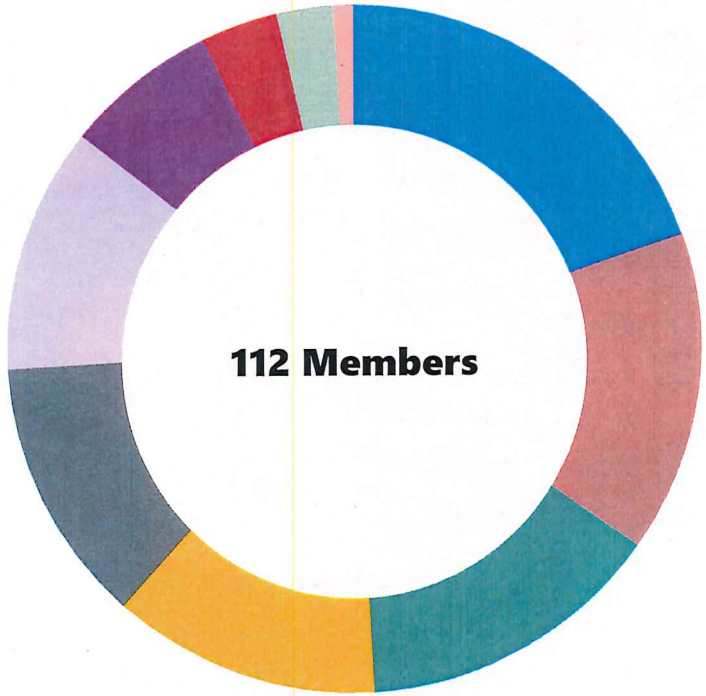
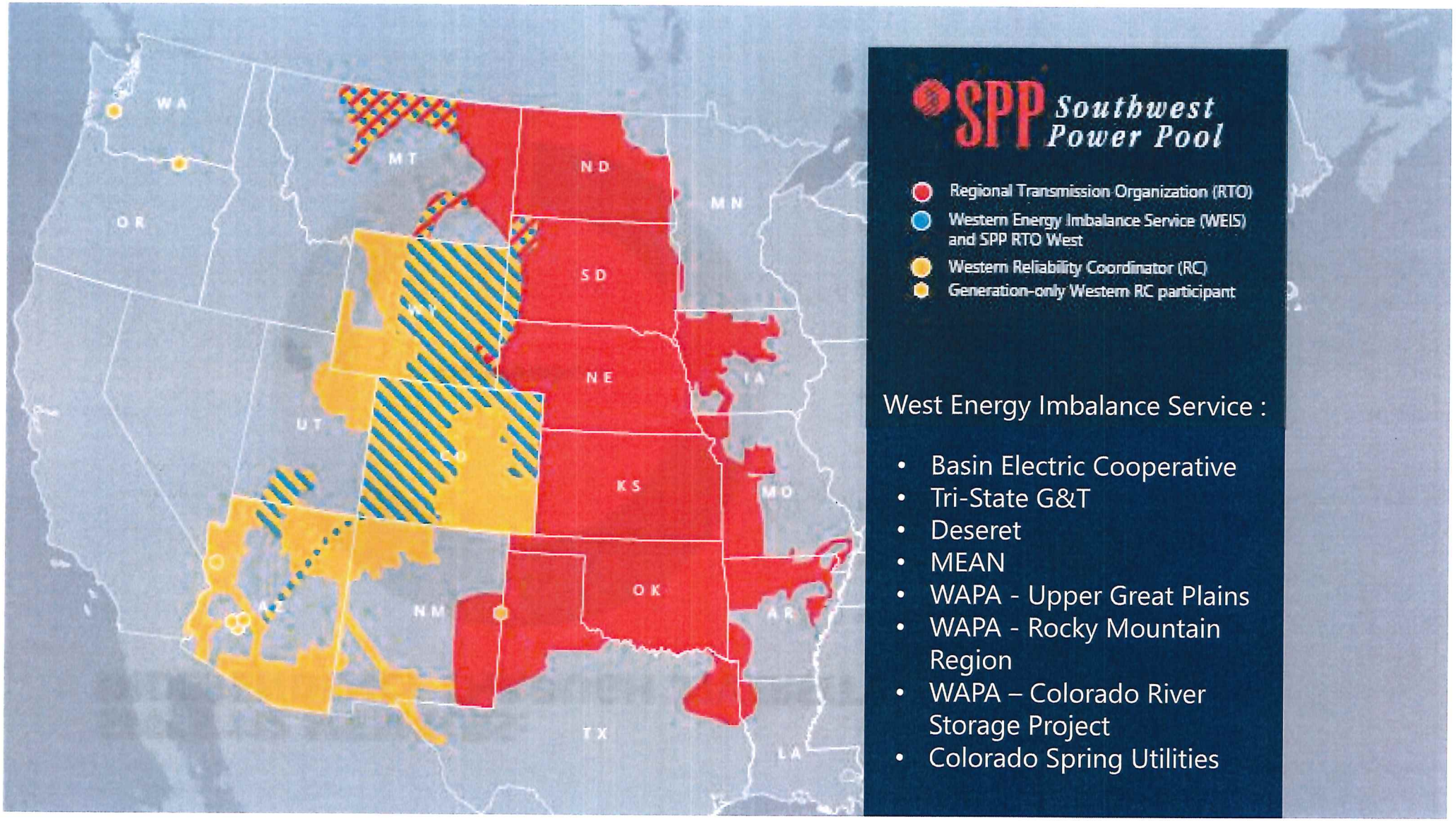

SPP Southwest Power Pool
SPP'S EVOLVING GRID
CASEY CATHEY
DIRECTOR, SYSTEM PLANNING
Helping our members work together to keep the lights on... today and in the future.
SouthwestPowerPool
SPPorg
southwest-power-pool


OUR MISSION: Working together to responsibly and economically keep the lights on today and in the future.
OUR VISION: Leading our industry to a brighter future while delivering the best energy value.
HEREFORD

SPP'S 112 MEMBERS: INDEPENDENCE THROUGH DIVERSITY



- 22 Generation and Transmission Cooperatives
- 17 Independent Power Producers
- 16 Investor-Owned Utilities
- 14 Municipal Systems
- 14 Independent Transmission Companies
- 13 Power Marketers
- 8 State Agencies
- 4 Large Retail Customers
- 3 Alternative Power/Public Interest
- 1 Federal Agency


