Building Energy

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Building Energy Benchmark Study

The Department of Energy and Environment (DOEE) has set forth legislation that requires private buildings of 50,000 sqft or higher in DC to benchmark their energy consumption

They also ask for more information regarding the building to help identify any drivers to energy consumption and emission rates

Why did we commit to this dataset?

As prospective architects, we are motivated to build communities that are sustainable and energy efficient

We also care about the occupants' perspectives and how such measures can affect their living situations

This data allowed us to identify the prominent factors in DC's energy consumption and the possible solutions we can apply to reduce its measure.

Main Objectives

- Influential factors to energy usage intensity
- Relationship between GHG and energy consumption
- 2013 - 2017 Trends
- Source and Site EUI ratio

Initial Hypotheses

Due to our understanding of sustainability and energy spending, we assumed the build, location, and use of the building would affect the buildings' EUI as well as the Greenhouse Gas emissions

Research

We decided to invest most of our research within the data's scope, utilizing our studies in the architecture program.

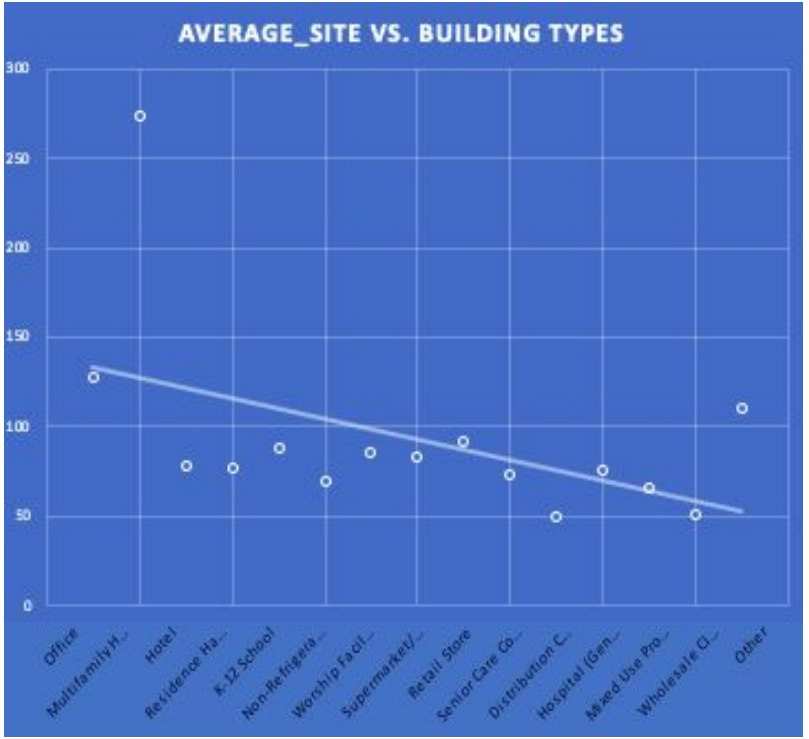
We also decided to use additional data conducted by HUD. This was to gain insight on the occupants' living situations and how energy usage can affect their cost of living.

Provided Data

Property Type
Postal Code
Ward
Floor Area
Electricity Use
Water Use
Site EUI and Weather Normalized Site EUI
Source EUI and Weather Normalized Source EUI
Natural Gas
Greenhouse Gas Emission rate

