Plugging in the Wind and Sun: Grid Integration with Cost Externalities and Uncertainty

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Abstract

The past decade has seen a surge in new renewable power projects seeking to plug in to the electric grid. Plant entry on the grid generates cost externalities, whereby each new potential plant can change the costs that other projects nearby must pay to connect. We study the interconnection queue that admits new projects to the California electricity market. We find evidence that externalities matter for investment: (i) plant interconnection costs increase in nearby entry; (ii) projects with lower interconnection costs are more likely to connect; (iii) projects awarded the right to use spare grid capacity are much more likely to connect. We embed these descriptive findings in a dynamic equilibrium model of the interconnection queue that admits externalities between projects. In ongoing work, we analyze how counterfactual queue policies to correct externalities would alter queue behavior and social surplus.