Methodology for analyzing the risk of disruption of overhead power lines in Portugal

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Power systems, such as power transmission infrastructure - overhead lines, and consumers have been heavily affected by extreme weather events, which are becoming more intense and more frequent. An efficient and effective way to respond to the adverse consequences of EWEs is the risk analysis and the consequent risk management, which play a decisive role in adapting to climate change. The main objective of this work is to present the methodology of the risk analysis of the EWEs on overhead power lines in Portugal. In this way, the level of risk associated with each of the identified events was classified according to their probability of occurrence and respective consequence (in a risk matrix), and through the cause-and-effect analysis (a diagram) for better understanding. Thus, it is concluded that the wind is the main factor that provoked the disruption of the overhead power lines, between 28% to 40% of analyzed events associated with windstorms. The probability of damage to overhead power lines for the occurrence of compound events (wind and rain) is 21% to 30%, and this fact was verified when it was considered the events of the three or four last extended winters, respectively, for both cases. Therefore, these events represent a critical risk for electrical systems, and it is necessary to continue to develop effective solutions to minimize the associated impacts. Measures and solutions that go through the management of vegetation, the revitalization, the updating, and replacement of the line, the network monitoring, and the preparation of repair teams, among several others.

Keywords: Extreme weather events; Risk assessment; Energy systems; Disruption; Powerlines; Portugal.

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