

Rethinking the Role of Financial Transmission Rights in Wind-Rich Electricity Markets in the Central U.S.

James Hyungkwan Kim,^a Mark Bolinger, Andrew D. Mills, Ryan Wiser

In the United States, most wind power capacity has been deployed in the wind-rich central region. Transmission congestion within this large region can cause a divergence between wholesale power prices at the individual pricing nodes where power is generated and the more-liquid trading hubs where that power is often delivered and sold. This nodal price difference is commonly referred to as the “locational basis” (or just “basis”). Because the basis varies over time, it can—if not hedged—unpredictably affect a wind plant’s revenue and/or value, which increases investor risk and potentially slows deployment.

We use historical nodal pricing and generation data for thermal and wind plants operating within three central U.S. markets to calculate the generation-weighted locational basis between generator nodes and common trading hubs. We find that, due in part to the negative correlation between wind generation and wholesale power prices, wind plants typically face a larger and more-negative basis than do thermal generators, and hence are more-negatively impacted by congestion.

Moreover, while most thermal generators can effectively hedge basis risk by purchasing conventional fixed-volume financial transmission rights (FTRs), these fixed-volume FTRs do not effectively hedge basis risk for variable wind generation. More-effective hedging mechanisms—for example, an FTR whose volume varies with wind plant output—may be required to support those generators most-impacted by congestion, and to promote continued investment in variable generation resources in congested markets.

Electric power systems are facing an energy transition where meeting decarbonization goals requires energy production to shift from fossil-based generators to cleaner sources like renewables. With higher renewable penetration in the decarbonized grid, generators may face even higher congestion risk. Introducing effective congestion hedging mechanisms can replace exposure to basis risk with a fixed auction price. Introducing new FTR products like a wind FTR will reduce basis risk exposure between renewable plants and major trading hubs and promote forward contracting, resulting in lower risk to project developers, and ultimately promoting renewable project development. In addition, aligning hedging instruments with how the grid is actually being used may increase the overall utilization of the transmission network.

^a Corresponding author: Lawrence Berkeley National Laboratory, MS90R4000, 1 Cyclotron Rd. Berkeley, CA 94720 USA, hyungkwankim@lbl.gov