October 30, 2024

Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, Kansas 66604

RE: Evergy TDC Work Study Presentation for Dockets 24-EKCE-254-CPL and 24-EKME-253-CPL

To Whom it May Concern:

The public workshop required by K.S.A. 66-1237 was held August 1, 2024, at 9:00 a.m. and was broadcast on the Commission's YouTube channel, entitled "Work Study: Evergy Transmission Compliance Filing (8/1/24)."

Please find attached Evergy's presentation as discussed in the workshop. We ask that this presentation be filed in each of the above-referenced dockets for informational purposes.

Sincerely,

Cathryn J. Dinges
Sr Director and Regulatory Affairs Counsel
Evergy, Inc.

cc: Service list

Transmission Delivery Charge Public Workshop

August 1, 2024

evergy

Objectives of Today's Discussion

- Provide high-level overview of Evergy planning processes and different drivers of transmission investment
- More in-depth discussion of considerations in project prioritization
- Describe drivers of projects included in this year's compliance filing

Systematic Planning Process

Specific Needs Identified

"Needs" can be a mix of:

- Historical **reliability** issues causing customer outages and/or increased maintenance costs
- Aging **asset condition** or asset not aligning with current standards
- New customers / customer **growth**
- **Capacity** needs for current and future loads
- Changes in generation mix requiring investment for stability and reliability
- Need for **contingency** options to increase operational flexibility

Not exhaustive

Solutions Identified

Needs can be addressed through specific **projects** or through **programs**

- **Projects** ***(focus of this presentation)*****:** Targeted effort on a part of the system which addresses one or more needs
  - Projects are evaluated based on the benefits they provide across multiple categories
- **Programs:** Overall efforts targeting a specific asset type (e.g., breakers) across one jurisdiction
  - Individual assets within a program are generally prioritized based on condition, reliability, and criticality

Estimates Created

Engineering Estimates are created to define funding required for each **project**

Program amounts are estimated based on overall needs within that asset category

Projects Prioritized

Projects and Programs are prioritized and moved between years based on:

- Relative **benefits** provided by different solutions
- **Funding availability** by year
- Project **interdependencies** or timing requirements
- **Labor availability** for execution in different areas

There are always more needs on the system than can be addressed in one single budget year (or even in a 5-year window). Prioritization is critical to try and maximize value within annual investment levels

Final Budgets Created

Prioritized projects and programs are combined with annual, recurring budget items and reviewed with **cross-functional leadership teams** prior to incorporation into final budget

Execution Plans Developed

Based on final budgets, plans are created for labor and materials required for execution

Once a project is identified and execution begins, typical construction timeline is 36-48 months

Evergy Transmission Planning Process

Transmission Investment Portfolio (major drivers, not exhaustive)

Mandatory

SPP-Directed

- Service Requests: Reimbursable upgrades required for generation interconnections, sponsored upgrades and transmission service requests
- Base-Plan Funded: Notifications to Construct (NTCs) issued out of annual ITP[1] or similar process with costs allocated based on voltage[2]

Load Growth or New Customers

- Upgrades needed to serve incremental load growth (i.e., new substations) or new customers that may require system upgrades

Other Mandatory

- Projects required to accommodate road moves
- Upgrades identified due to compliance requirements
- Annual investment required for emergent needs (e.g., storm response, reactive replacements)

Performance

- Projects or programs identified to address reliability, safety, operational flexibility, asset condition and protection & control issues
- Results of holistic planning studies for a specific area factoring in a variety of drivers

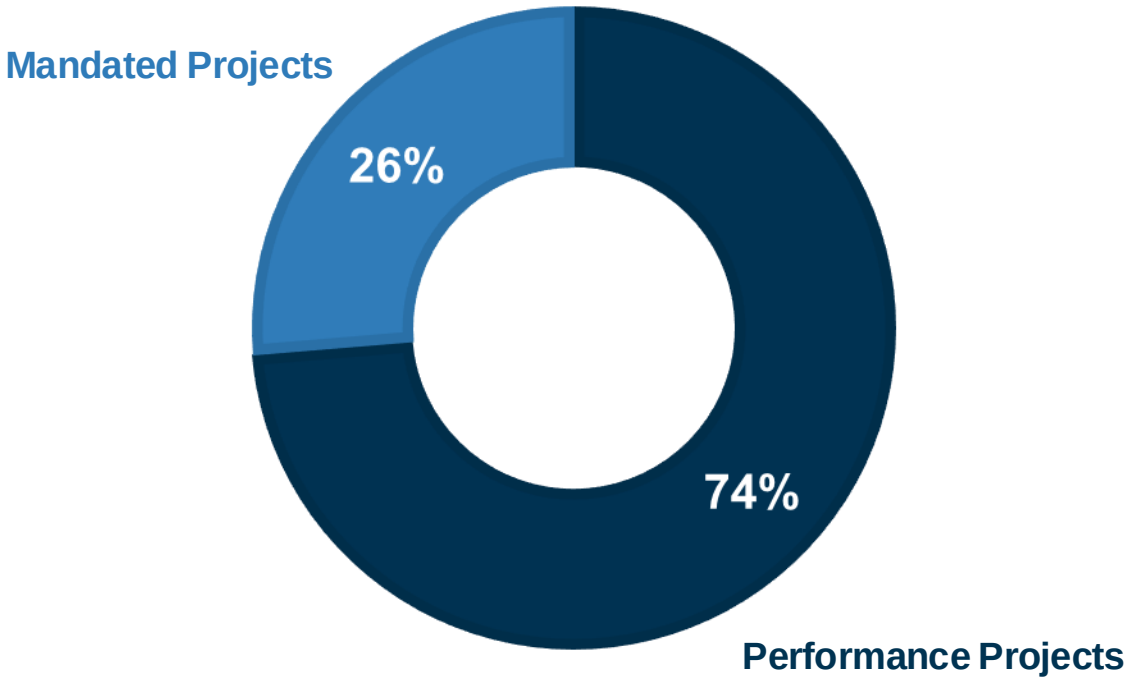
Discussed in more detail on subsequent slides

[1] Integrated Transmission Planning

[2] Projects over 300kV are allocated regionally via load ratio share; projects 100-300kV are allocated 1/3 regionally, 2/3 zonally; projects <100kV are fully allocated to the zone

Transmission Project Categories

Percentage of ~$2.1B 2024E-2028E Kansas Transmission Project Investment
(% by Project Type)



