



Abstract



Singapore's compact, densely populated landscape and reliance on imported energy demand a critical review of electricity usage. Urbanization, industrialization, and technological advancements drive escalating electricity needs, primarily met by natural gas combustion, posing greenhouse gas emission challenges.

The Energy Market Authority (EMA) and relevant agencies conduct regular reviews to analyze trends, identify challenges, and craft effective policies. Optimizing electricity consumption enhances efficiency, mitigates environmental impacts, and fosters a sustainable energy future.

Contact



Name: Chai Zhixuan
(zxchai.2022@mitb.smu.edu.sg)

Name: Muhammad Rizqi Febriansyah
(rizqif.2022@mitb.smu.edu.sg)

Name: Wei Yanrui
(yanrui.wei.2023@mitb.smu.edu.sg)



NETLIFY



SHINY APP

Introduction



In Singapore, achieving net zero emissions by 2050 necessitates a substantial reduction in electricity consumption across all sectors.

The household sector, accounting for 15% of total electricity consumption, is an important segment to target for impactful change.

Objective



a) Conduct a comprehensive analysis of electricity consumption across various regions in Singapore and formulate policies aimed at reducing consumption, with a specific focus on the area exhibiting the highest electricity usage.

b) Investigate household types associated with both the highest and lowest electricity consumption, and devise tax incentives or rebates to encourage reduced consumption, fostering a more sustainable approach to energy usage.

Methodology



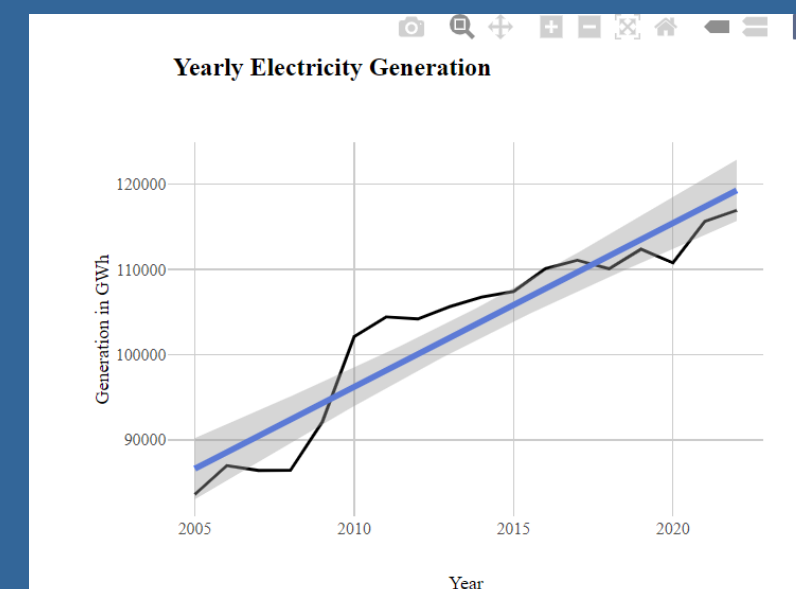
The Shiny App uses visual analytics techniques to enable users to conduct exploratory data analysis and forecast mode. Packages used are as shown below:



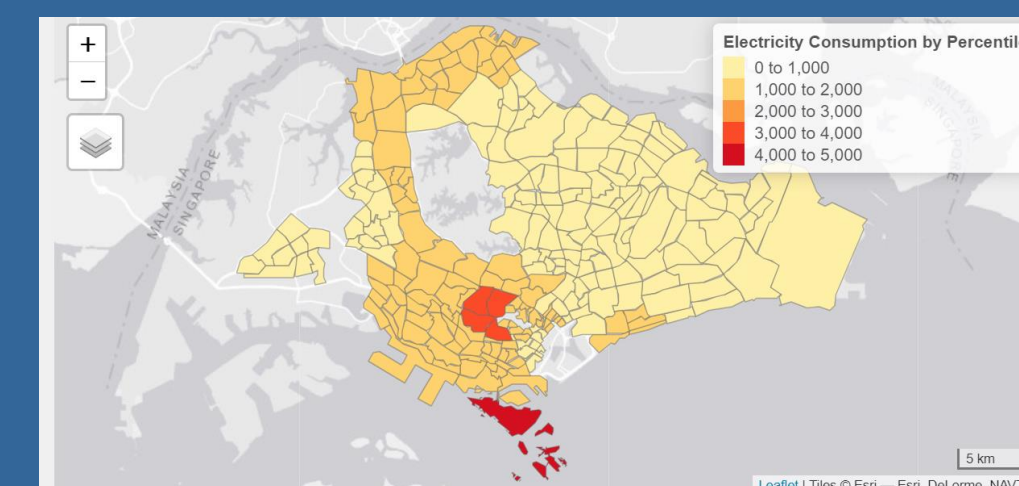
App Concept



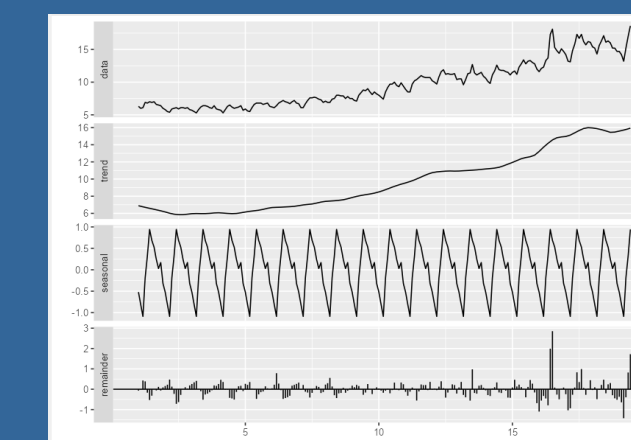
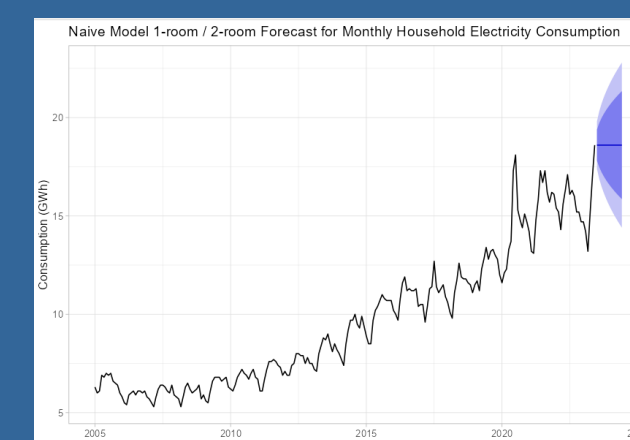
Tool 1: Overview: Users can have an overview of the data but choosing a suitable fitting model and the electricity generation



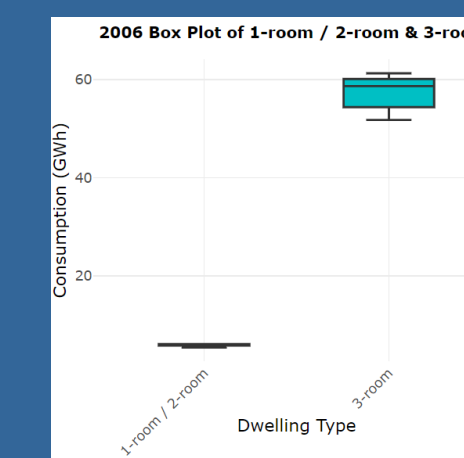
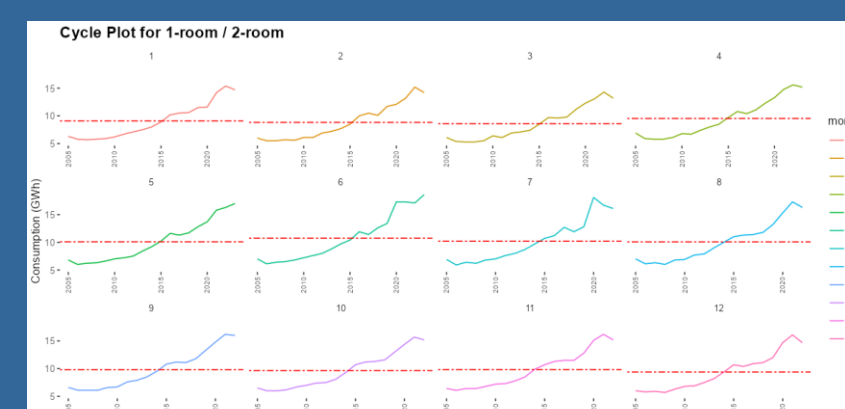
Tool 2: By Region: Users can choose the colour scheme, classification method, dwelling type and period to view by the different regions in Singapore



Tool 3: Time Series: Users can dive deep into deeper analysis by choosing forecast model of their choice, dwelling type and months to forecast



Tool 4: By Dwelling Type: Users can choose the dwelling types to compare and visual the different in statistical measures using a boxplot



Insights



1. Sentosa and Nassim have the highest electricity consumption (using 2022 data) with dwelling type: Landed Properties
2. Regional electricity tariff can be imposed to areas with high electricity consumptions. Dwelling type with the highest electricity consumptions may also be charged with higher markup rates for electricity consumptions. Greater tax rebates should be given to dwelling type such as 1-room/2-room for the least electricity usage
3. Seasonal Naïve Model exhibits to be the best model with close to 0% MAPE, with ARIMA being the 2nd best in terms of forecasting

Future Work



- a) To Identify companies contributing the most significant share percentage to overall electricity consumption and propose policies to mitigate and reduce their consumption.
- b) To Identify key sectors responsible for the highest electricity consumption and develop targeted strategies to address and optimize energy usage within these sectors.

Data used



1. Electricity data (Singapore Energy Statistics) from Energy Market Authority



2. Master Plan 2019 Subzone Boundary from data.gov.sg