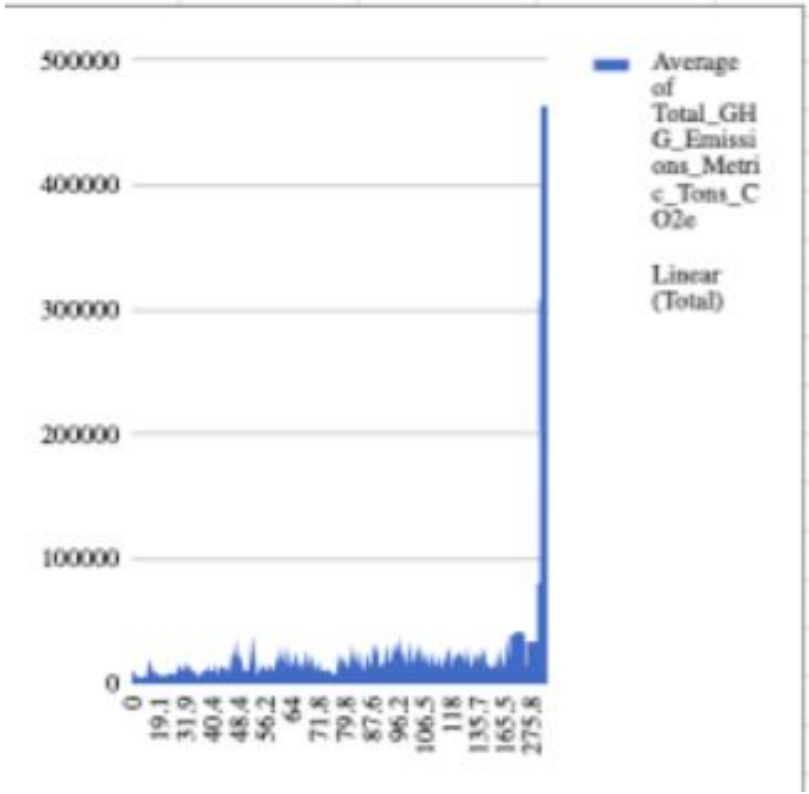
Influential factors to EUI

The most detrimental factor of Energy Use Intensity proved to be the building type



Greenhouse Gasses

Direct correlation to EUI?



Trends

As the years progressed from 2013 to 2017, the EUI measures generally decreased

This identifies the collective effort of both independent and public organizations

Except for the spike in 2014 for non-weather normalized EUI, the values were relatively stable throughout.

Ratio

Ratios
0.505398583712696:1
0.416763451162217:1
0.468801117442978:1
0.608582108371955:1
0.449333050737 37:1
0.432401443849043:1
0.513083292528 74:1
0.805118791857377:1

Site EUI:Source EUI (Per Ward)

External Data: HUD 2014

Average of TOTAL_ANNL_INCM_AMNT	Average of GROSS_RENT_AMNT	Average of PVRTY_PRCNT
11778.52405	873.5088167	27.29426759

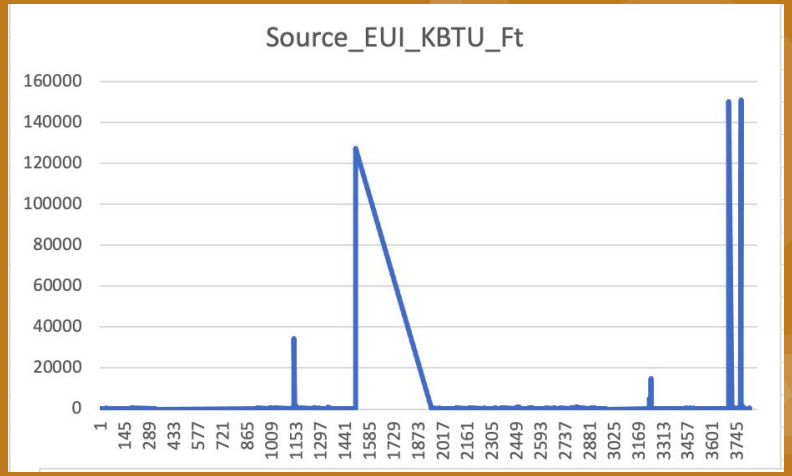
*Multifamily Housing Averages

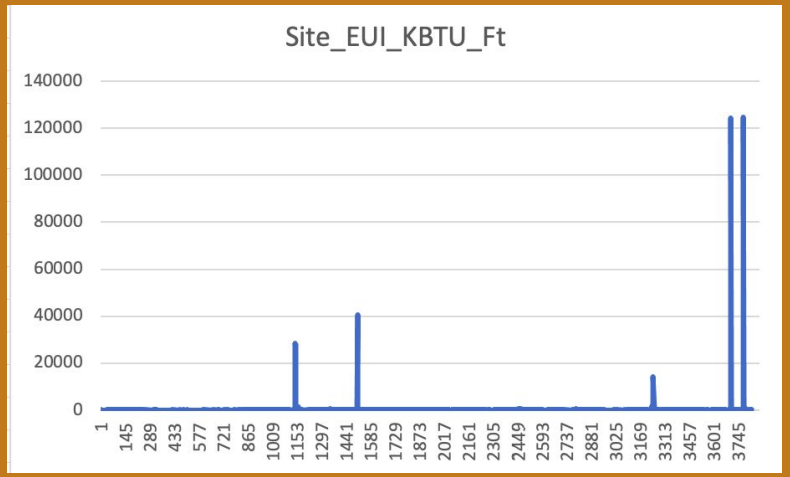
Such data identifies the significance of energy use to the communities that live within the DC area.