SPP Southwest Power Pool
Regional Transmission Organization (RTO)
Western Energy Imbalance Service (WEIS) and SPP RTO West
Western Reliability Coordinator (RC)
Generation-only Western RC participant
West Energy Imbalance Service :
• Basin Electric Cooperative
• Tri-State G&T
• Deseret
• MEAN
• WAPA - Upper Great Plains
• WAPA - Rocky Mountain Region
• WAPA – Colorado River Storage Project
• Colorado Spring Utilities
WA
OR
MT
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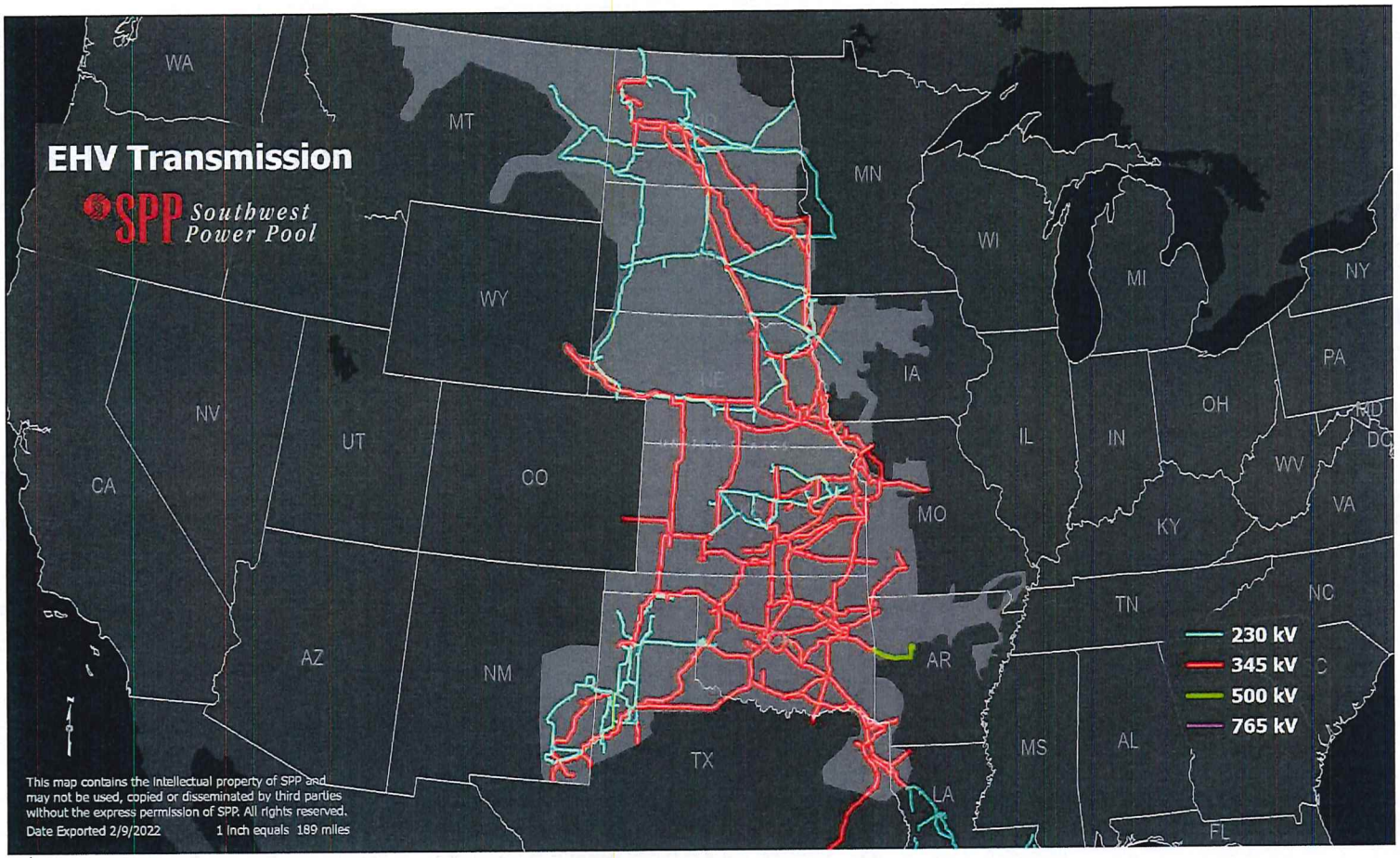
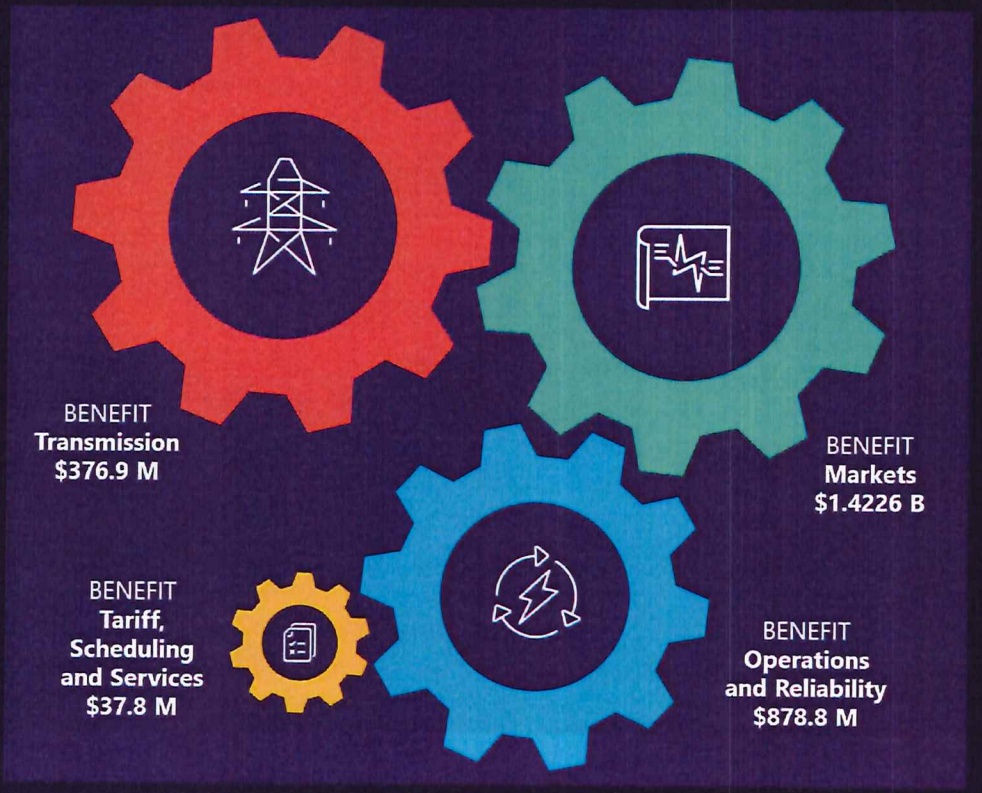


MILES OF TRANSMISSION: 70,025

- 69 kV 17,982
- 115 kV 16,677
- 138 kV 9,942
- 161 kV 5,677
- 230 kV 7,604
- 345 kV 12,052
- 500 kV 91

