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KIT CARSON ELECTRIC COOPERATIVE

Resilience-Focused Microgrid and Spatial Risk Analysis

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PROJECT OVERVIEW



- **Goal:** Support Kit Carson Electric Coop (KCEC) in prioritizing storage-enabled microgrids that strengthen resilience and continuity of electric service.
- **Current Practice:** KCEC has some energy storage projects, but resilience investment decisions are often based on fragmented information about wildfire exposure, outages, and community consequence.
- **Why SNL:** energy storage-based resilience analytics, wildfire risk, and spatial decision-support
- **Innovation:** : feeder-zone-based resilience analytics framework that integrates wildfire exposure, outage history, critical infrastructure, and vulnerable population data into decision-support metrics for microgrid and storage investment prioritization.
- **Duration:** FY25-FY26
- **Impact:** Supports **affordable, reliable, and secure electricity** by improving how resilience investments are prioritized
- **Investment Area:** Analytics/Grid Integration and Field Validation
- Strategic alignment:
 - **Stabilize:** addressing acute reliability and safety risks associated with wildfire and outages
 - **Optimize:** improving planning decisions through integrated analytics and risk-informed prioritization
 - **Grow:** enabling future-ready microgrid and storage deployment through scalable planning methods

PROBLEM AND APPROACH: DATA-DRIVEN RESILIENCE SCREENING ACROSS THE SERVICE TERRITORY



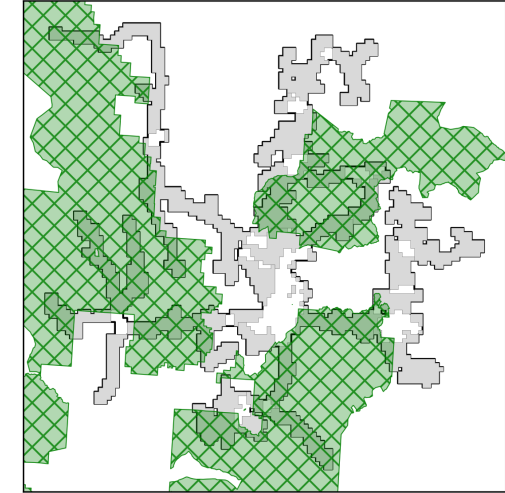
- **Problem**

- KCEC serves a large rural service territory with:
 - wildfire exposure
 - long feeders
 - difficult access
 - dispersed critical infrastructure and vulnerable populations

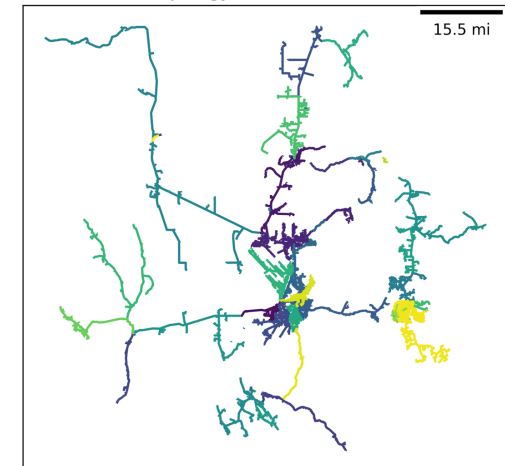
- **Solution**

- Use energy storage to minimize outage impacts
 - Planned outages
 - Maintenance
 - Possible Public Safety Power Shutoff (PSPS) near zones with high fire risk
 - Unplanned outages

