascading outages would occur
  - Would result in violations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

EPA's Projected 2016-2020 EGU Retirements

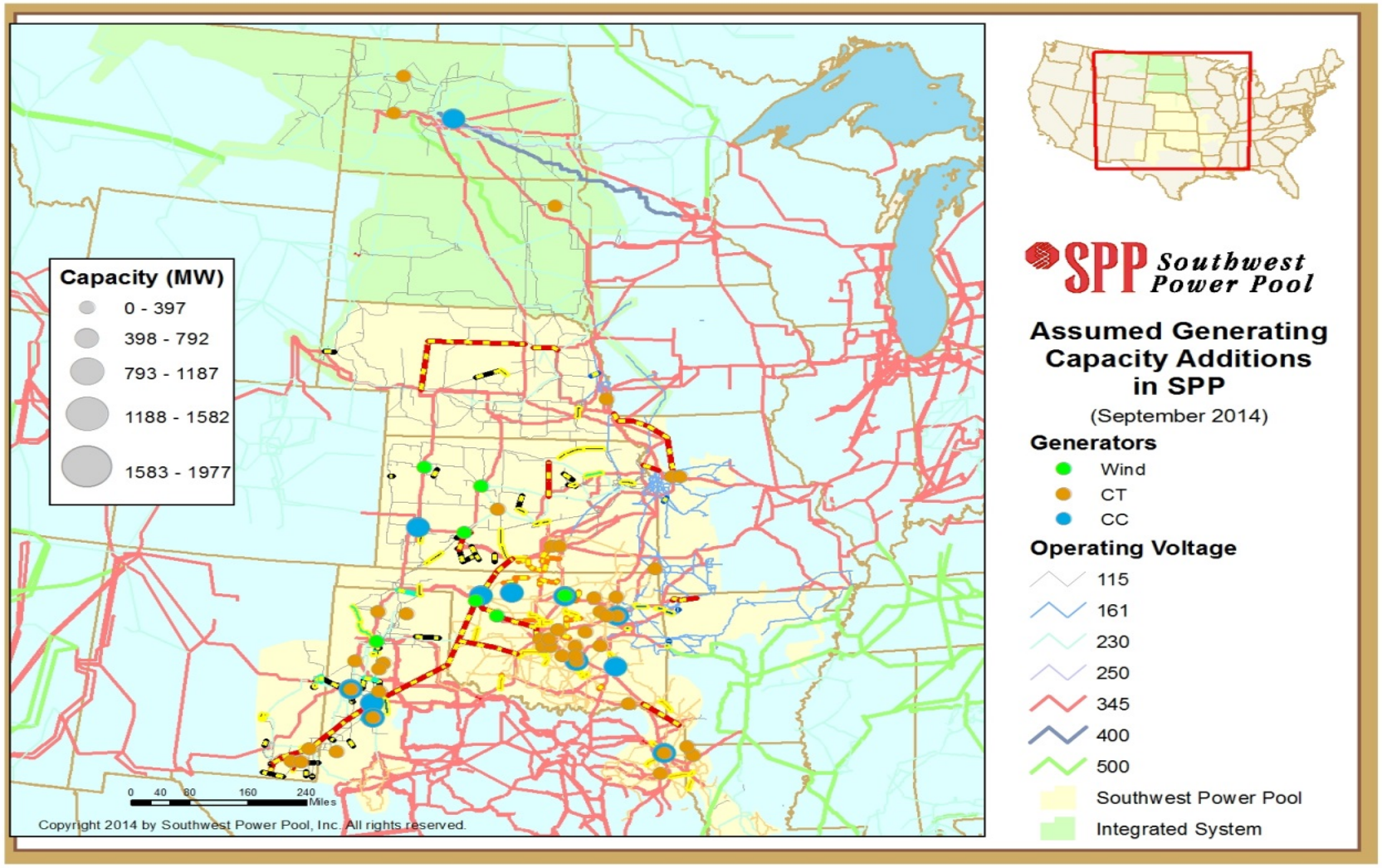


*Excludes committed retirements prior to 2016
**Extracted from EPA IPM data
***THESE RETIREMENTS ARE ASSUMED BY EPA – NOT SPP

