January 10, 2024

Kansas Corporation Commission
1500 SW Arrowhead Rd.
Topeka, KS 66604-4027

**RE: Evergy TDC Work Study Presentation for Docket Nos. 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 this morning at 9:00 a.m. and was broadcast on the Commission's YouTube channel, entitled "Work Study: Evergy Transmission Delivery Charge Compliance."

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

*January 10, 2024*

evergy

# Objectives of Today’s Discussion

- Outline division of responsibilities between Southwest Power Pool (SPP) and Evergy related to transmission planning
- 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

# 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

# Division of Responsibilities between SPP and Evergy

## Evergy

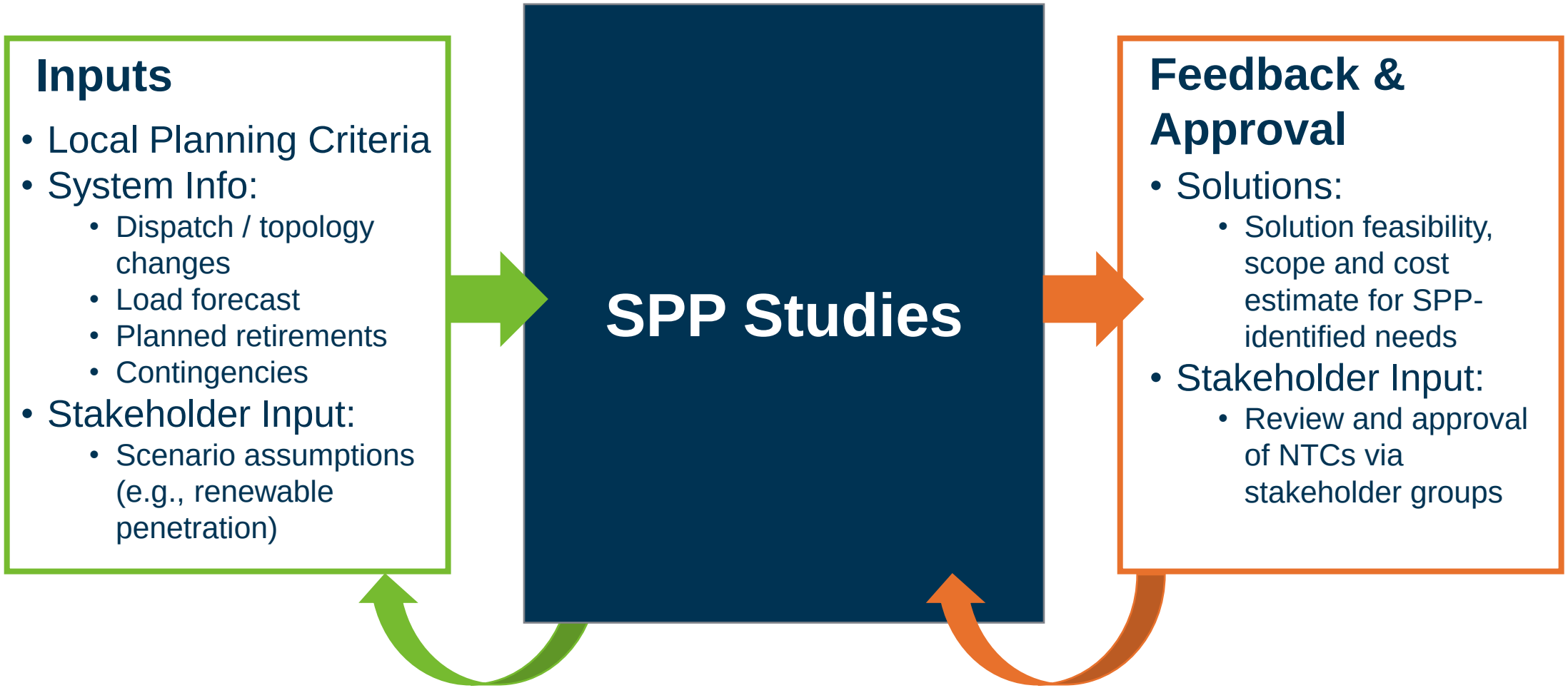
- Age & Condition
- Local Planning Needs
- Operational Issues
- Load Growth / **Delivery Point Additions**
- **North American Electric Reliability Corporation (NERC) Compliance**

## 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***

# 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 20.5% based on 2022 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 |

# 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

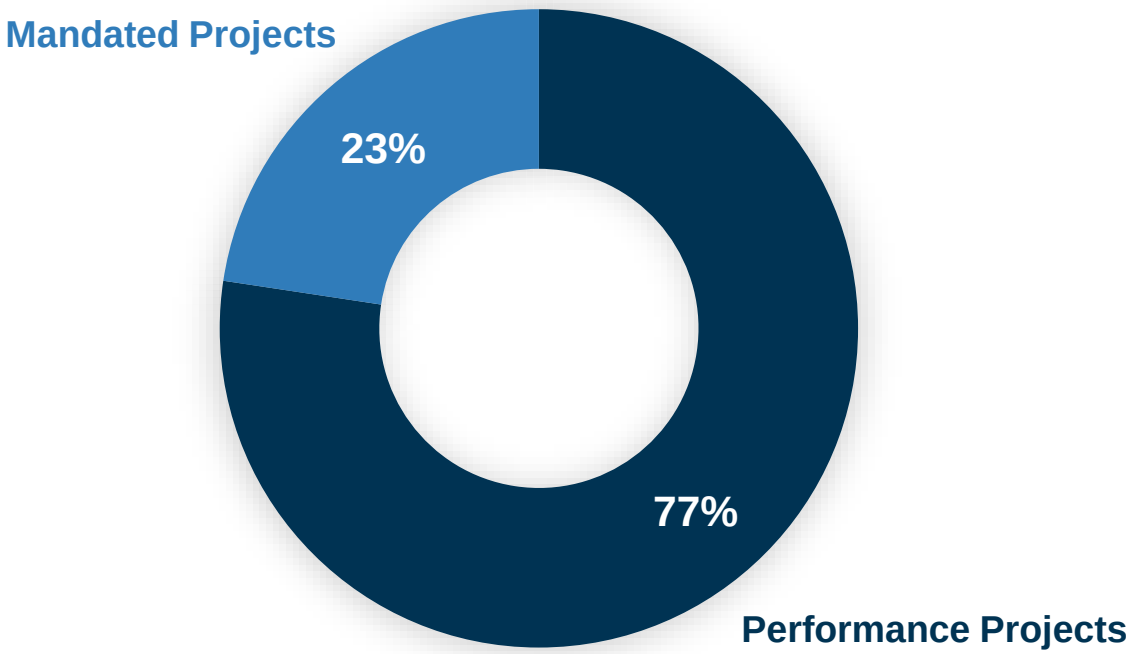
**Execution Plans Developed**

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***

# Transmission Project Categories

**Percentage of ~$2.25B 2023E-2027E Kansas Transmission Project Investment**
(% by Project Type)




**Generally, projects are prioritized between two distinct categories:**

1) **<u>Mandated</u>** - 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) **<u>Performance Projects:</u>**
   - 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<br>• Known design issues<br>• Level of congestion risk<br>• Future overload risk<br>• ~44% of total score<br><br>***Primary driver of prioritization*** | • Critical customers<br>• Mitigation of public impact risks<br>• ~13% of total score | • Reducing employee safety risk<br>• Improving workforce productivity<br>• ~21% of total score | • Implementing new strategic technologies (e.g., automation)<br>• Supporting a strategic initiative (e.g., conversion to standard voltages)<br>• ~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:

- 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

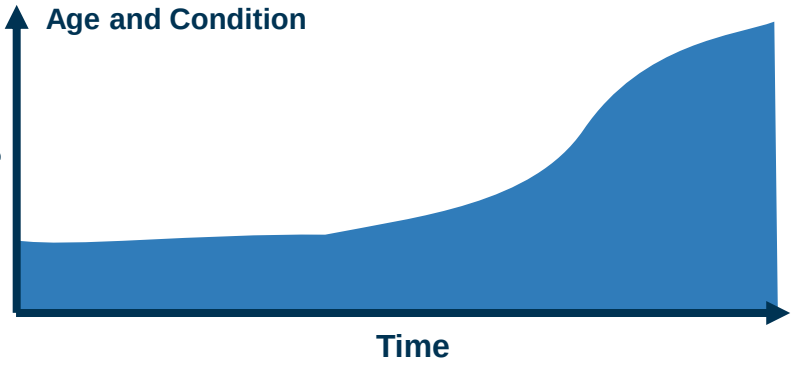
**Local Planning**

- Changes in generation mix requiring investment for stability and reliability

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

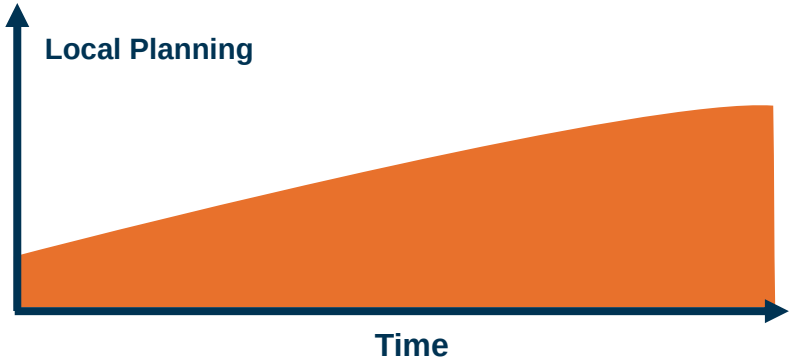
**Operational Issues**

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



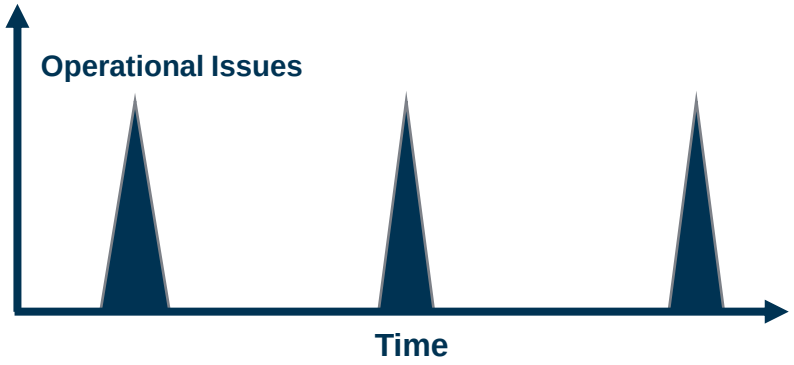

*Over time, assets age and become harder to maintain / restore in case of failure. There is no hard and fast rule for when an asset will fail – every asset is built differently / subject to different conditions*

**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 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

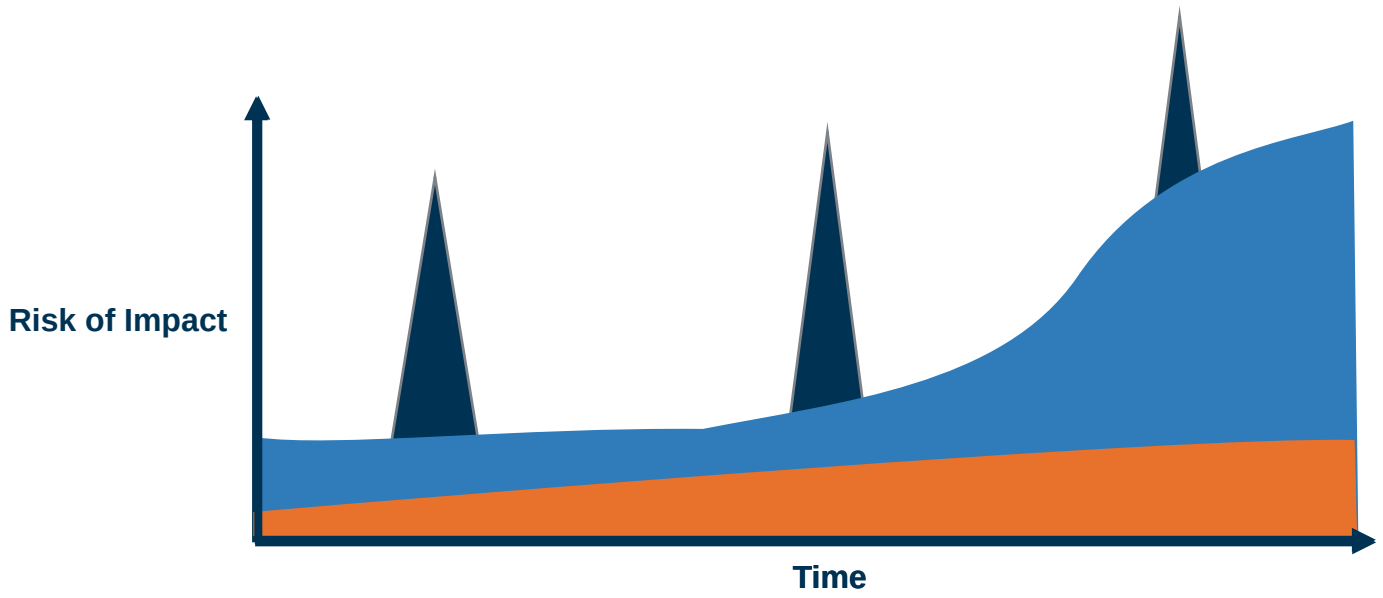
**Local Planning**

- 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.*




***Example:*** *One project included in this years' filing mitigates operational risk which could require load shed to manage certain contingent overloads (operational issues), but also replaces assets which exceed their useful life (age and condition) and prepares the system to serve future load growth (local planning)*

# Age and Condition

## *Ongoing Condition Assessments*

**Every Year**

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

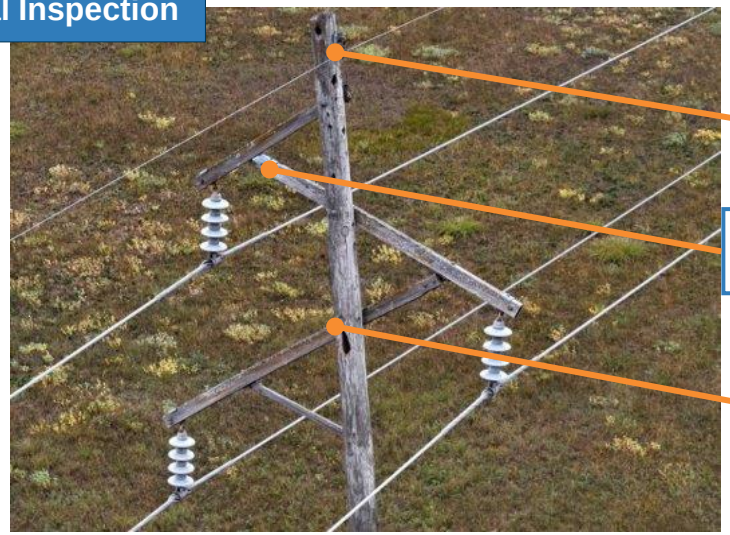
*Examples of external concerns include structural rust, rotted or splitting wood, and equipment discoloration*

