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STUDYING THE IMPACT OF THE CHANGING ENERGY LANDSCAPE ON ALTERNATIVE MARKET DESIGN

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Overview

The energy landscape and supply mix in Europe and other global markets is evolving, making regulators ponder on what might be the most pragmatic approach to facilitate a sustainable transition while minimizing regulatory uncertainty and costs. Key factors driving this change are (i) efficiency advancements in intermittent generation technology and energy storage options accompanied with their large scale implementation, (ii) policymakers recognizing the need to reduce carbon emissions and consumers recognizing that this reduction comes at an associated cost, (iii) greater customer involvement on the grid and (iv) an aging generation fleet approaching retirement.

The subsidization of renewable energy resources by regulators and governments have resulted in their implementation becoming economic, causing their installation to proceed on an unprecedented scale in some European power markets, and in many other jurisdictions internationally; this investment trend will pick up in the coming decade. Such a transformation will require rethinking of the conventional market design. Intermittency brings a high degree of system operations variability and price volatility. Moreover, the zero marginal cost aspect of many renewable technologies materially impacts price levels and profits for other resources.

Method

This paper aims to analyze the capability of varying market design structures in managing a sustainable transition in the supply mix, that would ensure energy security and reliability as the grid takes on greater portion of intermittent generation. This economics of this transition must ensure that developers receive their fair share of revenue while allowing for capacity investments to be made. We will start by examining historical pricing trends in three different types of market structures, namely (i) energy only markets (ii) capacity and energy markets, and (iii) centralized procurement-based markets to consider how markets have coped with renewable integration to date. Furthermore, relying on simulation forecasts of future market conditions on different market designs, we will also evaluate trends going forward and determine to what extent market design, separated from other factors, affects the cost and quality of electricity service.

Results

Using our modelling approach, we will look at several indicators of market design resilience and robustness to evaluate each of the three market designs to manage a sustainable transition. Several outputs relating to energy and capacity prices, new entry costs, and reliability will be produced through our proprietary modelling software POOLMod. Indicators to measure the level of success of each design will be measured in terms of sustainability of price levels relative to new entry costs, frequency of unserved load, impact on existing generation, turnover of existing capital stock, and need for out-of-market supports. Our results will also include a qualitative commentary on the magnitude of impacts that policymakers and regulators will need to consider with regard to the changing energy landscape and energy security, with a primary focus on European countries, and additional commentary on its impact in other global markets.

Conclusions

The implications of this study (including quantitative and qualitative analysis) will provide key findings for policymakers and system planners on the importance of market design when thinking about pursuing significant overhaul of the generation fleet through the introduction of environmentally-motivated policies, such as the attainment of carbon reduction goals.