$2.70 BILLION
ANNUAL SAVINGS AND BENEFITS



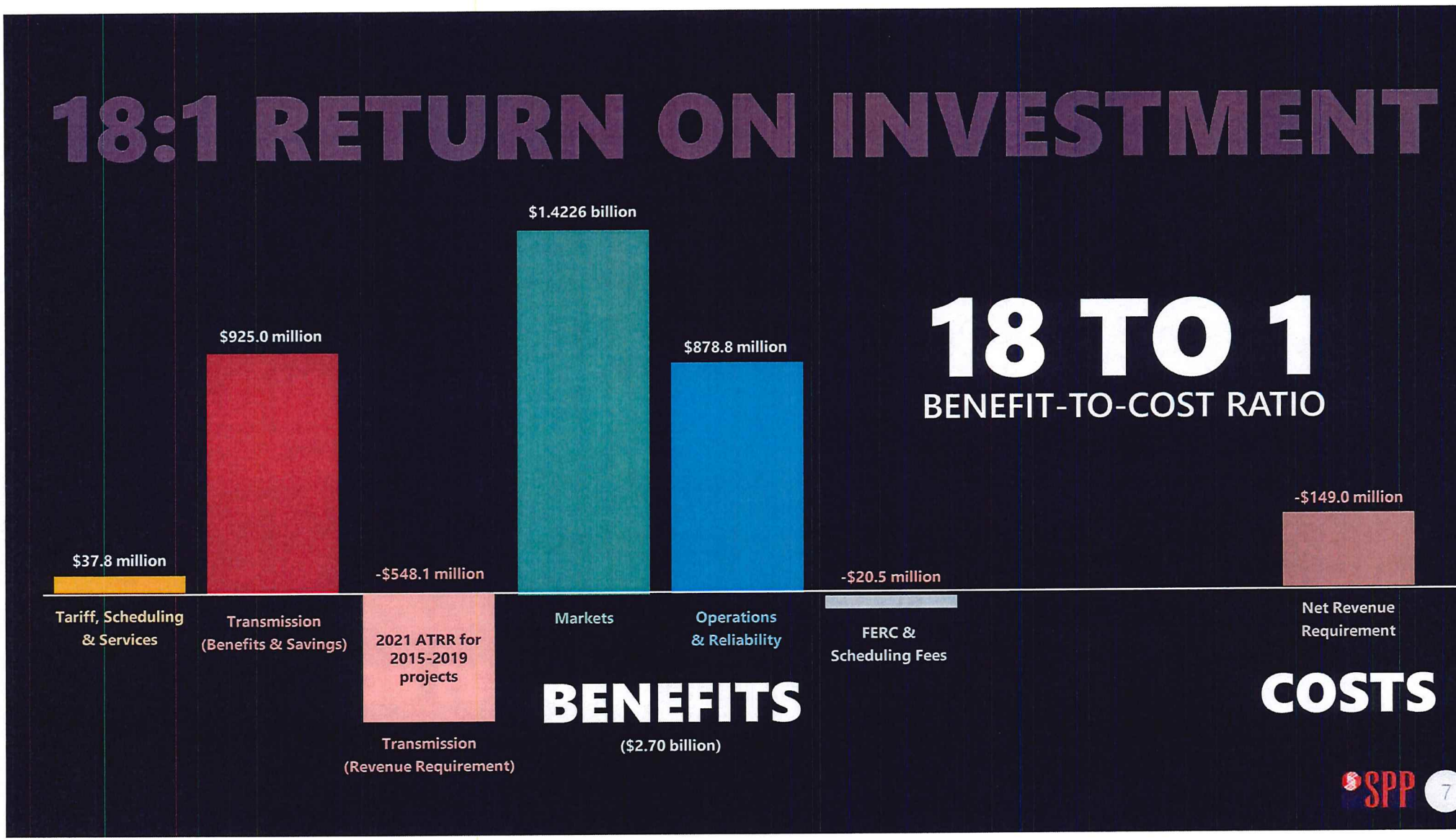
Operations and Reliability: $878.8 million
SPP operates from a regional perspective. This reduces costs and required energy reserves and increases efficiency.

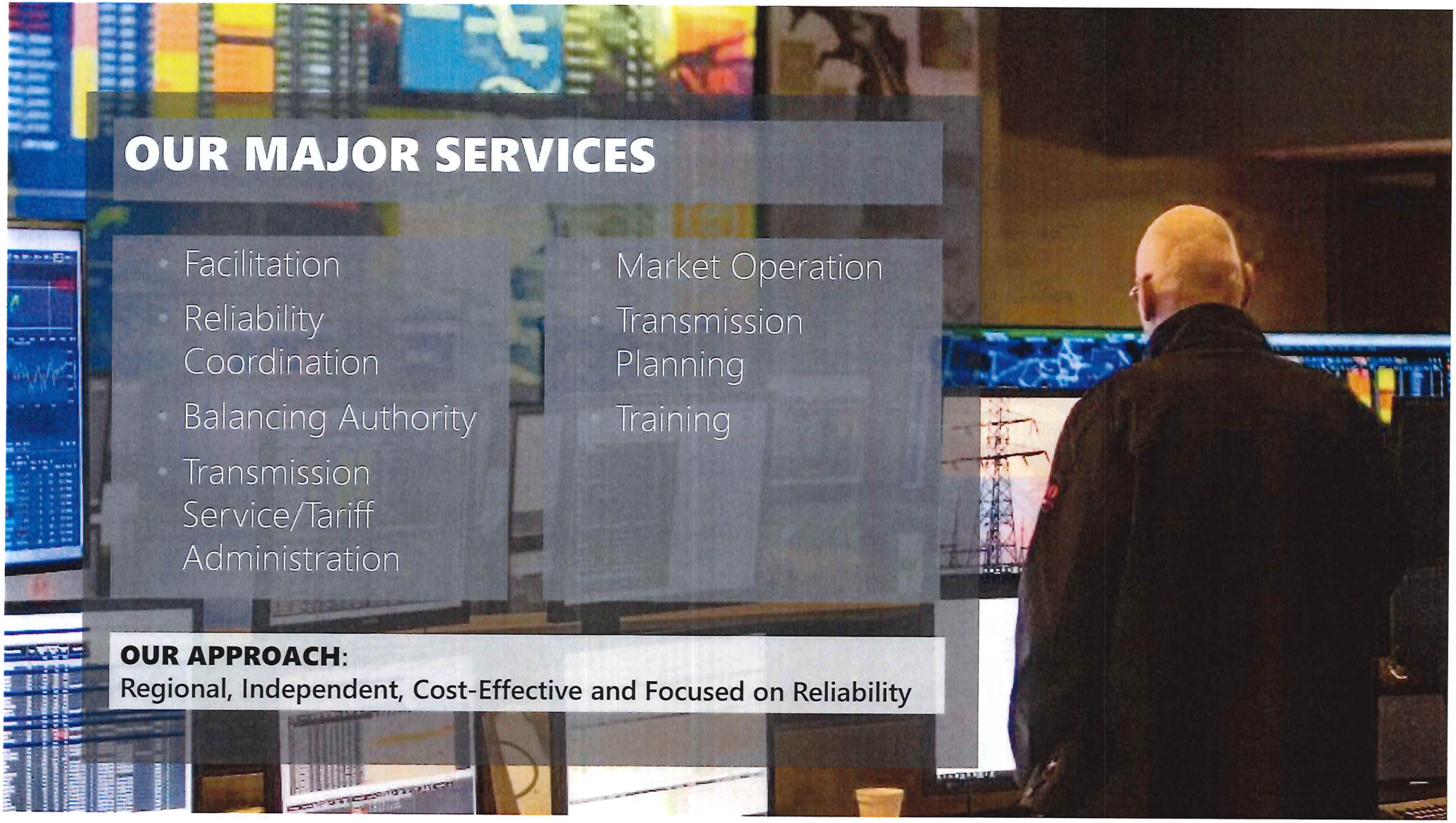
Markets: $1.4226 billion
SPP's Integrated Marketplace combines efficient and economic day-ahead, real-time and transmission markets.

