Load Forecast

This memo describes the model behind the Energinet.dk day ahead electricity load forecast. The model forecasts the net consumption, i.e., the day ahead consumption excluding transmission loss for the two price areas Western Denmark (DK1) and Eastern Denmark (DK2).

The model is divided into two parts. First it forecasts the total diurnal production and then it divides this sum into hourly-resolution.

1. Diurnal Sum

The diurnal sum consists of four components

$$F = F_T + F_R + F_S + \varepsilon,$$

where F_T is calendar- and temperature dependent and F_R is an autoregressive process (AR(2)). F_S explains the additional influence of the global radiation, G, and ε is a stochastic term. F_S is assumed to be on the form $F_S = k \cdot G$, where the constant k is re-estimated daily.

1.1 Calendar and Temperature

The annual variation of the term F_T for a normal day is basically explained by the temperature, and the weekly variation is handled by dividing the load into five general day-types (Monday, Tuesday-Thursday, Friday, Saturday and Sunday) and look at each type separately.

Besides this, the model handles the following days separately: summer-, autumn-, and winter breaks, Christmas, Easter, general prayer day, ascension day, Pentecost, May 1, June 5, and squeeze days (days between one of the mentioned special days and a weekend).

The load patterns for Christmas, May 1 and June 5 depends on the day of the week and the model looks for matching historical days (may have to go back 5-10 years). The others are estimated using the average load on "similar" days within the last 5 years (corrected by slow varying trends and temperature).

2. Diurnal Pattern

Having the diurnal sum we need to downscale into hours. Since the diurnal distribution chances quite fast during spring and autumn, it is not always enough to look at the last days with available settlement data (usually one week old). Fortunately, the diurnal profile doesn't change much from year to year. The model thus uses the pattern for a similar day-type one-three years ago as well as the pattern for the last day with correct day-type, if not too old. The same procedure is used for the special days.