



Non-Wire Alternatives: Challenges and Opportunities

Creating sustainable value for all

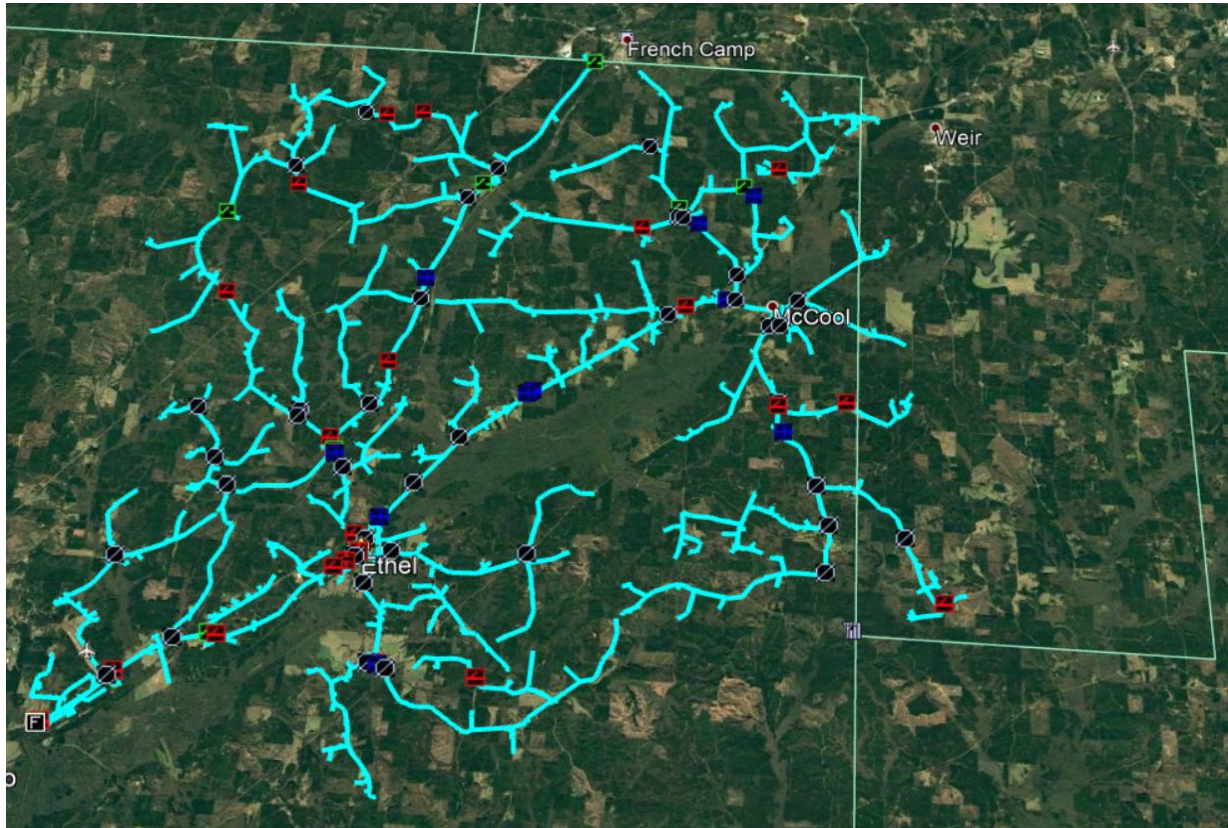


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Overview

- Non-wire alternatives have increasingly become an area of focus
 - Distribution use-cases focus on reliability solutions, often when paired with solar resources
 - Transmission use cases focus on applications that involve
 - Sustainability vs Resiliency
- Challenges:
 - Ensuring value-stacking is understood properly
 - Cost
 - Operations and control