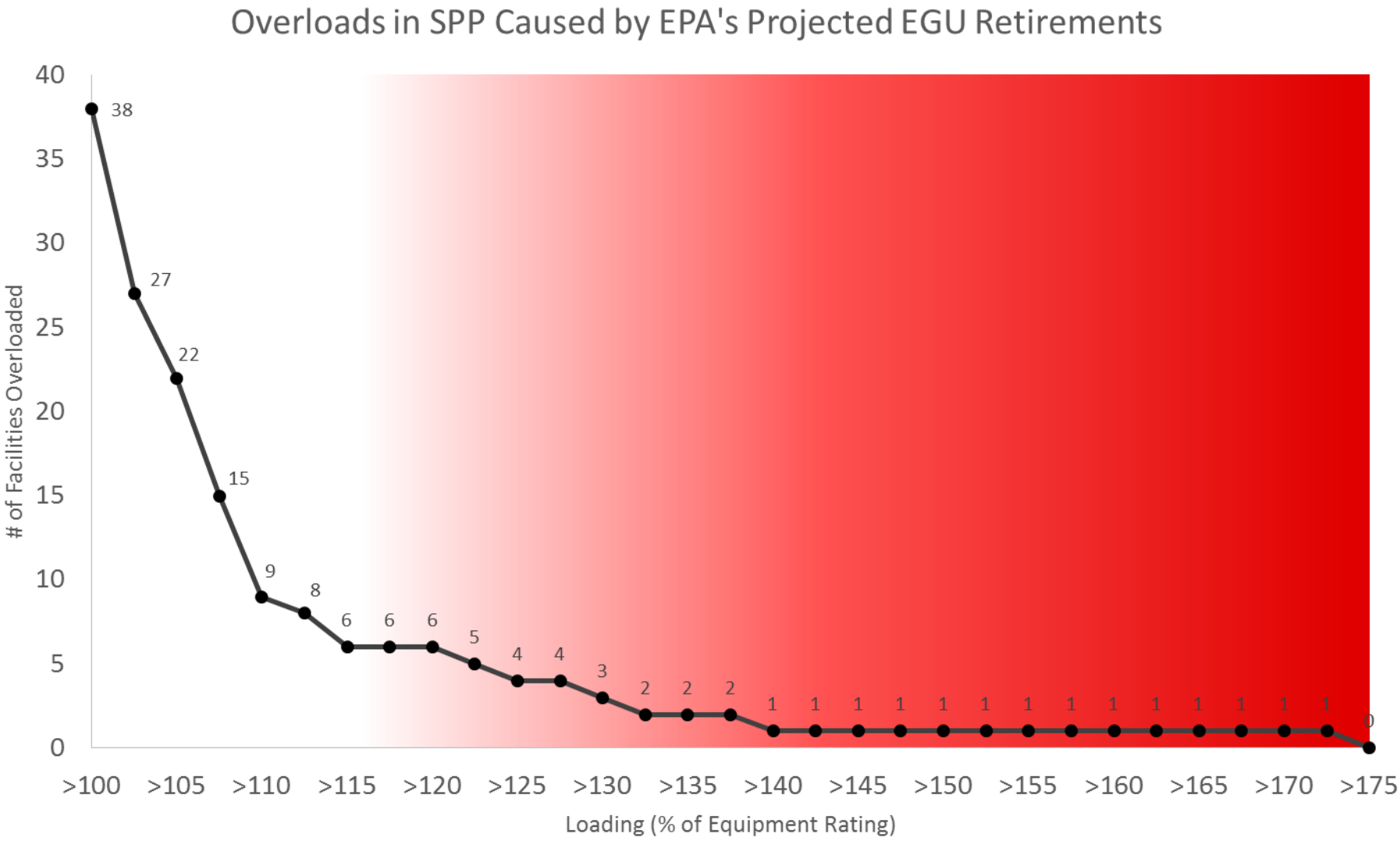
Reactive Deficiencies Observed in Part 1 of TSIA



