Regional Implications of the Clean Power Plan

Iowa 111(d) Stakeholder Meeting

November 16th, 2015

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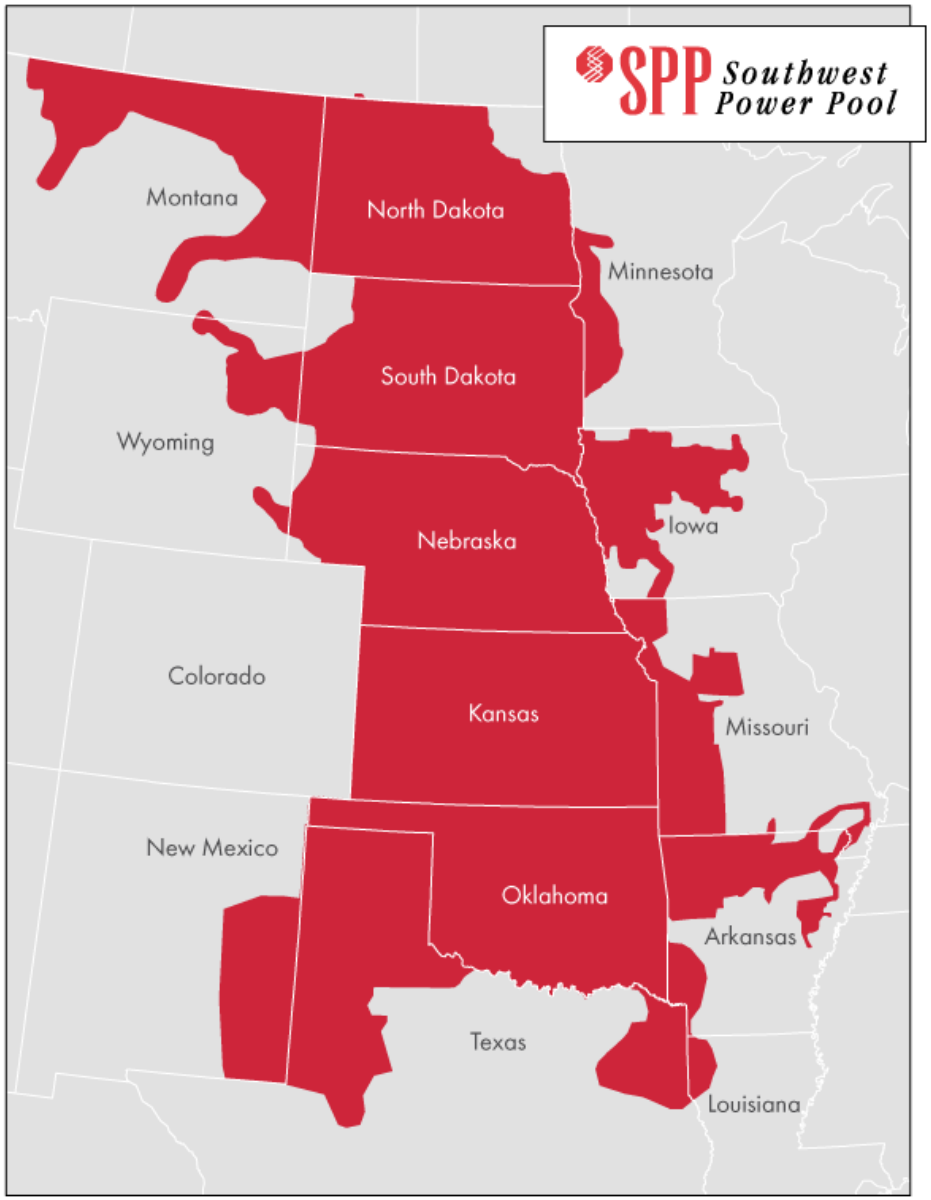
Southwest Power Pool