Generally, projects are prioritized between two distinct categories:

1) **Mandated:** Investment categories include:
   - Compliance requirements (e.g., NERC, National Electric Safety Code)
   - Notifications to Construct from the SPP
   - Projects required to serve existing, growing load or new customers
   - Road projects as required by government entities
2) **Performance Projects:**
   - Target replacement of aged, poor performing infrastructure to a more weather-resilient reliability standard
   - Projects to enhance operational flexibility or prepare for future system needs

Transmission Project Prioritization

Mandated	Performance[1]			
	Customer Reliability	Public Impact	Employee Benefit	Growth & Technology
• Score automatically assigned according to category	• Outage risk • Known design issues • Level of congestion risk • Future overload risk • ~44% of total score ***Primary driver of prioritization***	• Critical customers • Mitigation of public impact risks • ~13% of total score	• Reducing employee safety risk • Improving workforce productivity • ~21% of total score	• Implementing new strategic technologies (e.g., automation) • Supporting a strategic initiative (e.g., conversion to standard voltages) • ~21% of total score

[1] Financial metrics (NPV of Revenue Requirements and Net Income) are still being refined and do not currently impact the score.

Assessing and Balancing Reliability Needs (Illustrative)

Specific Needs Identified

"Needs" can be a mix of:

Age & Condition

- Historical **reliability** issues causing customer outages and/or increased maintenance costs
- Aging **asset condition** or asset not aligning with current standards

Local / Zonal Planning

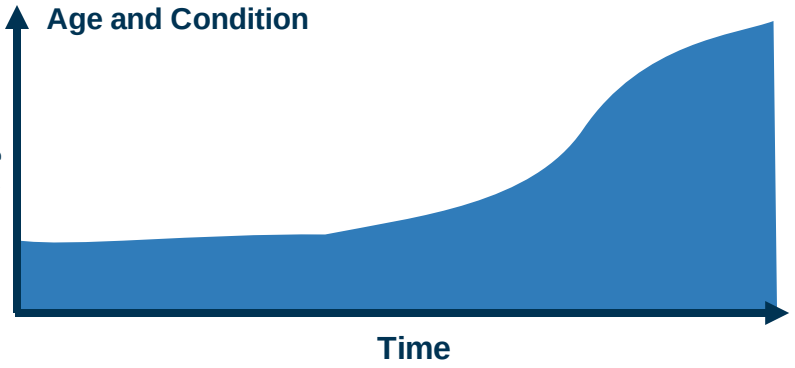
- New customers / customer **growth**
- **Capacity** needs for current and future loads

- Changes in generation mix requiring investment for stability and reliability

Operational Issues

- Need for **contingency** options to increase resiliency

Risk of Impact
Failure causing outage (may or may not result in customer outage)

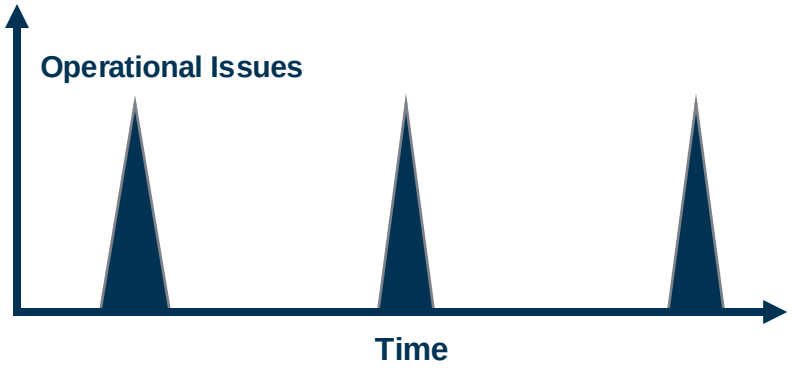


Over time, assets age and become harder to maintain / restore in case of failure. There is no hard and fast rule for when an asset will fail – every asset is built differently / subject to different conditions

Risk of Impact
Overload caused by system changes / load growth which must be mitigated per NERC standards

Due to long-term planning horizon of local / zonal planning, risks increase more gradually as local loads and generation mix change, although large changes can drive near-term needs

Risk of Impact
Contingent overload which requires operational mitigation (e.g., dispatch of local generation, load shed)



Operational risk occurs during certain system conditions when transmission / generation outages, load, and system flows create contingent overloads which must be addressed

Assessing and Balancing Reliability Needs (Illustrative)

Specific Needs Identified

"Needs" can be a mix of:

- Historical **reliability** issues causing customer outages and/or increased maintenance costs
- Aging **asset condition** or asset not aligning with current standards

Age & Condition

- New customers / customer **growth**
- **Capacity** needs for current and future loads

