PUBLISHED ARTICLE

Mitigating Wildfire Risks:

System Hardening Strategies for Fire Flashover Prevention

INTRODUCTION

Wildfires have increased over the last several years whether from climate change or electric power system equipment. Wildfires pose a significant threat to public safety and infrastructure; it is crucial to implement effective strategies to mitigate the risk of fire flashovers caused by overhead grid equipment. To mitigate and eliminate fires caused by sparks, system hardening strategies help create a more robust, fire-resistant grid. **Other mitigation strategies are:**

1. **Preventive Maintenance**– Constant inspection and repair of aging power system infrastructure plus vegetation management
2. **Strategic Operation Practices**– Assess and forecast fire risk based on weather conditions and other environmental factors
3. **Enhanced System Protection** – Centralized aggregation of data from power system assets allows operators to adjust protection and control to match fire risk conditions
4. **System Hardening**– Updating poles or line loading, insulating overhead conductors, increasing conductor spacing and selectively

In this article, we will explore system hardening techniques that offer innovative solutions to reduce the probability of flashovers, safeguard communities, and minimize the devastating impact of wildfires.

Flashover Mitigation

The exposed energized conductors prevalent throughout the overhead grid can produce sparks or flashovers that can ignite wildfires. From system faults to wildlife violating electrical clearances, many different ignition sources need to be taken into consideration.

Enhanced Insulators and Elbow Connectors

The integration of higher-rated insulators and elbow connectors plays a crucial role in bolstering fire resistance within the grid system. Viper reclosers adhere to the IEEE 386 standard for separable insulated connector systems, enabling the utilization of removable and field-upgradable insulators. By upgrading to 38kV insulators, creepage, and strike distances are increased, adding an additional safety margin to prevent flashovers. Furthermore, elbow connectors designed with IEEE 386 interfaces minimize the number of exposed live connections, significantly mitigating the risk of flashovers.

Increased Phase Spacing

One of the key methods to mitigate flashover events is by engineering overhead distribution equipment with extended phase spacing. For instance, G&W Electric Viper reclosers offer customized designs with independent pole mechanisms for each phase. This flexibility allows for phase-to-phase spacing ranging from 15 to 30 inches or more. By implementing wider spacing, flashovers caused by vegetation, overvoltage, and wildlife contact can be significantly reduced.

Dead-Tank Recloser Design

The Viper reclosers employ a dead-tank design featuring solid dielectric modules. This design is instrumental in minimizing the propagation of flashovers from phase to phase. In the event of an overvoltage-induced flashover, the fault is conducted to the ground potential of the module, effectively reducing the risk of larger flashovers. Additionally, the dead-tank design reduces the need for external sensors and minimizes exposed live energy sources, further enhancing safety measures.

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Flame-Retardant Wildlife Guards

Wildlife interaction with electrical infrastructure can inadvertently trigger flashovers. To counter this, flame-retardant wildlife guards are employed to cover energized parts, preventing flashover events from igniting the guards and eliminating the risk of flaming material dripping onto the ground. These guards comply with stringent standards, such as IEEE 1656-2010 and UL 94 V-0 flammability ratings, ensuring effective fire mitigation measures.

Site-Ready Reclosers for Rapid Deployment

To expedite the implementation of fire mitigation solutions, site-ready reclosers offer a streamlined approach. G&W Electric configures Viper reclosers and SEL recloser controls as complete systems, incorporating all necessary components during quality-controlled manufacturing. By minimizing variability associated with field installations, the installation process becomes more efficient, reducing both time and labor requirements. With G&W Electric serving as a single supplier for all components, sourcing becomes simpler and more manageable.

Transitioning Overhead Circuits Underground

Identifying high-risk overhead lines and transitioning them to underground configurations is a proactive approach to fire prevention. The dead-tank design and IEEE 386 interfaces of Viper reclosers allow their integration in underground applications. By utilizing the same protection relays and settings, the transition process is streamlined, reducing relay part numbers and configurations that need to be managed. Parallel solutions like G&W Electric Trident bypass switchgear can simulate overhead construction, while visible break options such as SafeVu™, provide enhanced operator visibility in these configurations.

CONCLUSION

With the increasing threats posed by wildfires, implementing system hardening strategies becomes paramount. By adopting advanced technologies and practices, the risk of grid-induced fires can be significantly reduced. System hardening techniques, such as increased phase spacing, dead-tank recloser designs, enhanced insulators and connectors, flame-retardant wildlife guards, transitioning overhead circuits underground, and site-ready reclosers, collectively contribute to a more fire-resistant electrical grid. G&W Electric's expertise and solutions offer valuable resources to address fire mitigation needs effectively, ensuring the safety of communities and the resilience of our infrastructure in the face of evolving environmental challenges.

Learn more about the Viper reclosers or contact G&W Electric at info@gwelectric.com

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