Typical Distribution Use Case

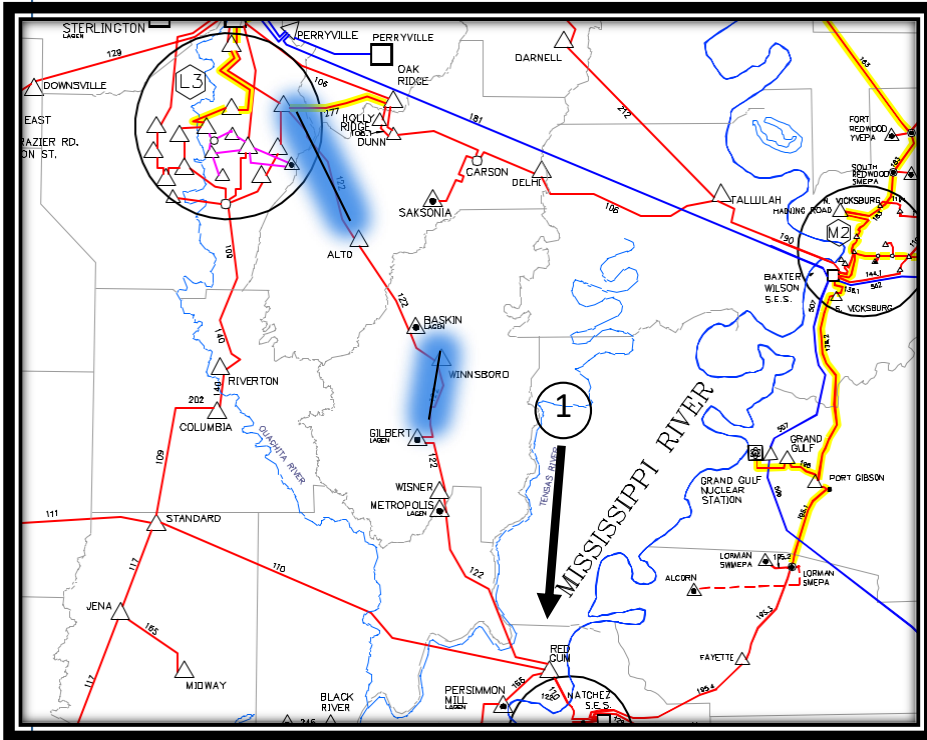


Project Driver : Distribution Reliability

Zone Type	Composite CI	Interrupt		Duration		Impact			Multi-Interrupt		Long Duration		Customer
		SAIFI	MAIFI	SAIDI	ASAI x1k	CAIFI	CAIDI	CTAIDI	CEMI_3	CEMI_5	CELID_4	CELID_8	
	-8.02	6.78	0.14	1825.74	996.53	0.00	269.33	0.00	1.00	0.70	0.88	0.74	
Feeder	-8.02	6.78	0.14	1825.74	996.53	0.00	269.33	0.00	1.00	0.70	0.88	0.74	

Typical Transmission Use Case

- Typical transmission use cases:
 - Applications that involve thermal overloads/voltage constraints that are forecasted to be observed for a few hours only
 - Another common use-case has been P6 contingencies that involve multiple contingencies
 - Incorporation of black-start and other such resiliency use-cases remains an important consideration
 - Ability to capture energy and ancillary market revenues is another important value driver



Resiliency vs Sustainability

Both sustainability and resiliency are becoming important factors

- Resiliency favors technologies that allow parts of the system to:
 - black-start and
 - Restore power following a broader area outage
 - Often involves on-site fuel and other capabilities to black-start auxiliary load of generating resources

- Sustainability goals make it challenging to replace a wire solution with a non-wire alternative that is not carbon-efficient
 - Energy storage solutions lend themselves particularly well to meeting both resiliency and sustainability goals

Challenges

Factors that challenge the implementation of NWAs:

- Ensuring value stacking does not erode primary use-case effectiveness and life expectancy
 - Use cases that involve more frequent charge-discharge cycles for the battery will erode expected battery life quicker
- Cost
 - Assumes a particular usage profile
 - Assumes a certain replacement timeframe
 - All-in lifetime costs are still a challenge vis-à-vis the wire solution
- Operations and control
 - Use of non-traditional solutions to transmission and distribution constraints may involve integration with SCADA and advanced controls