

Data driven student projects

Project #1: National Energy Market demand data relationships with temperature.

Overview: There are clear relationships between demand for electricity and the weather – on hot days demand goes up as we turn on our air conditioners, and on cold days demand also goes up as the heaters go on. In between, on milder days the demand is relatively low. Demand is also affected by the time of day (we use more during the day than at night) plus demand drops off during public holidays and the summer vacation period.

Data description: This project will use the Australian Energy Market Operator derived half hourly demand data for the 5 east coast states (SA, VIC, NSW, QLD and TAS), and the Bureau of Meteorology (BoM) Automatic Weather Station (AWS) half hourly temperature and humidity observations for the capital cities in each of the states, for the 20 year period 2000 to the end of 2019. A variety of statistical representations can be made for the individual data sets (changes in averages, extremes, daily cycles). Once the individual datasets have been described, we will investigate the changes in the relationships between demand and temperature using a multivariate regression approach.

Programming requirements: Write python code to read in the csv files for the two data sets, parse the date/time, and interrogate the date time series and get the two timeseries to line up. Take into account missing values and other errors in the data. Use scipy library to calculate statistics for the time series (e.g. regression fits) and derive a polynomial fit for the relationship between temperature and demand.

What a successful project looks like: Well written code, fully commented, parsed into subroutines/functions, generating tables and plots that are clear and well labelled, and text that described the findings of the project.

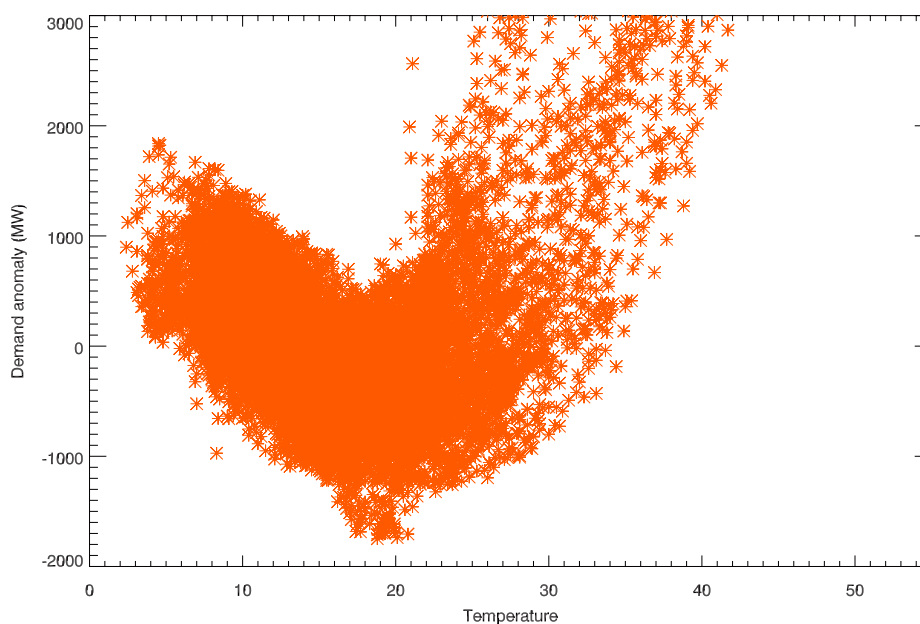


Figure 1: Demand anomalies versus temperature for 2019