**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**

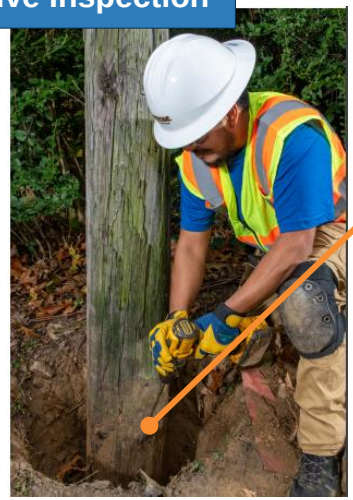


Pole top rotten

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

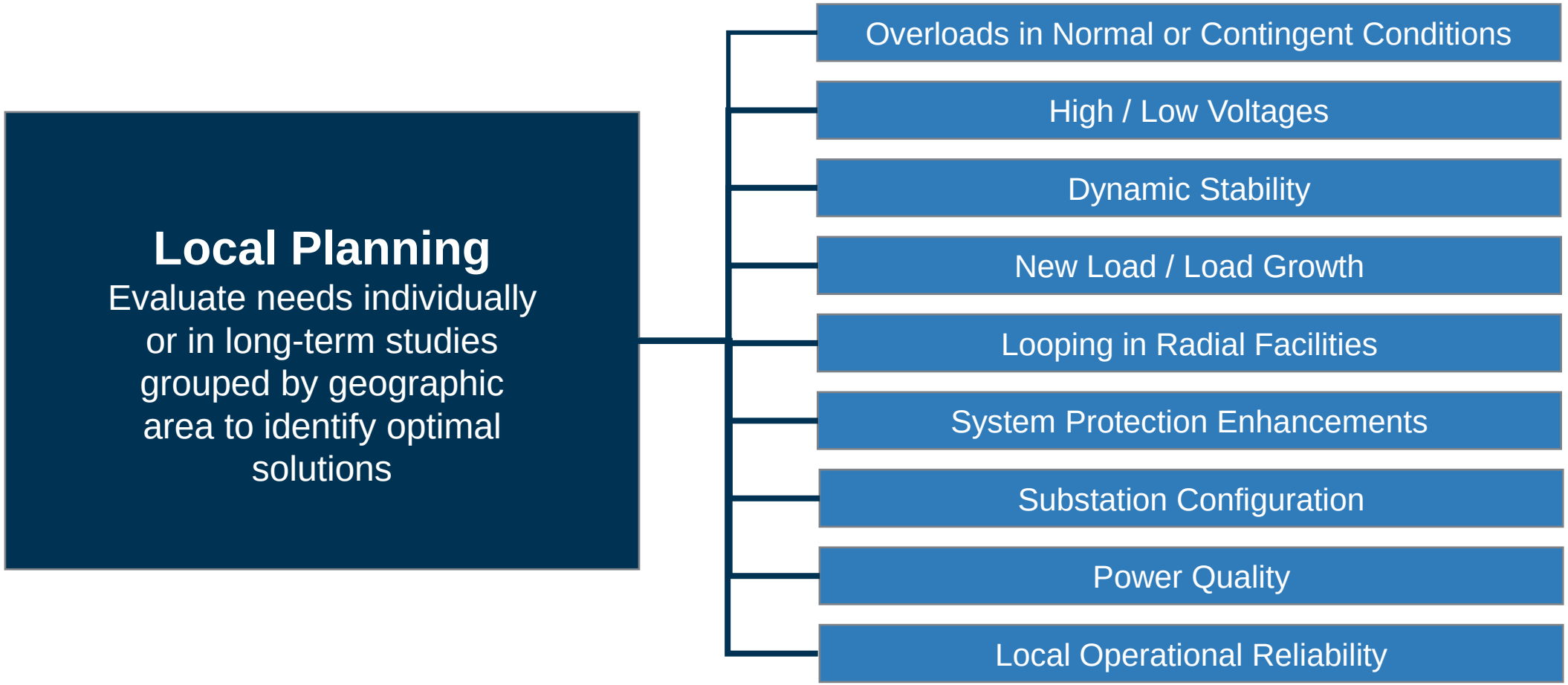
- The entire line is rebuilt, which can be motivated by many factors
- Examples could include the old age and poor condition of the entire line, but also area development or reliability concerns that require more capacity