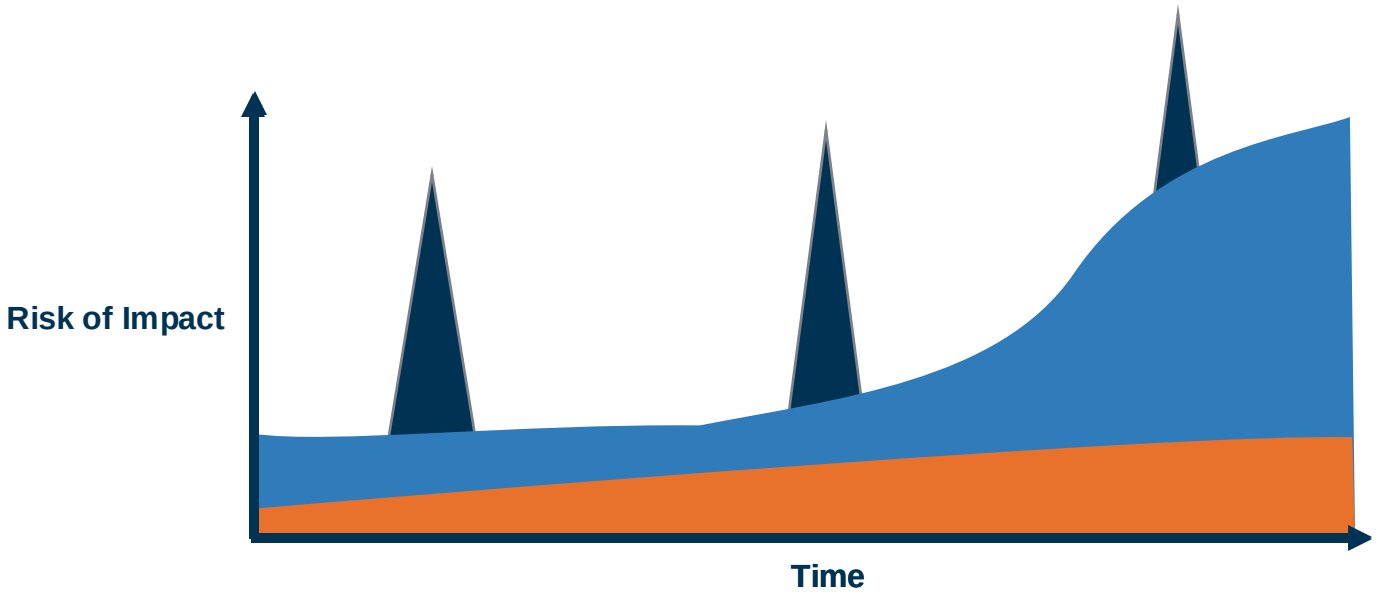
Local / Zonal Planning

- Changes in generation mix requiring investment for stability and reliability

- Need for **contingency** options to increase resiliency

Operational Issues

In reality, many projects have multiple drivers and the potential risks compound each other over time. Prioritizing projects is based on balancing this risk over time – more discussion on later slides.



Local / Zonal Planning

Overview and Types of Projects

Local / Zonal Planning
Evaluate needs individually or in long-term studies grouped by geographic area to identify optimal solutions

- Overloads in Normal or Contingent Conditions
- High / Low Voltages
- Dynamic Stability
- New Load / Load Growth
- Looping in Radial Facilities
- System Protection Enhancements
- Substation Configuration
- Power Quality
- Local Operational Reliability

Age and Condition

Ongoing Condition Assessments

Every Year

Ground or aerial visual inspection of entire transmission system to evaluate external condition

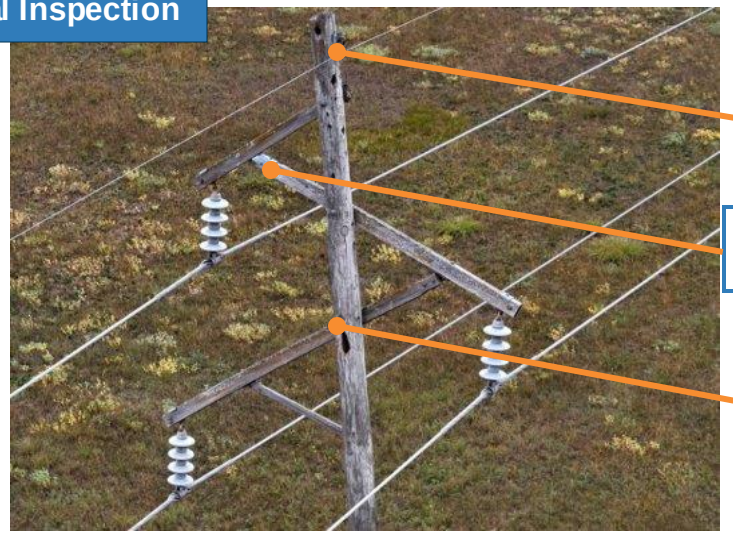
Examples of external concerns include structural rust, rotted or splitting wood, and equipment discoloration

Every 12 Years

Detailed and intrusive inspection of poles to determine degree of internal decay or damage present

Inspection can entail "sounding" the pole, boring into the pole, and excavating around the base of a pole

Visual Inspection

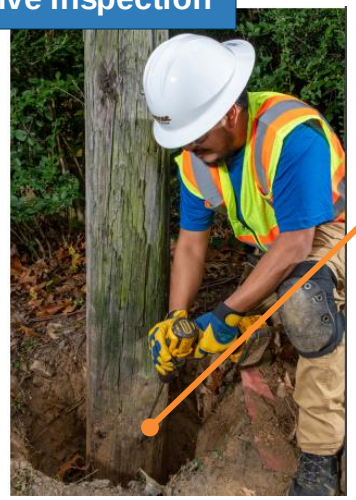


Pole top rotten

Top arm rotten and weather checked

Bottom arm bolt on hollow pole

Intrusive Inspection



Boring into pole to observe color, texture, and odor of wood shavings

Example of internal decay

Pictures provided by Osmose

Age and Condition

Evaluation of Options to Address

Maintenance

- Replace specific components of a line that are found to be in poor condition
- Examples could include a downed guy-wire, broken insulator, or conductor replacement

This option is similar to replacing a battery in your car. You do not need to replace your entire car, but a part of your car does need maintenance.

Targeted Replacements

- Replace specific poles or line sections due to heightened wear and tear
- Examples could include a line section in a wooded area which will experience more wood-pecker damage, or a line section spanning a low-lying wetland

This option is similar to when the check engine light comes on in your car. Then, when you take it into the shop, you discover only part of the engine needs to be repaired.

Rebuild

- The entire line is rebuilt, which can be motivated by many factors
- Examples could include the old age and poor condition of the entire line, but also area development or reliability concerns that require more capacity

This option is similar to when the check engine light comes on in your car. Only now when you take it into the shop, you discover it is most economic to replace the entire car.

Determining whether maintenance, targeted replacements, or a rebuild is the best approach to addressing the age and condition of a line is based on many considerations

Project Details

Criteria for Project Inclusion

- Projects included in filing:
  - Within Evergy Kansas Central or Evergy Metro areas
  - Over $15M in transmission investment in Kansas
    - Included two projects in Evergy Metro Missouri that will have >$15M investment allocated to KS
  - Expected in-service date in 2025 or 2026
- Project types are assigned according to the definitions below:
  - New Build: Greenfield or expansion of existing infrastructure
  - Upgrade: Increase in ampacity of existing assets
  - Rebuild: Like-for-like replacement
- Project scopes and timelines may change based on many factors, including permitting/siting processes, funding availability, project interdependencies, equipment and labor availability, and relative need compared to other potential projects

