

# Note

(Z)1707

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## Note on an extended analysis of the capacity remuneration in scarcity conditions

carried out pursuant to Article 23, §2, second paragraph, of the Law of 29 April 1999 on the organisation of the electricity market

Non-confidential

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# 1. INTRODUCTION

Renewables are characterised by an important investment cost, a low fixed cost and a variable cost close to zero. The massive introduction of large amounts of renewable energy has led to overcapacity and has exacerbated the missing money problem, reflecting the difficulties of remunerating the marginal generation unit in an energy-only market with a marginal pricing principle.

This introduction has contributed to a decrease<sup>1</sup> of the average electricity price to levels that may put at risk the profitability of new large-scale generation units (mainly CCGT) in pure energy-only markets, even in the absence of excess generation capacity.

Additional revenues linked to ancillary services and re-dispatching are becoming more and more important for the profitability of these units.

A first study on this issue has been finalised in May 2016. Its results are published on the CREG website: <http://www.creg.info/pdf/Divers/Z1527EN.pdf>

As all nuclear units in Belgium in 2016 have unexpectedly been reintroduced on the market, the situation has changed radically and, before deciding on a possible application of such a method to the Belgian system, it is of utmost importance to check the value of the proposed price adder in situations of absence of scarcity in the Belgian system, for the months where all nuclear units were available.

Therefore, it was decided that the Consultant should also:

- 1) determine the price adder for the period going from September 2015 to March 2016, on the basis of quarter-hourly (instead of hourly) data of the studied period, taking into account the reintroduction of all nuclear units in 2016.
- 2) review the impact of the use of loss of load value of €8300 instead of €3000
- 3) review the impact of a strategic reserve of 750 MW on the price adder
- 4) check if imbalance error is independent at 15-minute intervals, and if the adder expression should be adapted for a case where imbalance error is not independent.

This note highlights the main results of the extension study. The paper describing the work carried out in the scope of this extended analysis is attached to this note (Annex 1).

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<sup>1</sup> Together with a reduction of the consumption, and a decrease of CO2 and coal prices

## 2. EXTENSION STUDY RESULTS

According to the CREG, the results of this extension study are:

- The average adder over the duration of the study amounts to €0.3/MWh. This indicates that, in conditions of abundant capacity resulting from the restoration of nuclear capacity, the ORDC adder has a negligible effect on energy prices, which is compatible with the adaptive nature of the adder.
- The strategic reserve has no impact on the market price but on the price adder well.
- A change of the value of loss of load from €3000 to €8300 has nearly no impact on the price adder.
- There is a strong positive correlation between two consecutive imbalances of 15' periods<sup>2</sup>. Based on this observation, the impact of the 7,5 min and 15 min increments of imbalance on the computation of the adder has been reviewed in three scenarios: one with fully independent increments, one with fully correlated increments and one with an intermediate case based on empirical data. Computations show that the assumption of independent adders leads to notably higher adder values, and that the correlated scenario and the assumption based on observed data deliver approximately the same results. This confirms that an assumption of perfect correlation strikes an acceptable balance between accuracy and simplicity of the resulting adder formulas.

## 3. CONCLUSIONS

The extension of the original study provides additional information on specific implementation details which can significantly impact the performance of ORDC pricing.

An important question that remains to be investigated is how the adder behaves when certain aspects of the existing market design are not fully compatible with the theory underpinning scarcity pricing, as is the case in European markets. Future research on the application of the mechanism should therefore focus on determining how the following design choices influence the ability of the ORDC adder to send a long-term investment signal: (i) If energy and reserves are separately cleared in day-ahead markets, does the timing of the day-ahead reserve auctions (before, during or after energy market clearing) matter? (ii) Is the co-optimization of energy and reserves required in real time? (iii) Is virtual bidding required? These questions will be tackled in a subsequent study on a possible design for the implementation of a scarcity pricing mechanism compatible with the Belgian context and with the balancing mechanism in particular.

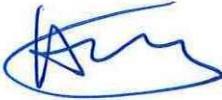
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<sup>2</sup> In the previous study, the hourly resolution of the data did not allow a statistical analysis of imbalance correlations within the hour. As a starting point, no correlation was assumed at that time.

Finally, a detailed implementation study by Elia, including parallel runs simulations, should be considered before implementing this mechanism.

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# **ANNEX 1**

## **Extended analysis of the capacity remuneration in scarcity conditions**