



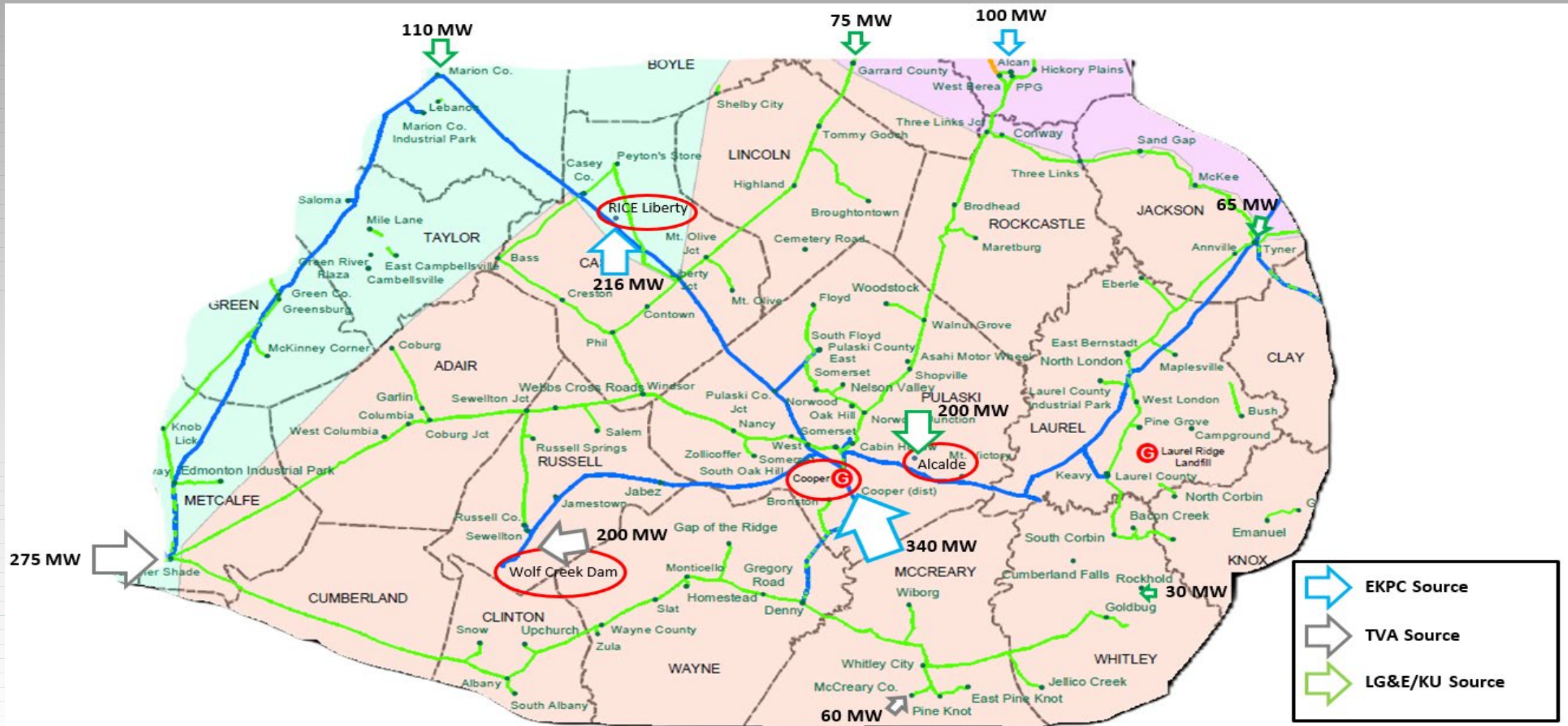
Cooper Generation Unavailability Transmission Analysis

June 5th, 2024

Cooper Area Sources

- **Four Main Sources for Somerset – Area Load Center:**
 - Cooper Plant (EKPC)
 - Liberty RICE (EKPC)
 - Alcalde 345/161 kV Substation (LGE/KU)
 - Wolf Creek-Russell County-Cooper 161 kV Line (EKPC-TVA)

Cooper Area Sources Map – Approx. Peak Contribution of Sources



Cooper Unavailability Impact

- Leaves only three main sources into area to serve demand normally
- EKPC contingency analysis identifies diminishing voltage in area
 - Amplified by generation outages/reduced output at any of area sources:
 - Liberty RICE
 - LGE/KU's E.W. Brown Plant
 - USACE Wolf Creek Dam
- PJM likely to identify criteria violations if Cooper is not available
- Real-time operational concerns
 - RICE generation is EKPC's only generation resource available for area
 - Generation outages/reduced output at Liberty RICE, E.W. Brown and/or Wolf Creek Dam would further erode system strength

Study Approach and Considerations

Define the Study Area



- Reduced the area considered to limit immense data parsing.
- Focus on areas likely to be directly impacted by the loss of Cooper 1&2.

