

## PowerBI Dashboard #3

There are a lot of repeat visuals within this dashboard. Some have subtle changes so could use in portfolio, or to share with others.



### Sum of CO2(tCO2) by date\_only

date\_only



These values and expectations were created before finished all my analysis and modeling.

The new cost saving prediction is around 20K.



**\*\*Estimated Savings:**  
**\$13,500/year (5% energy reduction).**

Sum of Usage\_kWh and AvgkW...

**Goal: 26.0 (-5%)**

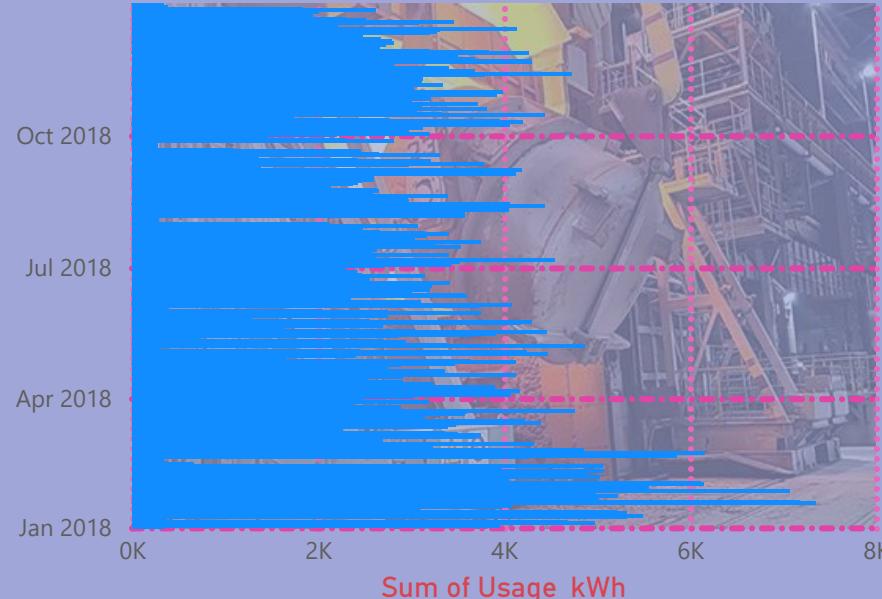
Ave: 27.39

<sup>339.08</sup>

\*\*Based on \$0.10/kWh and industry reports (EIA, IEA)

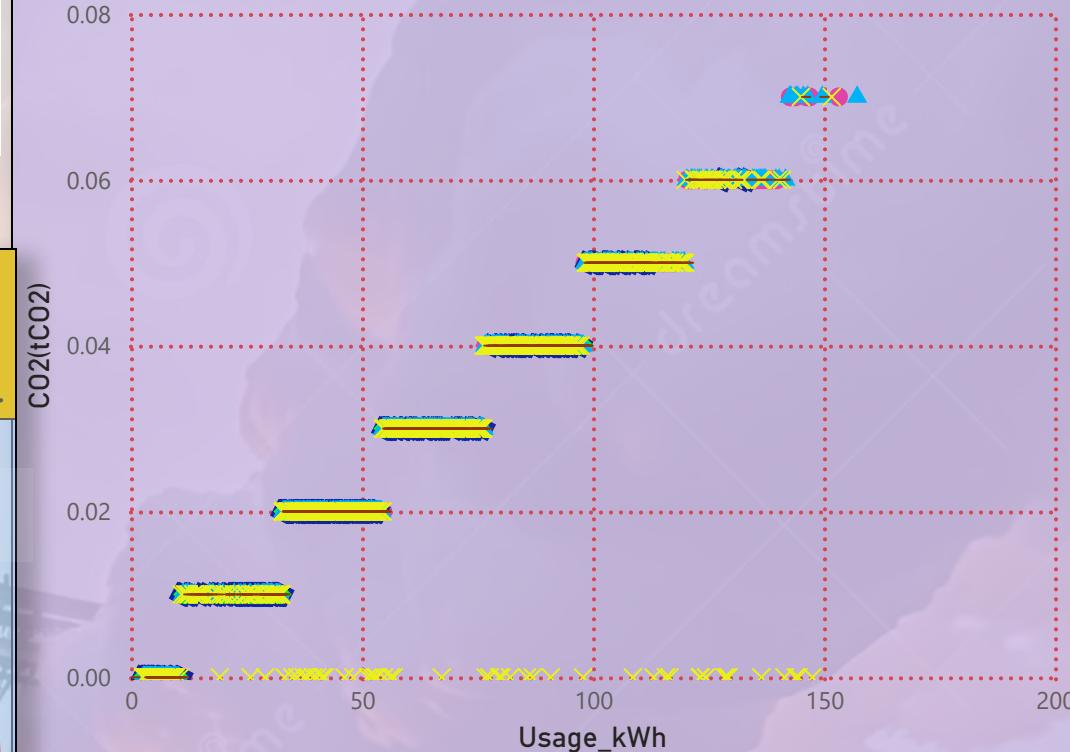
### Sum of Usage\_kWh by date\_only

date\_only



### Day\_of\_week, Usage\_kWh and CO2(tCO2)

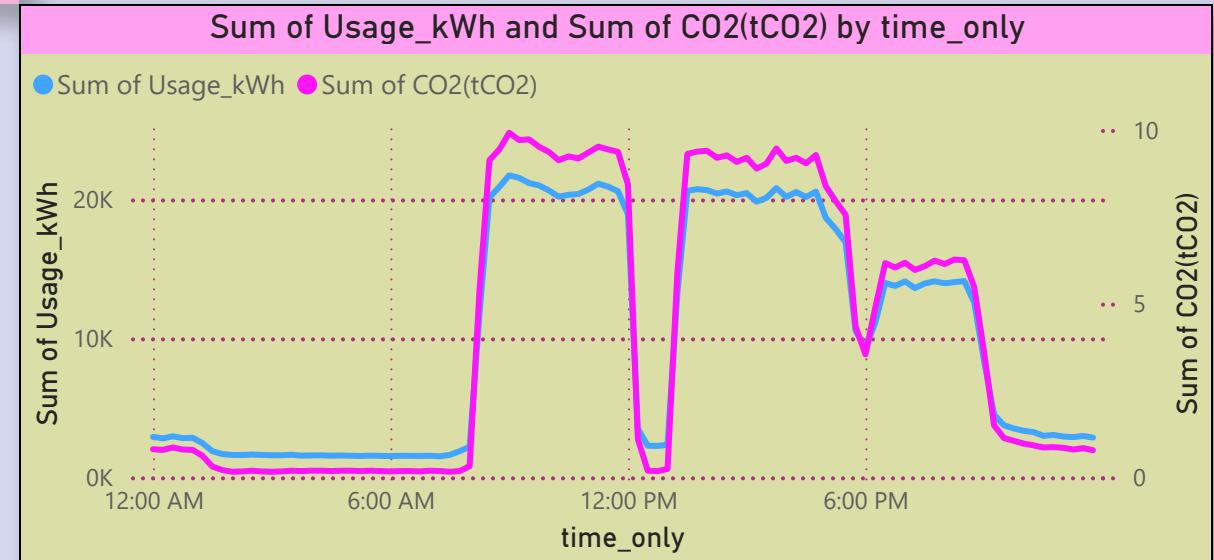
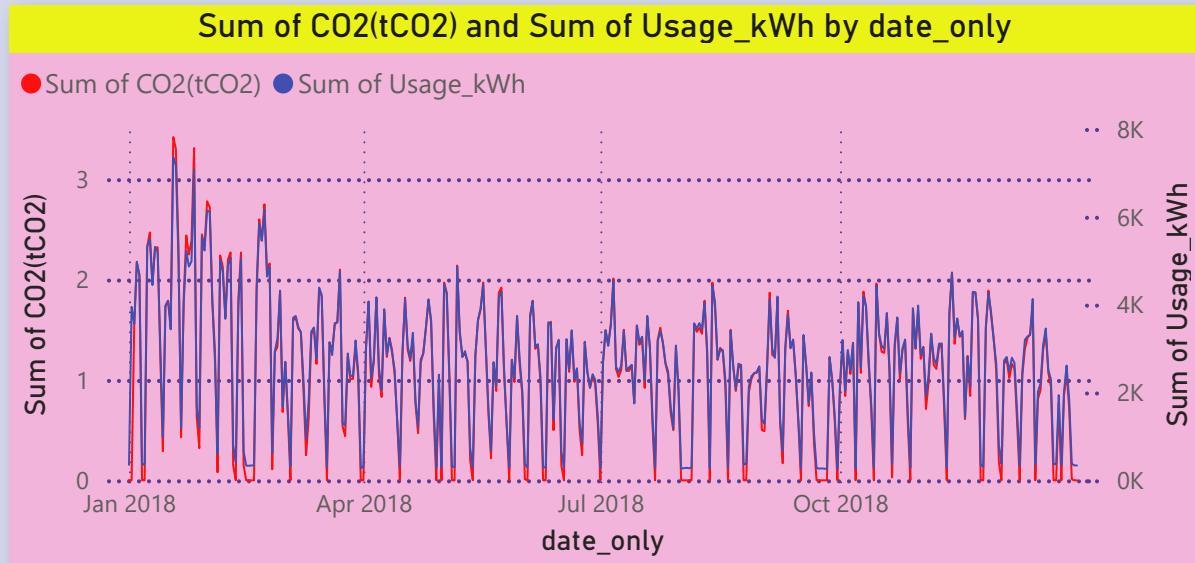
Day\_of\_week — Friday ● Monday ■ Saturday ♦ Sunday ▲ Thursday ▾ Tuesday