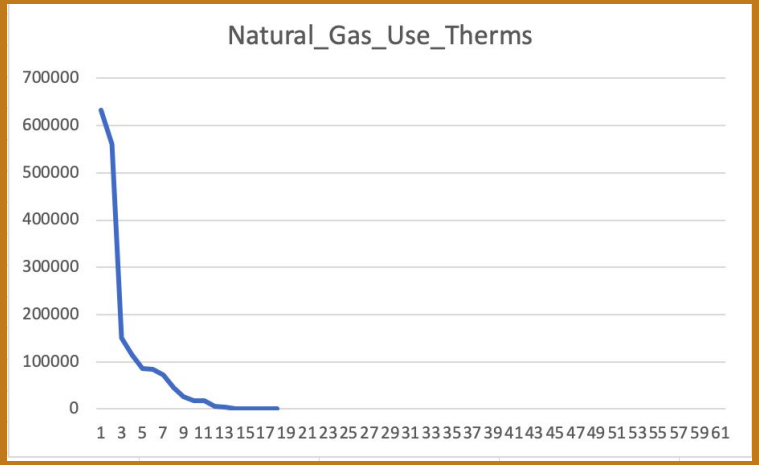
As the percent of poverty line families is nearly 30%, and multifamily housing energy use is one of the highest ranked building types, this can cause significant struggles to families throughout.

