

# Assignment 3 Load Forecasting and EV Penetration

## Load Forecasting and EV Penetration

### Background

Accurate load forecasting is essential for power system planning and operation. In this assignment, you will explore New York City's electricity demand using real-world data from NYISO, analyze forecast errors (accuracy), and examine how electric vehicle (EV) adoption could impact the grid.

### Data Source

- Visit NYISO [Custom Reports](#) page and explore available datasets.
- We will be focusing on:
  - [Day Head Market Load Forecast](#) (1-hour interval)
  - [Real Time Dispatch Actual Load](#) (5-min interval)
- Preprocessed dataset: I have cleaned and combined the dataset in R. The [Combined Load Forecast Actual Data](#) file is available for you to use. If you're interested, you can access the [R code](#) to replicate or modify the dataset.

### Tasks and Questions

1. Load curve and load duration curve. (1pt)
  - Using Actual Load, plot the hourly load curve and load duration curve of New York City in 2024
  - What do these curves reveal about NYC's electricity demand pattern?
2. Average daily load characteristics. (1pt)

Analyze and visualize the acutal load profile for:

- 366 days average load by hour of day (avearage by “Hour\_of\_Day”)
  - Weekdays vs. weekends average load by hour of day (avearage by “Hour\_of\_Day”, organize by “Is\_Weekday”)
  - Monthly avearge houly load (average by “Month”)
  - Seasonal average houly load (avearge by “Season”)
3. Forecast accuracy. (1pt)

- Identify the hour(s) and day(s) with the largest forecasting error (Actual Load - forecast)
- Analyze potential causes for these errors (e.g., extreme weather, holidays, economic activities)

4. EV adoption and impact on load curve. (1pt)

- Make reasonable assumptions about EV penetration in New York City,
- Analyze how EV charging would affect the load curve
- Consider different charging scenarios (e.g., overnight charging, peak-hour charging)

5. Policy incentives. (1pt)

- Should ConEdison be concerned about increased EV charging demands? Why or why not?
- What policies or incentives could be introduced to encourage cost-effective and grid-friendly charging behaviors (e.g., time of use rates, smart charging incentives, vehicle to grid programs)?

**Further reading:**

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