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Summary:

In recent years, power systems have experienced adverse impacts of climate change-induced weather events and natural hazards, necessitating a concerted effort to strengthen their resilience to such disastrous consequences. In this context, several researchers have proposed diverse cost-based multi-stage methodologies aimed at enhancing resilience. Nevertheless, the majority of these approaches tend to concentrate on arbitrary worst-case scenarios and metrics such as Energy Not Served (ENS), often disregarding the inherent uncertainties associated with weather events and natural disasters. Furthermore, only a limited number of researchers employ expected loss as a measure for resilience enhancement, a metric that holds promise for enhancing the robustness of decision-making tools. Moreover, there is no resilient planning tool available as a software package, specifically addressing the need for climate-proofing power systems against weather and natural events. In response to these identified limitations, we have developed a web-based software tool named “RGS: Resilient Grid Solutions.” This tool is purpose-built to provide comprehensive planning solutions for power grids in a risk-averse manner, with a primary focus on reinforcing their resilience against high-impact, low-probability events. RGS offers a systematic approach to resilient power system planning, seamlessly integrating the following software modules: spatial and temporal modelling of the external event, fragility-driven assessment of its impact on the integrity of power system assets, holistic system-level resilience assessment and risk-averse investment decision-making. Additionally, this tool is equipped with robust data visualization capabilities and possesses the ability to autonomously generate detailed reports summarizing the chosen investment asset options and optimization results.