Service Area National Forests



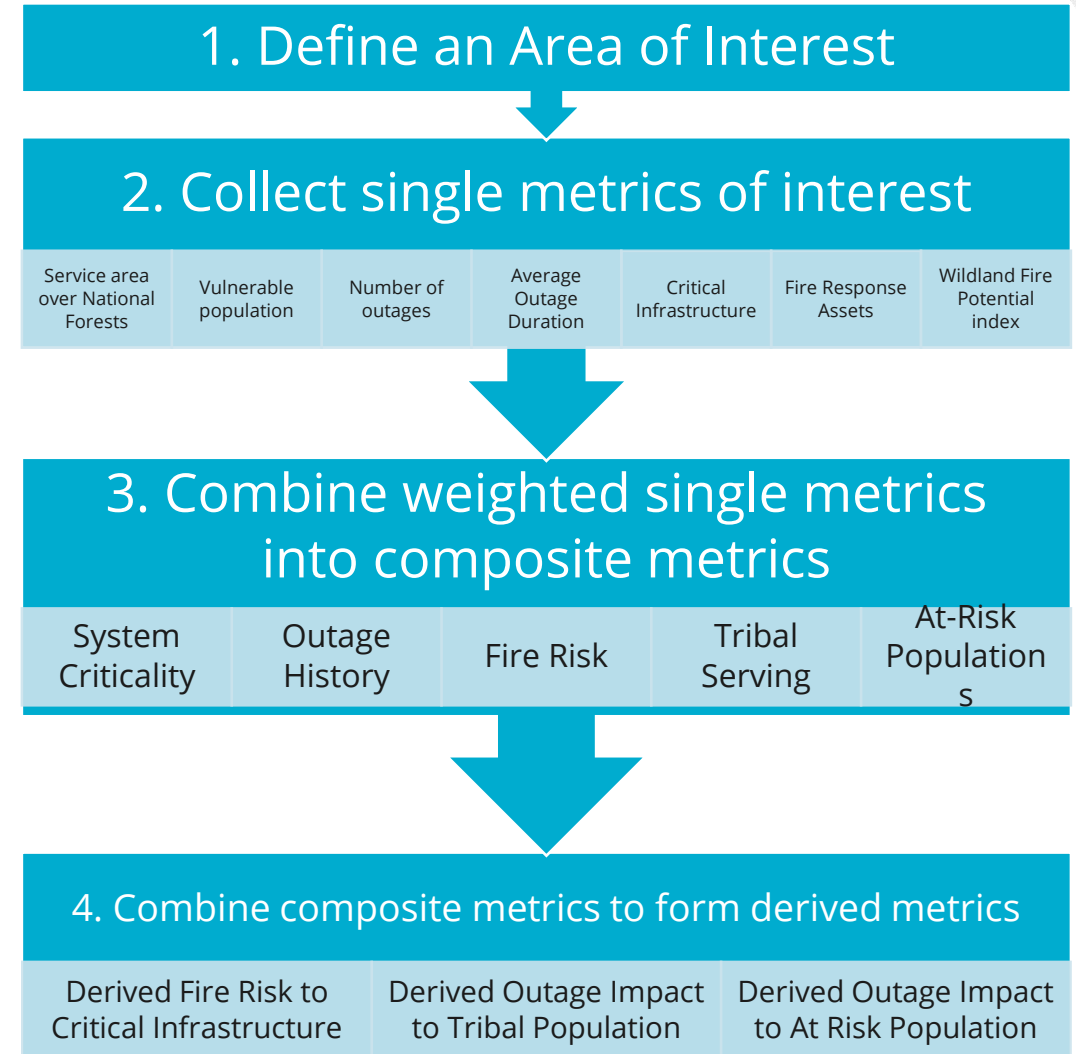
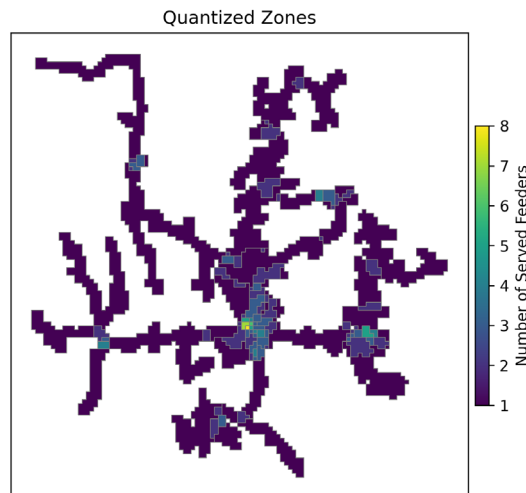
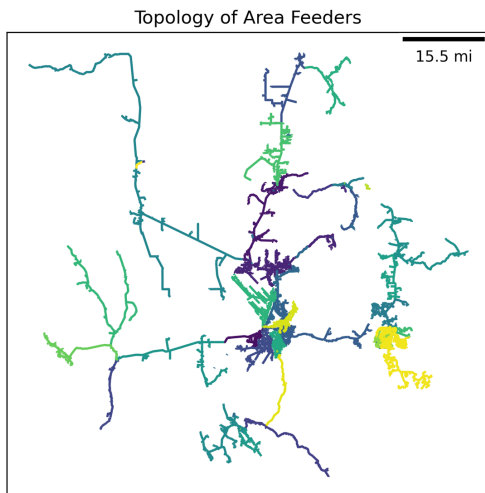
Topology of Area Feeders



