

Exploring Climate Data of Singapore

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Recent events...

 The Straits Times

Temperature of 37 deg C in Ang Mo Kio matches all-time highest daily mark hit 40 years ago

Temperatures also breached the 30 deg C mark in other parts of the island. Read more at [straitstimes.com](https://www.straitstimes.com).

2 weeks ago



What did you do in response to the weather?

 Today Online

[Rainy afternoons expected to continue in first half of March, after wettest February day on record: Met Service](#)

Rainy days are expected to continue this month, with thundery showers expected in the afternoon on most days, even occasionally extending to...

1 Mar 2023



Background

Climate change is likely to both increase electricity demand for cooling in the summer and decrease electricity, natural gas, heating oil, and wood demand for heating in the winter.

- United States Environmental Protection Agency¹

¹https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-energy_.html#:~:text=Climate%20change%20is%20likely%20to,peak%20demand%20during%20heat%20waves.

Problem Statement



- The EMA (Energy Market Authority) would like to know if there is any impact of weather conditions in Singapore on household electricity consumption.
- Given that the weather is set to become more extreme (eg. heat waves, more rainy days, large storms) due to climate change, insights into such trends can help EMA anticipate any unexpected over/under-demand scenarios which will help optimize operations.

Project Objectives

ONE

- Find energy consumption of households in Changi ¹
- Visualize data on weather and energy consumption

