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# THE EFFECT OF THE SPANISH NUCLEAR PHASE-OUT ON THE ELECTRICITY MARKET

Juan Manuel Roldan-Fernandez<sup>1\*</sup>, Javier Serrano-Gonzalez<sup>2</sup>, Jose Hugo Fiestas-Chevez<sup>3</sup>, Manuel Burgos-Payan<sup>4</sup>, Jesus Manuel Riquelme-Santos<sup>5</sup>

<sup>1,2,4,5</sup> *Universidad de Sevilla, Camino de los Descubrimientos, Sevilla, Spain*

<sup>3</sup> *Universidad de Piura, Peru Av. Ramón Mugica 131, Piura 20009, Peru*

\* **Corresponding author.** E-mail address: [jmroldan@us.es](mailto:jmroldan@us.es)

**Abstract** – Portugal and Spain are integrated into what is known as the Iberian Electricity Market. Spain participates in this market with significant contribution of energy produced by nuclear plants. In 2022, nuclear energy accounted for 22 % of the total energy generated in Spain. Nuclear power plants sell their energy largely through bilateral contracts, and approximately 20 % is offered in the day-ahead electricity market. By 2035, Spain will phase-out nuclear power producing a structural change of its generation mix. In this paper, we investigate the effect on the day-ahead Iberian electricity market that the gradual removal of nuclear power plants will have on the daily electricity market. The methodology is based on a ceteris paribus approach, where generation conditions are modified by removing nuclear plants and keeping the rest of the variables constant (demand and other generation). Under these conditions, the market is reproduced, estimating how electricity prices change in the day-ahead electricity market. To evaluate the market electricity prices under this new scenario with a total or a partial elimination of nuclear energy generation, it is necessary to use a market model. The existing literature shows various approaches to replicate the electricity market, among which are agent-base modelling, optimization algorithms, artificial intelligence techniques or metaheuristic merit-order methods. Our approach is based on the latter methods, by using actual generation and demand data, the new market generation and demand curves are reconstructed and the new clearing price is obtained. For the most conservative scenario, the results show a price increase of more than 5 % for the first 6 months of 2021. The reason for this increase is that nuclear generation participates in the market by offering its energy at prices close to zero. When this generation is withdrawn, there is a shift to the left of the hourly generation curve producing a new market equilibrium at a point of higher price and lower energy.

**Keywords** – *Electricity market; energy transition; nuclear decommissioning*

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