### CO2 Columns with kWh(avg) Rows

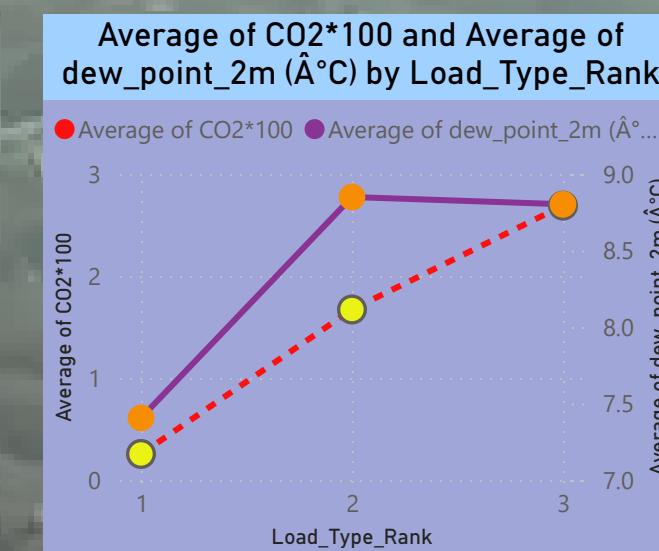
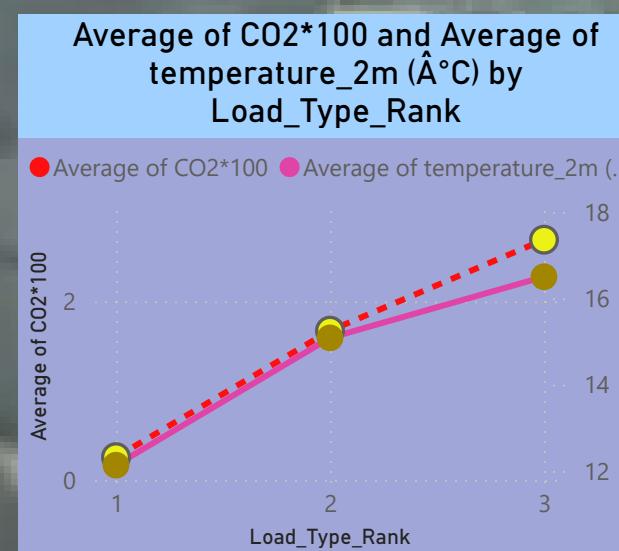
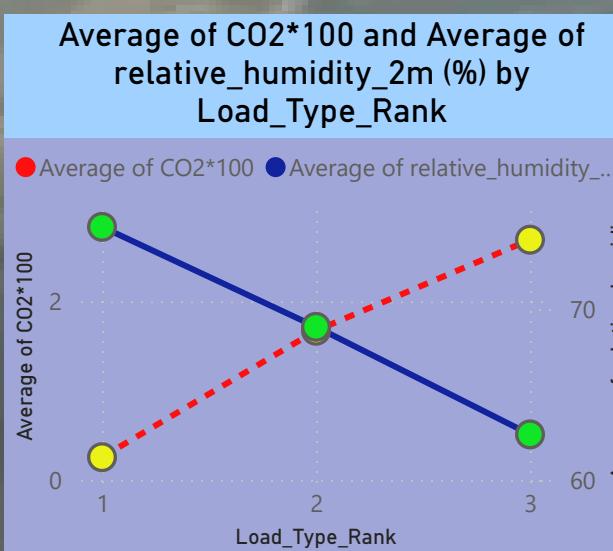
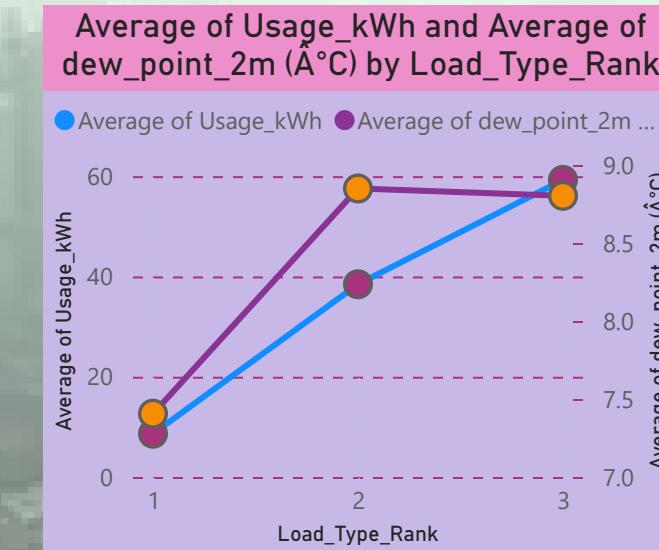
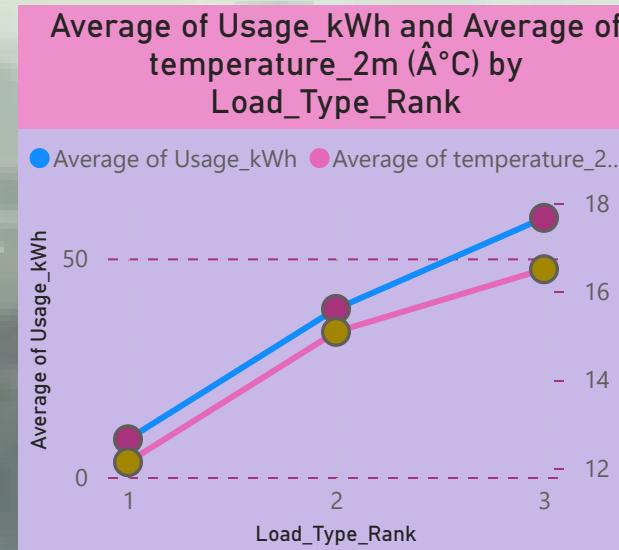
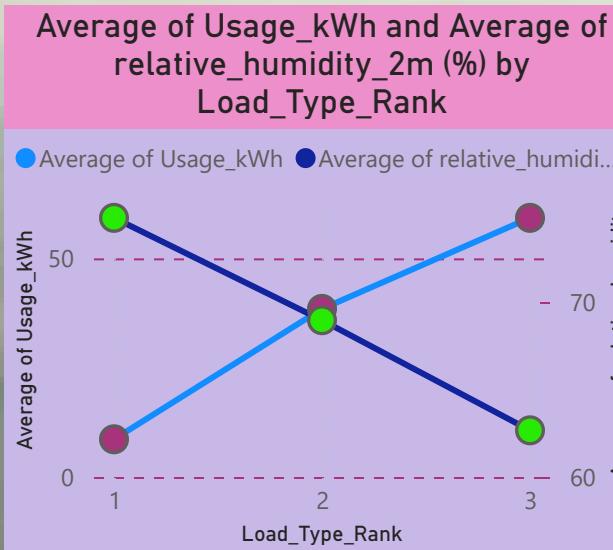
Day_of_week	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	Total
Friday	3.89	26.76	45.27	62.77	87.43	108.20	127.04	145.56	33.20
Monday	3.72	25.55	45.75	63.37	87.10	107.87	128.18	145.82	33.14
Saturday	3.65	26.18	40.95	64.85	86.86	105.85	127.82		15.92
Sunday	3.42	25.76	39.00	64.30	88.67	104.22			7.55
Thursday	3.84	25.26	44.83	63.47	86.38	108.19	128.74	146.56	35.11
Tuesday	5.25	25.91	45.00	63.94	86.50	107.35	126.64	148.34	34.43
Wednesday	3.87	25.36	44.85	63.38	87.40	107.93	127.03	145.36	32.25
<b>Total</b>	<b>3.88</b>	<b>25.87</b>	<b>44.35</b>	<b>63.46</b>	<b>86.98</b>	<b>107.77</b>	<b>127.61</b>	<b>146.10</b>	<b>27.39</b>