*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***

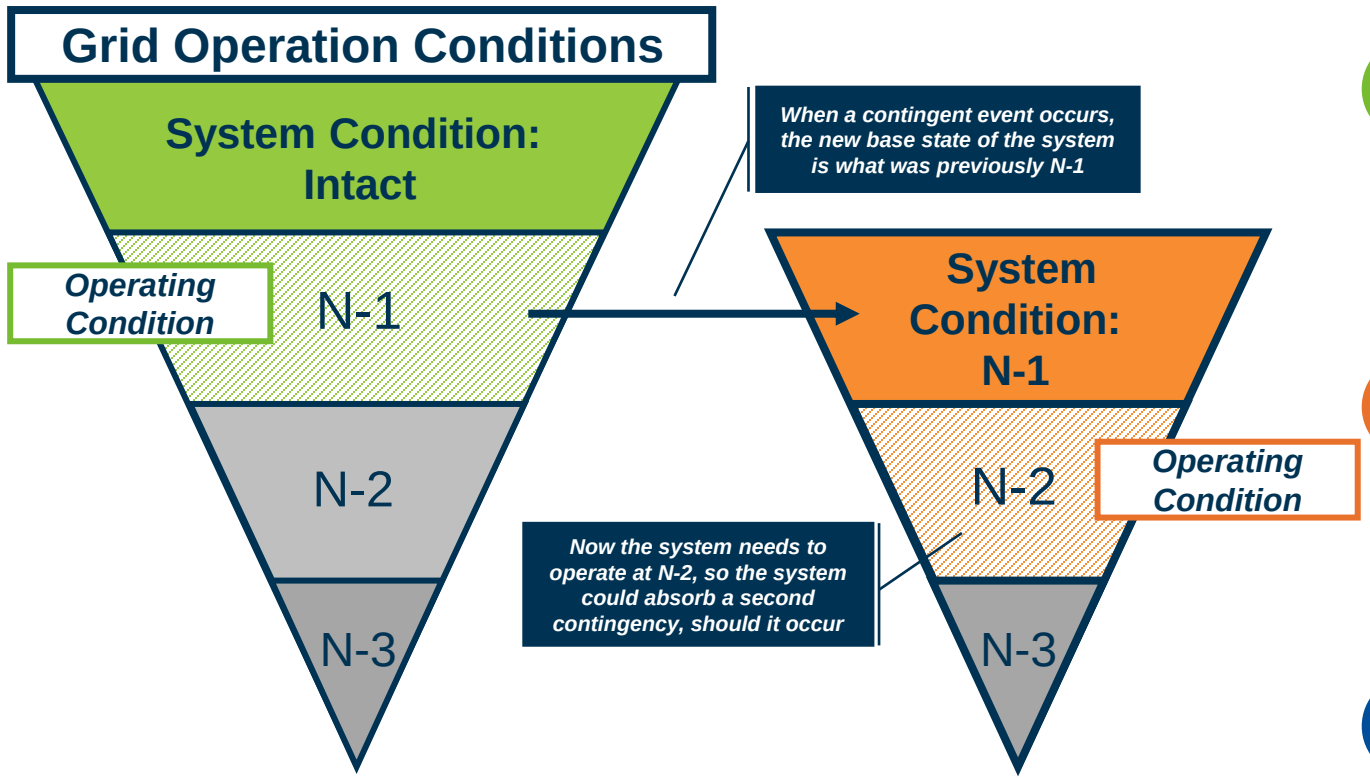
# Local Planning

*Overview and Types of Projects*



# Operational Issues

## *Overview and Types of Projects*




When planning for future transmission needs, all elements are assumed in-service in the base model. NERC requires the system to remain within criteria following any single contingency on the system, which is also referred to as N-1

During actual operations, the system is rarely intact. Evergy must continue to operate within limits, considering the potential loss of any element, N-2. These system adjustments are nearly constant as different events occur during real-time operations

Evergy evaluates the risk and likelihood of the loss of multiple elements (N-2 or greater) events when identifying potential projects to improve local operational reliability

# Project Details

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# Criteria for Project Inclusion

- Projects included in filing:
  - Within Evergy Kansas Central or Evergy Metro areas
  - Over $15M in transmission investment in Kansas
    - Included one project in Evergy Metro Missouri that will have >$15M investment allocated to KS
  - Expected in-service date in 2024 or 2025
- 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 Operations*

Evergy Kansas Metro | Evergy Kansas Central

| Project | Mandated – New Customer | Asset Age & Condition | Local Planning | Operational Issues |
|---|---|---|---|---|
| 345/115kV New Substation & Transmission Lines | X | | | |
| 161kV Rebuild | | X | X | |
| 138kV Line Conversion | | | X | X |
| 345/138kV & 138/69kV Substation Expansion | | | X | X |
| Substation Rebuild 69/12kV | | X | X | X |
| 115kV Substation Rebuild and Voltage Conversion from 69kV to 115kV & 138kV | | X | X | X |
| 115kV New Line Build | | X | X | X |
| 115kV Rebuild | | X | X | |
| Temporary Construction Power | X | | | |
| 115kV Substation Rebuild | X | | | |
| 345/115 kV Transformer Addition | X | | | |
| 115kV New Substation & 115kV Rebuild / Relocation | X | | | |
| Substation 345/115kV New Substation & Transmission Lines | X | | | |
| 138kV Line Rebuild with 34kV Underbuild | | X | | |
| 69kV Line Rebuild | | X | | |
| 161kV Rebuild | | X | | |
| 69 kV Rebuild and 138kV Conversion | | X | | X |
| 161-69kV Substation & New 161kV Line | | | X | X |
| Substation Rebuild | | | X | X |

# Execution of Prioritized Projects

## Engineering and Procurement

- Complete detailed engineering after project is included in budget
- Have issued requests for proposal on key materials to drive competition
- Index-based pricing for materials under alliance agreements
- Put construction of most projects out to bid to ensure market pricing

## Ongoing Management

- Internal Project Manager responsible for tracking project status and budget – construction completed by contractors
- Provide monthly cost updates versus budget and identify variance drivers for unexpected deviations
- Will adjust budget as needed based on these monthly reviews

Kansas Central

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | |
| Local Planning | X |
| Operational Issues | X |

# 138kV Line Conversion & 345-138kV and 138-69kV Substation Expansion (Related Projects)

- Purpose for both: Identified in 2016 study on area following past retirement of peaking resources. Allows additional 345-138kV path into load pocket and reduces the risk of manual load shed during high load periods.
- 138kV Line Conversion
  - TFR Spend: $45,587,783
  - Evergy Division: Wichita
  - Project Type: Upgrade
  - Vintage of Replaced Facilities: 1951
- 345-138kV and 138-69kV Substation Expansion
  - TFR Spend: $27,571,500
  - Evergy Division: Wichita
  - Project Type: New Build
  - Vintage of Replaced Facilities: N/A

# Substation Rebuild 69-12kV

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| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local Planning | X |
| Operational Issues | X |

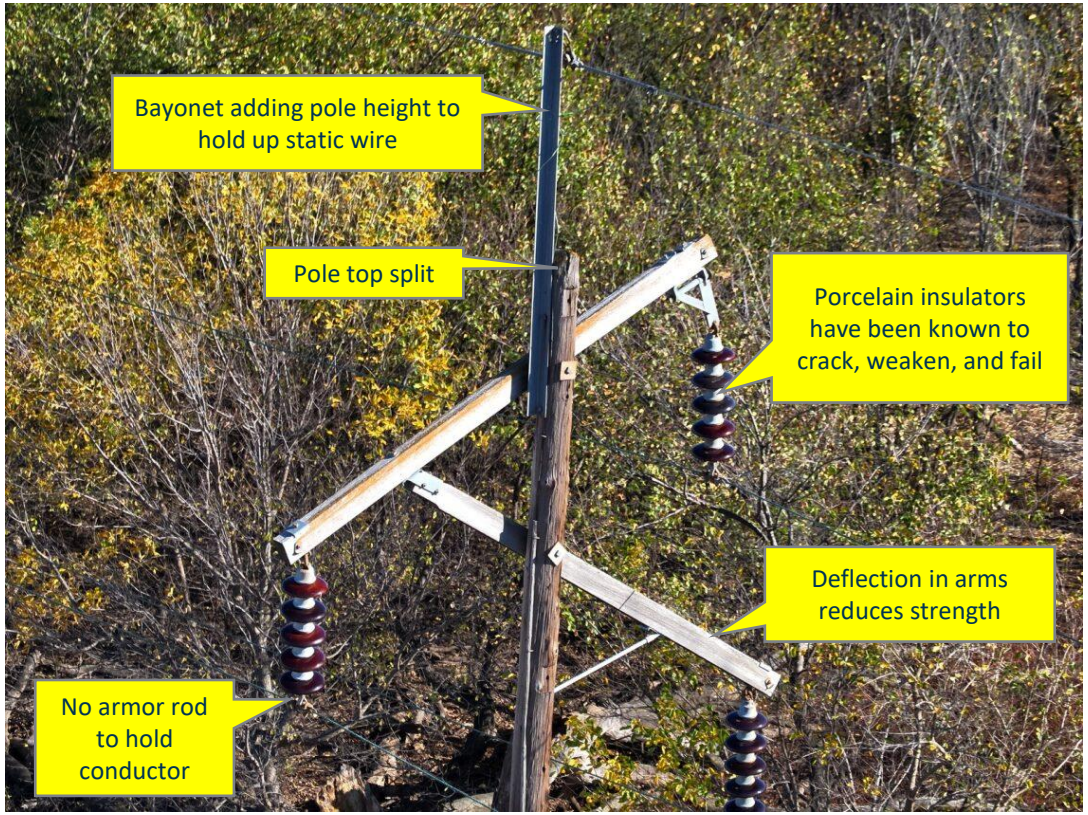
- Anticipated ISD: 12/31/25
- TFR Spend: $15,835,074
- Evergy Division: Wichita
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1958
- Purpose: Eliminate aged substation equipment and improve reliability, move substation out of church parking lot, and allow for normally closed operation of all four lines into substation.
  - Current configuration feeds substation from hard taps on two lines, preventing both lines from being closed in simultaneously and resulting in substation being fed radially
  - Lines feeding substation experienced five outages for over 67 hours between 2017 and 2020
  - Rebuilding to a higher reliability configuration that eliminates radial feed