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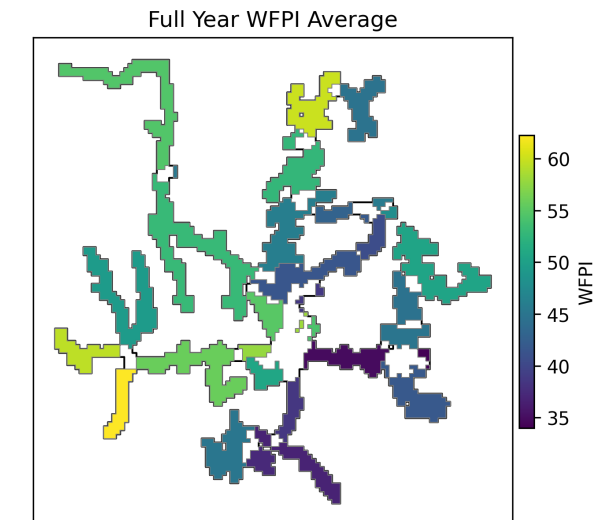
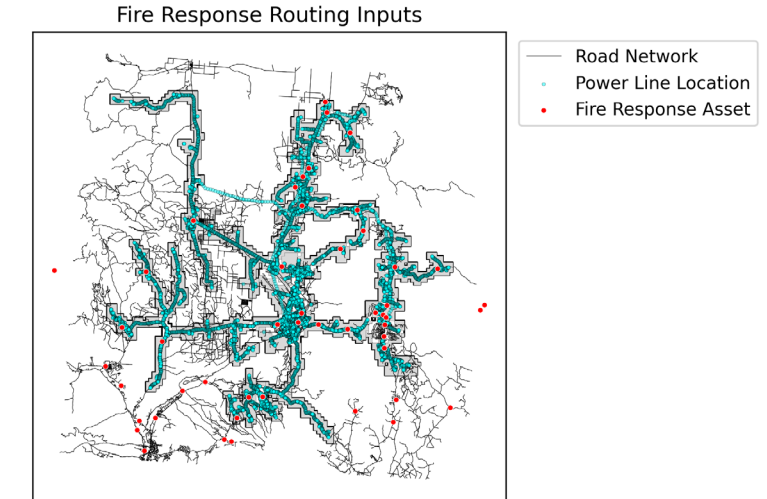
- Partitioned the system into **34 single-feeder zones**
 - More than 29,000 customers over 5,000 square miles
 - More than 5,500 miles of power lines
- Combine metrics to support siting of storage-enabled microgrids



RESULTS: IDENTIFYING ZONES OF ELEVATED HAZARD AND RESILIENCE CONSEQUENCE



- **Composite metric example: Fire Risk**
 - captures wildfire-related exposure across feeder zones
- **Derived metric example: Fire Risk to Critical Infrastructure**
 - Wildland Fire Potential Index (WFPI), Road network, and National Forest Areas
 - combines hazard exposure with consequence
- **Key result:**
 - the framework distinguishes between:
 - areas with elevated hazard, and
 - areas where elevated hazard overlaps with higher consequence to electric service and community assets\
- This supports more focused resilience planning