INTRODUCTION TO SPP

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

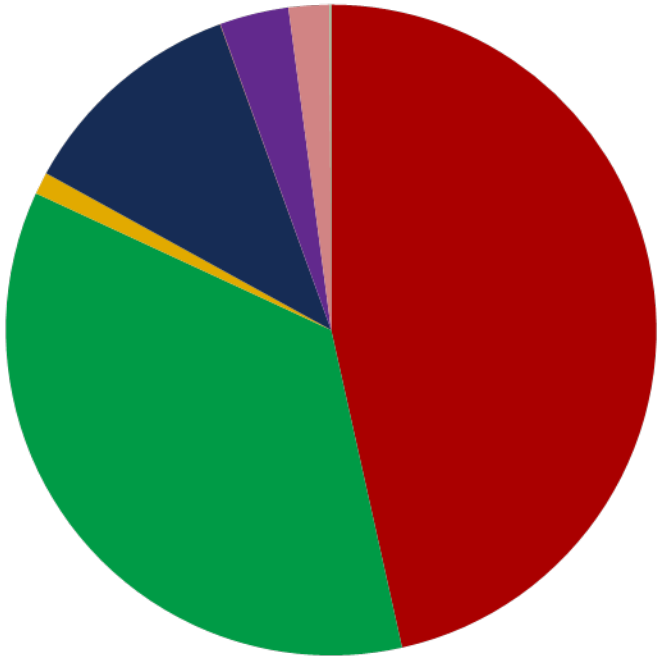
Members in 14 States

- Arkansas
- Kansas
- Iowa
- Louisiana
- Minnesota
- Missouri
- Montana
- Nebraska
- New Mexico
- North Dakota
- Oklahoma
- South Dakota
- Texas
- Wyoming



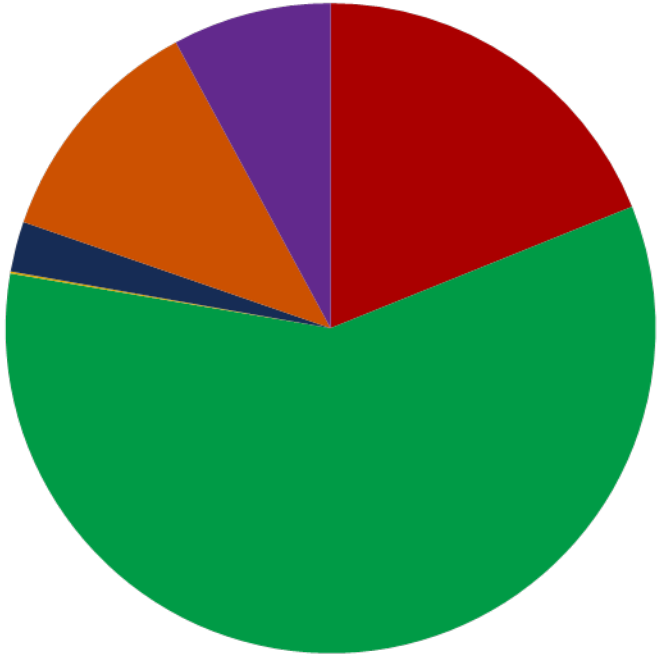
2014 Energy Capacity and Consumption (MWh)

