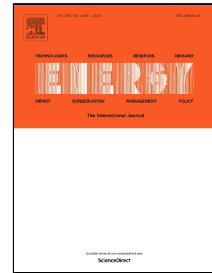


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# RELIABILITY MECHANISM DESIGN: AN ECONOMIC APPROACH TO ENHANCE ADEQUATE REMUNERATION AND ENABLE EFFICIENT EXPANSION

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## KEYWORDS

Electricity markets, Firm energy certificate, Reliability mechanism.

## ABSTRACT

In the sectorial reform processes that several countries underwent in the 1990s and 2000s, it was common to introduce a capacity mechanism to ensure adequacy in the systems' expansion. The definition of a "reliability product" that is separate from the energy product, whose main role is to identify the contribution of generators in critical moments of low probability, was instrumental to attract investments in new generation in the newly-liberalized electricity markets. This study presents a methodology to simultaneously determine not only the value of the reliability product as perceived by the demand side but also the quantities of this product (the firm energy certificates) to be allocated to each generator in a hydrothermal power system. The methodology was put into practice through a detailed case study of the Brazilian electric system using specialized optimization software. We calculated the amount of firm energy certificates and their economic value for six generators representative of the main technologies present in the Brazilian electric system – thermoelectric plants with different costs (peak and baseload), hydropower plants with and without seasonal reservoirs, wind and solar – evidencing the role played by the characteristics of each technology in the allocation of the firm energy certificates among generators.

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