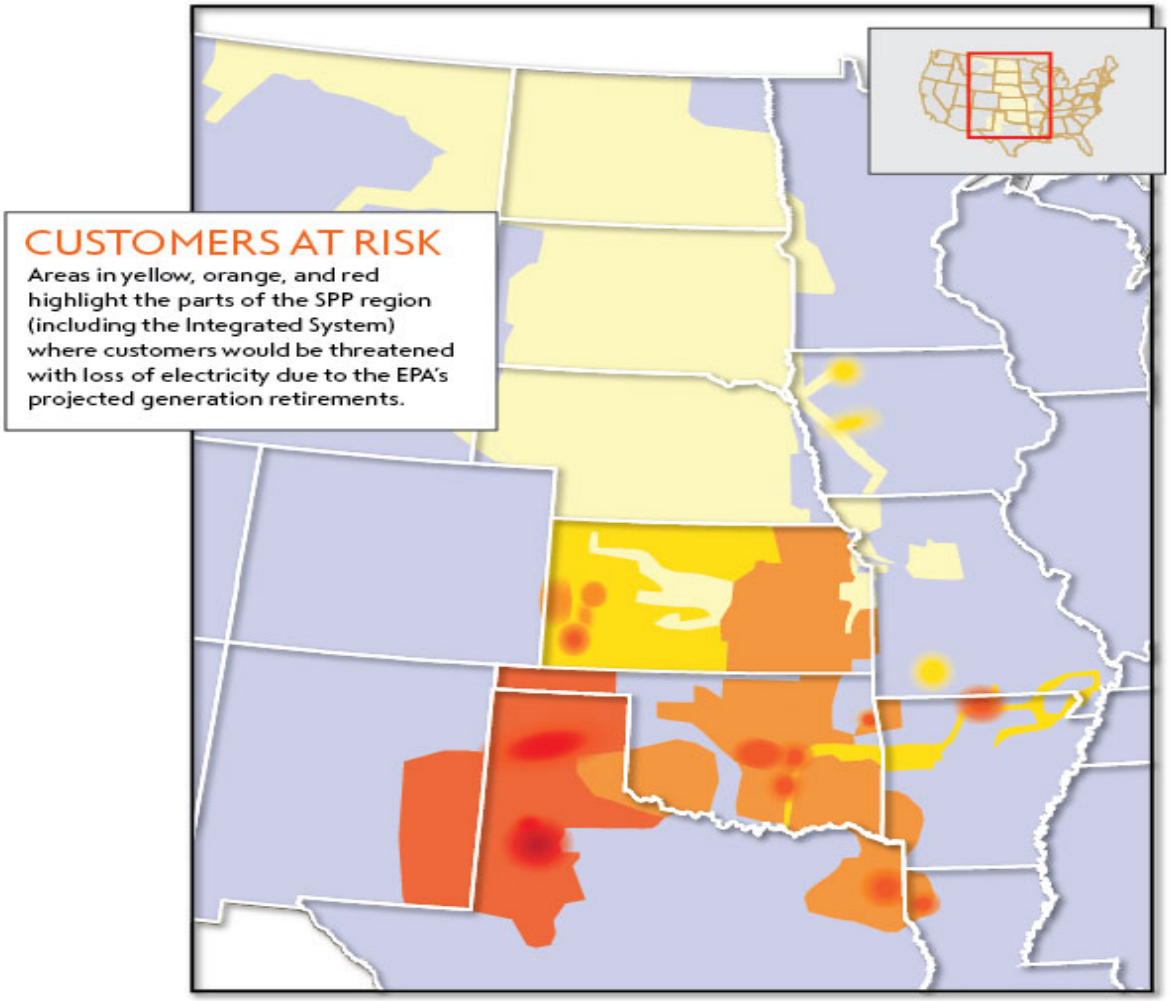
New Generating Capacity Added in Part 2 of SPP's TSIA