Transmission: $376.9 million
SPP's collaborative, stakeholder-driven transmission planning processes result in robust infrastructure and have rapidly and reliably integrated renewables.

Tariff, Scheduling and Services: $37.8 million
SPP's industry-leading services and training meet the compliance, settlements, engineering, tariff and scheduling needs of our customers on a regional scale.

18:1 RETURN ON INVESTMENT



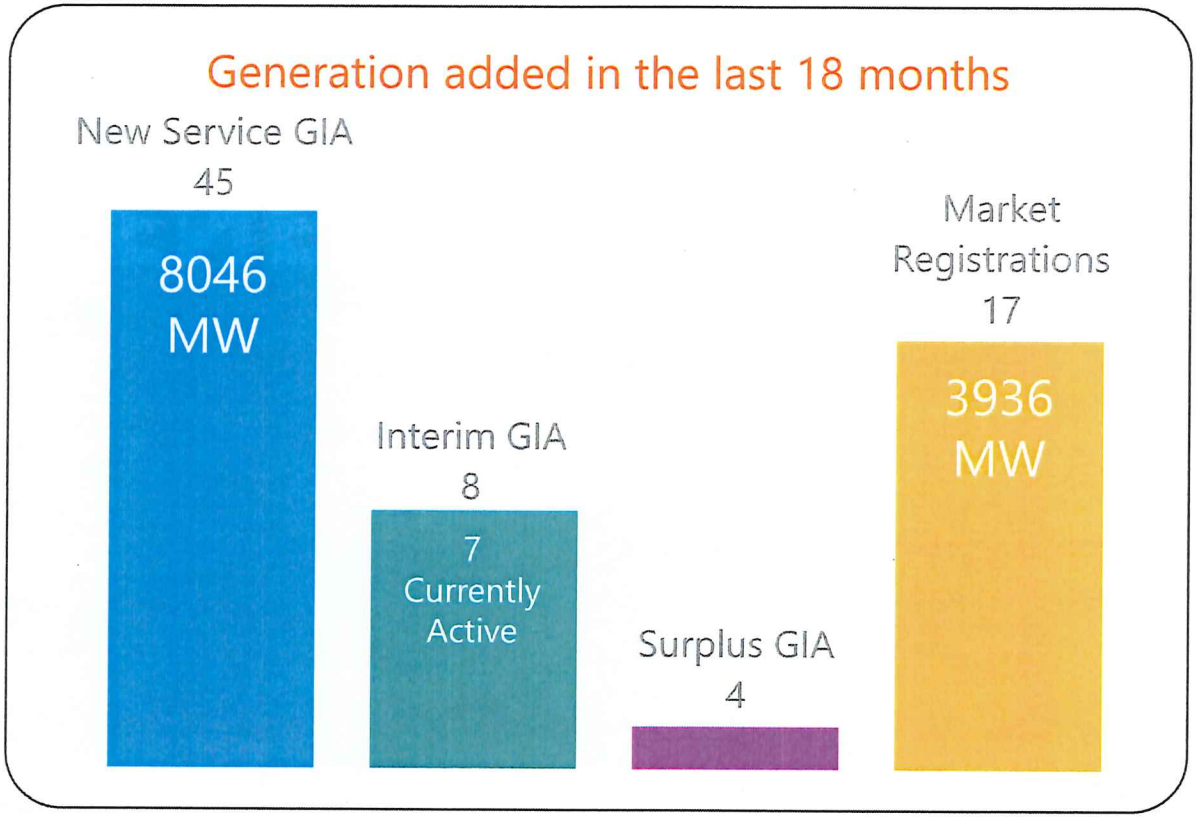

OUR MAJOR SERVICES
Facilitation
Reliability Coordination
Balancing Authority
Transmission Service/Tariff Administration
Market Operation
Transmission Planning
Training
OUR APPROACH:
Regional, Independent, Cost-Effective and Focused on Reliability

GENERATION QUEUE

HOW ARE WE DOING?

GENERATION ADDED TO THE SYSTEM

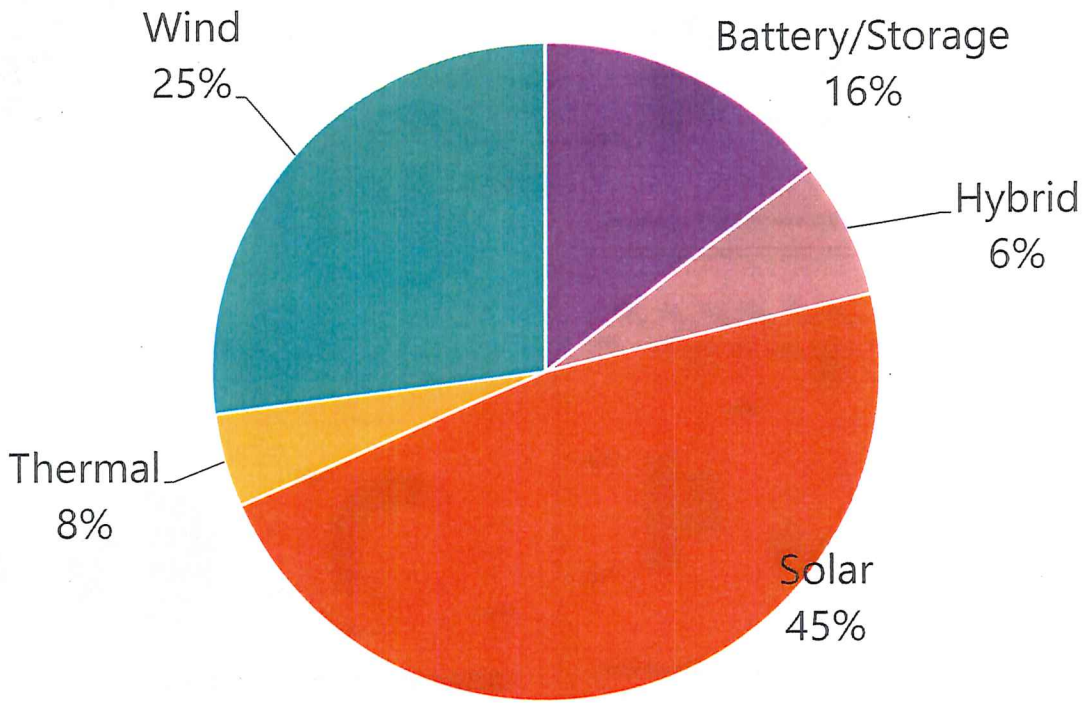
In spite of the backlog, new generators are being added to SPP's resource pool