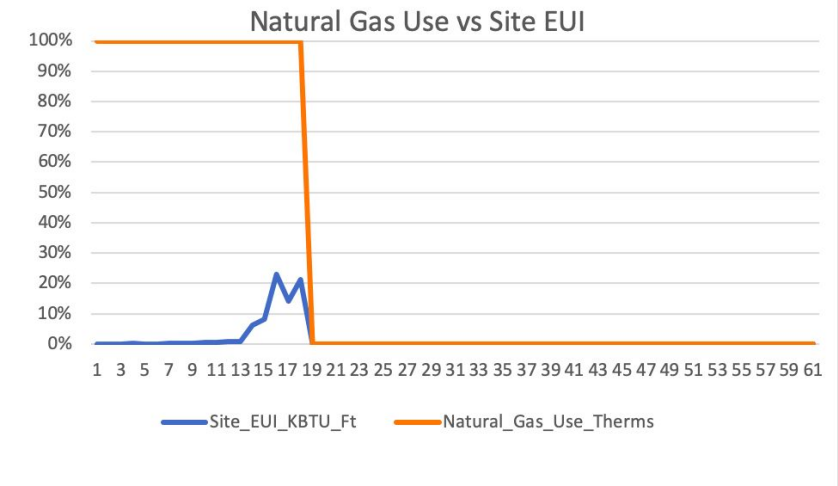
Additional Data Sets

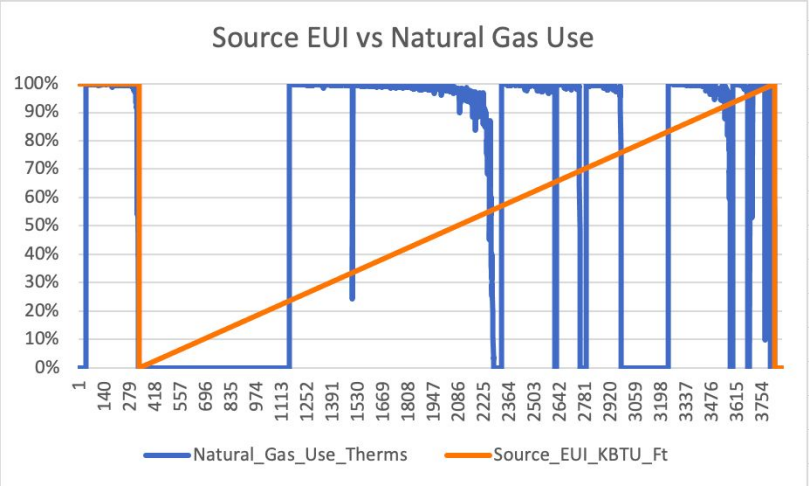
* Averages Per Ward

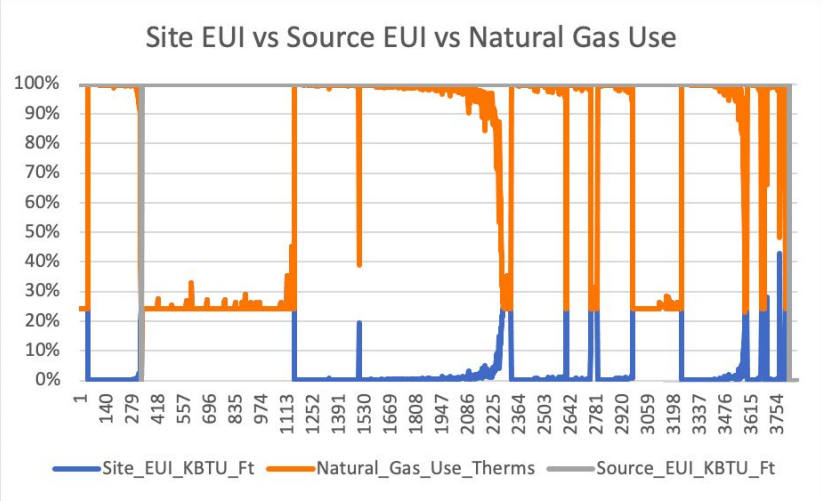