Kansas Central

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local Planning | X |
| Operational Issues | X |

# 115kV New Line Build / 69kV Line Demo & 115kV Substation Rebuild & Voltage Conversion from 69kV to 115kV & 138kV (Related Projects)

- Purpose for both: Part of plan for improving infrastructure in the area. Consolidates load served from 69kV system to 115kV transmission path within the area and upgrades substations, allowing the retirement and dismantling of the aging 69kV infrastructure.
- 115kV New Line Build / 69kV Line Demo
  - TFR Spend: $13,524,589[1]
  - Evergy Division: Hutchinson
  - Project Type: Upgrade
  - Vintage of Replaced Facilities: 1946[2]
- 115kV Substation Rebuild & Voltage Conversion from 69kV to 115kV & 138kV
  - TFR Spend: $22,856,820
  - Evergy Division: Hutchinson
  - Project Type: Upgrade
  - Vintage of Replaced Facilities: 1965




[1] Included due to relationship with 115kV substation rebuild & voltage conversion
[2] While the filing states 1978 as the vintage of the line, it was discovered after submittal that the vintage of some portions of the line are 1946.

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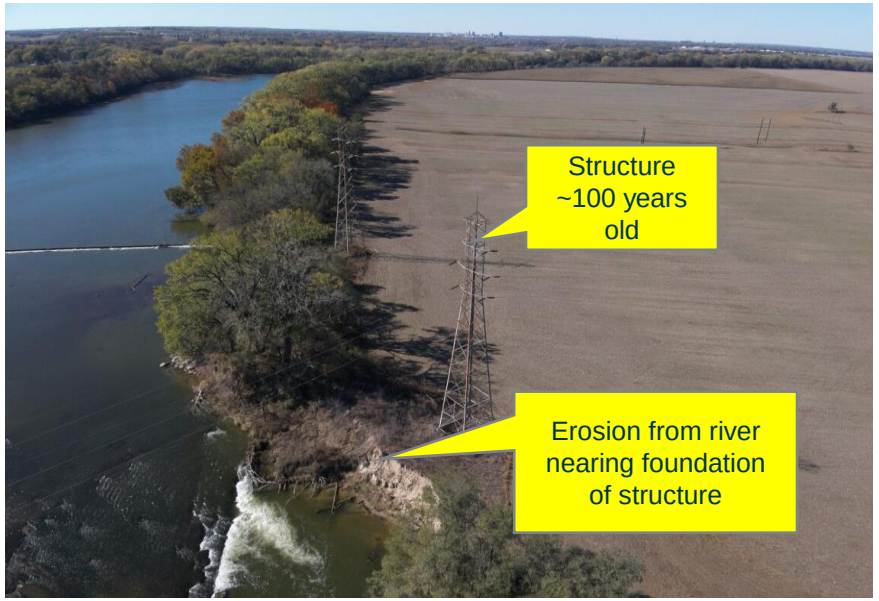
# 115kV Rebuild

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local Planning | X |
| Operational Issues | |

- TFR Spend: $24,278,394
- Evergy Division: Topeka
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1925
- Purpose: Removing multiple lines in area and rebuilding as 115kV. Increases overall transmission capacity in the area.



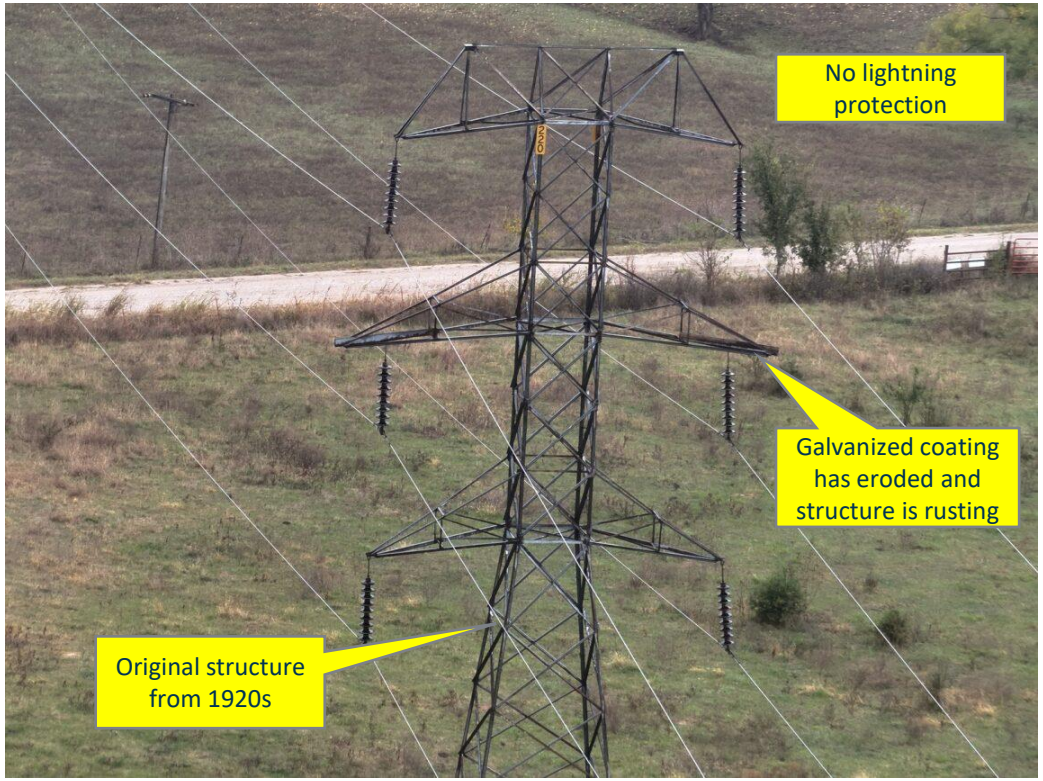


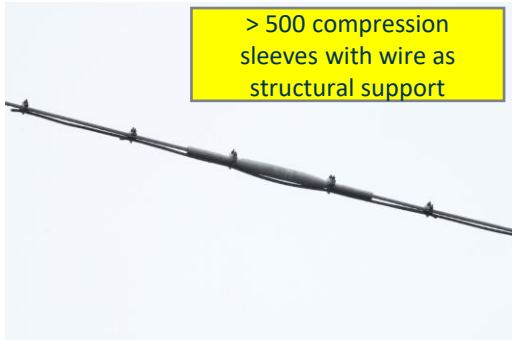
# 138kV Line Rebuild with 34kV Underbuild

Kansas Central

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local Planning | |
| Operational Issues | |

- TFR Spend: $65,008,778
- 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; line was out of service for over 2,220 hours from 2017-2023.