Capacity



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

Consumption

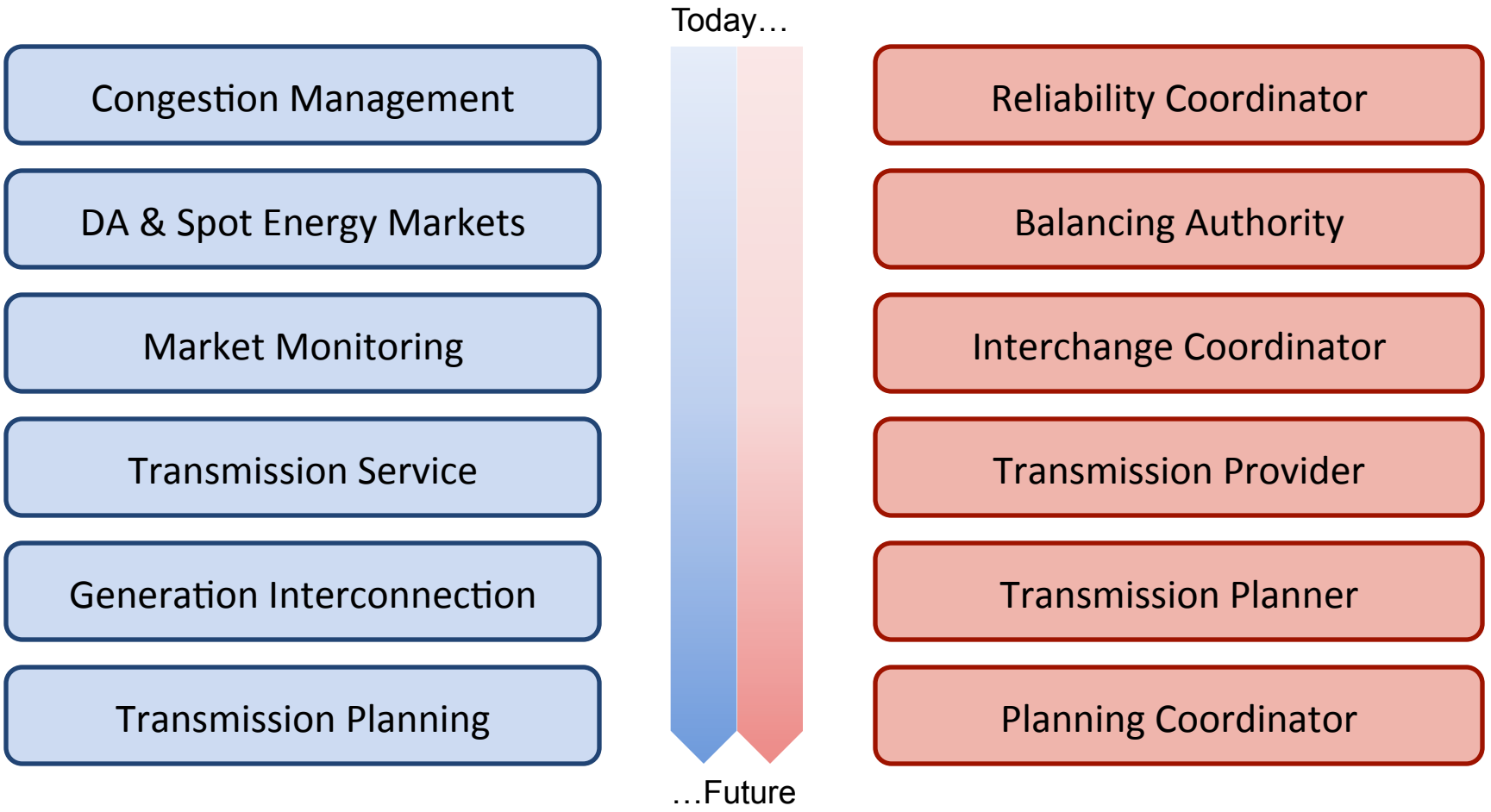


Gas	18.9%
Coal	58.8%
Other	.1%
Hydro	2.5%
Wind	11.8%
Nuclear	7.9%

Regulatory Environment

- Incorporated in Arkansas as 501(c)(6) nonprofit corporation
- FERC — Federal Energy Regulatory Commission
  - Regulated public utility
  - Regional Transmission Organization
- NERC — North American Electric Reliability Corporation
  - Founding member
  - Regional Entity

SPP's Services and Reliability Functions



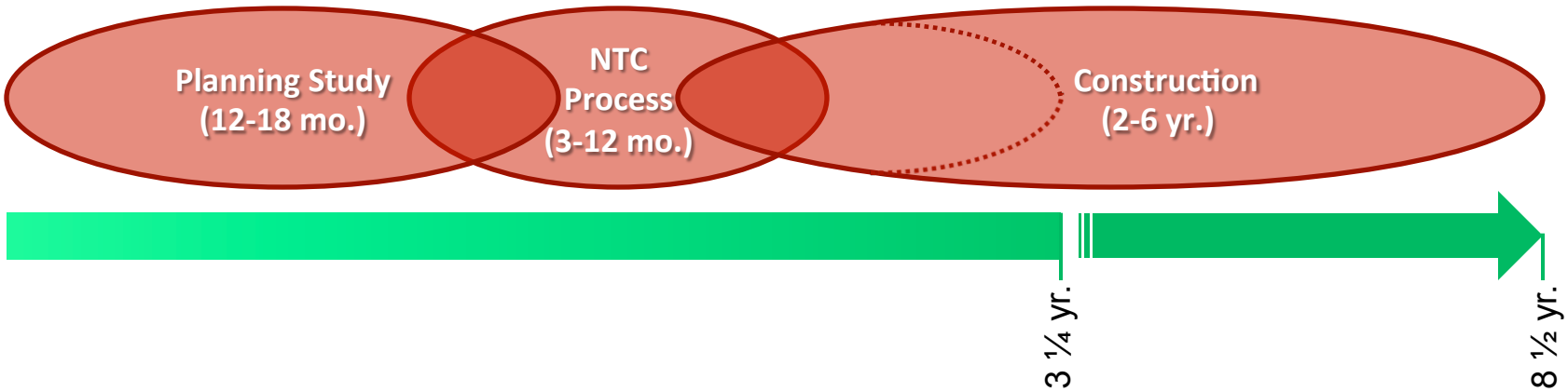
Pursuant to SPP's FERC-Approved Tariff | Pursuant to NERC Reliability Standards