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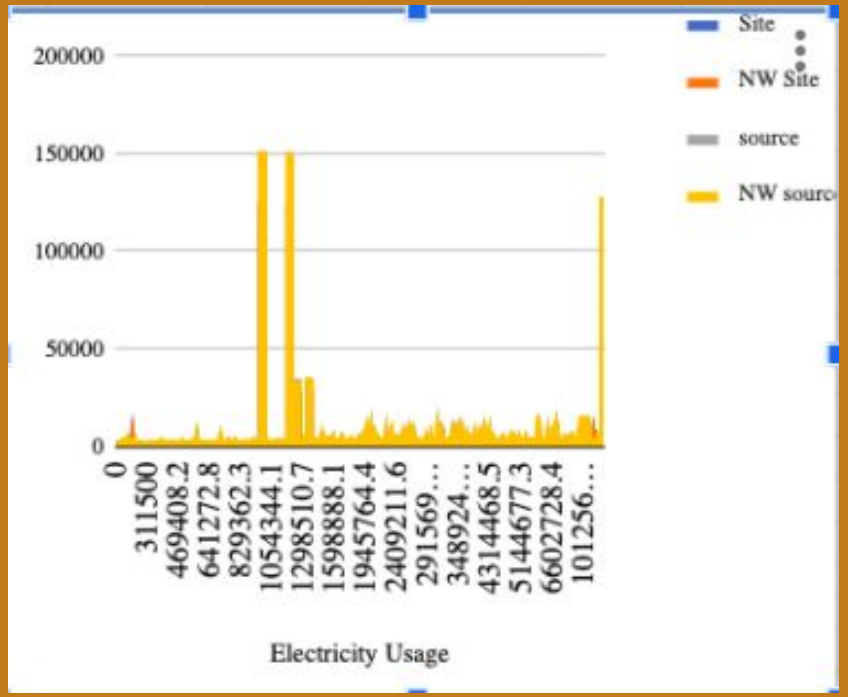
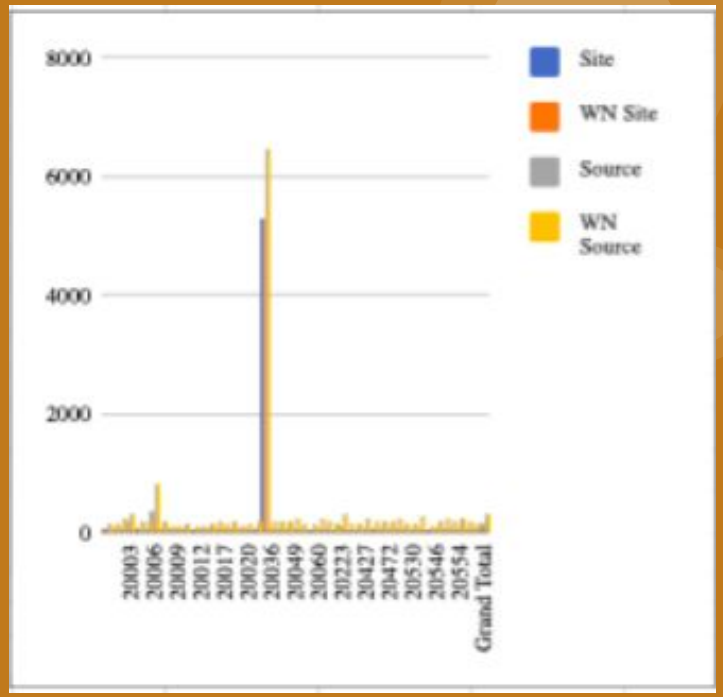
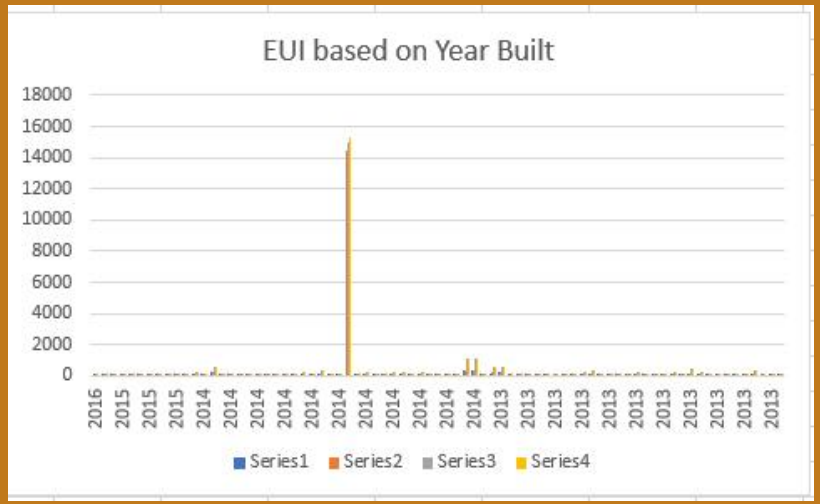
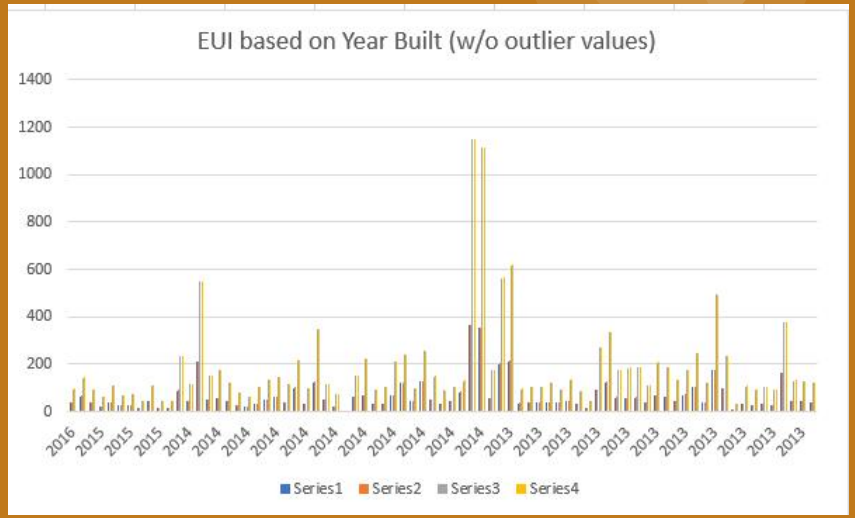