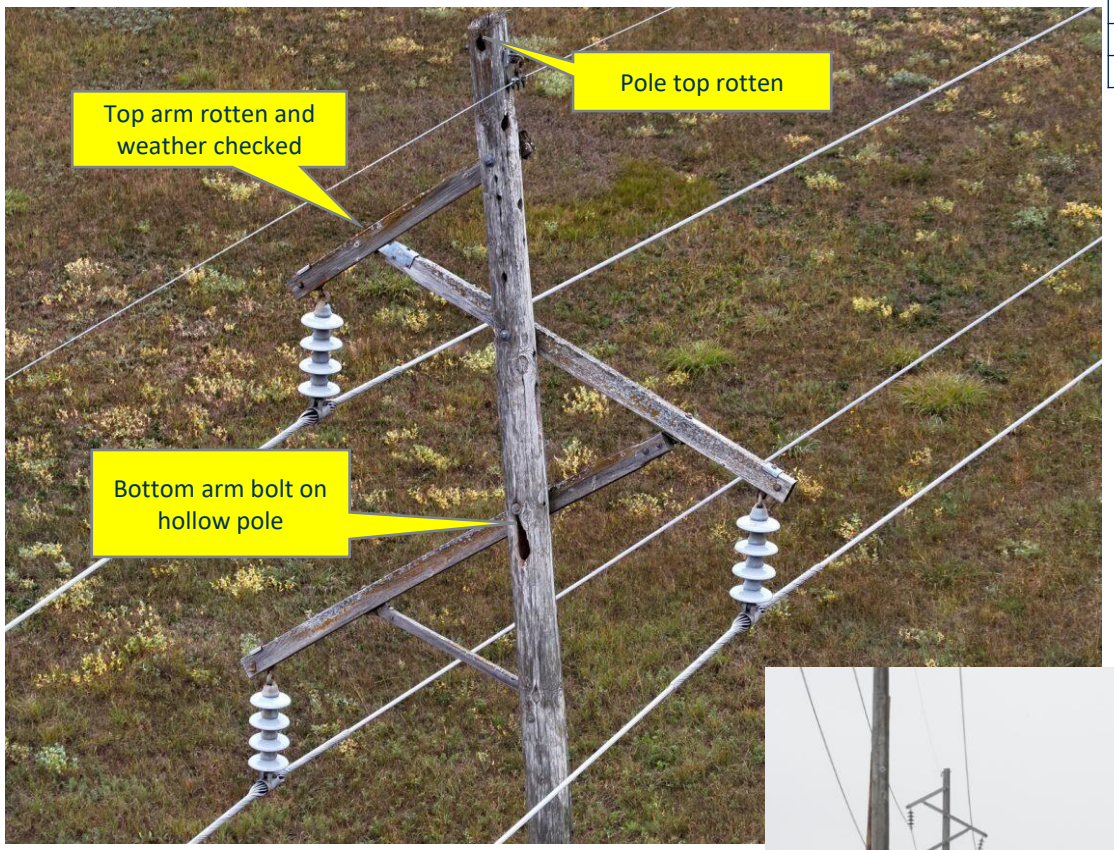




# 69kV Line Rebuild

Kansas Central

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local 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.

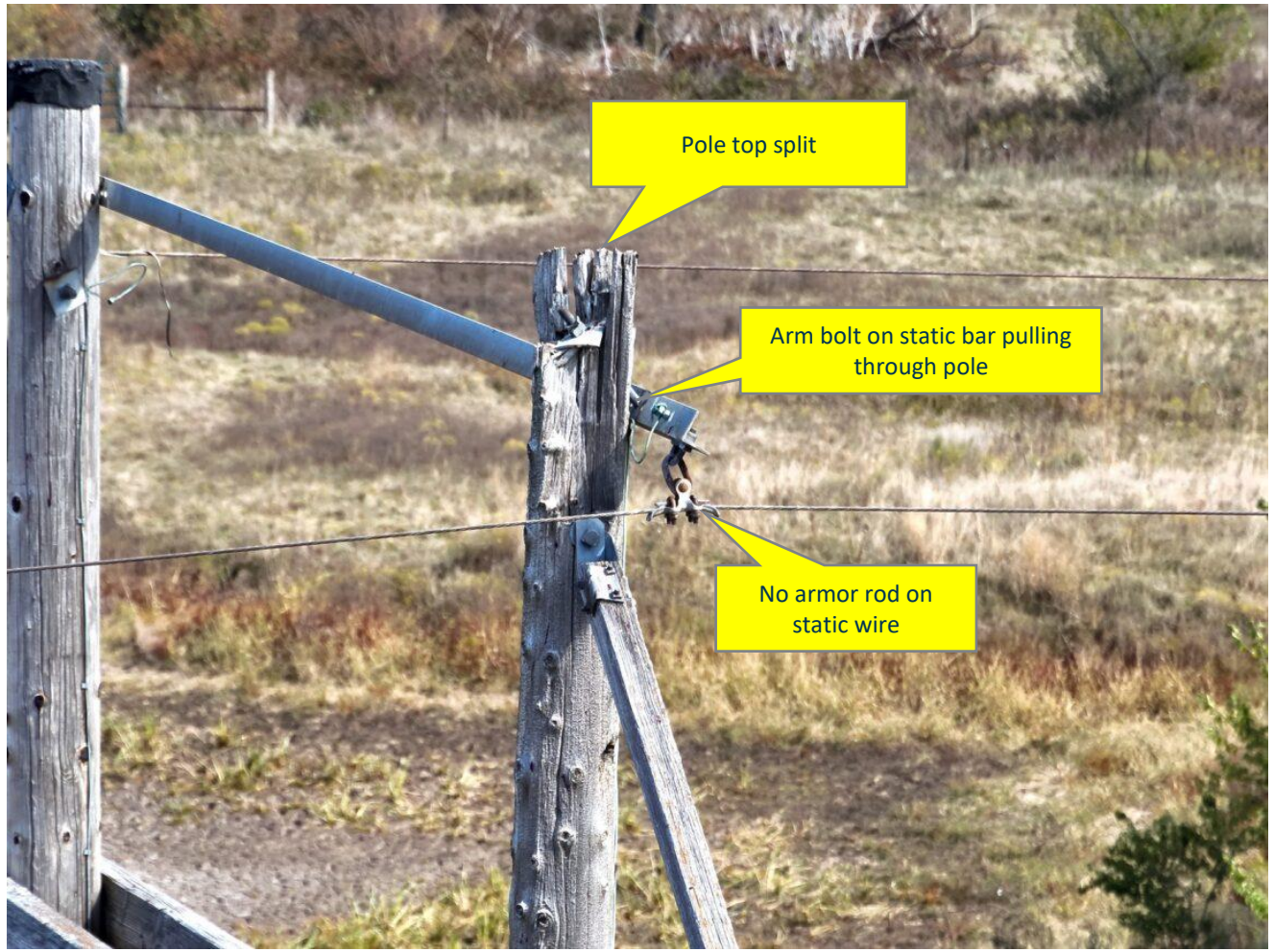



# 161kV Rebuild

Kansas Central

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local Planning | |
| Operational Issues | |

- TFR Spend: $43,524,516
- 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.