Some Activities Outside of SPP's Responsibility

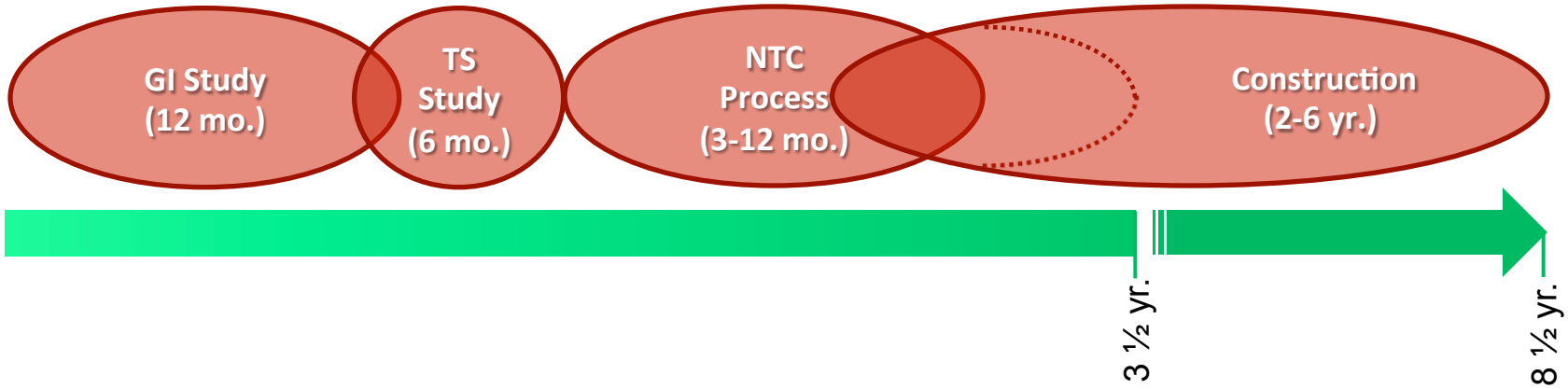
- Transmission Siting
- Generation Planning/Siting
- Transmission/Generation Construction
- Transmission/Generation Permitting
- Credit/Allowance Trading Oversight

Transmission Build Cycle

Transmission Planning Process



GI and Transmission Service Process



OVERVIEW OF SPP OPERATIONS

Operations Characteristics

- SPP operates regionally and power flows on the path of least resistance
- Power does not follow state boundaries but electrically based on metered areas
- SPP responds to the price signals provided by market participants in their load bids and generation offers
- Operations always prepares for an event to happen
- Response to events are based on impact and time frame to respond but always to keep the lights on

Operations Major Services

- **Reliability Coordinator**
- **Balancing Authority**
- **Market Operator**

Reliability Coordinator

- Monitor grid 24 x 365
- Anticipate problems by continuously doing detailed transmission system studies
- Take preemptive action when necessary to prevent cascading outage
- Coordinate regional response prior to and after events happen
- Independent decision making on all activities

Balancing Coordinator

- Monitor Load/Generation 24 x 365
- Monitor tie flows for ~400 ties
- Monitor Real-Time load and generation to balance
  - Balance load and generation every 4 seconds
  - Dispatch most economical units in a reliable manner
- Respond to loss of generation or load in region

Market Concepts: What is a Market?

Wholesale Energy Market:

Sellers/ Producers	Buyers/ Consumers	Locational Prices	Products
• Utilities • Municipals • Independent Power Producers • Generators • Power Marketers	• Utilities • Municipals • Load Serving Entities (LSEs) • Power Marketers	• Driven by Supply and Demand at defined locations	• Energy • Operating Reserves • Congestion Rights

Integrated Marketplace Overview

Key Components

- Day-Ahead (DA) Market
- Real-Time Balancing Market (RTBM)
- Transmission Congestion Rights (TCR) Market

Products

- Energy
- Operating Reserve (Regulation Up, Regulation Down, Spinning, Supplemental)
- Congestion Rights

