ECE 590 I
POWER & ENERGY SYSTEMS SEMINAR

Monday, November 8, 2021, 3:00 – 3:50 p.m.

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Solar and Wind Grid System Value in the United States: The Effect of Transmission Congestion, Generation Profiles, and Curtailment

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Abstract
As the deployment of wind and solar resources grows, the value of wind and solar generation declines relative to that of generators with more dispatchable output profiles. This 'value decline' is simply due to the downward pressure put on prices by the increased supply during windy and/or sunny hours. Such a value decline is cited as a motivator for aggressive cost targets for solar and wind implementation because, left unchecked, value decline could slow deployment of wind and solar and hinder carbon reduction efforts. This presentation provides a comprehensive analysis of wind and solar value decline from the examination of recent changes to the value at all utility scale wind and solar plants across the organized US power markets in the RTO/ISO regions. The analysis is based on the hourly generation profiles and the real-time prices. For the analysis, the impacts on wind and solar value of transmission congestion, generation timing and curtailment are isolated. This decomposition of value decline provides insights into the impacts of the changing composition of generation technology, the impacts of new grid infrastructure, as well as, into potential solutions to such value decline.

To preview this material, please see

- D. Millstein et al., "Solar and wind grid system value in the United States: The effect of transmission congestion, generation profiles, and curtailment." *Joule*, 5, 2021; available online at https://doi.org/10.1016/j.joule.2021.05.009
- R. Wiser et al., "Land-Based Wind Market Report: 2021 Edition", Lawrence Berkeley National Laboratory; available online at https://emp.lbl.gov/publications/land-based-wind-market-report-2021

Biography
Dev Millstein is a Research Scientist with Berkeley Lab's Electricity Markets and Policy Department. Dr. Millstein uses atmospheric science tools, specifically meteorological, climate and air quality modeling, and satellite observations, to inform policy and economic decision making processes. Dr. Millstein leads research across a diverse range of topics, including the assessment of wind and solar resource variability, renewable power and grid-integration, and air quality. Dev Millstein received a B.A. in economics from Vassar College in 2002 and a Ph.D. in Civil and Environmental Engineering at UC Berkeley in 2009.