Kansas Central

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

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | |
| Local Planning | X |
| Operational Issues | X |

- TFR Spend: $23,696,951
- 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.

# Substation (Rebuild)

Kansas Central

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | |
| Local Planning | X |
| Operational Issues | X |

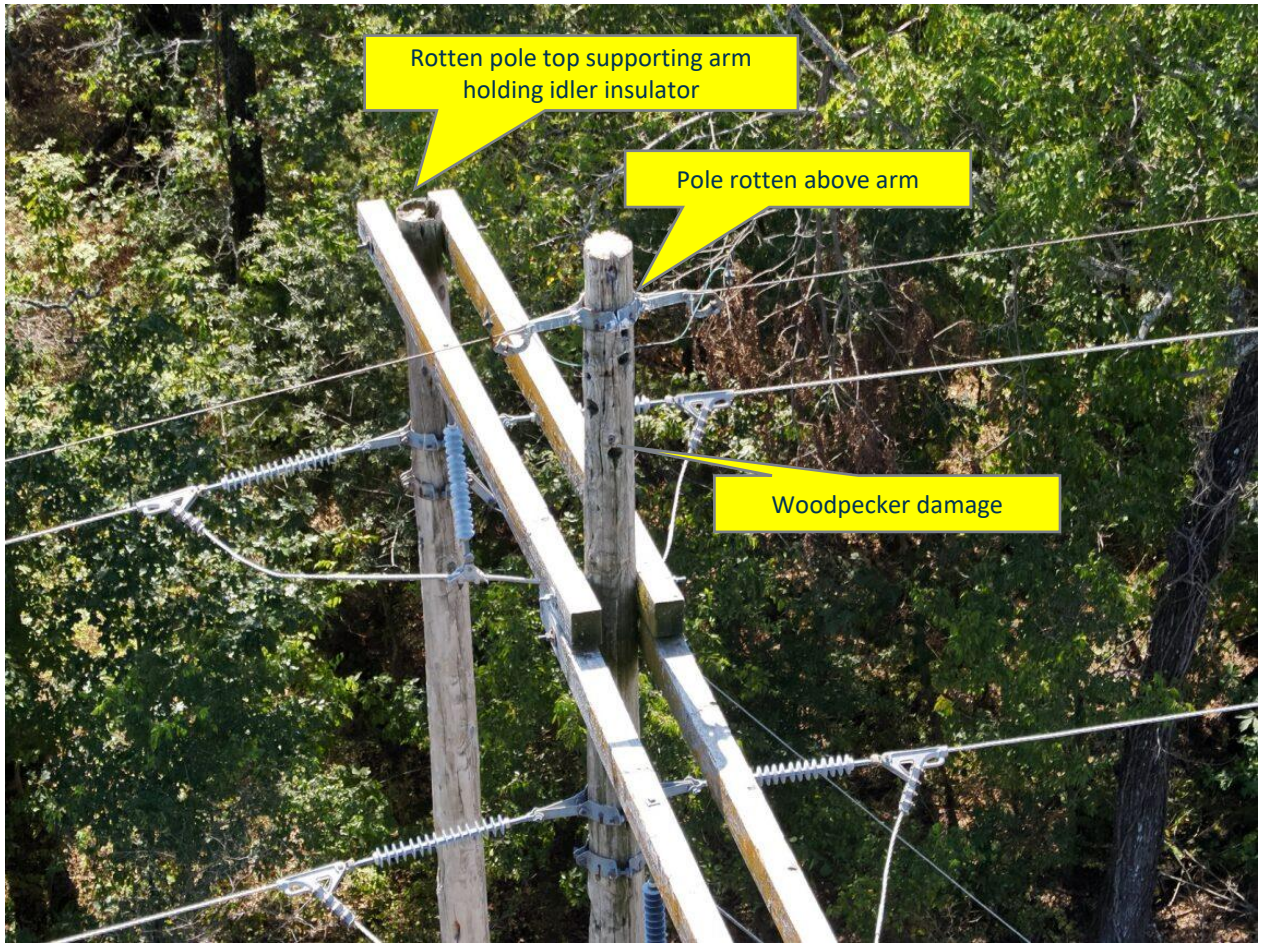
- TFR Spend: $14,831,824
- Evergy Division: Lawrence
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1974
- Purpose: Supports reliability inside the city. Breakers will be added to the substation to help with reliability.

# 69kV Rebuild & 138kV Conversion

Kansas Central

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local Planning | |
| Operational Issues | X |

- TFR Spend: $20,691,111
- Evergy Division: Independence
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1956
- Purpose: Rebuilding line due to age and condition to improve reliability. Operations sees contingency overload issues on the line when transformers in the area are out of service.



Metro

# 161kV River Crossing Rebuild[1]

| | |
|---|---|
| Mandated – New Customer | |
| Asset Age & Condition | X |
| Local Planning | X |
| Operational Issues | |

- TFR Spend[2]: $32,788,497
- Evergy Division: Metro MO
- Project Type: Upgrade
- Vintage of Replaced Facilities: 1955
- Purpose: The conductor was identified as needing to be upgraded due to load growth in the area. The structures on the river crossing experience additional wear and tear due to proximity to the river. It is currently a triple-circuit crossing but will be rebuilt as double-circuit following the retirement of a 69kV line.

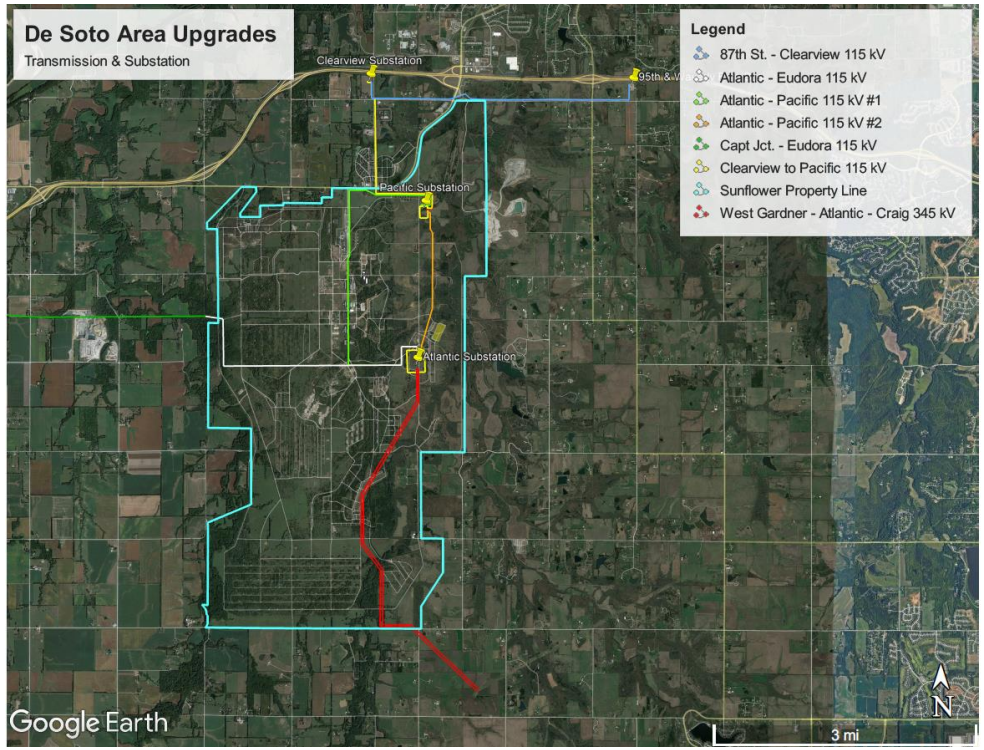


[1] The anticipated ISD of the project is expected to be deferred beyond 2025 through the ongoing budget and planning process
[2] TFR spend includes total project cost; KS portion will be allocated based on Demand Allocator