Day-Ahead Market

- Determines least-cost solution to meet energy bids and reserve requirements
- Participants submit offers and bids to purchase and/or sell energy and operating reserves the day prior to operating day:
  - Energy
  - Regulation-Up
  - Regulation-Down
  - Spinning Reserve
  - Supplemental Reserve

Real-Time Balancing Market

- Balances real-time load and generation committed by the Day-Ahead Market and Reliability Commitment processes
- Operates on continuous 5-minute basis
  - Calculates Dispatch Instructions for Energy and clears Operating Reserve by Resource
- Energy and Operating Reserve are co-optimized
- Settlements based on difference between results of RTBM process and Day-Ahead Market clearing
- Charges imposed on Market Participants for failure to deploy Energy and Operating Reserve as instructed

IMPLICATIONS OF CPP

Power System Implications of CPP

- Resource mix changes
  - More natural gas and renewables
  - Less coal
  - Energy Efficiency/technology development
- 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

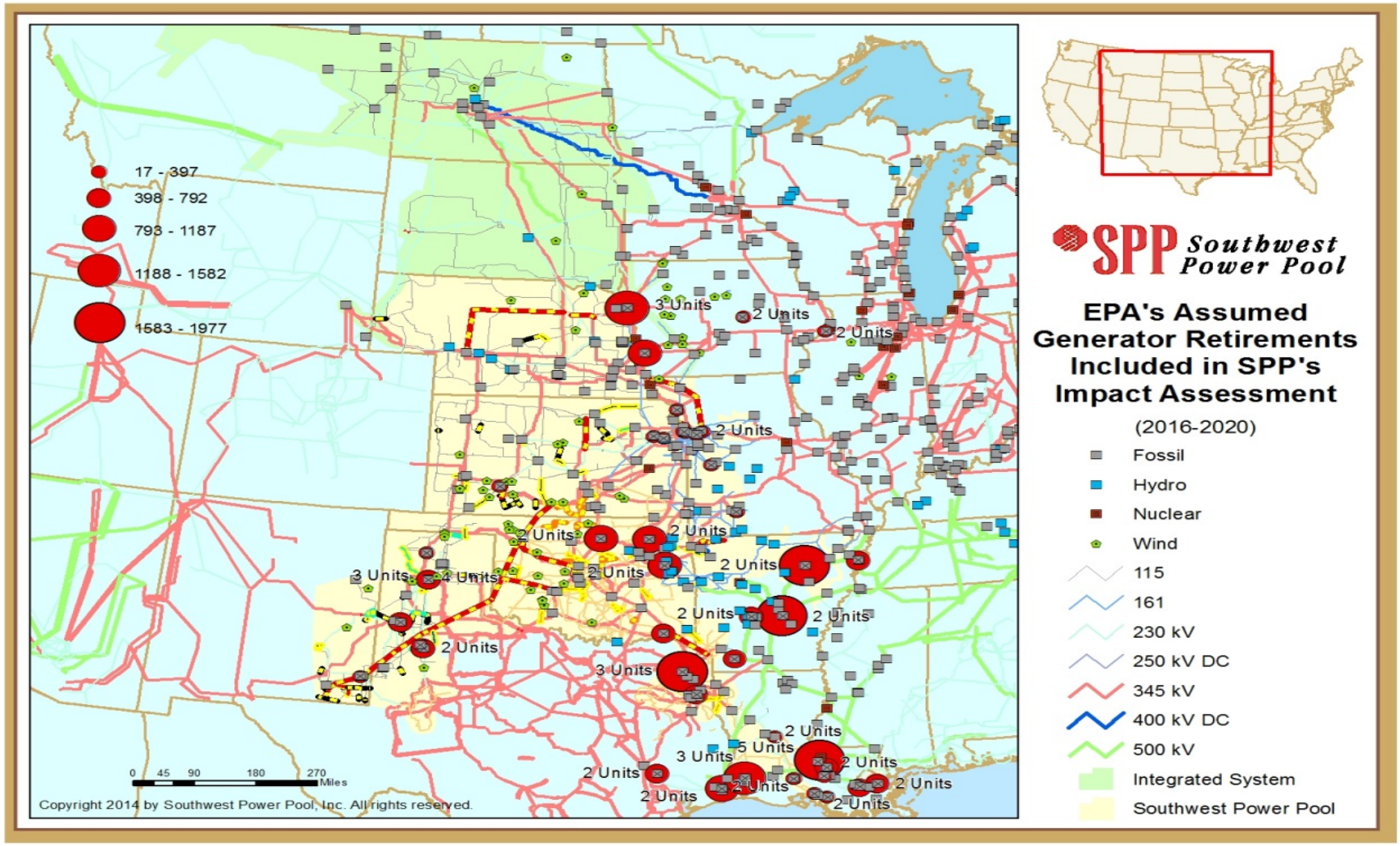
SPP's CPP Impact Assessments

- SPP performed three assessments