Observe Impacts

- With these system configurations in place we want to consider EKPC and PJM planning criteria to establish a baseline of the system today with these assumed changes.

Provide Support and Enhance

- Develop alternatives to provide system support and improve load serving ability.

Baseline Results

- Initial results showed there is no immediate impact to the study area due to the retirement of Cooper 1&2 along with the RICE installation at the Liberty site.

Area	Total Service Points	Total Load 2033W 50/50	Total Load 2033W 90/10	Diff	Winter Storm Elliott*	Winter Storm Gary*
EKPC	90	906.7	1026.9	120.2	1026.0	1000.6
TVA	9	144.7	144.7	0.0	150.7	150.2
LG&E/KU	41	261.1	281.5	20.4	266.6	306.4
Totals	140	1312.5	1453.1	140.6	1443.2	1457.2

* Adjusted – represents system actuals for existing loads and adds in assumed model loads in the area

Alternatives Considered

- Alternative 1 – Install a 53 MVAR capacitor bank at the Cooper 69kV station.
- Alternative 2 – Construct a 26 miles 161kV line from McCreary Co – Cooper.
- Alternative 3 – Construct a 48 mile 345kV line from West Garrard – Cooper.
- Alternative 3b – Construct a 48 mile 161kV line from West Garrard – Cooper.
- Alternative 4 – Construct a 29 mile 345kV line from West Garrard – Liberty Jct.
- Alternative 5 – Construct a 5 mile 345kV line from KU Alcalde – Cooper.
- Alternative 6 – Construct a 29 mile 161kV line from Wayne Co - Cooper

Performance Summary – Load Serving Ability

Alt	Total EKPC MW Added 50/50	% Scaled Above Base
Base	216.4	24%
Alt. 1 - 53 MVAR Capacitor Bank @ Cooper 69kV	288.5	32%
Alt. 2 - 26 mile 161kV line from McCreary County to Cooper.	342.6	38%
Alt. 3 - 48 mile 345kV line from West Garrard to Cooper.	405.7	45%
Alt. 3b - 48 mile 161kV line from West Garrard to Cooper.	351.6	39%
Alt. 4 - 29 mile line from West Garrard to Liberty Jct.	225.4	25%
Alt. 5 - 5 mile 345kV line from KU Alcalde to Cooper.	405.7	45%
Alt. 6 - 29 mile 161 kV line from Wayne County to Cooper.	333.5	37%

Further Evaluation on Reduced List

Alternative	EKPC In-service Year Construction Cost with contingency	Net Present Value
Alt. 2 - Construct a 26 mile 161kV line from McCreary County to Cooper.	\$38,367,663	\$51,721,286
Alt. 5 - Construct a 5 mile 345kV line from KU Alcalde to Cooper.	\$69,002,499	\$56,651,891
Alt. 6 - Construct a 29 mile 161 kV line from Wayne County to Cooper.	\$42,464,494	\$57,576,349

Alternative	Total EKPC Added	Overall \$/MW	Increase above Base	\$/MW Increase
Alt. 2 - Construct a 26 mile 161kV line from McCreary County to Cooper.	342.6	\$112,001	126.2	\$304,045
Alt. 5 - Construct a 5 mile 345kV line from KU Alcalde to Cooper.	405.7	\$170,085	189.3	\$364,474
Alt. 6 - Construct a 29 mile 161 kV line from Wayne County to Cooper.	333.5	\$127,312	117.2	\$362,413

SME Team Recommendation

Alternative 5:

Construct a 5 mile 345kV line from KU Alcalde – Cooper.

Initial Capital Construction Cost (2033\$) – \$69,003,000

Rationale:

Provides EKPC the best ability to serve additional load in the area around Cooper when considering retirement of Cooper Generation. Introduces a 345kV source into the area with capabilities to expand 345kV into the southern portion of the EKPC transmission system.

This solution is a significant investment into the LG&E/KU transmission system with ~45% of the ISY cost is associated with substation work at KU Alcalde substation.



Questions and Discussion