## Comparison of the Usage\_kWh and CO2 Over Year and over Time (sum)





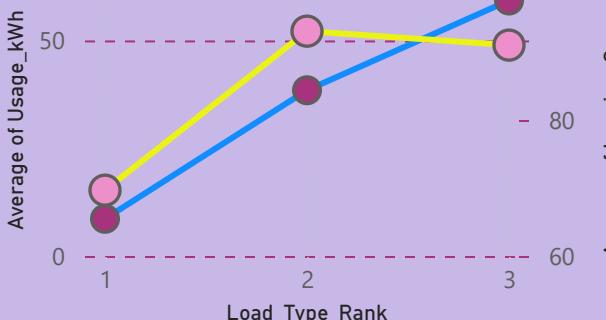
## Weather with CO2 and kWh Comparison



## Comparisons of kWh and CO2 with Load Rank (and other energy)

Average of Usage\_kWh and Average of Lagging\_Current\_Power\_Factor by Load\_Type\_Rank

● Average of Usage\_kWh ● Average of Lagging\_Curre...



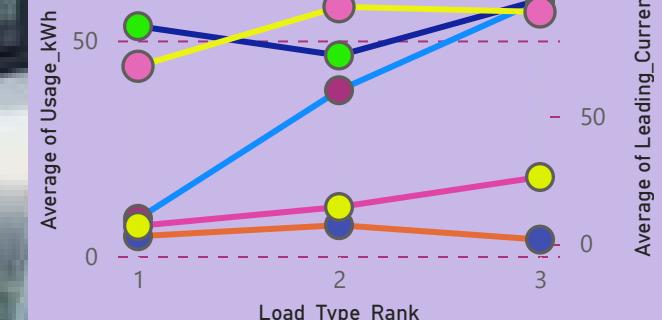
Average of Usage\_kWh and Average of NSM by Load\_Type\_Rank

● Average of Usage\_kWh ● Average of NSM



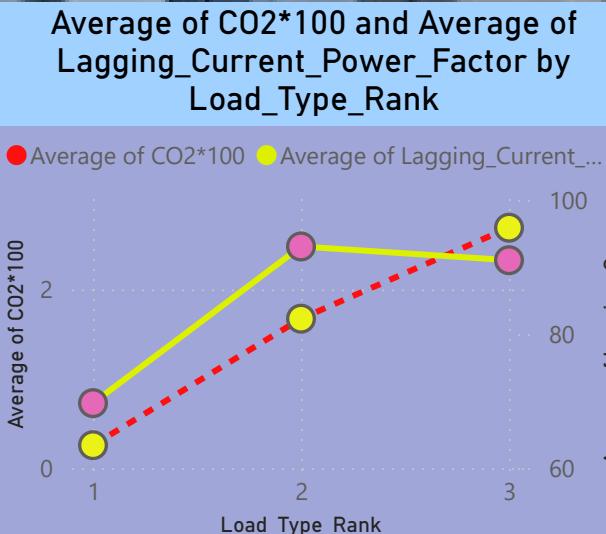
Average of Usage\_kWh, Average of Leading\_Current\_Power\_Factor, Average of Leading\_Current\_Reactive\_Power\_kV...

● Average of ... ● Average of L... ● Average of ...



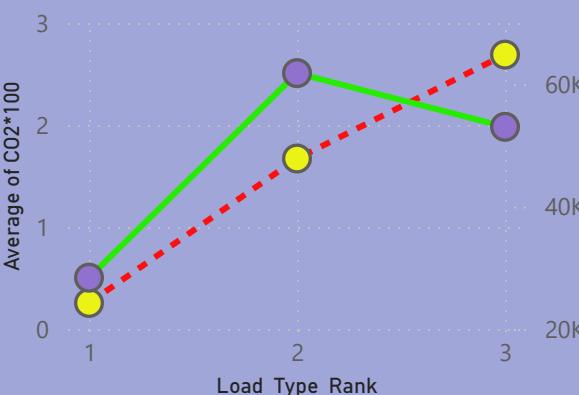
Average of CO2\*100 and Average of Lagging\_Current\_Power\_Factor by Load\_Type\_Rank

● Average of CO2\*100 ● Average of Lagging\_Current\_...



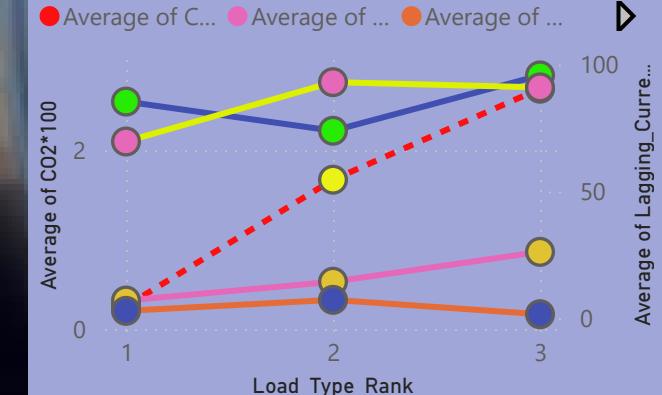
Average of CO2\*100 and Average of NSM by Load\_Type\_Rank

● Average of CO2\*100 ● Average of NSM

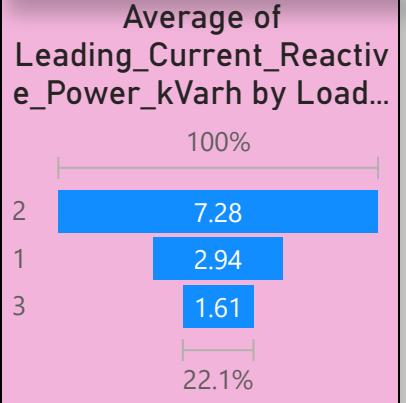


Average of CO2\*100, Average of Lagging\_Current\_Reactive\_Power\_kVarh, Average of Leading\_Current\_Reactive\_P...

● Average of C... ● Average of ... ● Average of ...

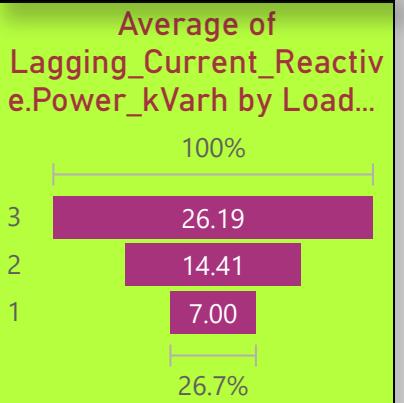


**Leading Current Reactive Power (kVarh):** This measures the reactive energy associated with capacitive loads. It occurs when current leads voltage, often used for power factor correction.