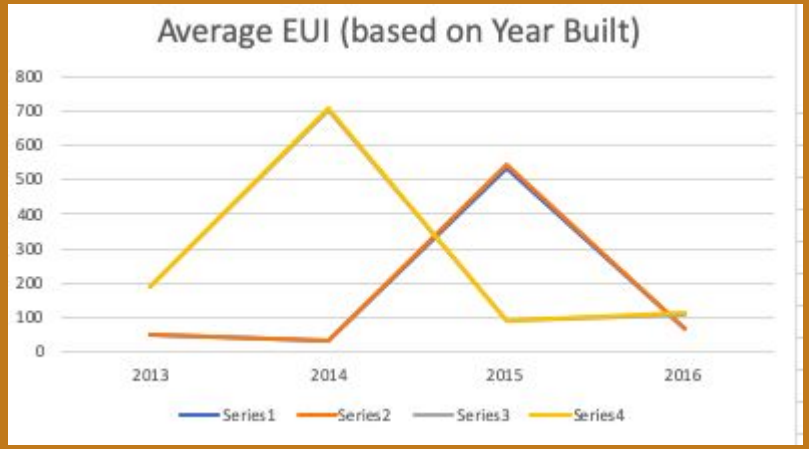


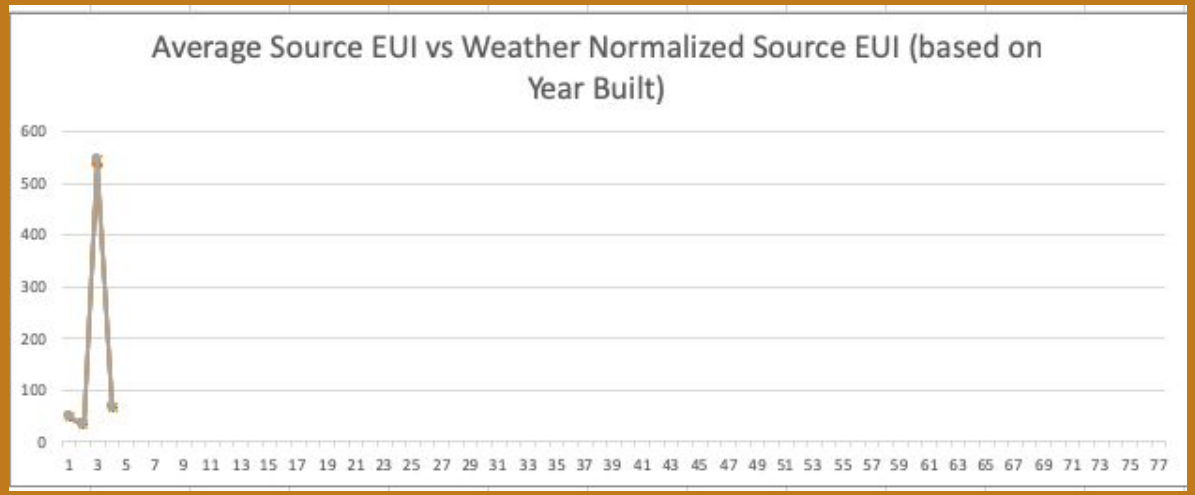
* Averages Per Zip Code





* Averages Per Year Built





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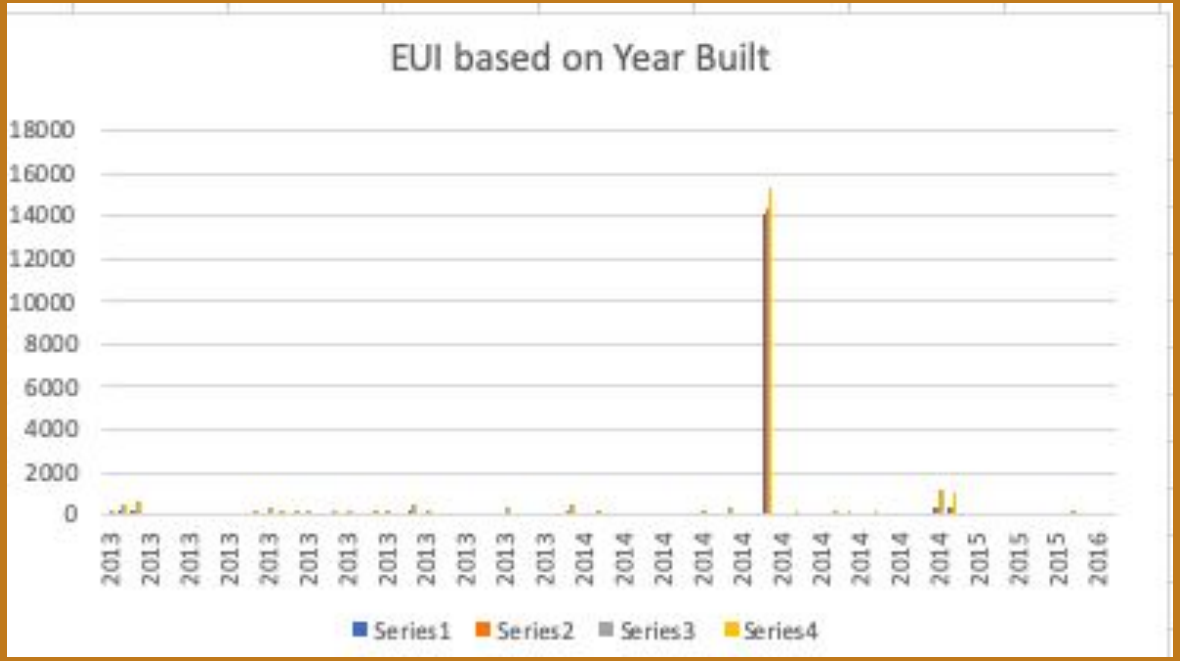