Since January 2017:
26,846 MW added
to the system
140 GIAs executed

REQUESTS PENDING IN THE CURRENT GI QUEUE

GEN TYPE	Requests	GW Capacity
Battery / Storage	113	13.94 GW
Hybrid	30	6.44 GW
Solar	210	45.11 GW
Thermal	21	4.36 GW
Wind	113	25.84 GW
TOTAL	**487**	**95.69 GW**



Southwest Power Pool Generation Interconnection Queue Dashboard

The current generator interconnection active queue consists of 454 projects totaling 87.2 GW

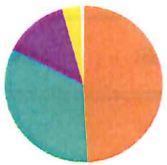
North

Projects: 51
Size 9.39 GW

Nebraska

Projects: 92
Size 16.74 GW

Central



Projects: 144
Size 27.53 GW

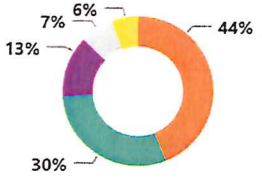
Southeast

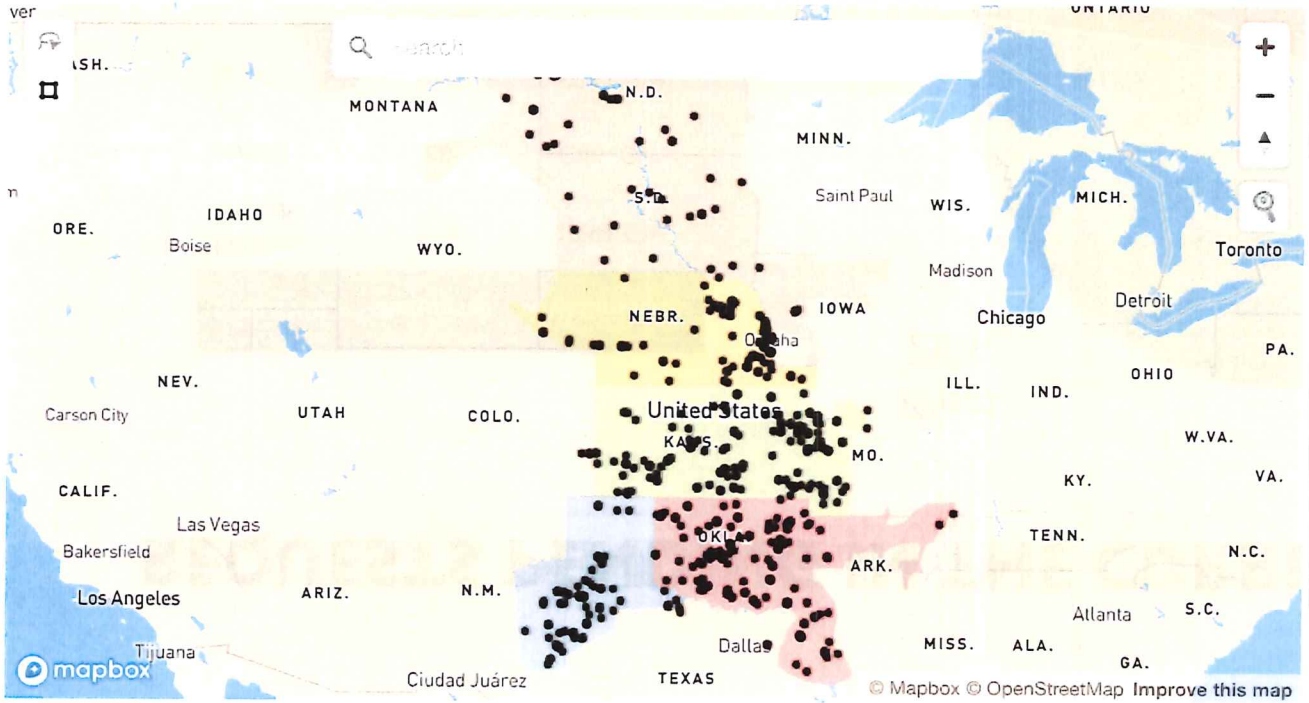
Projects: 115
Size 22.19 GW

Southwest

Projects: 52
Size 11.37 GW

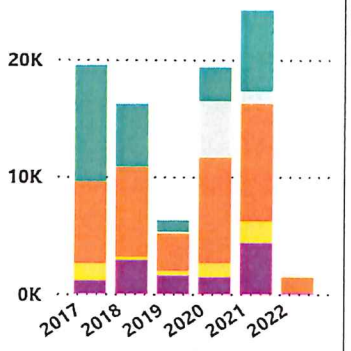
Total Queue



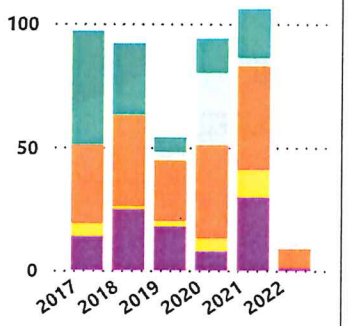


Generation Type ● Battery/Storage ● Hybrid ● Solar ● Thermal ● Wind

Active Projects by Year (MW)