Summary of Projects Included in Filing

Overview of Transmission Projects

Included in 2023 Workshop

Project	Territory	Mandated – New Customer	Asset Age & Condition	Local / Zonal Planning	Operational Issues
345/115kV New Substation & Transmission Lines	EKC	x			
138kV Line Rebuild with 34kV Underbuild	EKC		x	x	
New Substation, 115kV Line Rebuild / Relocation	EKC	x			
161-69kV Greenfield Substation & New 161kV Line (in and out)	EKC			x	x
161kV Rebuild	EKC		x		
69kV Line Rebuild	EKC		x		
138-69kV Substation Rebuild	EKC		x		x
138kV Conversion	EKC			x	x
69kV Substation Rebuild	EKC		x		
115kV Substation Rebuild and Voltage Conversion from 69kV to 115kV & 138kV	EKC		x	x	x
345/115kV New Substation & Transmission Lines	Metro	x			
345kV New Substation	Metro	x			

New Projects in 2024 Filing

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138-69kV Substation Rebuild

Kansas Central

Mandated – New Customer	
Asset Age & Condition	X
Local / Zonal Planning	
Operational Issues	X

- TFR Spend: $25,901,647
- Evergy Division: Independence
- Project Type: New Build
- Vintage of Replaced Facilities: 1930
- Purpose: The substation was originally constructed in 1930 and still contains assets dating back to that time. The two 138/69kV transformers were installed in 1953 and are different sizes, which makes it infeasible to operate them in parallel. They will be replaced with a single, larger transformer which will resolve the issue.

138kV Conversion

Kansas Central

Mandated – New Customer	
Asset Age & Condition	
Local / Zonal Planning	X
Operational Issues	X

- TFR Spend: $23,525,284
- Evergy Division: Wichita
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1951 & 1955
- Purpose: Converting the line to 138kV was identified in a long-term study performed for the area to reduce reliance upon 138/69kV transformers. Much of the equipment at the substations has reached its end of life. Taking maintenance outages at one of the 138kV substations is extremely difficult due to the bus layout and number of terminals and the other substation is of a design that is difficult to recover following a failure.

Kansas Central

69kV Substation Rebuild

Mandated – New Customer	
Asset Age & Condition	X
Local / Zonal Planning	
Operational Issues	

- TFR Spend: $21,163,601
- Evergy Division: Independence
- Project Type: New Build
- Vintage of Replaced Facilities: 1979
- Purpose: The existing substation is in a floodplain and has flooded twice in recent years. The site serves a major customer and the frequent flooding adversely affects Evergy's ability to serve them. The new substation location is out of the floodplain. As part of the new substation, additional distribution transformation will be added as well as an extension of the existing distribution line, which will improve the reliability to surrounding customers.

Metro

345kV New Substation

Mandated – New Customer	X
Asset Age & Condition	
Local / Zonal Planning	
Operational Issues	

- TFR Spend: $50,563,312[1]
- Evergy Division: Metro MO
- Project Type: New Build
- Vintage of Replaced Facilities: N/A
- Purpose: The substation is needed to serve load associated with a new data center. Load is expected to ramp from 96 MW in 2025 to its full capacity of 384 MW by 2028.

[1] TFR spend includes total project cost; KS portion will be allocated based on Demand Allocator

Project Update Summary

Project Identifier or Name	Op Co	2024 TFR Estimated Cost (Includes 34kV)	2023 TFR Estimated Cost (Includes 34kV)	Comments
Substation 345/115kV New Substation & Transmission Lines	EKC	$ 82,376,024	$ 86,406,971	Received NTC from SPP for project in April 2024
138kV Line Rebuild with 34kV Underbuild	EKC	$ 65,432,008	$ 65,008,778	
115kV New Substation, 115kV Rebuild / Relocation	EKC	$ 49,812,231	$ 46,366,623	
161-69kV Greenfield Substation & New 161kV Line (in and out)	EKC	$ 31,512,802	$ 23,696,951	Additional scope includes 1.5 miles of 69kV transmission line and upgrades to the remote ends
161kV Rebuild	EKC	$ 28,259,472	$ 43,524,516	Project scope was reduced and materials and labor came in less than estimated
69kV Line Rebuild	EKC	$ 28,913,725	$ 28,913,725	
115kV Substation Rebuild and Voltage Conversion from 69kV to 115kV & 138kV	EKC	$ 26,167,181	$ 22,856,820	Additional site remediation and civil work and work at remote ends of line is required and was not included in initial scope; Material prices came in higher than estimated
Substation 345/115kV New Substation & Transmission Lines	Metro	$ 28,308,193	$ 28,709,420	Received NTC from SPP for project in April 2024

Two additional projects were included in the 2023 filing and have had their anticipated ISDs pushed outside the window for inclusion in the HB 2225 filing:

- Substation Rebuild 69-12kV (EKC)
- 161kV River Crossing Rebuild (Metro MO)

Questions?

evergy

Appendix

Projects Included in 2023 Filing

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Kansas Central

115kV Substation Rebuild & Voltage Conversion from 69kV to 115kV & 138kV

Mandated – New Customer	
Asset Age & Condition	X
Local / Zonal Planning	X
Operational Issues	X

- TFR Spend: $26,167,181
- Evergy Division: Hutchinson
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1965
- Purpose: The line provides a second feed into the area but cannot carry much power relative to the other lines around it. Due to its reliability and low capacity, it is operated normally open. The nearby load pocket is primarily served by two transmission sources on the north side. When either of these sources or adjacent lines have planned outages, a large amount of the load pocket is put on a radial (single line). A separate nearby area is also primarily served by two transmission sources and when either of these sources or adjacent lines have planned outages, additional lines or transformers need to be opened to reduce the opportunity for system issues (low voltage and/or line overloads). By rebuilding this line to a higher capacity and converting to a higher voltage, it will provide a strong source into both areas.

Kansas Central

Mandated – New Customer	
Asset Age & Condition	
Local / Zonal Planning	X
Operational Issues	X

