Assignment 4 Load forecast and EV penetration

Load forecast is very important for power system planning and operation. First visit NYISO website's Custom Reports to explore all sorts of data out there. We will be focusing on day-ahead market (DAM) forcast (1-hour interval), and actual load (5-min interval), and comparing them and analyze how to make forecast better. Download one whole year (2023) of Real_Time_Dispatch_Actual_Load and Day Head Market Load Forcast for New York City. (5pts)

- Plot the load curve and load duration curve of New York City.
  - **Load Curve**: Plot the NYC hourly actual load for 2022, highlighting daily, weekly, and seasonal variations.
  - **Load Duration Curve**: Sort the load data in descending order and plot it to show the distribution of demand over time. This reveals the percentage of time different demand levels occur.

- Show the characteristics of hourly load curve of an average day in New York City
  - All days average
  - Weekday vs. weekend
  - Monthly avearge
  - Seasonal average (Winter, Spring, Summer, and Fall)

- Find the hour(s)/day(s) with the largest forecast error [actual - forcast], and try to explain why (e.g., weather evetns, holidays, disruptions)?

- Now make reasonable assumptions of EV penetration rate and EV charging in New York City, and try to show how that would change the load curve.
- Should ConEdison/NYPA worry about it, what policy/incentives should you use to change people's charging behavior so to save costs for the utility companies?

Further reading:

Arvind Jaggi, Senior Economist, Demand Forecasting & Analysis, Electric Vehicle Forecast Impacts (Gold Book 2021)

Play around the En-ROADS model, and change some of the parameters and check how assumptions affect modeling results.