Active Project Counts by Year

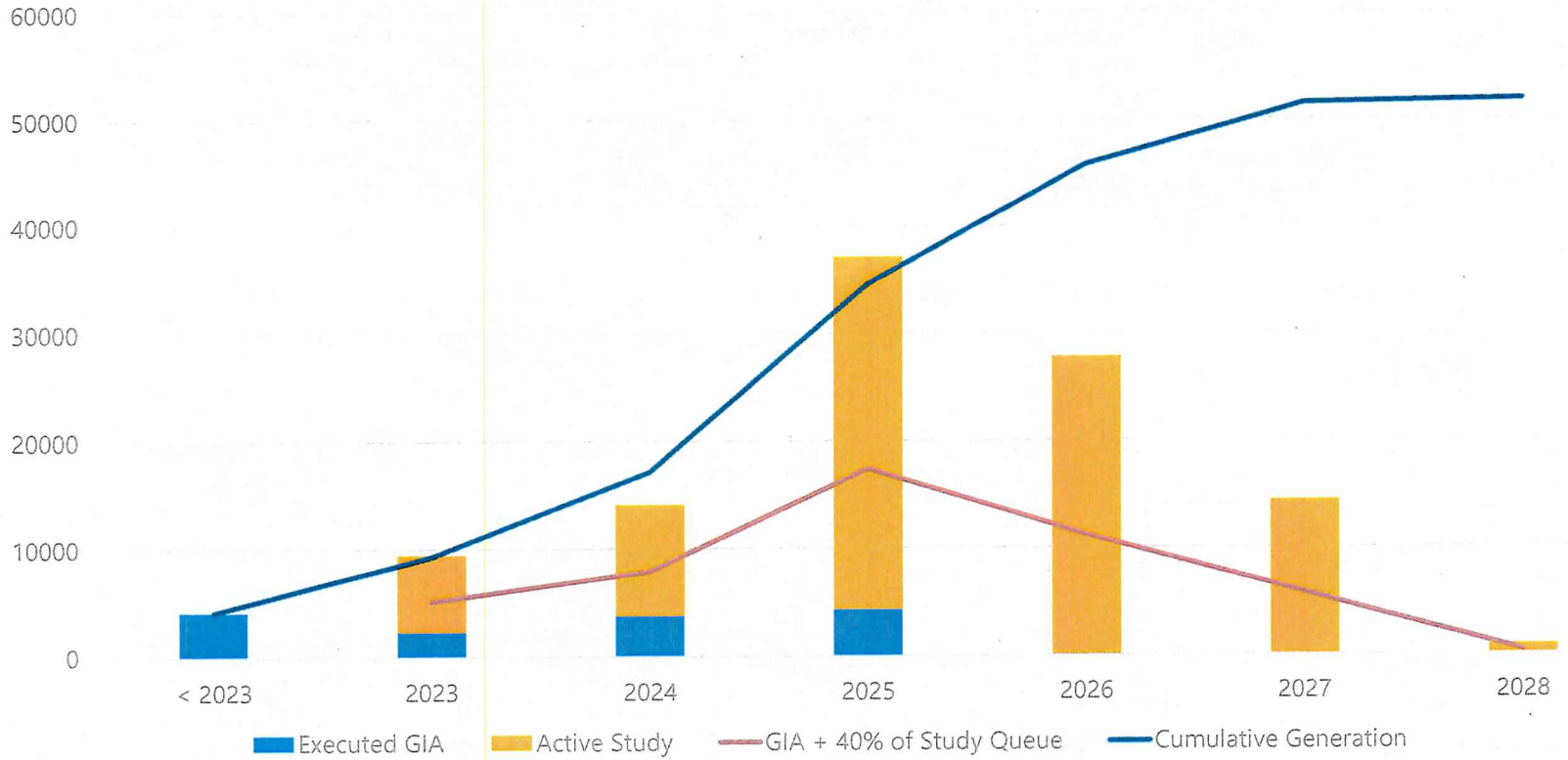


All

Cluster	MW	Projec
01 NORTH	**9,391.52**	**5**
Battery/Storage	931.90	
Hybrid	110.00	
Solar	2,466.00	1
Thermal	1,343.65	
Wind	4,539.97	2
02 NEBRASKA	**16,736.20**	**9**
Battery/Storage	1,475.64	1
Hybrid	845.00	
Solar	6,560.69	3
Thermal	3,571.32	2
Wind	4,283.55	1
03 CENTRAL	**27,530.68**	**14**
Battery/Storage	3,667.90	3
Hybrid	1,045.00	
Solar	13,492.80	6
Thermal	166.56	
Wind	9,158.42	4
04 SOUTHEAST	**22,188.65**	**11**
Battery/Storage	4,237.30	3
Hybrid	2,453.00	1
Solar	9,702.51	4
Thermal	109.00	
Wind	5,686.84	1
05 SOUTHWEST	**11,366.57**	**5**
Battery/Storage	1,310.00	1
Hybrid	540.00	
Solar	5,988.47	2
Thermal	1,059.00	
Total	**87,213.62**	**45**

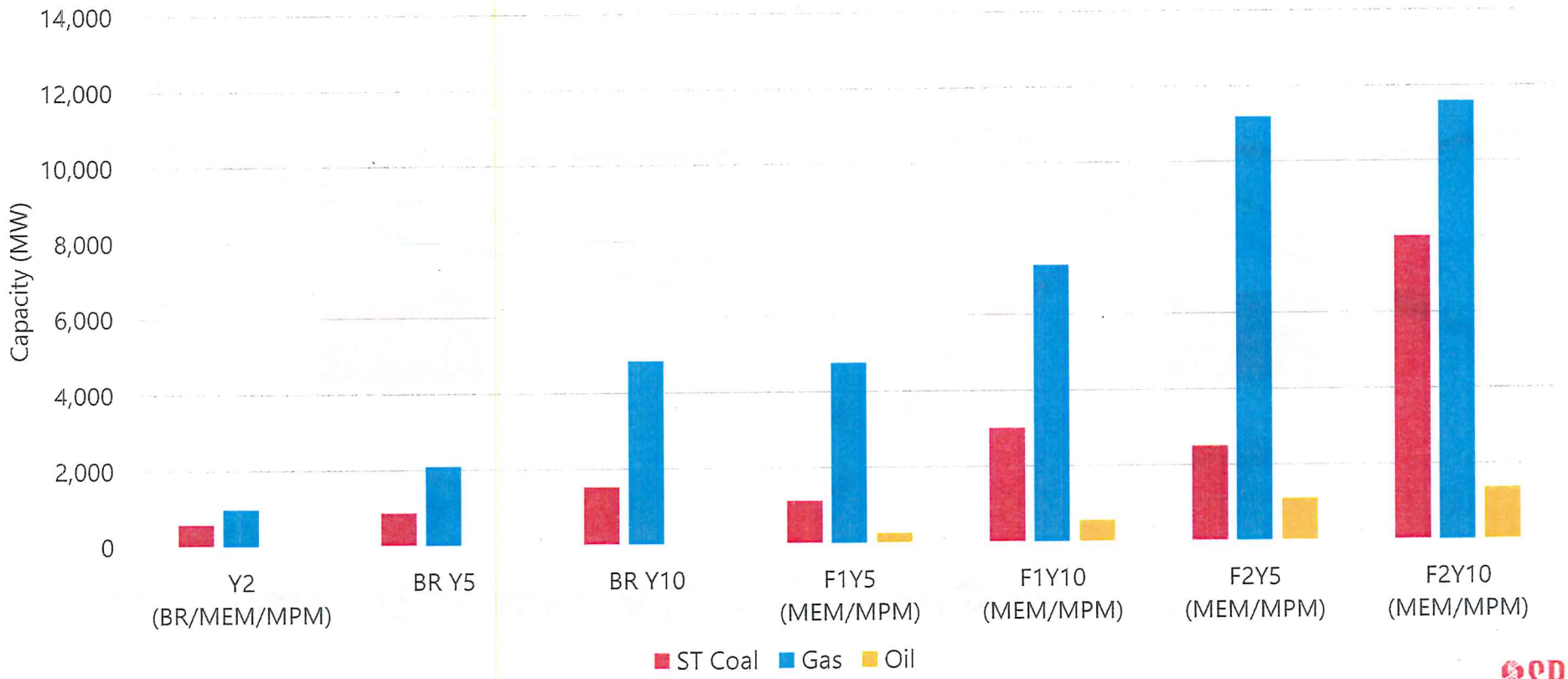
Disclaimer: The data provided is for information purposes only and is subject to change without notification. Questions? Email: gistudies@spp.org.
Click HERE for SPP GI Web Site. Click HERE for Study Region Map

