Can models predict grid tolerance to environmental extremes?
30 October 2017

Researchers constructed statistical models based on the weather variables that tend to give rise to grid stress. They used 10 years of high time-resolution electricity load and pricing data from 16 zones in the PJM (Pennsylvania-New Jersey-Maryland) Interconnection (a regional transmission organization), along with observed weather data from the same time period.

After testing several model types, researchers found that a penalized logistic regression model performed well in predicting grid stress when fit to a specific operational zone. It also revealed the weather variables most important for predicting grid stress in each zone. In addition to daily maximum temperature—typically the only variable that the electric power industry considers when making load forecasts—researchers found that other predictors of grid stress included humidity, precipitation, and lagged variables that account for persistent stresses on the grid over multiple days. In some zones, model performance was improved by including weather information from other zones, which may reflect the grid's interconnected nature.

Assuming that data are available, the methods presented in this work could be extended to other regions or used to project potential changes in grid stress associated with future climate and infrastructure scenarios.


Provided by Pacific Northwest National Laboratory

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.