

The generation adequacy problem: assessing dynamic effects of capacity remuneration mechanisms

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Abstract

Following power reforms in recent decades, the ability of liberalized markets to provide satisfactory incentives for capacity investments has become a major concern of the energy system. In particular, the current energy markets are prone to a phenomenon of investments cycles. Thus, new mechanisms, called capacity remuneration mechanisms (CRM) have been (or will be) implemented with the objective of providing optimal investments and solving adequacy issue.

The purpose of this paper is to assess the dynamic effects of different CRMs, namely the capacity market and the strategic reserve mechanism, and to study to what extent they can correct the cyclical tendencies and the investments issues prone to happen in the current energy markets. Moreover, these two mechanisms are compared based on social welfare, which is evaluated thanks to generation costs and shortage costs. A model, based on systems dynamics programming, has been developed to simulate the functioning of both CRMs and to model investment decisions.

The results highlight the benefits of deploying capacity remuneration mechanisms to solve the adequacy issue: shortages are strongly reduced by implementing such CRMs. Moreover, through the comparisons, the capacity market appears to be more beneficial than the strategic reserve mechanisms from the economic point of view, since it experiences fewer shortages and the generation costs are lower. These comparisons based on social welfare can be used by electricity market designers to determine which CRM to adopt, in particular in Latin America for power systems dominated by thermal generation.

Keywords

Electricity market, generation investment, capacity remuneration mechanism, system dynamics

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