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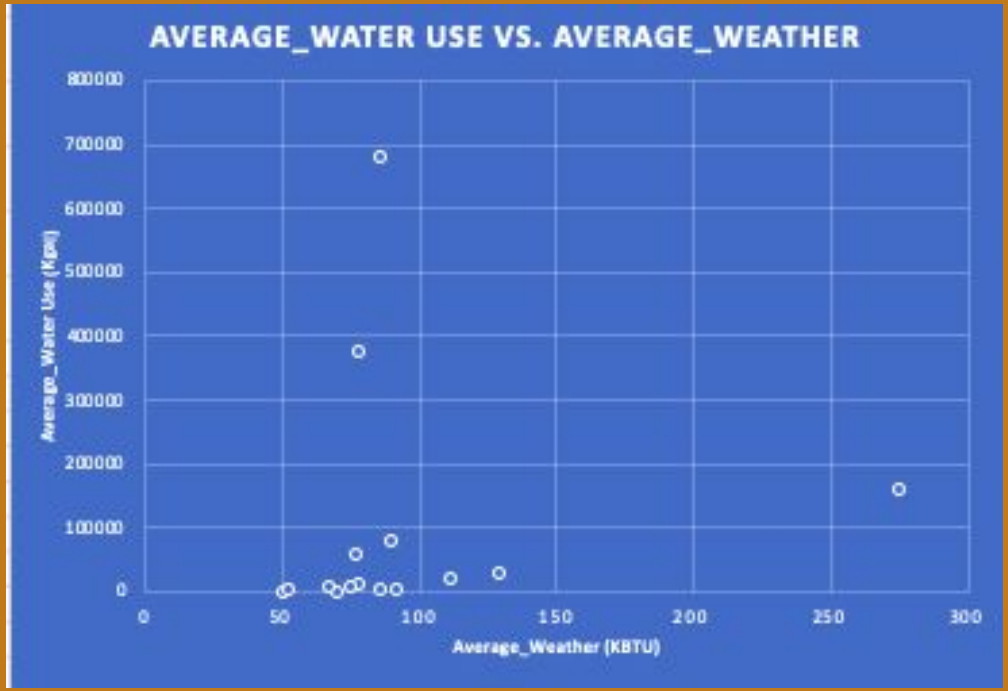
AVERAGE_WATER USE VS. AVERAGE_WEATHER
800000
700000
600000
500000
400000
300000
200000
100000
0
Average_Water Use (KGal)
0
50
100
150
200
250
300
Average_Weather (KBTU)