The 15th International Workshop on Electric Power Control Centers
Reykjavik, Iceland, May 12-15, 2019

From reliability and resilience towards a holistic approach to power system risk management

Efthymios Karangelos and Louis Wehenkel

Institute Montefiore, Université de Liège, Belgium.

Abstract

Over the recent years we have unfortunately witnessed the catastrophic consequences of extreme weather events on the functionality of electrical power systems. At the same time, there is growing concern that the future holds much more extreme weather events, as climate change is here to stay. Such concern has brought about a strong narrative on the importance of ensuring resilience in the planning and operation of electrical power systems. However, beyond consensus on such basic premise, there seems to be quite some disharmony on how the term resilience should be understood. Its relation to power system reliability remains open for interpretation, thus complicating the coherent establishment of priorities for both resilience and reliability.

In this discussion, we start from the standpoint that resilience and reliability are indeed distinctive concepts in terms of both the physical attributes they characterize and the planning and operational measures that can be used to achieve them. Moreover, these concepts are complementary by way of jointly expressing the survivability of a power system at risk. It follows that there is a need for a holistic viewpoint in reasoning over both reliability and resilience. We argue that combining the advantages of probabilistic modeling, stochastic and robust decision making under uncertainty is the pathway to achieving such holistic

viewpoint.

For the sake of the discussion, we shall rely on a well-known academic test system to exemplify the basic concepts. Building on top of these examples, we shall conclude the discussion by focusing on the needs for further research and development along three primary axes: (i) the data and models to enable probabilistic reasoning, (ii) the computational infrastructure to enable advanced operational practices, and (iii) the integration of the end-user preferences to enable socio-economic efficiency.

Please send the Abstract to **dsobajic@gridengineering.com** by April 12