TWO

Identify and analyze trends

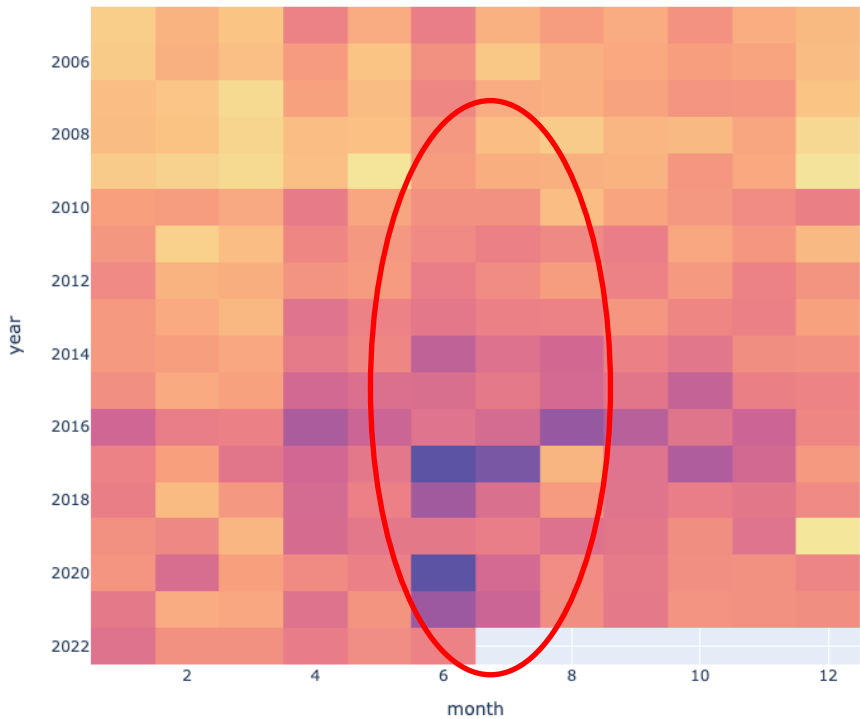
THREE

Make recommendations based on trends

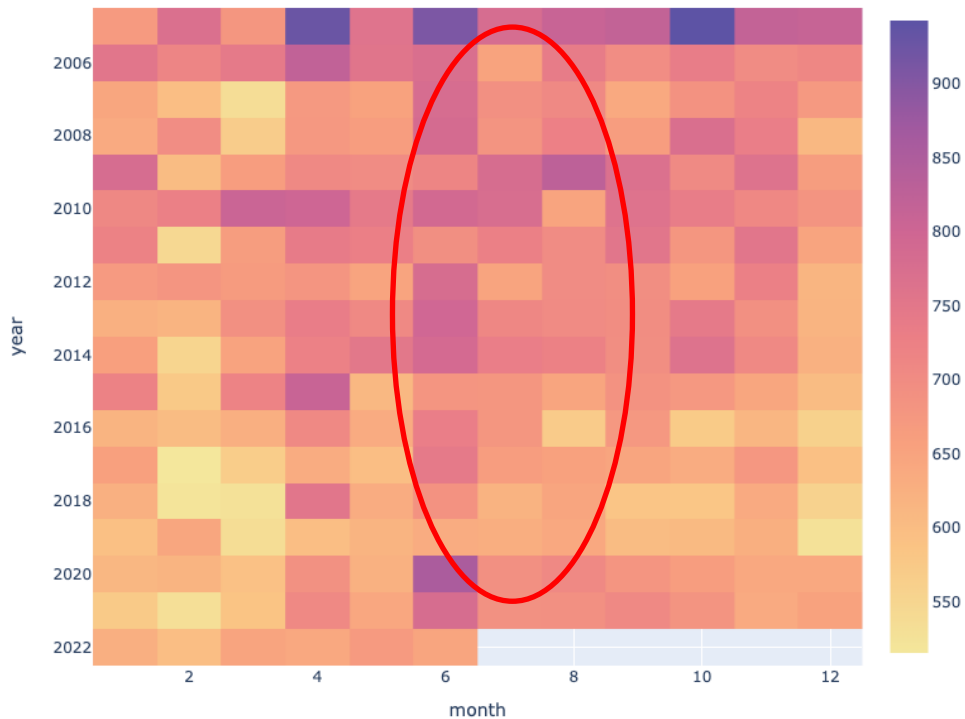
¹Available from https://www.ema.gov.sg/statistic.aspx?sta_sid=20140729cKpjlPbDaOxa