Transmission Overloads Observed in Part 2 of TSIA



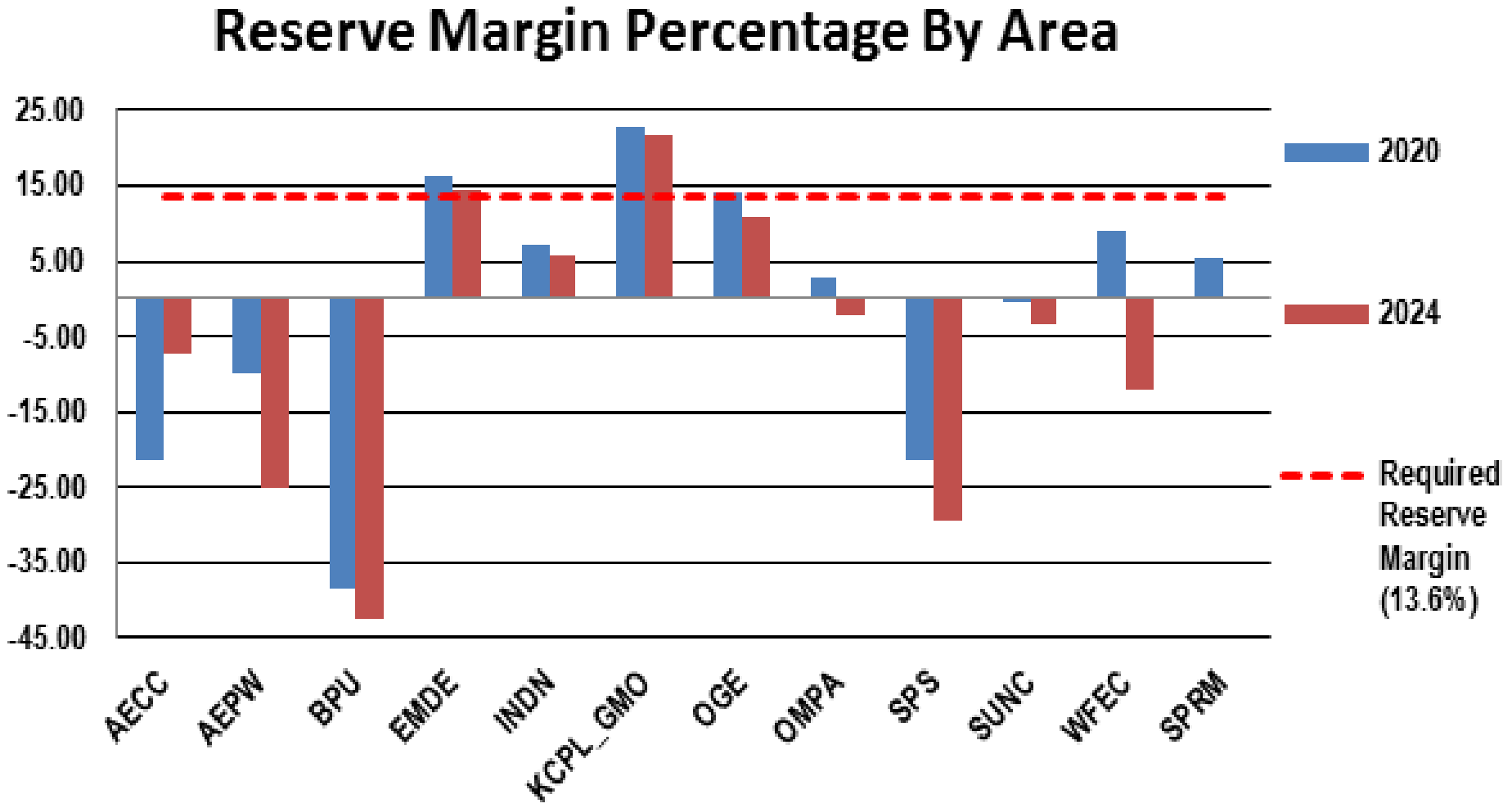
Reliability Risks Identified by TSIA



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

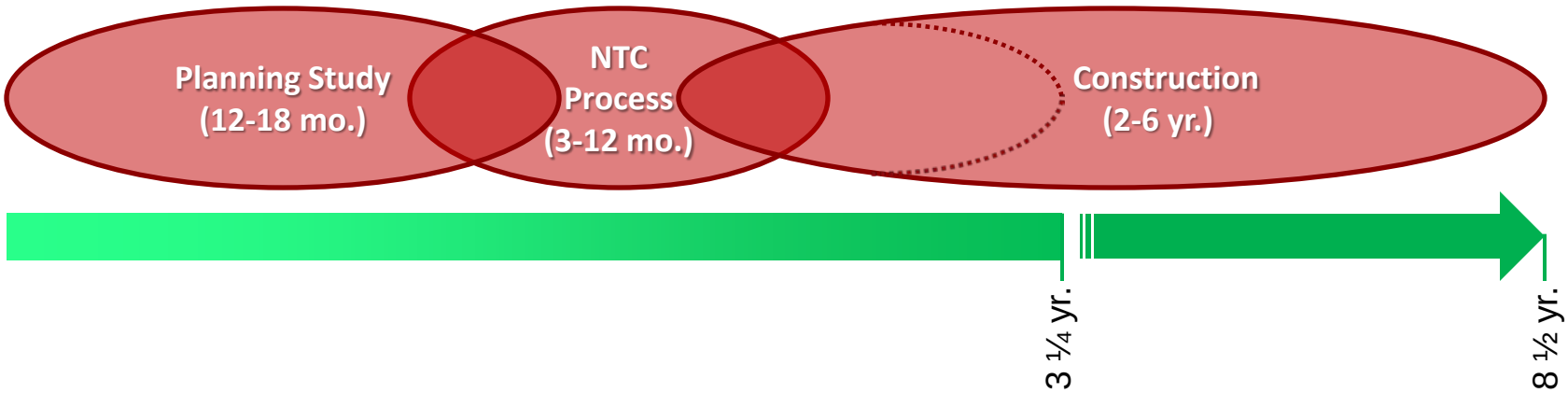
Impact of EPA's Retirements on Reserve Margin