GENERATION EXPECTED TO COME ONLINE BY COMMERCIAL OPERATION DATE

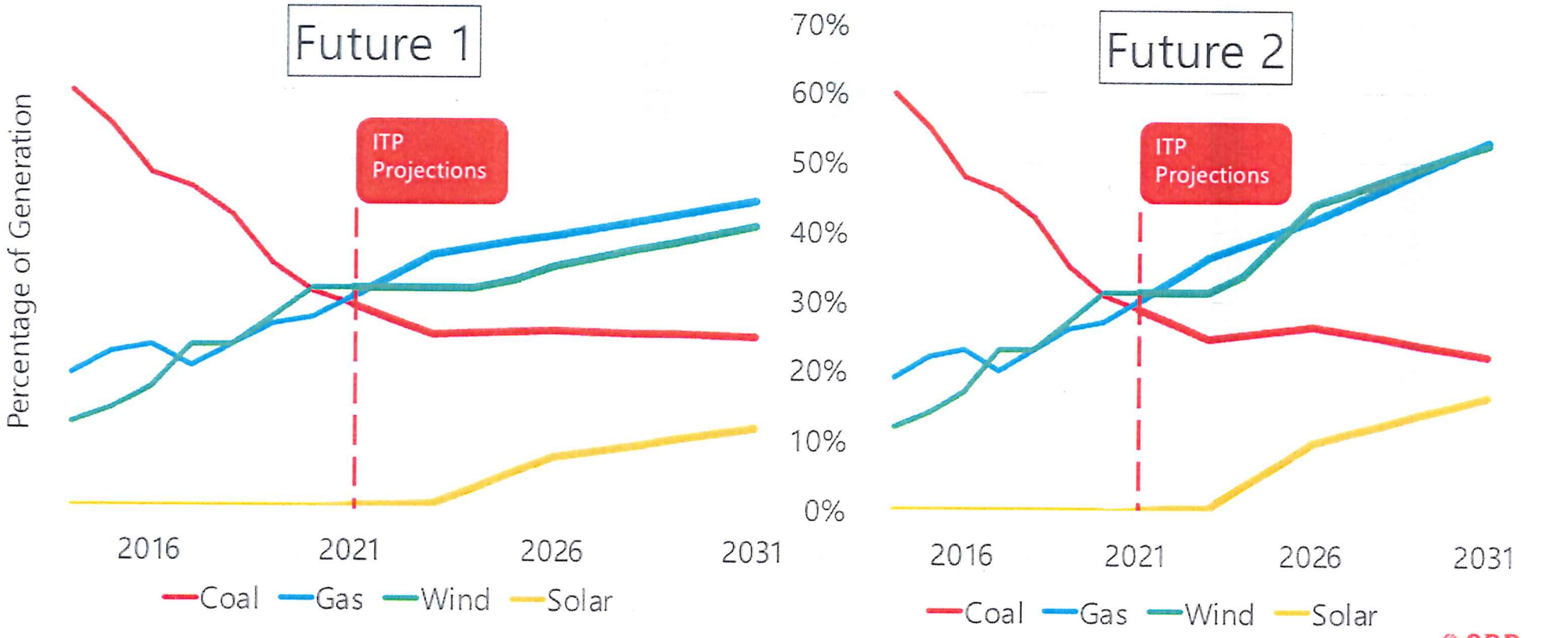


TRANSMISSION PLANNING

2021 ITP PROJECTED RETIREMENTS



EVOLVING GEN MIX AND ITP PROJECTIONS



2024 ITP FUTURES

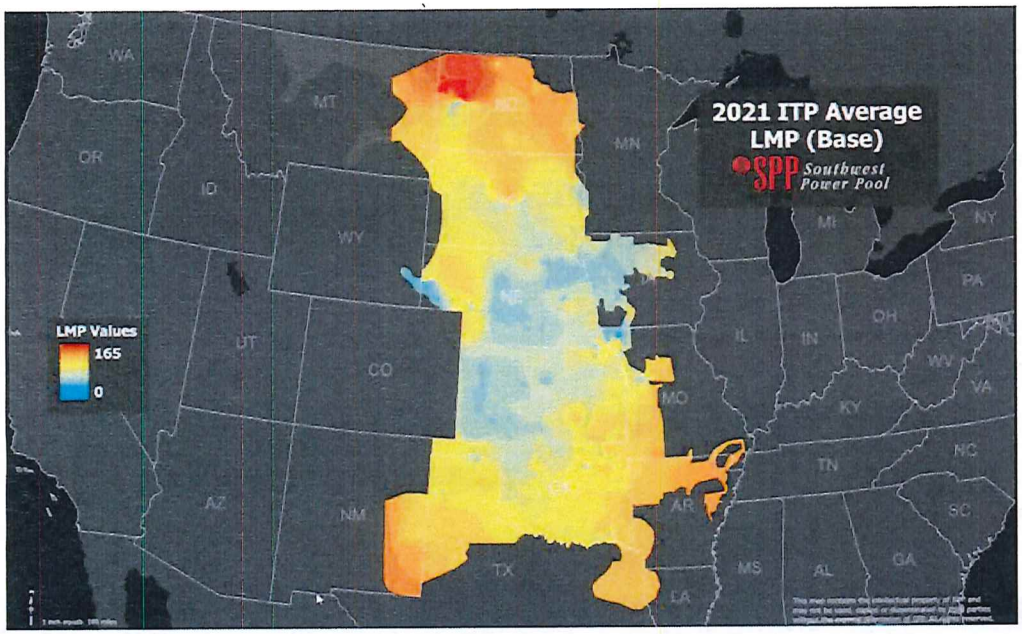
KEY ASSUMPTIONS	DRIVERS				
	Year 2	Future 1 – Reference Case		Future 2 – Emerging Technologies	
	2	5	10	5	10
Peak Demand Growth Rates	As submitted in load forecast	Increase due to electric vehicle growth		Higher Increase due to electric vehicle growth	
Energy Demand Growth Rates	As submitted in load forecast	Increase due to electric vehicle growth		Higher Increase due to electric vehicle growth	
Natural Gas Prices	Current industry forecast	Current industry forecast		Current industry forecast	
Coal Prices	Current industry forecast	Current industry forecast		Current industry forecast	
Emissions Prices	Current industry forecast	Current industry forecast		Current industry forecast	
Fossil Fuel Retirements	Current forecast	based on IRP feedback; subject to generator owner (GO) review		based on IRP feedback; subject to generator owner (GO) review	
Environmental Regulations	Current regulations	Current regulations		Current regulations	
Demand Response	As submitted in load forecast	As submitted in load forecast		As submitted in load forecast	
Distributed Generation (Solar)	As submitted in load forecast	As submitted in load forecast		As submitted in load forecast	
Energy Efficiency	As submitted in load forecast	As submitted in load forecast		As submitted in load forecast	
Storage	Existing + RARs	30% of projected solar (2.1. GW / 4.2 GW)		40% of projected solar (4.4 GW / 8.8 GW)	
Total Renewable Capacity					
Solar (GW)	Existing + RARs	7.1	14	11	22
Wind (GW)	Existing + RARs	43.8	49.9	48.2	54.9