161-69kV Greenfield Substation & New 161kV Line In-and-Out

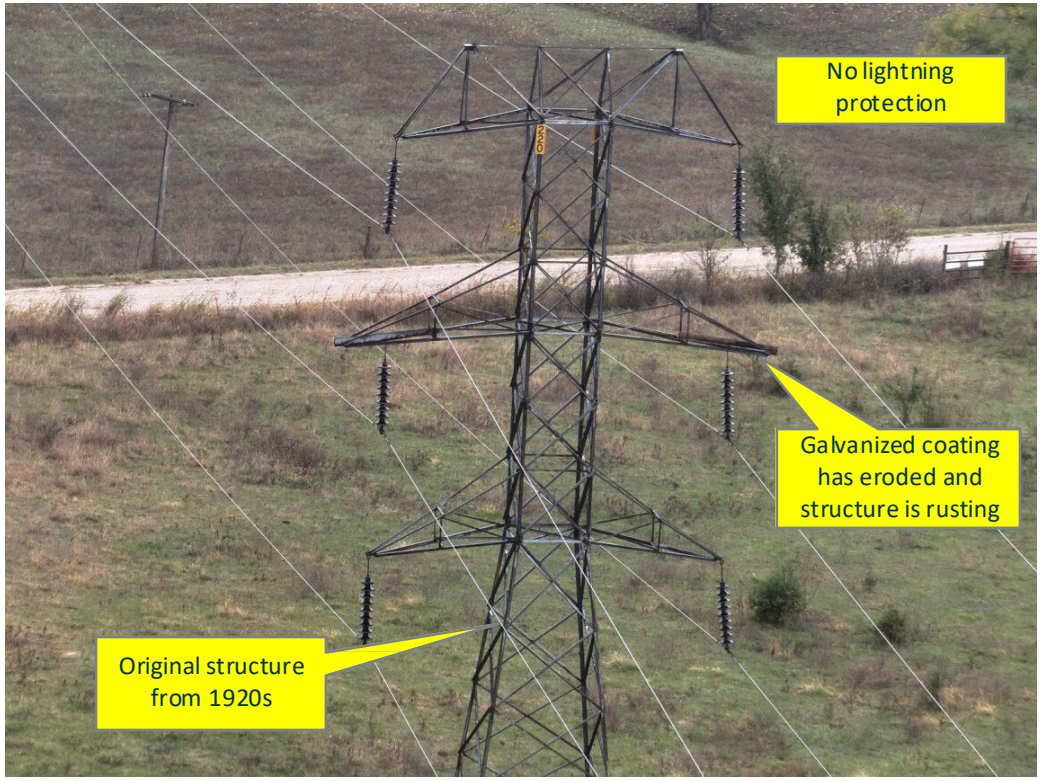
- TFR Spend: $31,512,802
- Evergy Division: Independence
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1975
- Purpose: New source into area and replacement for substation. If 69kV source is lost, remaining transmission capacity is not sufficient to support area and local generation must run to support reliability.

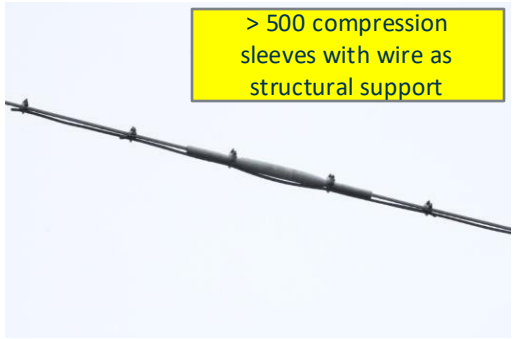
138kV Line Rebuild with 34kV Underbuild

Kansas Central

Mandated – New Customer	
Asset Age & Condition	X
Local / Zonal Planning	
Operational Issues	

- TFR Spend: $65,432,008
- Evergy Division: Independence
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1924
- Purpose: Replacing line originally constructed in 1924. No shield wires exist on the line. NERC identified it as having one of the highest sustained outage frequency rates for lines 100-199kV.



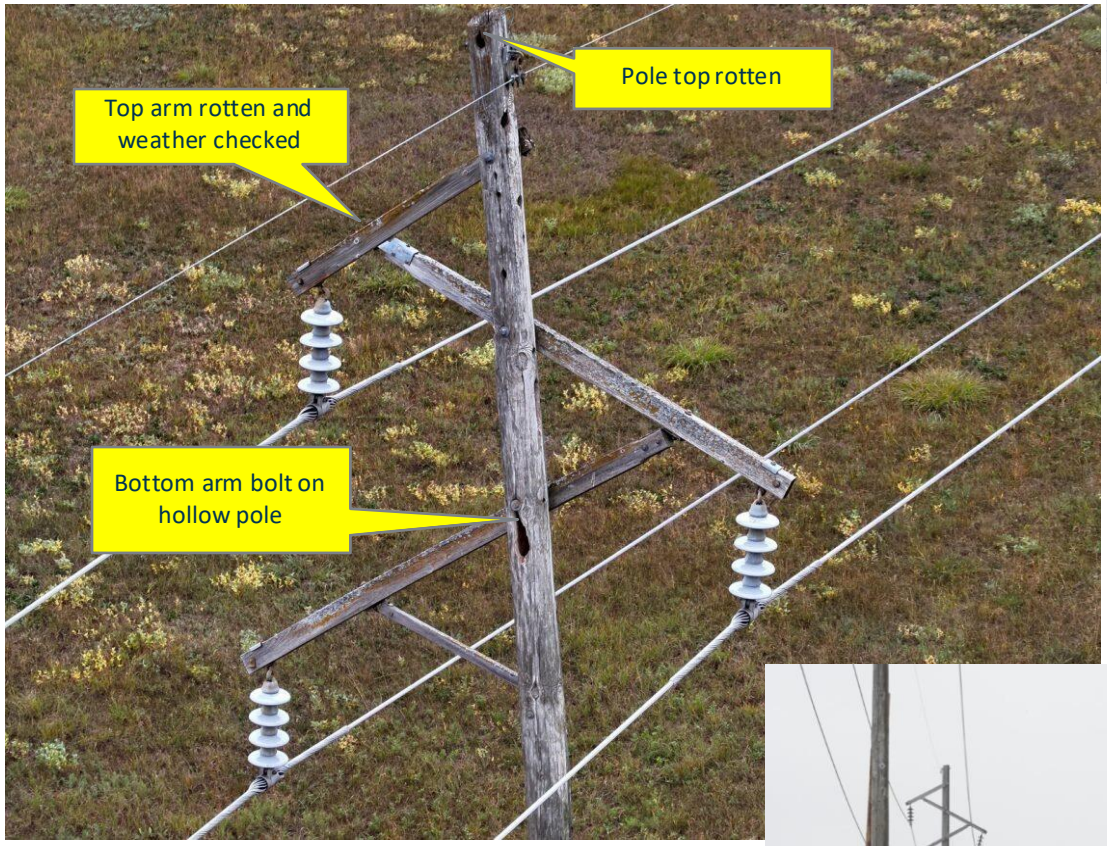


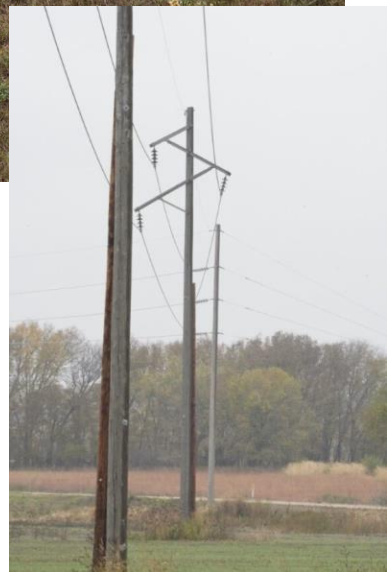
69kV Line Rebuild

Kansas Central

Mandated – New Customer	
Asset Age & Condition	X
Local / Zonal Planning	
Operational Issues	

- TFR Spend: $28,913,725
- Evergy Division: Pittsburg
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1969
- Purpose: Line was built in 1969 and has known maintenance issues due to underclass poles.