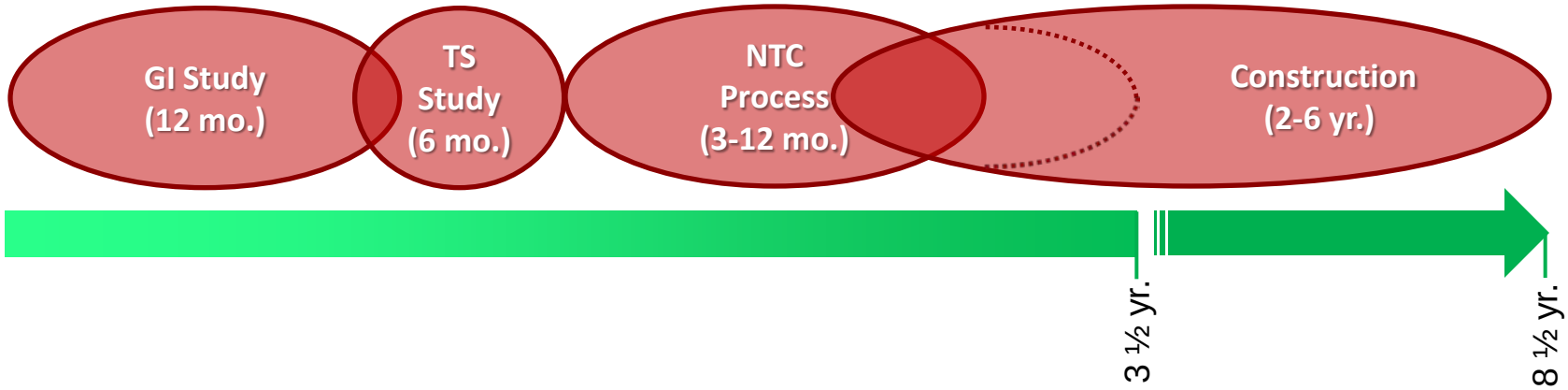
*Includes current load forecasts, current planned generator additions and retirements, and EPA's projected retirements

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

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