Effects of power plant mothballing decisions on system reliability and generation adequacy

Ahmed Ousman Abani[1,2,*], Nicolas Hary[1,2] , Marcelo Saguan[3], Vincent Rious[3],

Abstract

Introduction

A successful transition to a decarbonised energy system requires the retirement of old and highly polluting power plants. There are concerns however that this exit will not be done in an orderly and cost effective way (Roques, 2014) (Linklaters, 2014). Indeed, a multitude of early retirements and mothballing (temporary shutdown) of efficient and flexible thermal generation units (especially gas-fired power plants) is being observed across Europe, in reaction to persistently low electricity prices (Caldecott et al., 2014). Moreover, new investments in generation capacity are being stalled or even cancelled (Caldecott et al., 2014). Such strategies from utilities are understandable from a private perspective as their aim is to preserve the economic viability of exiting assets and to avoid uneconomic decisions (plant operation, investment, retirement, mothballing, etc.) in a context of difficult market conditions combined with policy uncertainty (regarding climate change particularly).

Still, the strategies mentioned above might be detrimental from a social welfare perspective. They might result in a major threat to the security of supply since the flexible units that are being prematurely shutdown or mothballed are needed to cope with the intermittency of Renewable Energy Sources (RES) electricity generation. The implications of these strategies are still not fully understood by policymakers and the literature on the subject is limited, especially regarding mothballing decisions. It is however essential to assess these implications in order to take appropriate policy actions that will guarantee a successful decarbonisation of our power system without compromising the security of supply.

Method

The aim of this paper is to study the effects of the different strategies adopted by power plants owners in a context of low electricity prices and increasing penetration of subsidised RES. By using a multi-technology dynamic simulation model which represents investment decisions as well as retirement and mothballing decisions, we analyse both the short-term and long-term effects of market participants' behaviour in an energy-only market design. More precisely impacts on investment incentives, generation mix and social welfare are investigated. A simplified version of the French power system is taken as a case study for this purpose.

[1] MINES ParisTech / PSL-Research University, CERNA-Centre for Industrial Economics, 60 Boulevard Saint Michel, 75006 Paris, France
[2] Microeconomix (now part of Deloitte France), 185 Avenue Charles de Gaulle, 92200 Neuilly-sur-Seine, France
[3] Florence School of Regulation, Robert Schuman Centre for Advanced Studies, European University Institute, Via delle Fontanelle, 19, 50014 Firenze, Italy
* Corresponding author : ahmed.ousmanabani@mines-paristech.fr ; aousmanabani@deloitte.fr

Results

Preliminary results suggest that mothballing decisions might help stabilize (in terms of system margin) electricity markets to some extent in the short to medium term but they might have an adverse effect on investment incentives, in particular for new entrants who may see them as barriers to entry.

References

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