1a. Energy usage by month

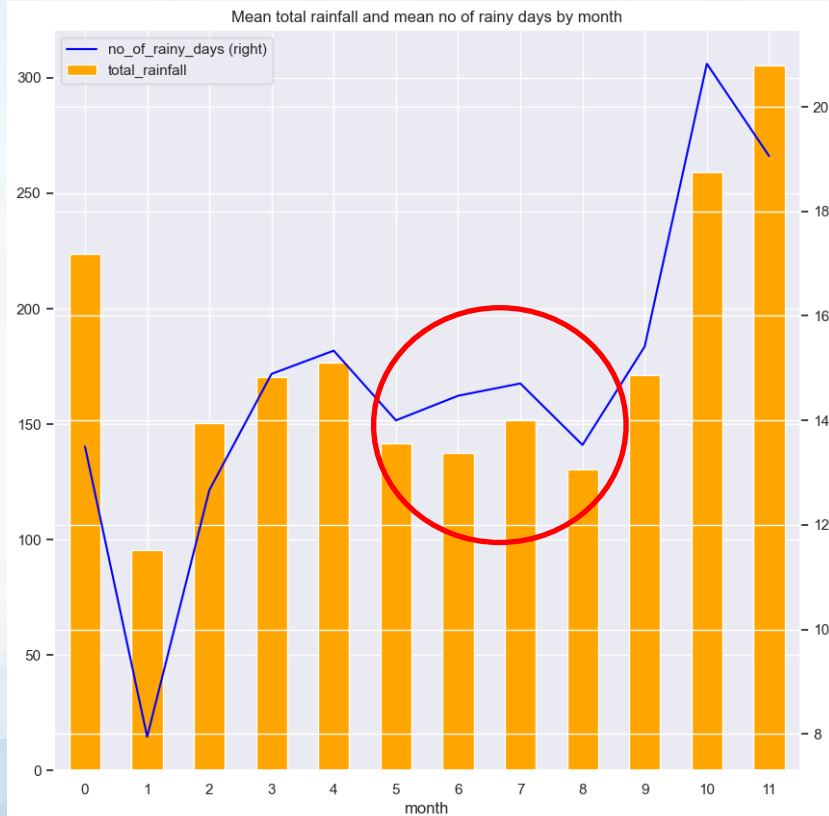
Energy usage of Changi public housing



Energy usage of Changi private housing



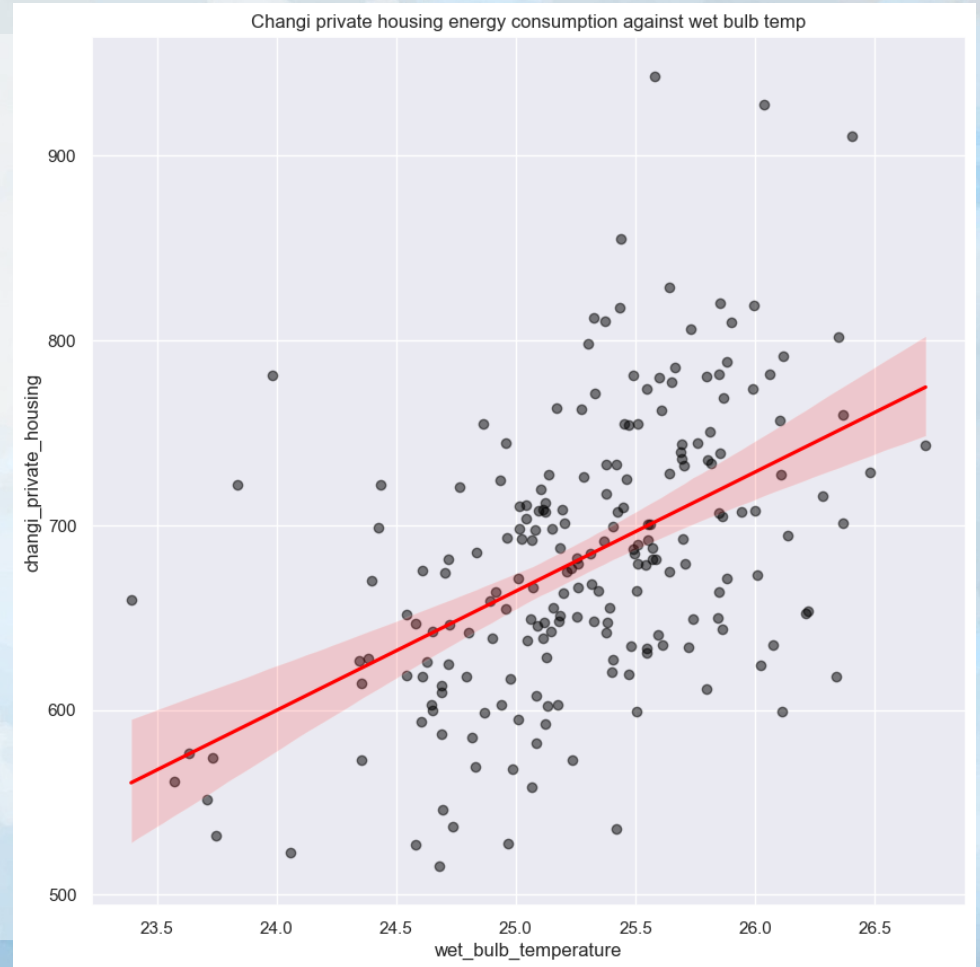
1b. Corresponding rainfall trends



- Barring Feb, we can see that both the mean total rainfall and mean no of rainy days fall in the middle of the year (May – Aug) are low