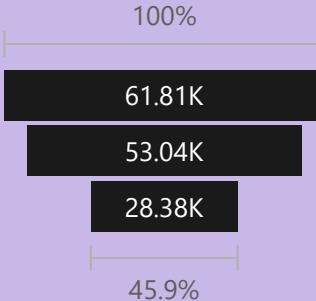
**LOAD RANK**  
The Load type classifications are used to analyze energy consumption patterns in steel plants.  
**Light (1):** Lowest demand (e.g., <30% of peak capacity).  
**Medium (2):** Moderate demand (e.g., 30–70% of peak).  
**Maximum (3):** Highest demand (e.g., >70% of peak).

**Lagging Current Reactive Power (kVarh):** This measures the reactive energy consumed by inductive loads. It occurs when current lags behind voltage, meaning the system requires extra energy to maintain magnetic fields.

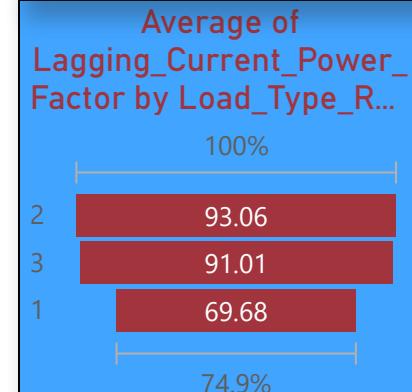


NSM: Number of Steel Melts (Steel production cycles)

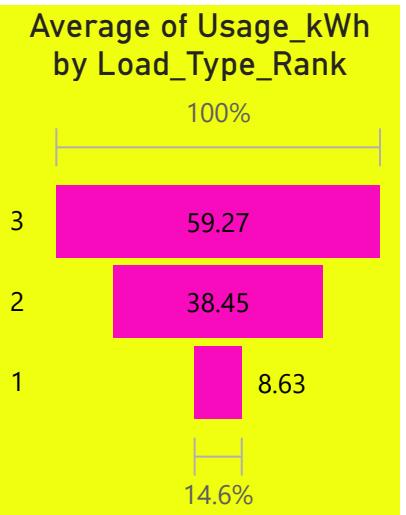
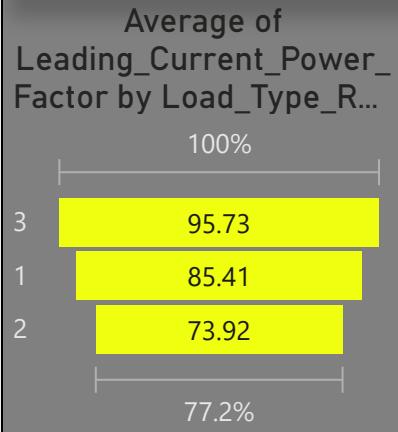
#### Average of NSM by Load\_Type\_Rank



**Lagging Current Reactive Power (kVarh):** Measures the reactive energy consumed by inductive loads when current lags behind voltage.



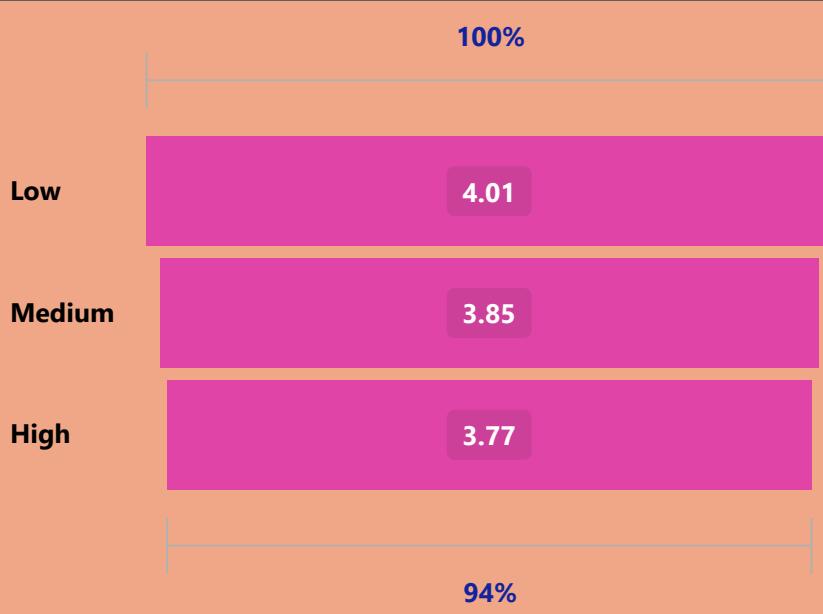
**Leading Current Reactive Power (kVarh):** Measures the reactive energy associated with capacitive loads when current leads voltage.



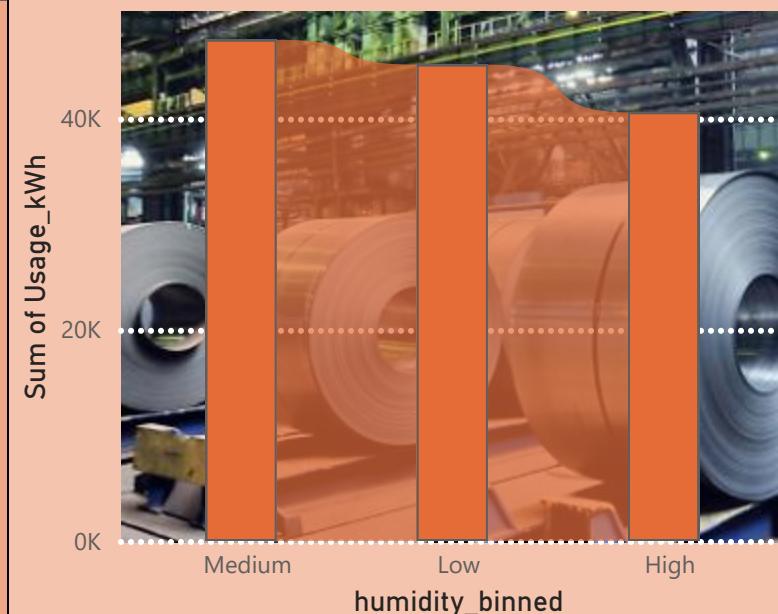
NOTE: These funnel plots are not the typical statistical types using standard errors. These plots are used to show the energy usages and CO2 averages at different Load Ranks



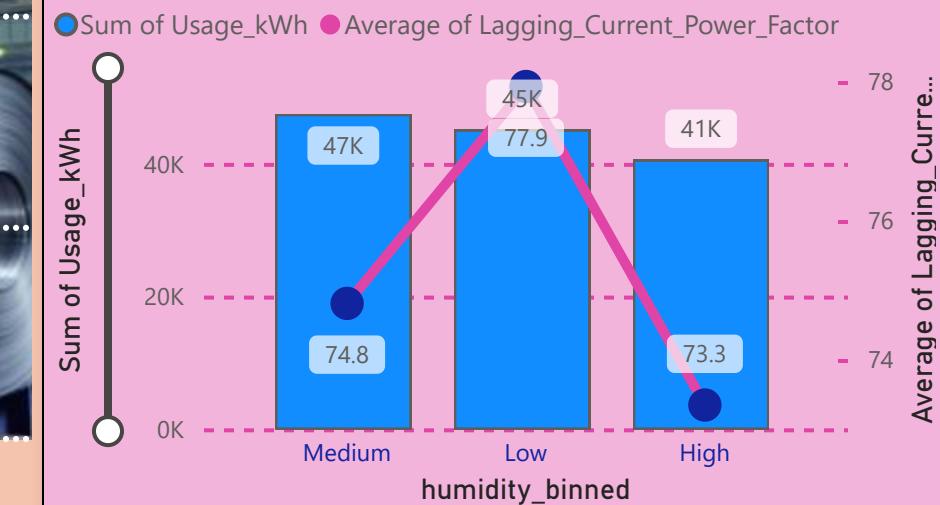
### Average of Usage\_kWh by humidity\_binned