RESULTS: EXISTING MICROGRID RANKINGS OF NOTE

- Two zones were part of ANL microgrid analysis

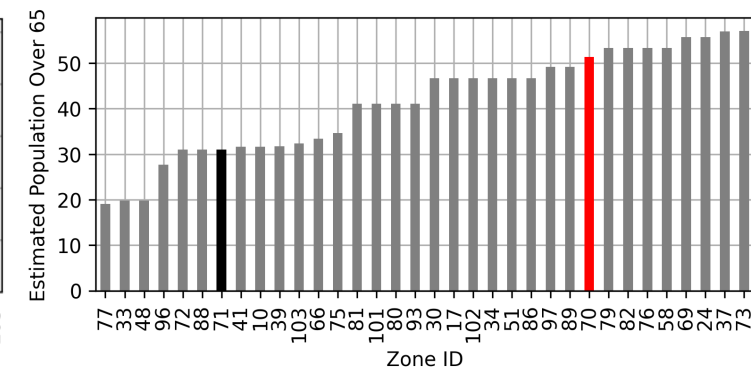
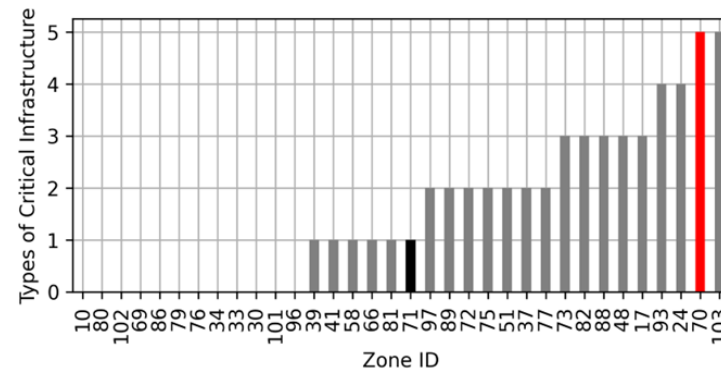
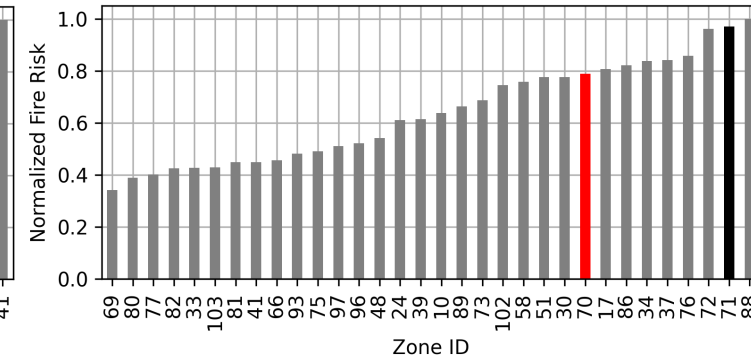
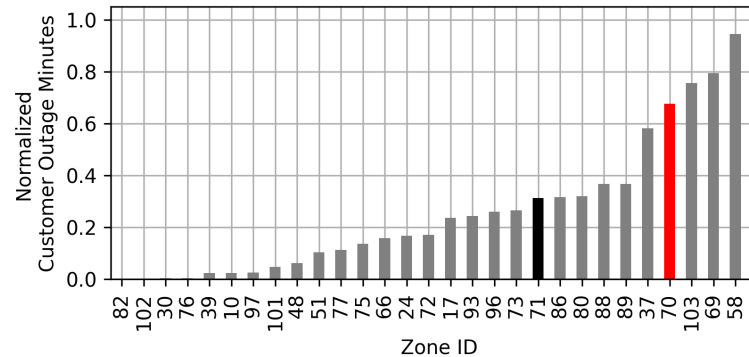
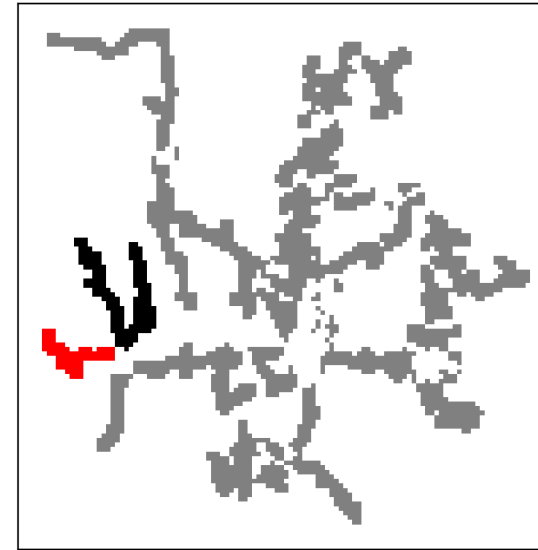
- 'Red' Feeder

