

Future-proofed resource adequacy metrics: A model-based assessment of multi-metric vs. composite-metric reliability standards

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Abstract-

The rapid decarbonisation of the power sector is challenging the traditional resource adequacy framework. Variable and energy-limited resources are driving the emergence of new correlations that, together with extreme weather events, are rapidly changing the expected scarcity conditions in the electricity system. Traditional resource adequacy metrics are showing their limitations under these new conditions, and many regulators have already started to reform them. This article presents the first model-based comparative analysis of two different approaches that have been proposed to overcome these limitations, i.e., multi-metric standards (imposing a set of different resource adequacy constraints) and composite-metric standards (combining different resource adequacy metrics through weighting factors to build a single reliability standard). These two approaches are quantitatively evaluated in this article through case studies obtained from a simulation model, focusing not only on the impact of the reliability standard on the resource mix, but also on the design of the reliability product to be traded in a capacity mechanism to guide the system towards that mix.

Index Terms- Resource adequacy; Reliability standard; Capacity mechanism; De-rating factor; Multi-metric; Composite metrics

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