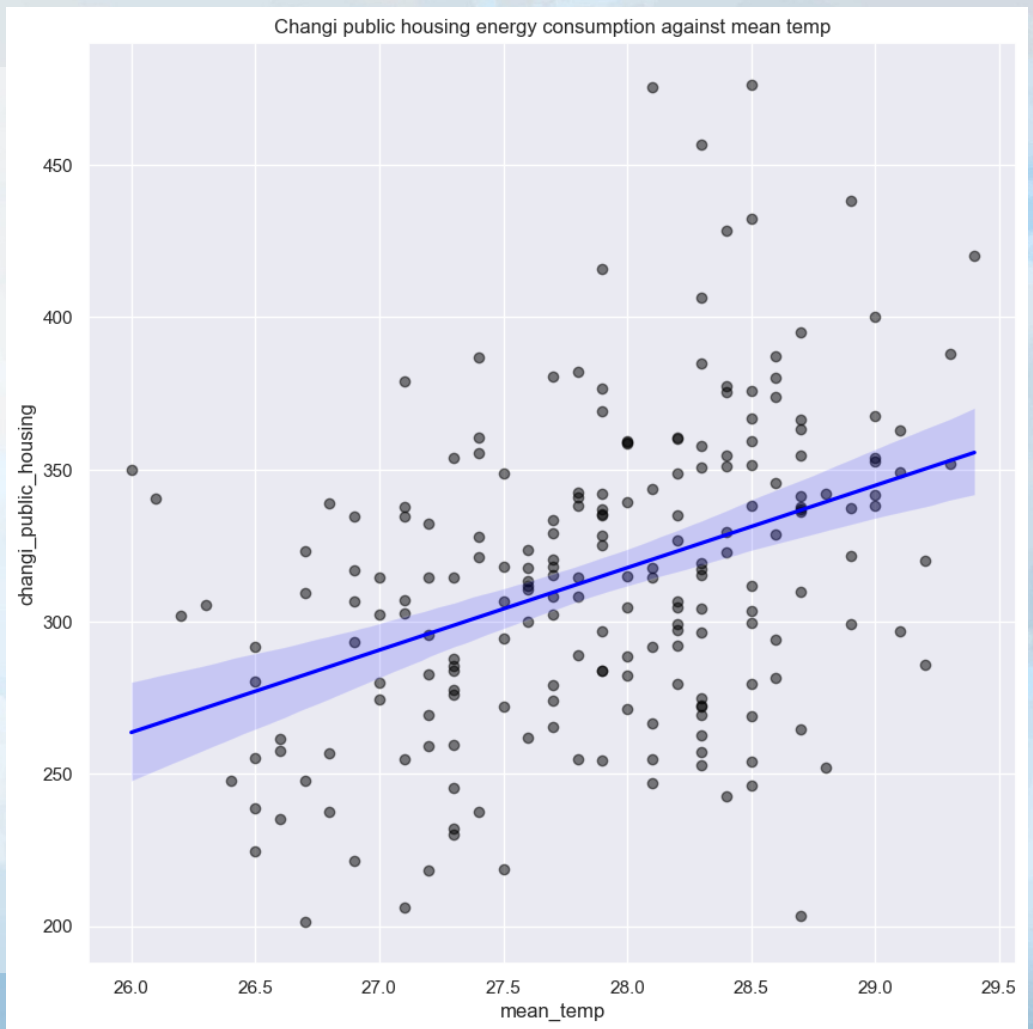
2. Effect of wet bulb temp

- For Changi private housing: as wet bulb temp increases, energy consumption increases



3. Effect of mean temp

- For Changi public housing: as mean temp increases, energy consumption increases



4. Other energy trends

- Both public and private housing energy usage saw an increase in 2020 as compared to 2019



Key Takeaways

- There are some trends showing that there is increased energy usage during months with low mean total rainfall and low mean no of rainy days
- Some correlations such as:
 - As wet bulb temp \uparrow , energy consumption for Changi private housing \uparrow
 - As mean temp \uparrow , energy consumption for Changi public housing \uparrow

Recommendations

- It would benefit EMA to include reviews of weather forecasts during energy demand forecasting in order to prepare for an increase in household energy usage during periods of:
 - Low total rainfall by month
 - Low number of rainy days in a month
 - High wet bulb temperature
 - High mean temp

Key Limitations

- Only data from Changi weather station and energy consumption of Changi housing (public/private) was explored, assumption is that trends found here hold for other regions in Singapore
 - Further work could be done with more data for other housing areas
- Correlation does not imply causation