- High customer outage minutes and fire risk
- Many types of critical infrastructure
- Estimated 50% over age 65 (18% national average)

- 'Black' Feeder

- ~50% less outage minutes than red feeder
- 2nd Highest fire risk zone
- Estimated 30% over 65 years old

Feeders Connected to Microgrid



CONCLUSIONS, IMPACT, AND NEXT STEPS

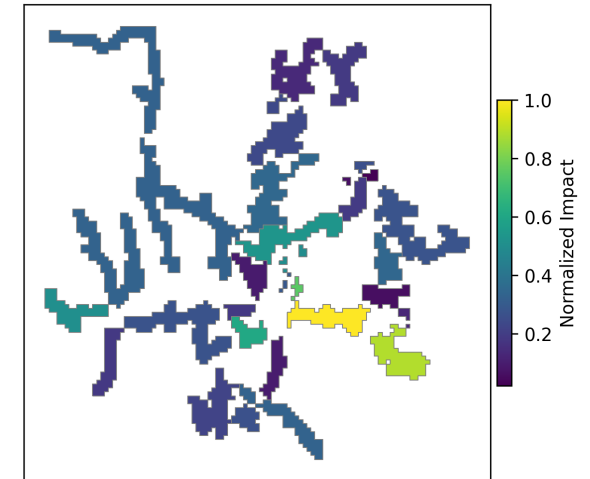
- **Conclusions**

- Transparent and adaptable framework for resilience-oriented screening of KCEC's service area
- Heterogeneous spatial and operational data into planning metrics that are actionable

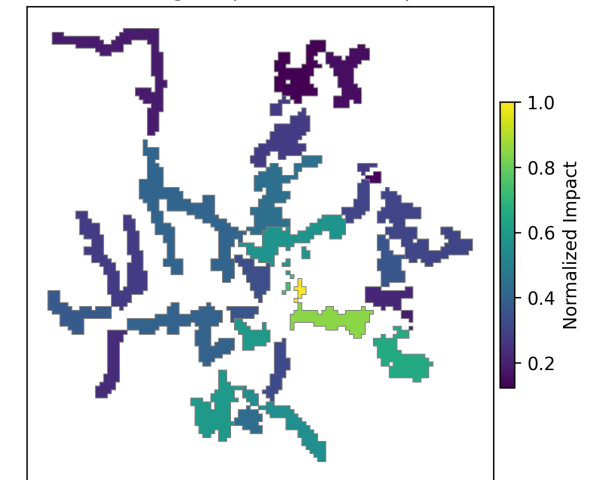
- **Impact**

- Supports **affordable, reliable, and secure electricity** by improving how resilience investments are prioritized
- Helps identify where storage-enabled microgrids may provide higher value for:
 - continuity of service
 - critical infrastructure support
 - wildfire and outage risk mitigation
- Provides a planning approach that can be adapted to other rural and hazard-exposed utility systems

Composite Outage Impact



Derived Outage Impact to Tribal Population



ACKNOWLEDGEMENTS

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