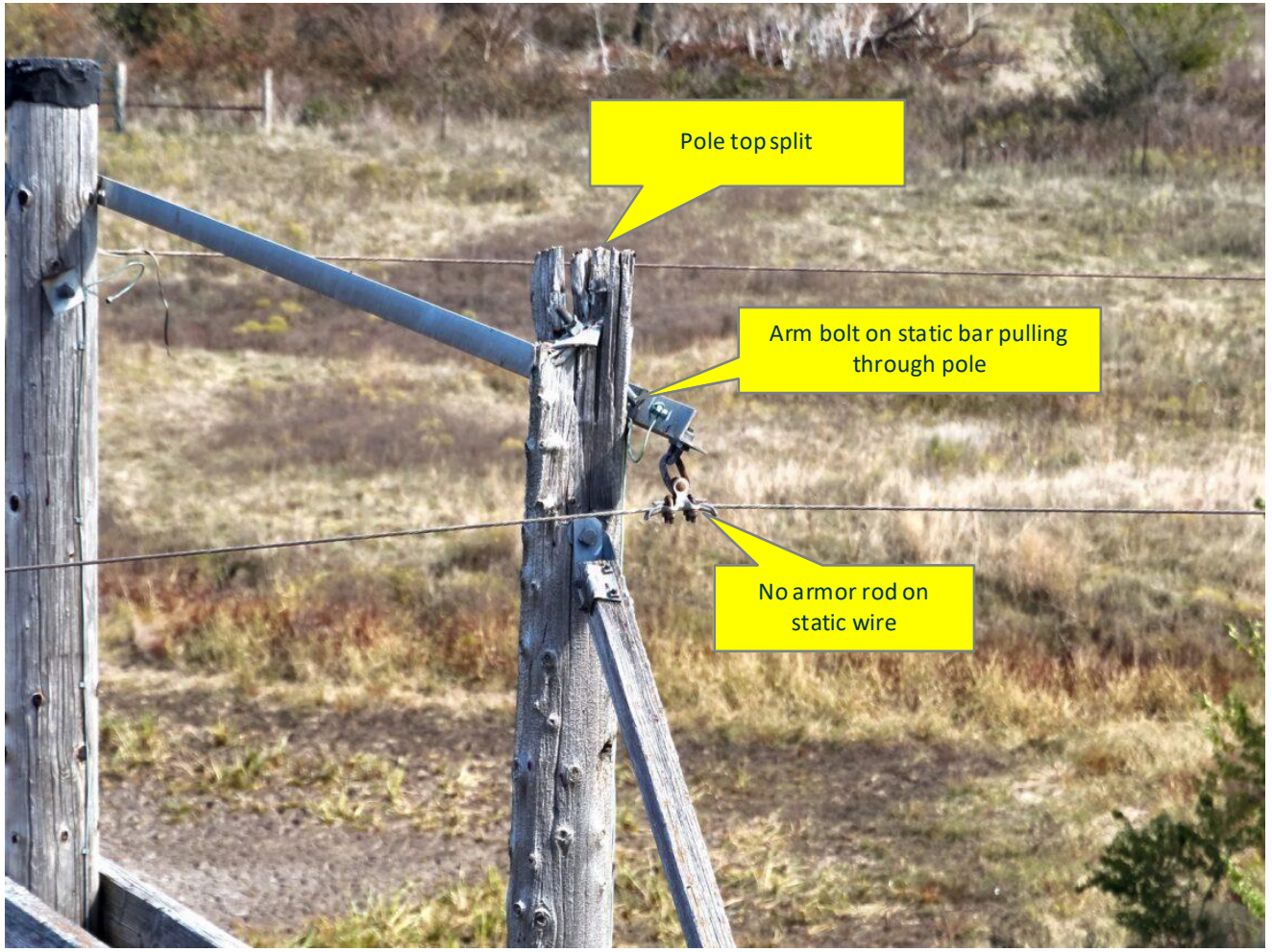


161kV Rebuild

Kansas Central

Mandated – New Customer	
Asset Age & Condition	X
Local / Zonal Planning	
Operational Issues	

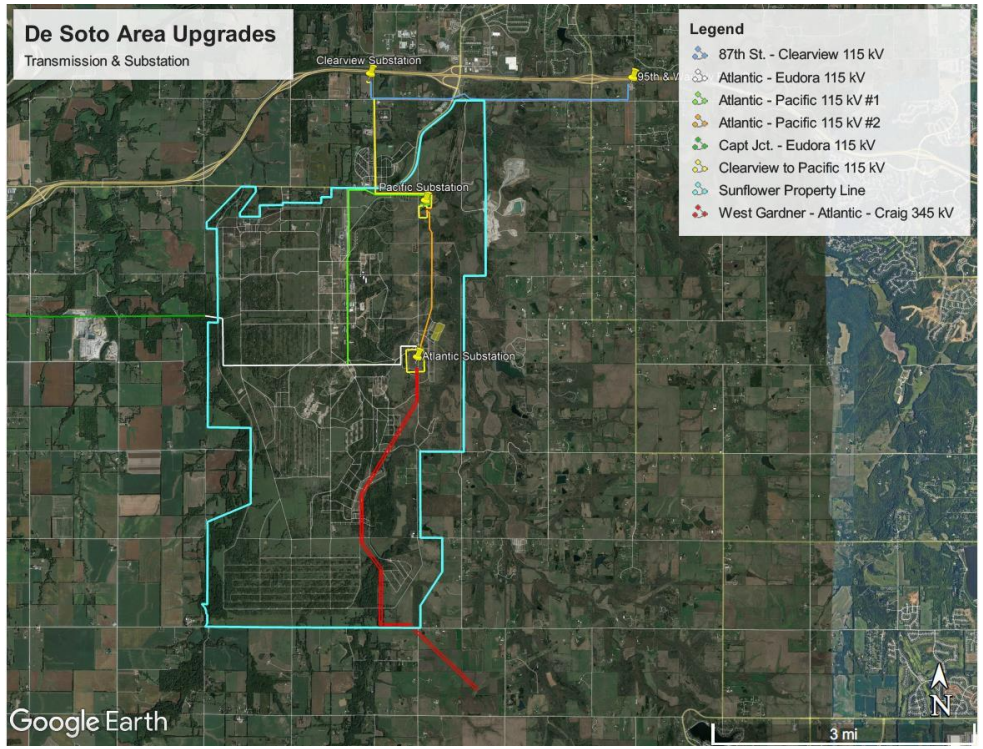
- TFR Spend: $28,259,472
- Evergy Division: Pittsburg
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1952
- Purpose: Rebuilding sections of line due to age and condition to improve reliability. Unable to do energized maintenance work due to poor conductor condition.



