

# Cross-Border Effects Of Capacity Remuneration Schemes In Interconnected Markets: Who Is Free-Riding?

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## Executive summary

Since the liberalization process began in the early 90s, the European power sector has been increasingly exposed to market-based mechanisms, to replace national planning. Investments are increasingly market-driven, spot prices are supposed to induce a socially optimal capacity mix and adequacy level. However, many observers have noted that the price signal alone does not generate the "adequate" level of capacity according to their Security of Supply standards. This trend that was accentuated by rapid by rapid penetration of renewable energy sources. Capacity remuneration mechanisms (CRMs) are seen as a solution to directly remunerate capacity (and not only energy) in some countries but without harmonization with their neighbors. The assessment of CRMs in a single market is very complex. Furthermore CRMs ignore cross-border effects or at best take imports into account in an implicit manner. This research shows that a lack of harmonization might prove very costly in the long run, as capacity support schemes have a cross-border impact on prices and in turn, on investment.

In a stylized analytical model, we study bilaterally interconnected markets with different market designs. The transmission line between these markets may be congested. Demand is stochastic, can be correlated in the two countries or not. In a first stage, investors build capacity. In a second stage, demand materializes in both markets and prices emerge.

The designs we considered are:

- 1) an energy-only market with no support scheme
- 2) a market where capacity receives a payment. This payment could be a regulated amount, or the outcome of an auction.
- 3) a market with strategic reserve ("dormant" capacity, activated only in case of scarcity).

We show that if transmission system operators (TSOs) can't control exports (under the internal market rules) and if neighbours stick to an energy-only paradigm, a capacity payment is ineffective unless transmission capacity is small. If TSOs can limit exports to serve their local consumers in times of scarcity (in line with most national network codes), the security of supply in the neighbouring energy-only market shrinks while the security of supply in the market with capacity support increases at low cost –a direct consequence of the capacity shift. A neighbouring energy-only or strategic reserve market will thus suffer in the long-run and may have to implement a capacity payment as well in order to meet its security of supply standard.

While the day-ahead market integration has made much progress in Europe, security of supply policies in Europe remain to a large extent in the hands of national governments –as opposed to the European level. The consequence is a patchwork of market designs that are assessed neglecting the potential spillover effects to neighboring countries. Our simple model proves that cross-border effects do exist, and they might be far from negligible. We show that the problem

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does not lie so much in capacity free-riding (at the expense of producers and consumers in the market with a CRM), but rather in unfair investment competition (at the benefit of the market with a CRM). Our conclusions urge for the harmonization of capacity remuneration schemes in Europe.

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