## A model-based analysis on the impact of explicit penalty schemes in capacity mechanisms

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## Abstract-

A major aim of Capacity Remuneration Mechanisms (CRMs) is to lead the power system expansion towards the level of security of supply that the regulator considers adequate. When introducing a capacity mechanism, therefore, regulators must ensure that the resulting mix will actually provide the firmness pursued, in such a way that both the generation and the demand resources awarded with the capacity remuneration actually perform as expected when the system needs them. In order to achieve this goal, some experts stressed the importance of including performance incentives in the CRM design. However, first capacity mechanisms (implemented mainly in the American continent) did not pay enough attention to this aspect. Two decades of operation have evidenced the need for performance incentives and these instruments are, at this writing, at the centre of the regulatory discussion. On the basis of a model analysis, this article demonstrates how the introduction of properly designed explicit penalty schemes for under-delivery can positively impact the CRM outcomes, providing resources with effective incentives to maximise their reliability, discriminating against non-firm generation units, and therefore increasing the effectiveness of the mechanism in achieving its objectives.

Index Terms- Capacity remuneration mechanisms; Security of supply; Reliability option contracts; Explicit penalty; Long-term auction; System adequacy

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