# New Load Related Projects around De Soto, KS

| | |
|---|---|
| Mandated – New Customer | X |
| Asset Age & Condition | |
| Local Planning | |
| Operational Issues | |

| Project Name | TFR Spend (Includes 34kV) | Evergy Division | Project Type | Purpose |
|---|---|---|---|---|
| Panasonic Temp Construction Power | $420,888 | Shawnee | New Build | Infrastructure needed to serve new load. |
| 95th & Waverly 115kV Substation Rebuild | $5,129,036 | Shawnee | New Build | Infrastructure needed to serve load growth in the area. |
| 87th Street 345/115 kV Transformer Addition | $9,929,983 | Shawnee | New Build | Infrastructure needed to serve load growth in the area. May be receiving NTC from SPP for project. |
| Pacific 115kV New Substation, 87th St. - Clearview - Pacific 115kV Rebuild / Relocation | $46,366,623 | Shawnee | New Build | Infrastructure needed to serve load growth in the area. |
| Atlantic Substation 345/115kV New Substation & Transmission Lines | $86,406,971 | Shawnee | New Build | Infrastructure needed to serve load growth in the area. May be receiving NTC from SPP for project. |
| Atlantic Substation 345/115kV New Substation & Transmission Lines | $28,709,420* | 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. May be receiving NTC from SPP for project. |




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

# Questions?

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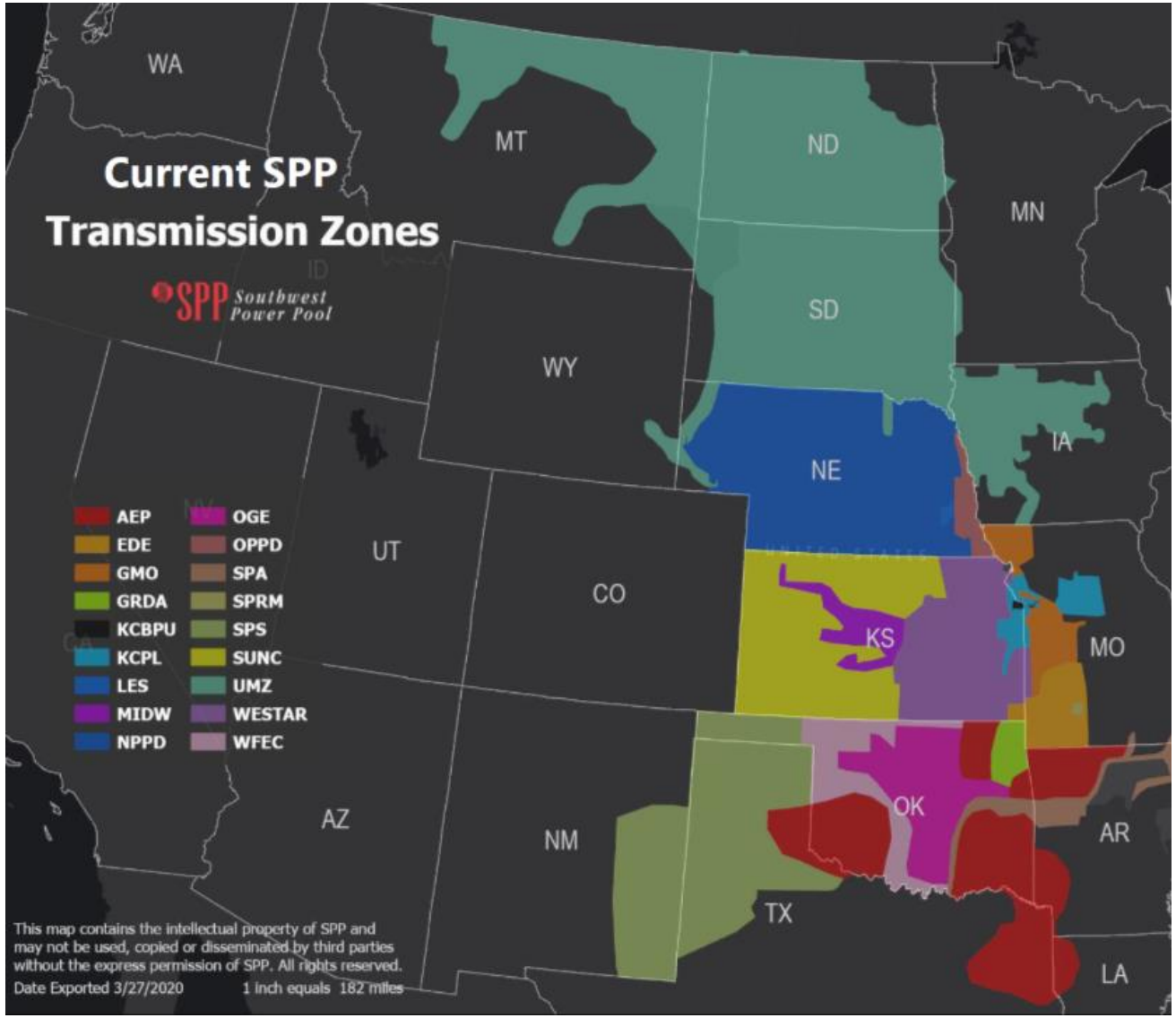
# Appendix

# SPP Zones




**Southwest Power Pool, Inc.**
**Regional and Zonal Transmission System Peak Loads (MW)**
**Calendar Year 2022**

| Zone | Utility | Total Region Zones 1 - 19 w/o FSE | |
|---|---|---|---|
| 1 | American Electric Power-West | 19.722% | |
| 2 | Kansas City Board of Public Util | 0.891% | |
| 3 | City Utilities of Springfield, MO | 1.288% | |
| 4 | Empire District Electric Co | 2.304% | |
| 5 | Grand River Dam Authority | 1.899% | |
| 6 | Evergy Metro, Inc. | 7.135% | |
| 7 | Oklahoma Gas & Electric Co | 13.104% | |
| 8 | Midwest Energy, Inc. | 0.725% | |
| 9 | Evergy Missouri West, Inc. | 3.765% | |
| 10 | Southwestern Power Admin | 0.754% | |
| 11 | Southwestern Public Service | 10.924% | |
| 12 | Sunflower Electric Power Corp | 2.117% | |
| 13 | Western Farmers Electric Coop | 3.483% | |
| 14 | Evergy Kansas Central, Inc. | 9.628% | |
| **15** | **Reserved for Future Use** | - | |
| 16 | Lincoln Electric System | 1.423% | |
| 17 | Nebraska Public Power District | 6.340% | |
| 18 | Omaha Public Power District | 4.968% | |
| 19 | Upper Missouri Zone | 9.531% | w/o FSE; 12.482% with FSE |



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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)