

Capacity market design options: a dynamic capacity investment model and a GB case study

EPRG Working Paper 1503

Cambridge Working Paper in Economics 1508

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Abstract Rising feed-in from renewable energy sources decreases margins, load factors, and thereby profitability of conventional generation in several electricity markets around the world. At the same time, conventional generation is still needed to ensure security of electricity supply. Therefore, capacity markets are currently being widely discussed as a measure to ensure generation adequacy in markets such as France, Germany, and the United States (e.g., Texas), or even implemented for example in Great Britain.

We assess the effect of different capacity market design options in three scenarios: 1) no capacity market, 2) a capacity market for new capacity only, and 3) a capacity market for new and existing capacity. We compare the results along the three key dimensions of electricity policy – affordability, reliability, and sustainability.

In a Great Britain case study we find that a capacity market increases generation adequacy since it provides incentives for new generation investments. Furthermore, our results show that a capacity market can lower the total bill of generation because it can reduce lost load and the potential to exercise market power. Additionally, we find that a capacity market for new capacity only is cheaper than a capacity market for new and existing capacity because it remunerates fewer generators in the first years after its introduction.

Keywords Capacity mechanism, capacity market, dynamic capacity investment model, generation adequacy, conventional electricity generation investment, renewable energy sources

JEL Classification Q48, L94, L98, C44, D81

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Publication February 2015
Financial Support --