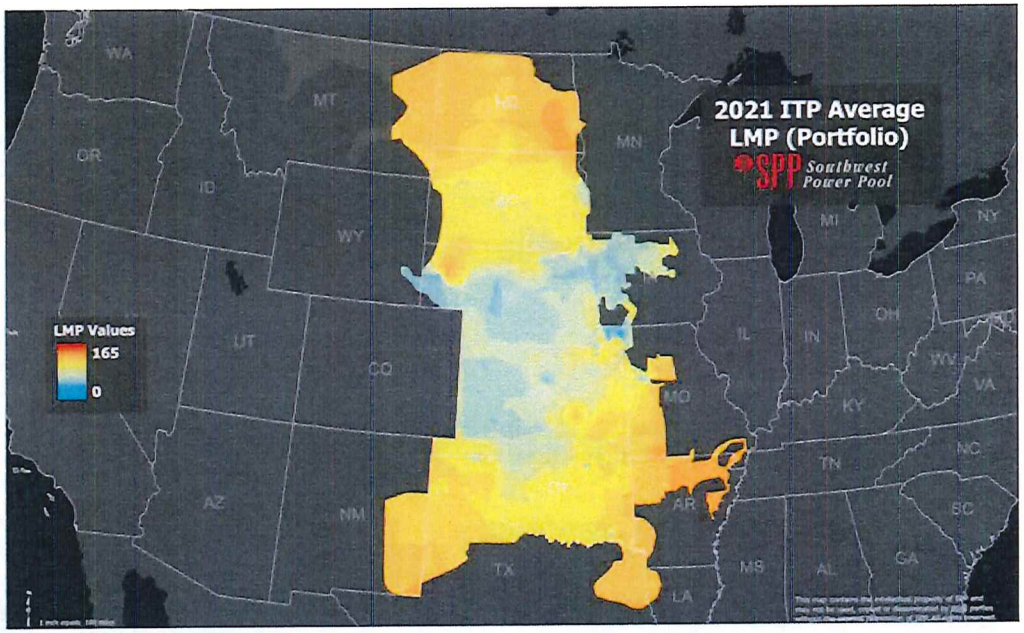
MOPC APPROVED 20-YEAR – FUTURES

	Drivers			
	Future 1 (F1)	Future 2 (F2)	Future 3 (F3)	Future 4 (F4)
Key Assumptions	2022 ITP Reference Case	2022 ITP Emerging Technologies	Accelerated Decarbonization (New administration and aggressive energy/ environmental policy change)	Based on SPP F3 with hurdle rate of zero between MISO and SPP
Year	20	20	20	20
Peak Demand Growth Rates	As submitted in load forecast	As submitted in load forecast	Moderate increase due to switching to electric home heating and increased electric transportation, potential shift to a winter peaking SPP	Moderate increase due to switching to electric home heating and increased electric transportation, potential shift to a winter peaking SPP
Energy Demand Growth Rates	As submitted in load forecast	Increase due to electrification growth	Higher demand due to electrification compared to F2 due to aggressive policy	Higher demand due to electrification compared to F2 due to aggressive policy
Natural Gas Prices	Current industry forecast	Current industry forecast	Increase prices incluenced by emissions pricing policy	Increase prices incluenced by emissions pricing policy
Coal Prices	Current industry forecast	Current industry forecast	Increase prices influenced by emissions pricing policy	Increase prices influenced by emissions pricing policy
Emissions Prices	Current industry forecast	Current industry forecast	Emission prices based on new policy	Emission prices based on new policy
Fossil Fuel Retirements	Coal age-based 56+, Gas/Oil age-based 50+, subject to generator owner (GO) review	Coal age-based 52+, Gas/Oil age-based 48+, subject to GO review and ESWG approval	All Coal and Oil retired. More Gas retirements, driven by higher emission reduction levels relative to F2 driven by new policy	All Coal and Oil retired. More Gas retirements, driven by higher emission reduction levels relative to F2 driven by new policy
Environmental Regulations	Current regulations	Current regulations	Federal Policy, mandated carbon cuts, carbon tax	Federal Policy, mandated carbon cuts, carbon tax
Demand Response[1]	As submitted in load forecast	As submitted in load forecast	Increase from F2	Increase from F2
Distributed Generation (Solar)	As submitted in load forecast	900MW	Increase from F2 due to policy shift and significant incentives to behind-the-meter installation	Increase from F2 due to policy shift and significant incentives to behind-the-meter installation
Energy Efficiency	As submitted in load forecast	As submitted in load forecast	Increase in F2	Increase in F2
Storage	20% of projected solar	35% of projected solar	Increase from F2	Increase from F2
Total Renewable Capacity				
Solar (GW)	19	27	48	48
Wind (GW)	41	50	65	65
Additional Assumptions				
Emissions Reduction Target	N/A	N/A	93% to 95% Emissions Reductions Target in 2042 from 2017 Levels	93% to 95% Emissions Reductions Target in 2042 from 2017 Levels
Hurdle Rate	N/A	N/A	N/A	SPP-MISO and MISO-SPP Hurdle Rate set to $0

[1] As defined in the MDWG Model Development Procedure Manual: MDWG Manual

2021 ITP PORTFOLIO BEFORE/AFTER





THIS ISN'T OUR PARENTS' ELECTRIC GRID

Smart meters

Generator retirements

Advanced technologies

Environmental constraints

Compliance

Cybersecurity

Microgrids

Wind

Energy efficiency

Prosumers

Electric vehicles

Evolving grid

Fuel prices

Battery storage

Solar

Consumer demand

Distributed generation

Extreme weather events

Demand response

PLANNING FOR AN UNCERTAIN FUTURE