Interconnector capacity allocation in offshore grids with variable wind generation

Different capacity allocation regimes have a strong impact on the economics of offshore wind farms and on interconnectors in offshore grids. Integrating offshore generation in offshore grids is currently a subject of discussion for different regions, e.g., the North Sea. A novel question is how the interconnector capacity should be allocated for wind generation and for international power trading. The main difficulty arises from the stochastic nature of wind generation: in a case with radial connections to the national coast, the wind park owner has the possibility of aggregating the offshore wind park with onshore installations to reduce balancing demand. This is not necessarily the case if the interconnector capacity is sold through implicit or explicit auctions. Different design options are discussed and quantified for a number of examples based on Danish, Dutch, German and Norwegian power markets. It is concluded that treating offshore generation as a single price zone within the interconnector reduces the wind operator’s ability to pool it with other generation. Furthermore, a single offshore price zone between two markets will always receive the lower spot market price of the neighbouring zones, although its generation flows only to the high-price market. Granting the high-price market income for wind generation as the opposite design option reduces congestion rents. Otherwise, compensation measures through support schemes or different balancing responsibilities may be discussed.

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