### Sum of Usage\_kWh by humidity\_binned

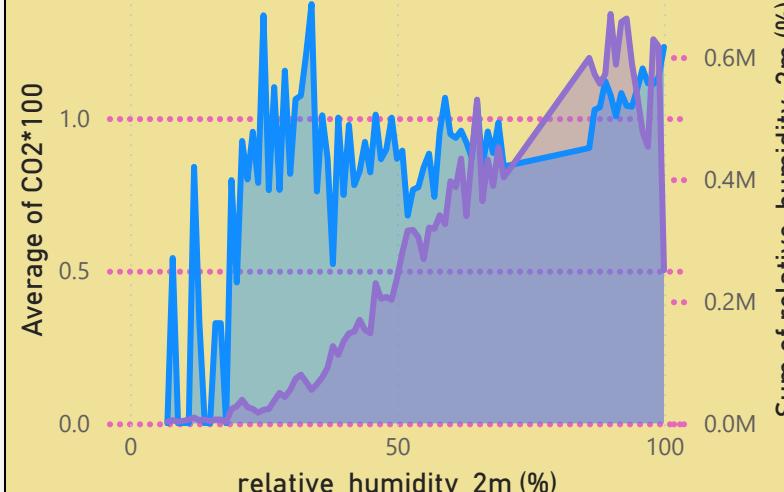


### Sum of Usage\_kWh and Average of Lagging\_Current\_Power\_Factor by humidity\_binned



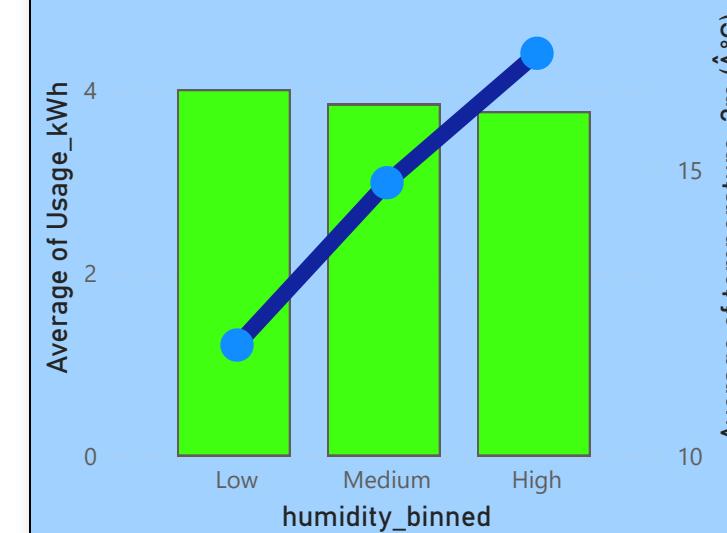
### Average of CO2\*100 and Sum of relative\_humidity\_2m (%) by relative\_humidity\_2m (%)

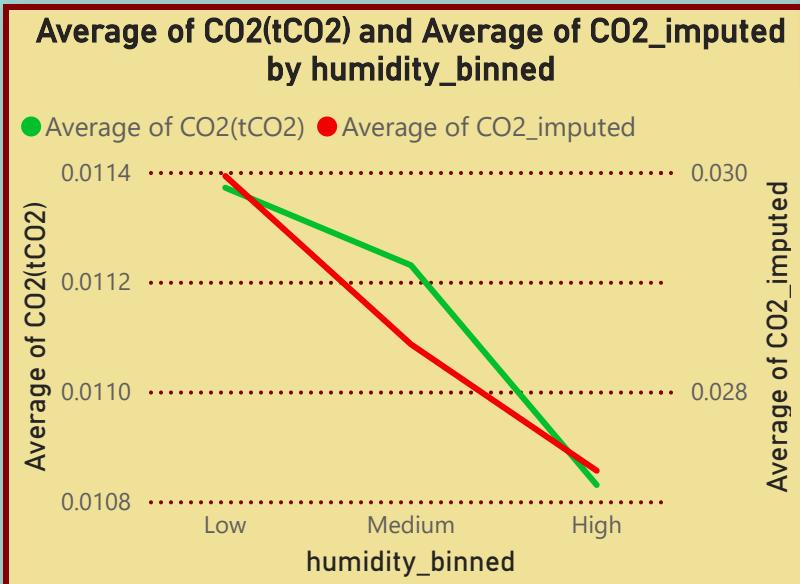
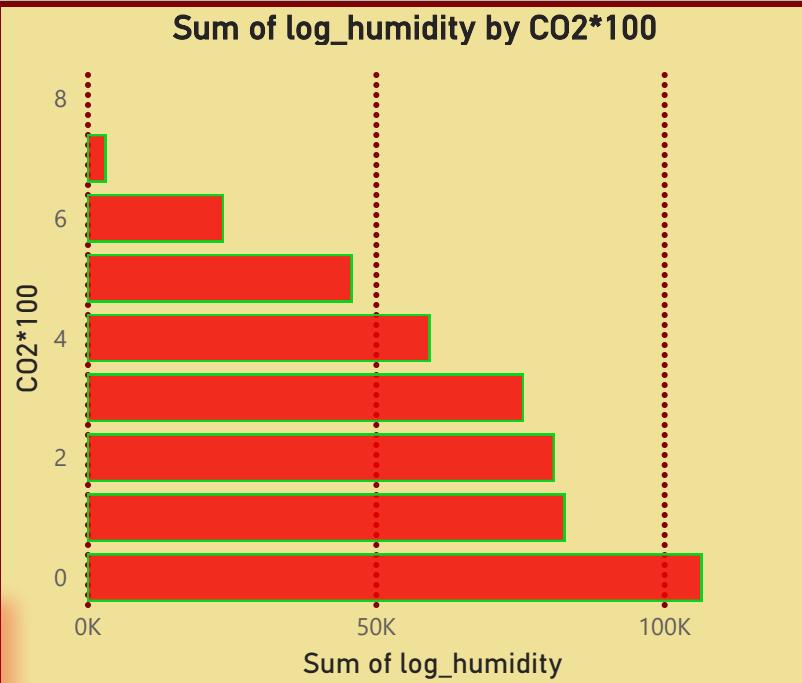
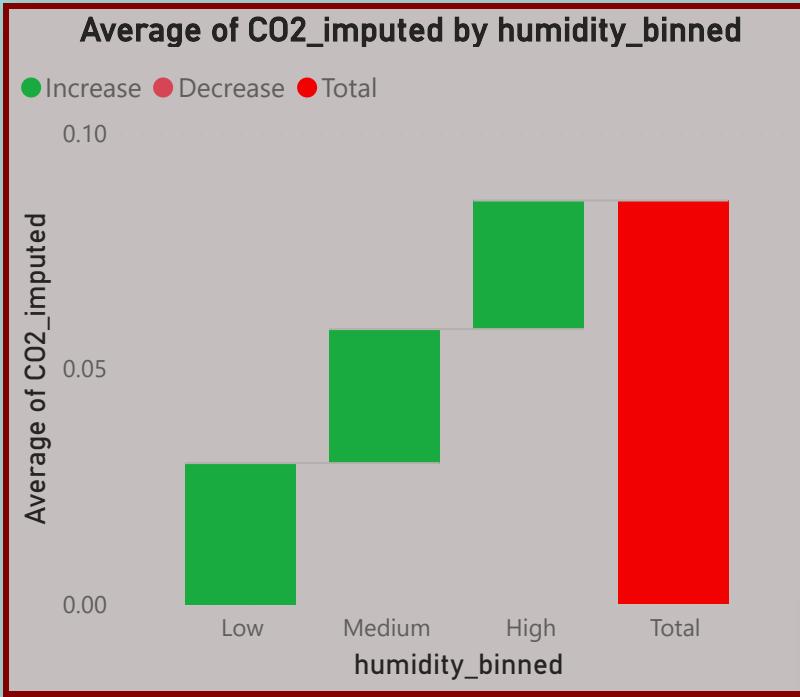
● Average of CO2\*100 ● Sum of relative\_humidity\_2m (%)



