Department of Electrical and Computer Engineering

Title: Optimal Resilient Planning Framework for Electrical Power Networks

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Room: XOD02-013

Abstract: In recent years, frequent natural hazards, including windstorms, earthquakes, and floods, have caused significant damage to the economy, particularly impacting critical infrastructure such as power networks. The literature proposes various methodologies to enhance system resilience against natural hazards. However, these approaches face several challenges. For instance, resilience enhancement optimization assumes a specific search space, such as selected lines for hardening or reinforcement, and redundant lines are often modeled without considering their spatial characteristics, especially for underground cables. Additionally, power system planning methodologies considers either the expected loss or the worst-case scenario, overlooking the co-optimization of both expected losses and tail risk. To address these challenges, a novel resilient investment planning tool has been developed under the H2020 EUniversal project. This tool provides optimal asset portfolios that integrate hazard models into the optimization framework and co-optimizes risk mitigation (including both expected losses and tail risks) and profit maximization for the electrical utility.

Biography: Balaji Venkateswaran V holds a Ph.D. in Power Systems from the University of Petroleum and Energy Studies, India, and has 8+ years of research and academic experience in power systems and renewable energy. He is a certified trainer for Engineer & Junior Engineer - Power Distribution and an IEEE Senior Member. Balaji is currently a Special Scientist - Research at the Department of Electrical and Computer Engineering, University of Cyprus. He has published several research articles in high-impact journals, delivered invited presentations, and worked on various funded projects. He also developed the software tool on resilient capital investments for smart grids, which was selected among the top 12 innovative solutions in Europe in the 2022 Innovation Radar competition by the European Commission.