  - Reliability Impact Assessment: Assessed impact of EPA's projected generator retirements on transmission system and resource adequacy (Oct 2014)
  - Regional Compliance Assessment: Evaluate changes to existing resources and resource plans needed to comply with CPP under a regional compliance approach (Apr 2015)
  - State-by-State Compliance Assessment: Evaluate changes to existing resources and resource plans needed to comply with CPP under a regional compliance approach (Jul 2015)
- **All assessments performed on draft rule**

Reliability Impact Assessment Summary

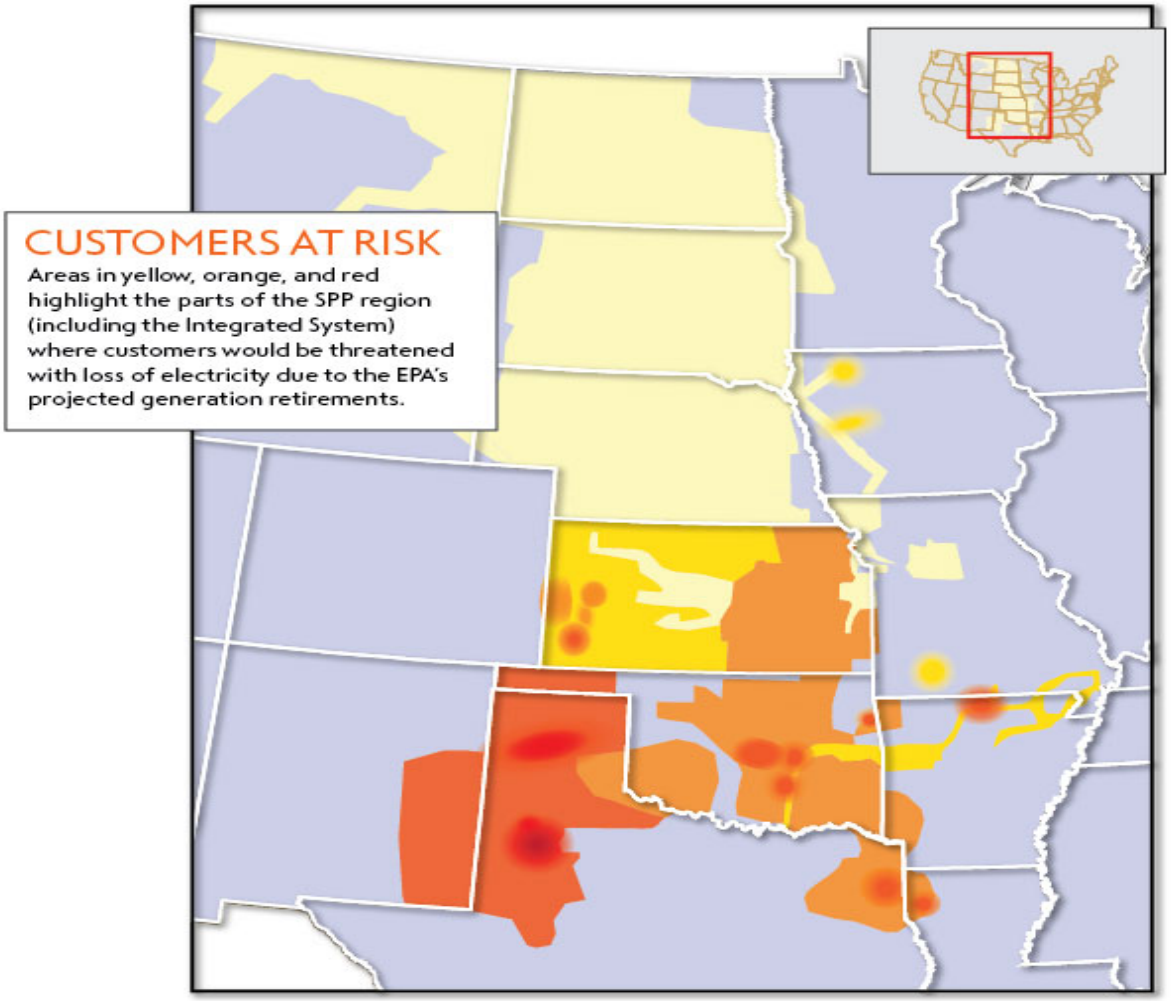
- What happens if CPP compliance begins and generator retirements occur before generation and transmission infrastructure is added?
  - Inadequate generation capacity
  - Inadequate transmission system capacity
- What happens during CPP compliance after replacement generation capacity is added but before additional transmission infrastructure is built?
  - Inadequate transmission system capacity
- Both scenarios identified a risk of electric service interruptions and potential violations of NERC 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!