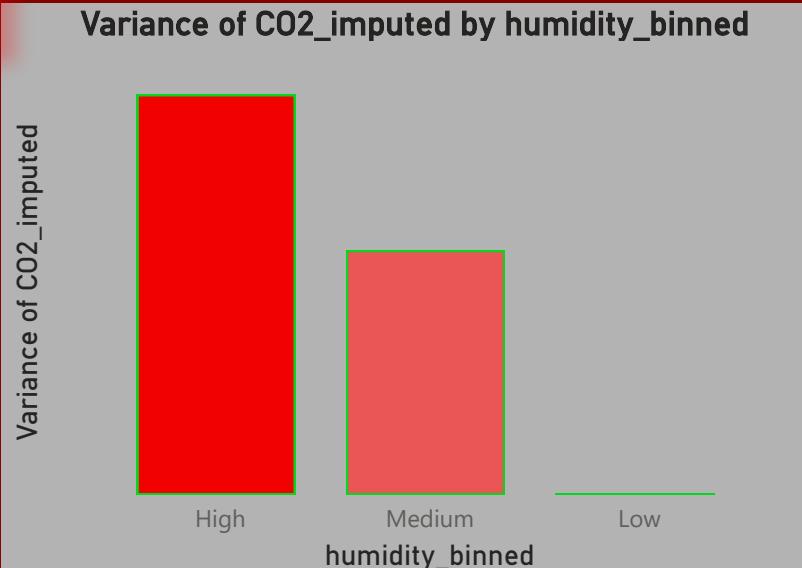
### Average of Usage\_kWh and Average of temperature\_2m (°C) by humidity\_binned

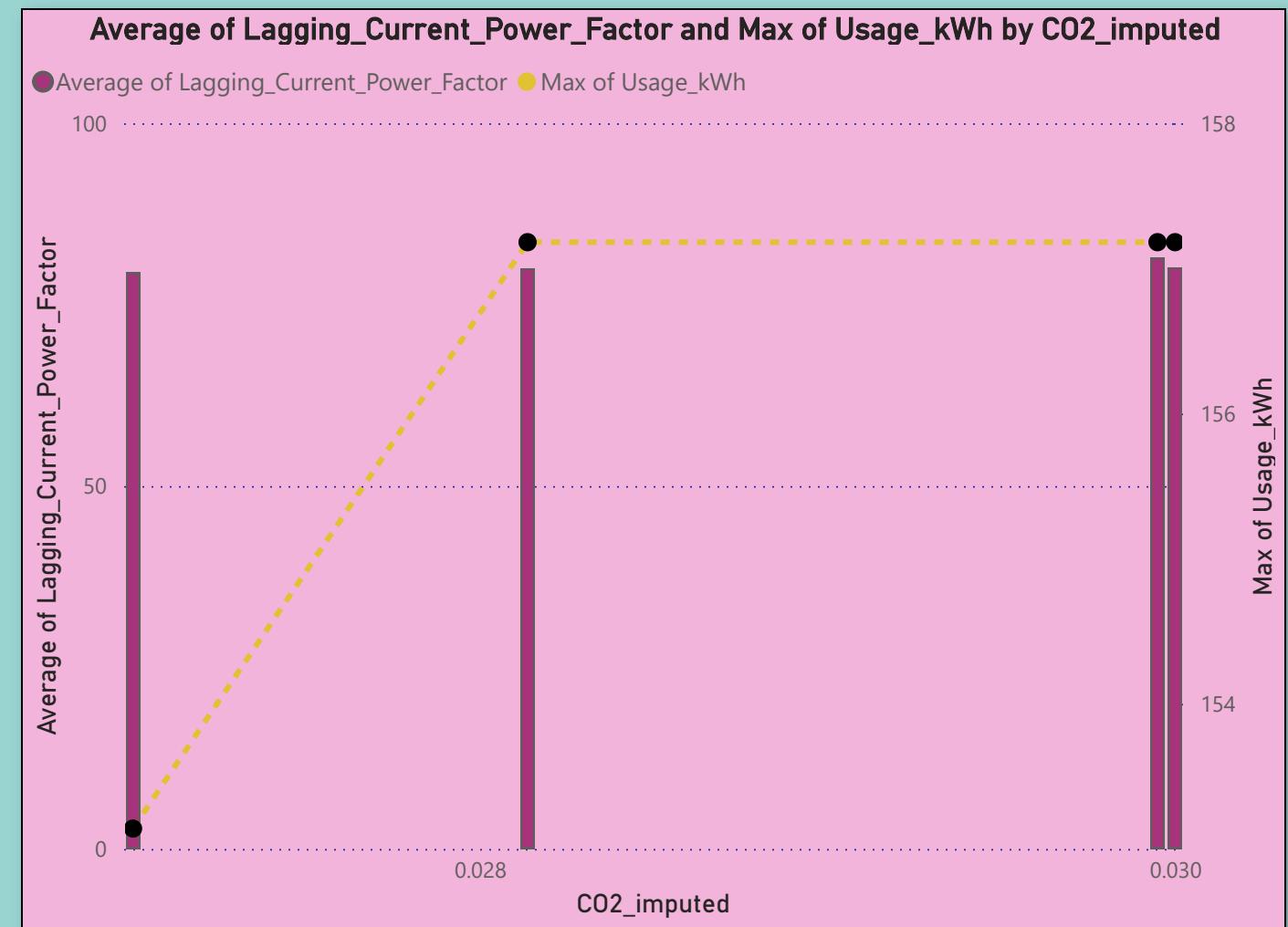
● Average of Usage\_kWh ● Average of temperature\_2m ...

