Using ensemble weather forecasts to manage utilities risk

MG Altalo & LA Smith

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Abstract

Errors in the forecast temperature are a major cause of short-term electricity load forecast error and thus grid instability. Weather forecast errors can account for 40% to 90% of demand forecast error, with the remainder attributed to load model error1. This weather-induced load error can be on the order of 8–10% of the load – and can therefore have significant financial consequences. An end-to-end demonstration project2 was conducted for a US electricity grid operator, the California Independent Systems Operator (Cal ISO)3, which manages the state's 25,000-mile power transmission system. Cal ISO aggressively analyses its weather-induced load forecast error and reduces error through continuous operational improvements. It currently contracts several weather service providers for day-ahead regional weather forecasts which may be combined with regional "weighting" factors to produce the official daily forecast used to commit the electrical generation to supply the grid. We show below that weather is the major contributor to load forecast error and associated costs during peak demand periods; that weather forecast accuracy can be significantly improved using a multimodel ensemble; and that use of probabilistic information represents reduction of costs of over 50% to the load forecaster.

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