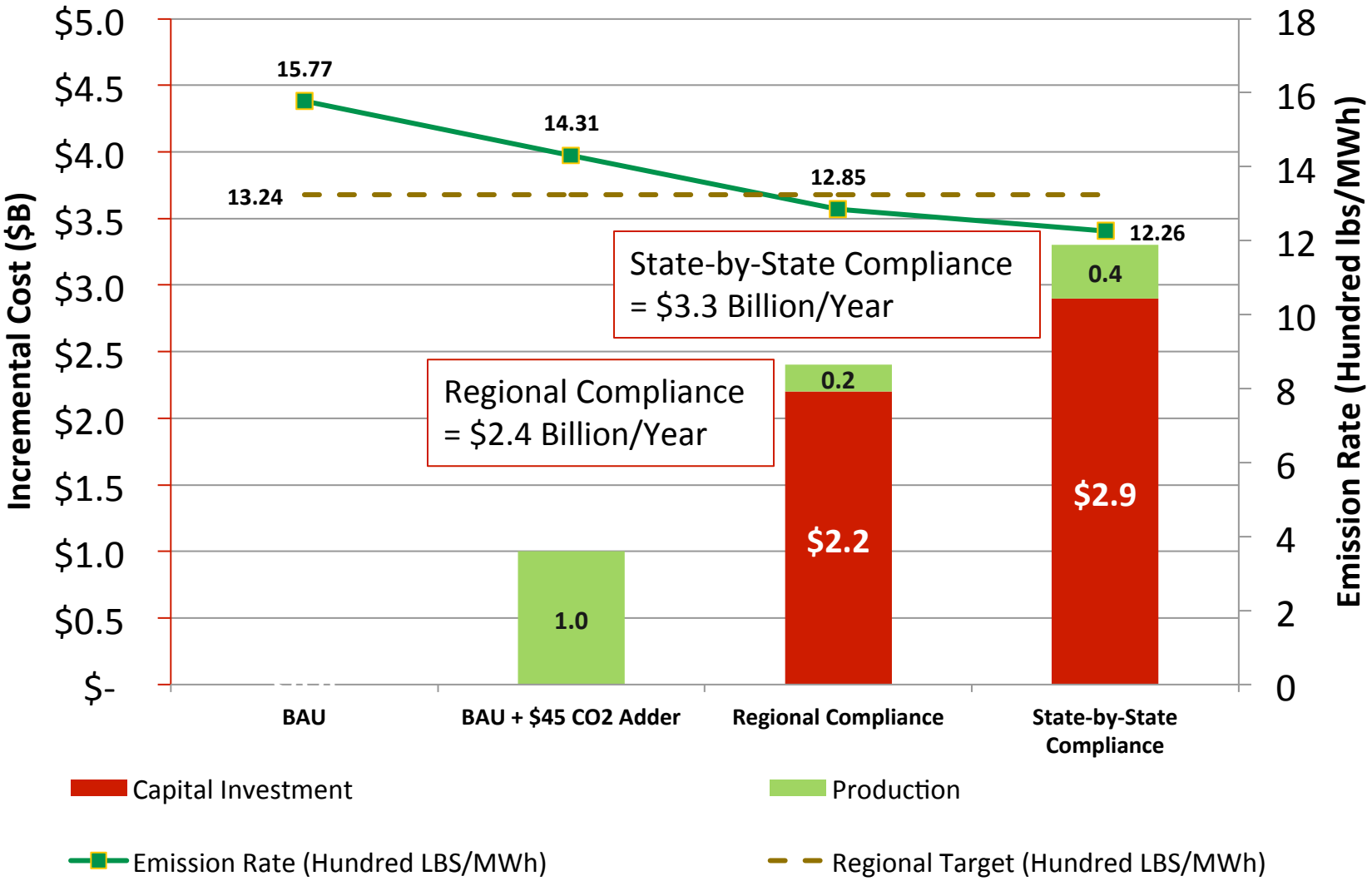
Reliability Risks Identified



Objectives of CPP Compliance Assessments

- Evaluate impacts of two alternative compliance approaches on existing and planned generation resources
  - State-by-State (no interstate "trading")
  - Regional (regional resource diversity)
- Provide an "apples-to-apples" comparison
- The assessments did NOT:
  - Identify the best resource mix
  - Include cost of transmission expansion, congestion, gas infrastructure, or market design changes
  - Take a position on the appropriateness of the EPA's proposed state goals

Costs of CPP Compliance Approaches Assessed



*The compliance approaches assessed were based on EPA's draft rule issued June 2014 and do not include cost of transmission expansion, congestion, market enhancements or other infrastructure.

Summary of Compliance Assessment Results

- Compared to the regional compliance approach:
  - State-by-state compliance increased generation investment and production costs by 40%
  - State-by-state compliance required 114% more generation retirements
  - State-by-state compliance increased generation at risk for retirement by 9%
  - State-by-state compliance required 185% more new natural gas generation and roughly the same amount of new renewables

General Conclusions from SPP's Assessments*

- New generation and transmission infrastructure likely needed to facilitate reliable compliance with CPP
- State-by-state approach to compliance is more costly than a regional approach
- Compared to a state-by-state approach, regional approach is less disruptive of the reliability and economic benefits provided by SPP's markets
- A state-by-state approach is likely to require more new generation and transmission infrastructure than a regional approach

**In SPP's assessments, the state-by-state approach was characterized by a lack of interstate carbon trading. State plans that incorporate trading ready provisions that are compatible can achieve similar results as the regional approach evaluated by SPP.*

PATH FORWARD

CPP Reliability Provisions

- Each state is required to demonstrate in its final plan that it has considered reliability issues, including consultation with reliability or planning agency
- A state may seek a revision to its plan in case unanticipated significant reliability challenges arise