New Load Related Projects around De Soto, KS

Mandated – New Customer	X
Asset Age & Condition	
Local / Zonal Planning	
Operational Issues	

Project Name	TFR Spend (Includes 34kV)	Evergy Division	Project Type	Purpose
Pacific 115kV New Substation, 87th St. - Clearview - Pacific 115kV Rebuild / Relocation	$49,812,231	Shawnee	New Build	Infrastructure needed to serve load growth in the area.
Atlantic Substation 345/115kV New Substation & Transmission Lines	$82,376,024	Shawnee	New Build	Infrastructure needed to serve load growth in the area. Received NTC from SPP for project in April 2024.
Atlantic Substation 345/115kV New Substation & Transmission Lines	$28,308,193*	Shawnee	New Build	The Evergy Metro portion of the project includes only the 345kV line extension. Infrastructure needed to serve load growth in the area. Received NTC from SPP for project in April 2024.



Evergy Kansas Metro

Evergy Kansas Central

* TFR spend includes total project cost; KS Metro portion will be determined based on SPP cost allocation and Demand Allocator between Kansas and Missouri Metro

SPP & Evergy Coordination

Division of Responsibilities between SPP and Evergy

Evergy

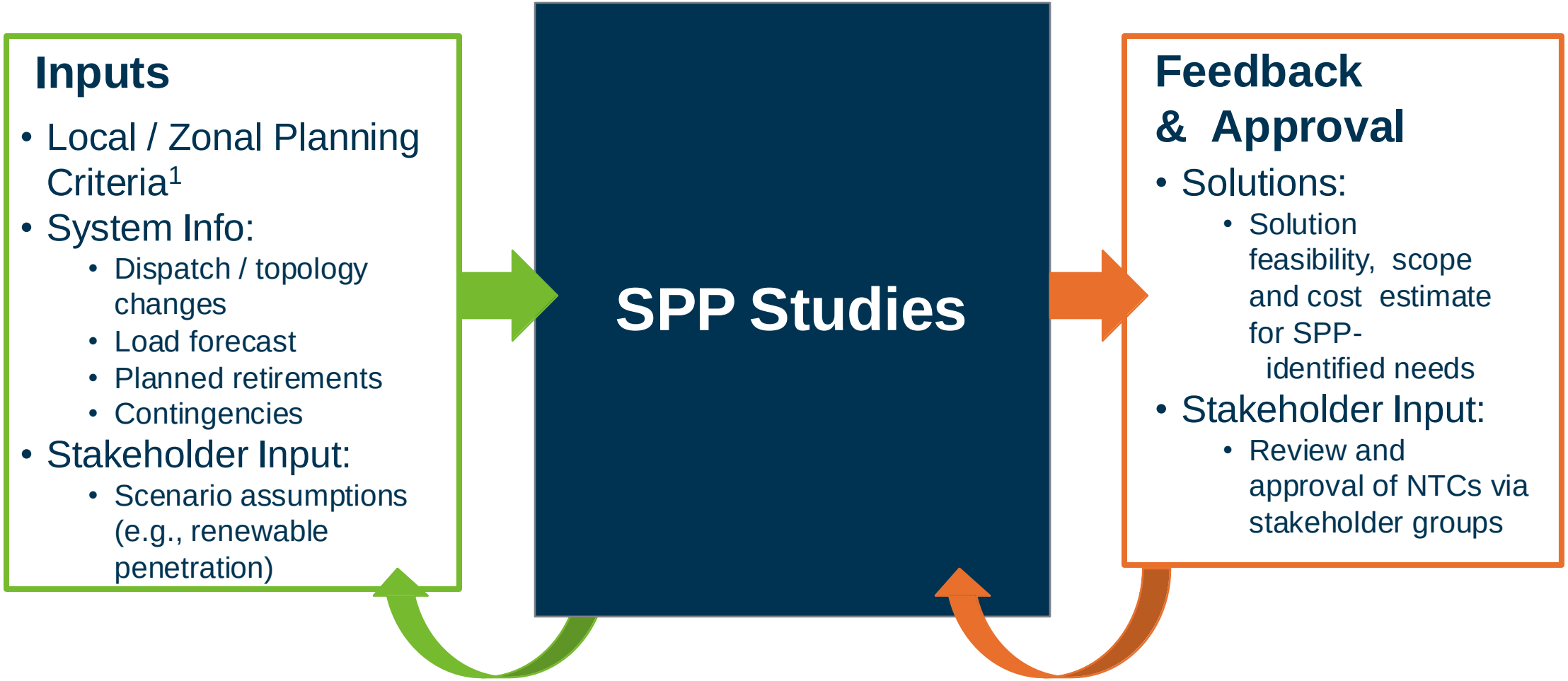
- Age & Condition
- Local / Zonal Planning Needs
- Operational Issues
- Load Growth / **Delivery Point Additions**
- **North American Electric Reliability Corporation (NERC) Compliance**

SPP

- Integrated Transmission Planning (Reliability & Economic Planning)
- Generator Interconnection
- Generator Retirement / Replacement
- Aggregate Transmission Service
- **Delivery Point Additions**
- **NERC Compliance**