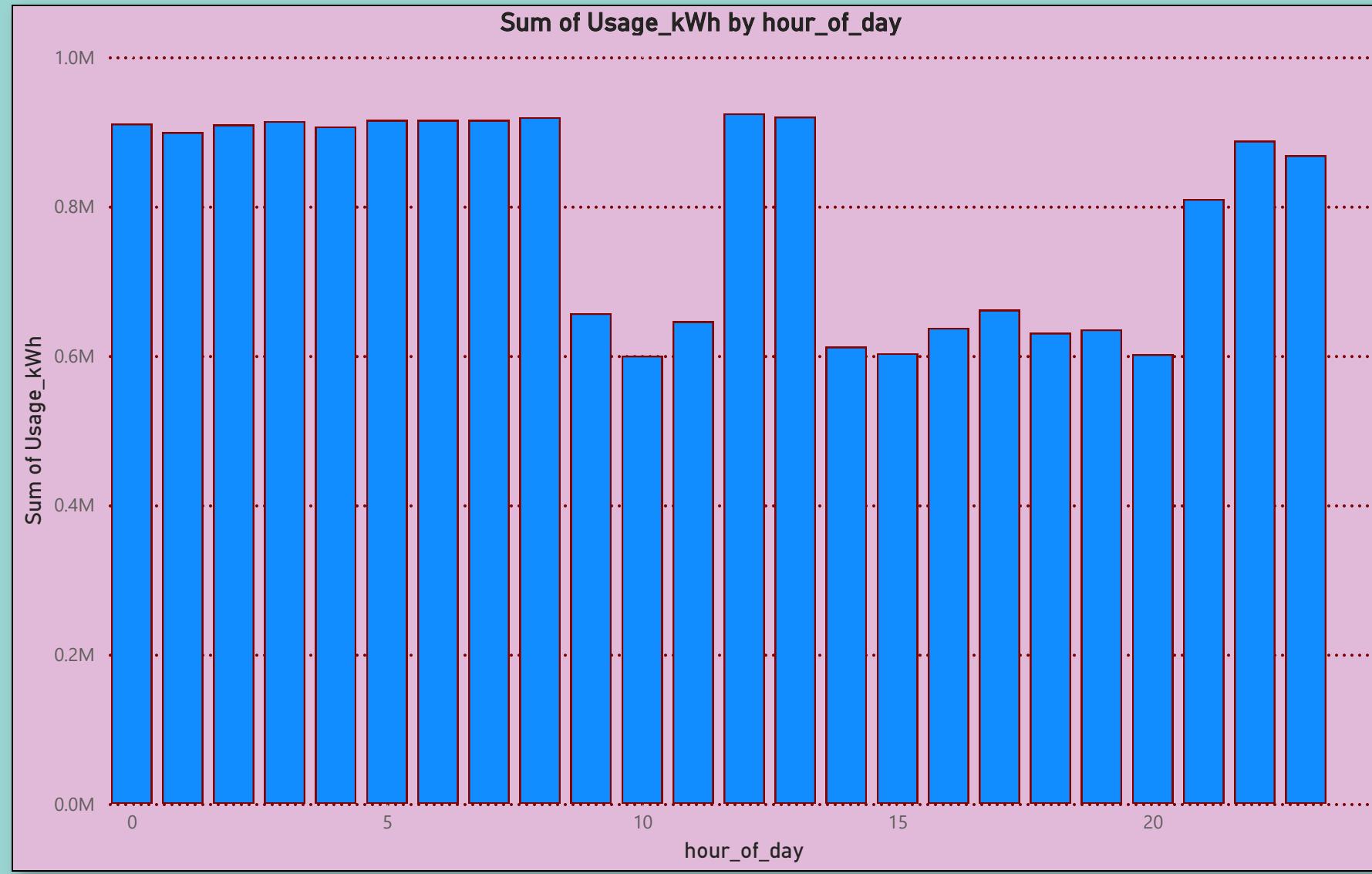


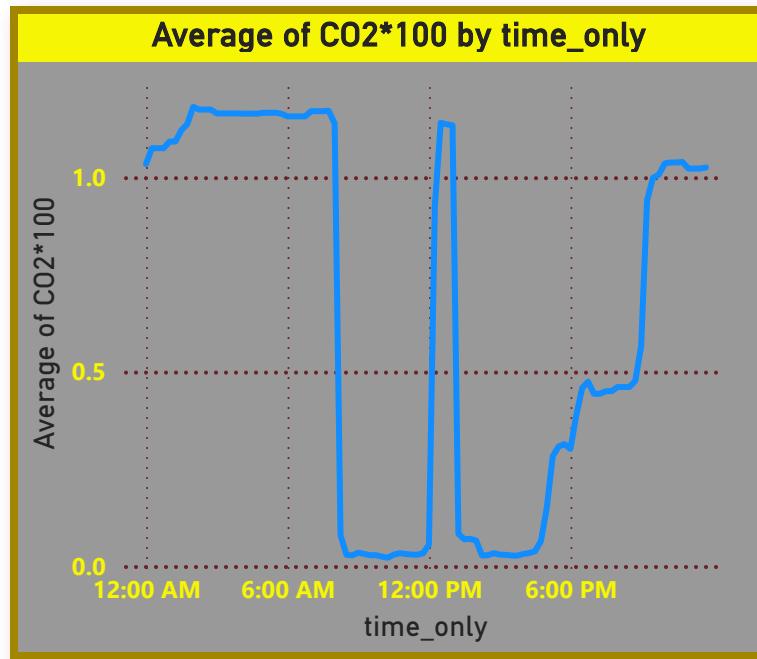


## CO2 and CO2 imputed *Graphing comparison with Humidity Bins.*

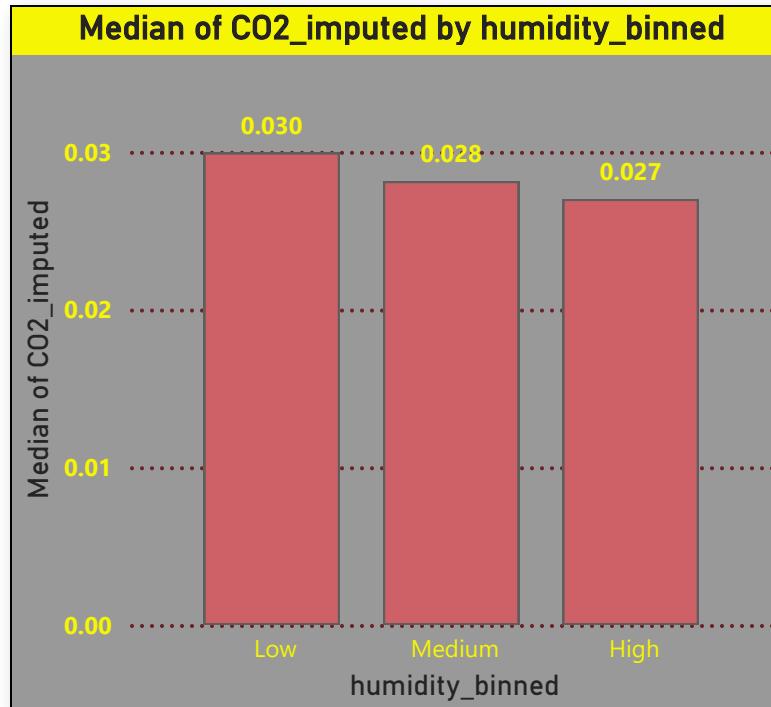
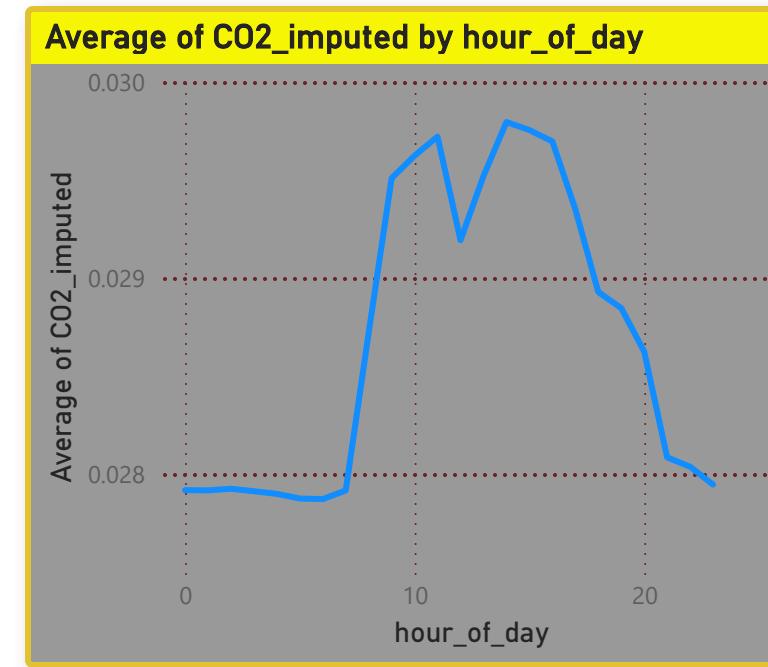




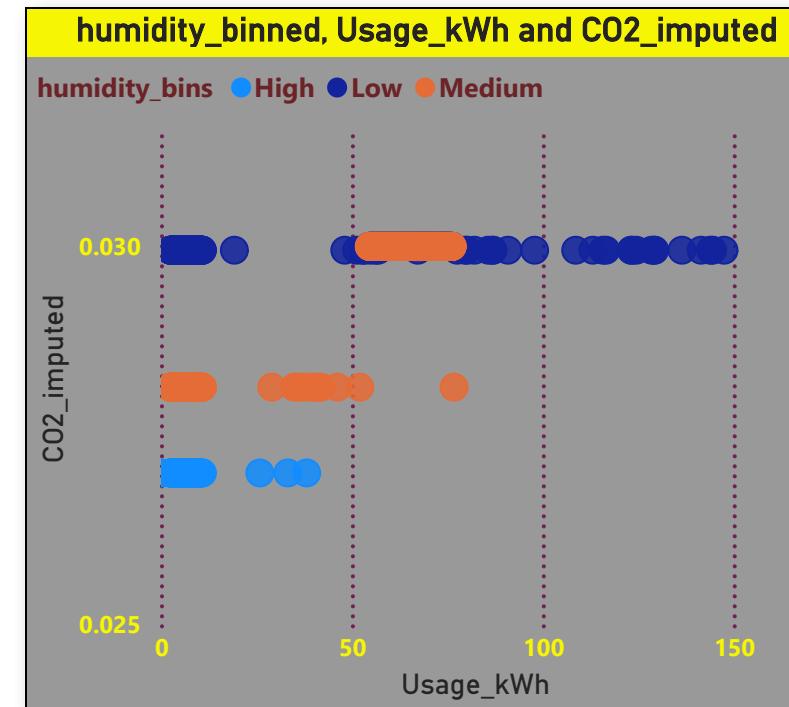




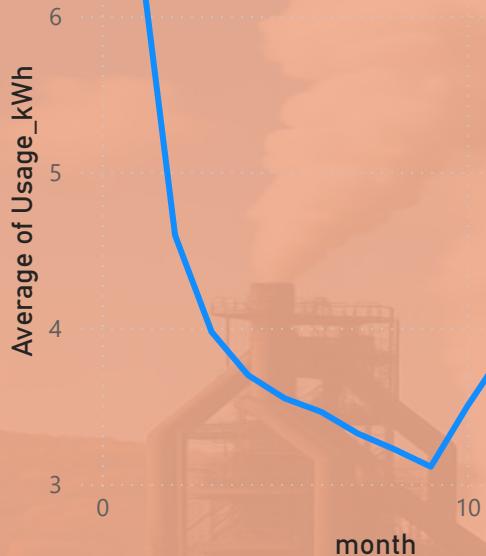
Imputing to  
take care of  
missing data