- Reliability safety valve is available to address unanticipated events or other extraordinary circumstances causing a conflict between environmental and reliability requirements
  - Includes a “free pass” period of 90 days
  - If circumstances extend beyond 90 days, plan must be revised

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

Coordination with SPP

- SPP is the Planning Authority and Reliability Coordinator for its Region and is available to assess state plans for reliability impacts to the SPP region
- We encourage states to begin coordination with SPP early and often during the development of state plans
- We encourage states to determine their expectations for SPP's role in the consultation process early so that SPP can appropriately schedule resources
- States with multiple RTOs/PAs/RCs should be aware of potential for overlapping impacts that could require broader coordination

SPP States with Multiple Planning Authorities

State	PA, in addition to SPP
Arkansas	MISO
Iowa	MISO
Louisiana	MISO
Minnesota	MISO
Missouri	MISO
	Associated Electric Cooperative
Montana	NorthWestern Corporation
	Bonneville Power
New Mexico	El Paso Electric Company
	Public Service Company of New Mexico
North Dakota	MISO
Oklahoma	Associated Electric Cooperative
South Dakota	MISO
	WAPA - Rocky Mountain Region
	Black Hills Corporation
Texas	MISO
	ERCOT
	El Paso Electric Company
Wyoming	Bonneville Power
	Black Hills Corporation
	NorthWestern Corporation
	PacifiCorp
	WAPA - Rocky Mountain Region

SPP Contact Information

- For any questions, ideas, concerns, requests, etc. related to SPP's role in the Clean Power Plan, contact:

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Additional Information

SPP's 2014 Reliability Assessment Report
http://www.spp.org/documents/23336/CPP%20Reliability%20Analysis%20Results%20Final%20Version.pdf

SPP's 2014 Letter to EPA
http://www.spp.org/documents/23338/2014-10-09_SPP%20Comments_EPA-HQ-OAR-2013-0602.pdf

SPP's 2015 Regional Compliance Assessment Report
http://www.spp.org/documents/28611/SPP%20Regional%20Compliance%20Assessment%20Report.pdf

SPP's 2015 State-by-State Compliance Assessment Report
http://www.spp.org/Documents/29180/SPP_State_by_State_Compliance_Assessment_Report_20150727.pdf