

Exploring climate data's relevance to predict Energy consumption

SPDS800: Master's thesis in Data Science
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1 Context

In Denmark 82.8% of the household energy consumption is used for heating[1], Figure 1. This causes energy peaks with low temperatures when homes need a lot of energy to keep warm and lows on warm temperatures.

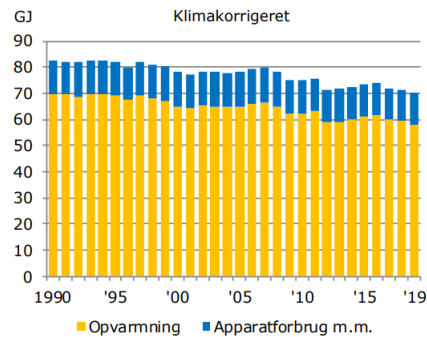


Figure 1: Energy consumption for households, showing distribution of consumption used for heat(yellow) and apparatus consumption(blue)

The danish meteorologic institute(DMI) and Energinet, the danish transmission system operator(TSO), are collected historical data for weather and electricity consumption. The idea behind this thesis is to explore the applicability of forecasting the energy consumption, based on weather data. Through this exploration the weather and electricity data will have to be thoroughly analysed and visualized.

2 Goals

During the project I plan on carrying out the following tasks:

- Thorough data analysis and visualization of available data from Energinet and DMI. The data analysis focuses on uncovering patterns and correlations between the two types of data.
- Reviewing and exploring prediction models and methods through a literature review, with a specific focus on the subject of predicting energy consumption.
- Consider several methodologies for predicting electricity consumption in an hourly timescale using climate data (for example, boosting algorithms, recurrent neural networks). The main focus will be the large price areas DK1 and DK2.
- Collecting results generated by the developed model and analyzing them.
- The predictor will be compared to a less complex naive model, which will serve as a baseline.
- If time allows it the model should be applied to a smaller scale, such as the consumption from the grid companies.
- Commenting on the results of the analysis and draw conclusions.

References

- [1] Energistyrelsen. *Energistatistik*. 2019, pp. 34–39. URL: https://ens.dk/sites/ens.dk/files/Statistik/energistatistik2019_dk-webtilg.pdf.