Forecasting UK Electricity Load 1 Day Ahead

Electricity supply has to be managed in order that the electricity generated matches demand for energy at any time. This issue has become particularly pressing in recent years as the proportion of electricity generated from renewable sources has grown. Tidal power generation is highly predictable and reliable, and hydro-electric power can be readily and rapidly controlled. But wind, wave and solar power, while predictable from weather forecasts in the short term, are not predicable more than a few days in advance and not readily controlled (production can be adjusted relative to the current maximum production, but that maximum is set by the weather and is highly variable).

Against this background it is necessary to predict what the short-term demand for power will be, so that generation can be managed to match demand, and so that incentives can be offered to big energy users, or even small consumers, to reduce or increase their demand to better match predicted supply. Statistical prediction models are used for this purpose and these models are under constant development for real time prediction by commercial energy providers.

Major considerations when building such prediction models are average accuracy of predictions, avoidance of any individual prediction having large error, and interpretability so that model predictions can be understood, and perhaps modified in unusual circumstances (the World Cup, national holidays etc).

This project will aim to build the best possible model, or ensemble of models, for predicting UK electricity demand 24 hours in advance, using half hourly data from the UK national grid, from 2011 to 2016, along with corresponding temperature data. Sensible approaches are likely to involve flexible statistical regression models, statistical learning methods such as random forests, and possibly model averaging approaches. Model validation and assessment of forecast accuracy will be essential project components, and the work will need to be written up in a manner that is accessible to the engineers responsible for operational grid management.