Responsibility for items in bold are shared between Evergy and SPP

Evergy Coordination with SPP



Highly iterative due to dynamic system inputs & overlapping study processes

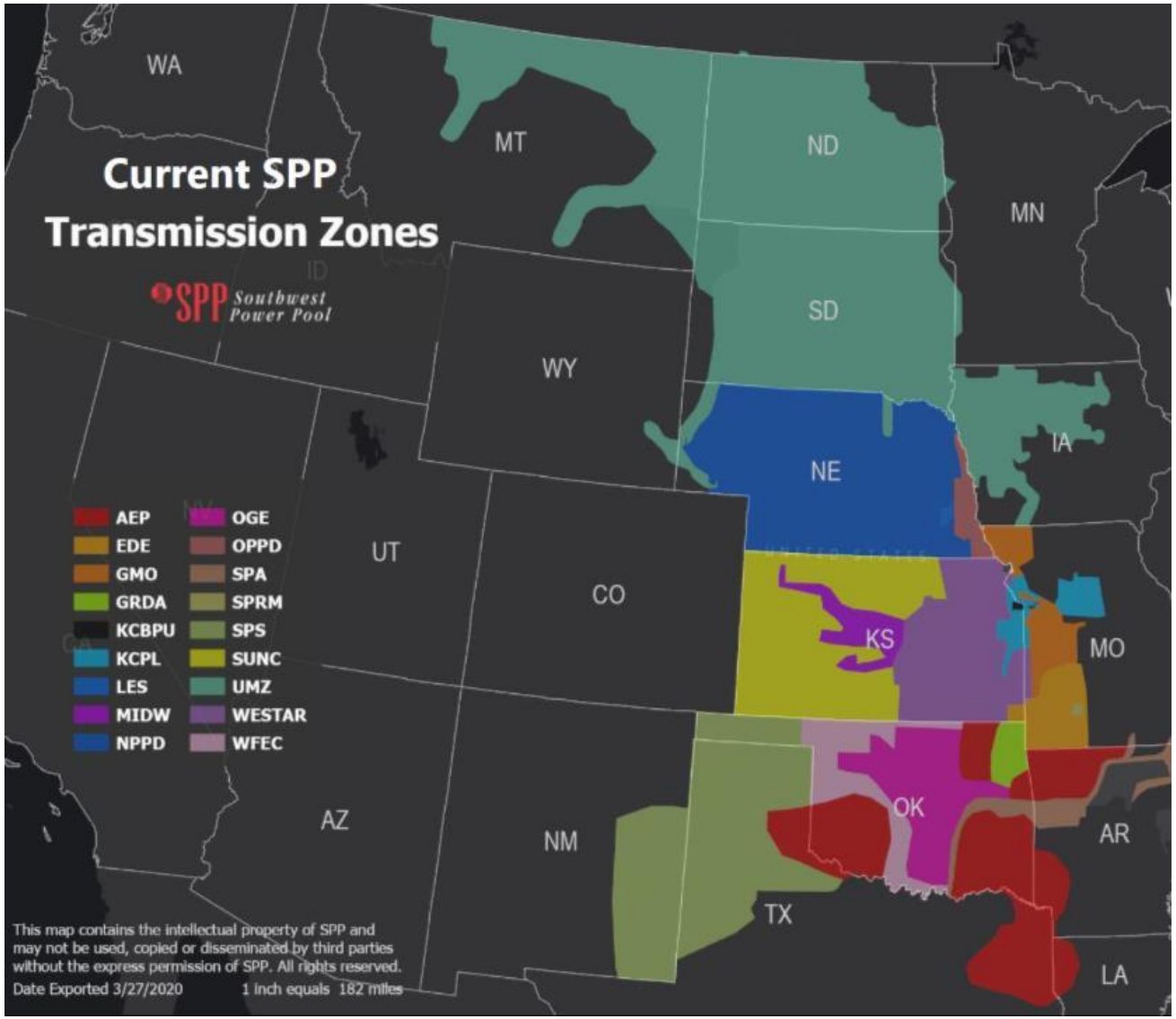
[1] In January 2024, a Zonal Planning Criteria was developed with and approved by all Transmission Owners and Customers within each Zone. Many of the projects discussed in this filing were planned using Local Planning Criteria prior to the implementation of Zonal Planning Criteria.

SPP Cost Allocation

SPP allocates the cost of Base Plan Funded (BPF) transmission projects that are subject to region-wide cost based on members' region-wide load ratio share. Evergy's combined region-wide load ratio share is approximately 20.2% based on 2023 energy consumption. SPP's cost allocation was accepted by FERC.

Allocation Type	Voltage Level	Allocation Method	Description
Highway	Extra-high-voltage 300kV and above	100% regional	100% of costs allocated to all SPP members – based on load share
Byway	Mid-tier facilities 100kV - 299 kV	1/3 regional; 2/3 zonal	1/3 of costs allocated to all SPP members; 2/3 allocated to local zone
Local	Low-voltage <100kV	100% zonal	100% of costs allocated to the local zone

SPP Zones



Southwest Power Pool, Inc.
Regional and Zonal Transmission System Peak Loads (MW)
Calendar Year 2023

Zone	Utility	Total Region Zones 1-19 w/o FSE
1	AEP	19.504%
2	KCBPU	0.860%
3	SPRM	1.268%
4	EDE	2.180%
5	GRDA	2.024%
6	EMe	7.028%
7	OGE	13.008%
8	MIDW	0.718%
9	EMW	3.643%
10	SPA	0.720%
11	SPS	11.047%
12	SECI	2.137%
13	WFEC	3.443%
14	EKC	9.488%
16	LES	1.407%
17	NPPD	6.244%
18	OPPD	5.052%
19	UMZ W/O FSE	10.229% with FSE 13.16%

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SPP Cost Allocation - Zonal

Transmission Projects under Evergy's Control

- Projects identified to address reliability, safety, operational flexibility, asset condition
- Projects identified by Evergy for a specific area to address area needs (Evergy Local Planning Criteria)

Transmission Zonal Funding:

Retail customers pay their portion or the Retail Load Ratio Share

- Computed as a % of Retail MW load to total Transmission MW load

Evergy Zones:

- Evergy is unique in SPP in that its transmission and load is spread across 3 Zones (Missouri West, Metro, and Kansas Central)
- Evergy serves more than 80% of the load in its Zones and owns more than 99% of the transmission
  - SPP Zone 14: Evergy Kansas Central (EKC) – EKC Retail Pays 83% (TDC)
  - SPP Zone 6: Evergy Metro (EM) – EM Retail Pays 87% (TDC)