

Locational Investment Decisions under Zonal Pricing: Evidence from the European Union

Emmanuel Berrebi¹, Diego Cebreros¹, David Jambois², Yannick Perez¹

¹LGI-CentraleSupélec-Université Paris Saclay, Gif-Sur-Yvette, France. ²OneTech-TotalEnergies, Palaiseau, France

Extended Abstract

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Abstract Summary

In zonal electricity markets, network expansion is planned by a regulated operator while generation investments are made by multiple private actors, making coordination between siting decisions and network development essential. Poor coordination can lead to unnecessary grid investment or higher congestion, reducing efficiency. Although Locational Marginal Pricing would theoretically provide optimal locational signals, Europe relies on zonal pricing, where prices are uniform within each zone. With rapid renewable deployment and weak locational signals, congestion issues are intensifying. Yet no empirical study has examined how investors choose plant locations in zonal markets. This research asks: *What determines generation asset siting under zonal pricing?*

First, we propose a new investment process that explicitly integrates power plant site selection as a core step of the investment decision. Second, as investors screen locations using locational signals such as natural resource availability, permitting and construction costs, land prices, network constraints, and social acceptance, we empirically analyse how renewable projects respond to these signals across 21 EU countries (2014–2019) using a logit model with country fixed effects. Average Marginal Effects quantify how each signal affects the probability of selecting a specific location.

Onshore wind and solar investments display the widest spatial dispersion compared to other energy technologies, reflecting exposure to diverse signals. Natural resource quality remains the dominant driver of siting in the absence of targeted mechanisms. Counterintuitively, land availability and nodes with spare grid capacity reduce the likelihood of investment, suggesting investors concentrate in already crowded nodes, potentially increasing the likelihood of congestion.

This study expands the understanding of locational signals by integrating both policy and non policy determinants and measuring their behavioural impact. Results show that

interactions between designed and undesigned signals matter for siting outcomes, offering insights for regulators seeking more effective coordination and locational mechanisms.

Presenting Author Biography

Emmanuel Berrebi-Toledano is a PhD candidate in energy economics, having begun his doctoral research in September 2025. He holds a dual master's degree from ESSEC Business School and CentraleSupélec with a specialization in Energy and Environment, complemented by a Master's in Energy Economics (EEET) from Paris Saclay University. His academic work focuses on electricity markets, renewable energy integration, and the economics of energy system coordination.

Emmanuel also brings professional experience in renewable energy project finance and has worked in a start up developing fast charging infrastructure for electric heavy duty vehicles.