Adding Usage  
kWh, (used in  
models)



Average of Usage\_kWh by month



Average of Usage\_kWh per month 2 by Seasons and month

\*\*ZEROS\*\* REMOVED

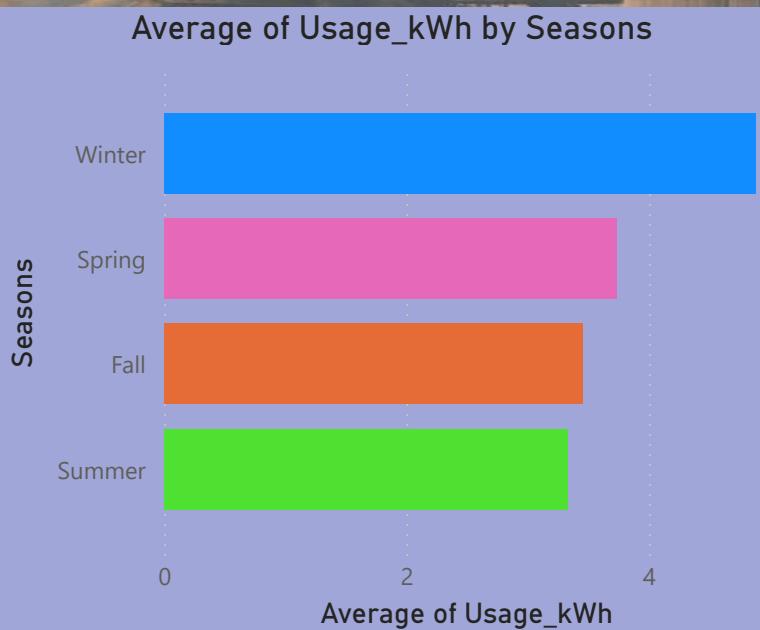
month ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 ● 11 ● 12

Average of Usage\_kWh max per ...

Winter Spring Fall Summer

Seasons

Average of Usage\_kWh by Seasons



Average of Usage\_kWh per month 2 by Seasons

\*\*ZEROS\*\*REMOVED

Seasons



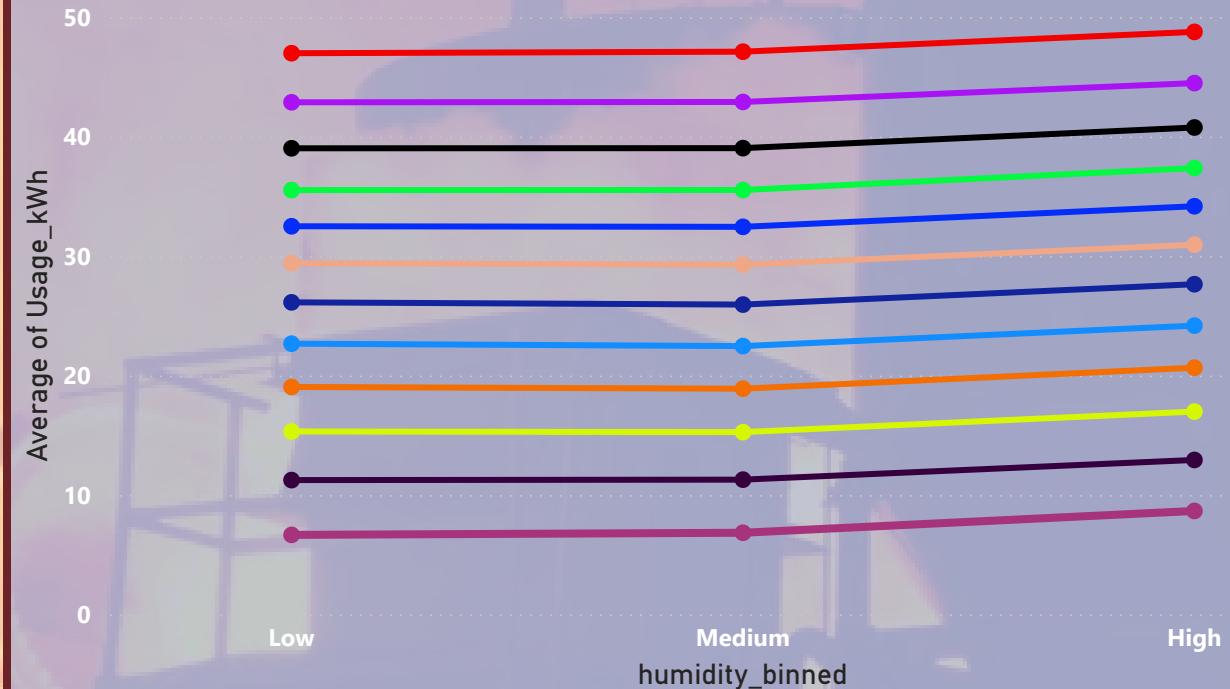


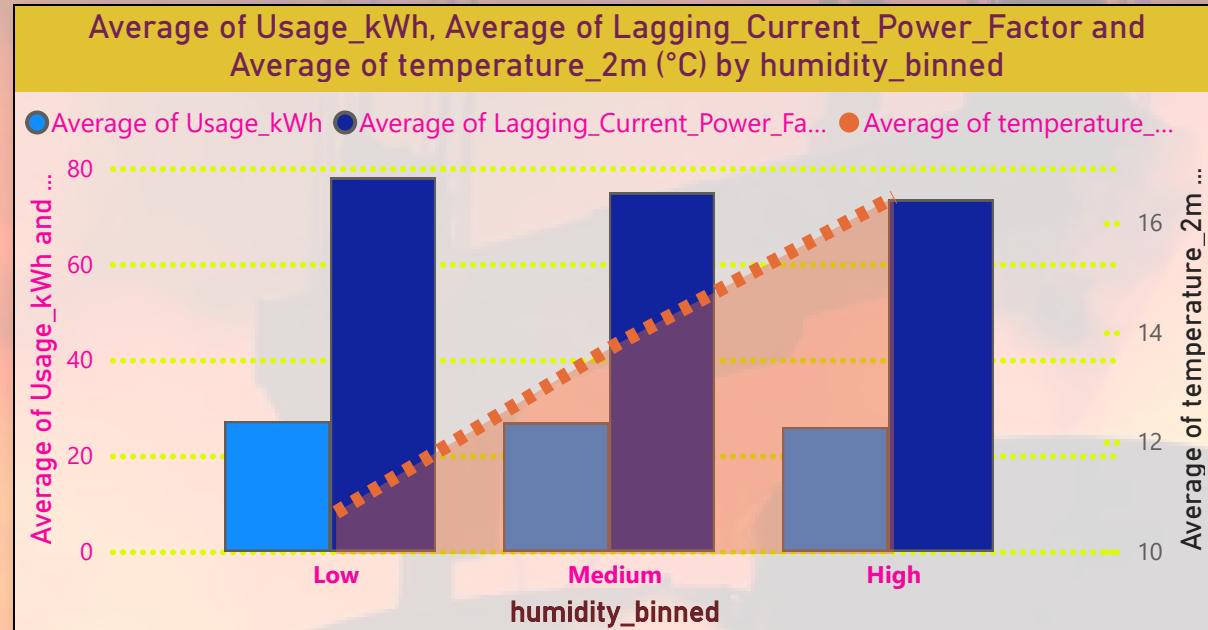
### Usage (kWh) by Month column

humidity_bin...	1	2	3	4	5	6	7	8	9	10	11	12	Total
High	8.65	4.27	4.05	3.67	3.52	3.47	3.31	3.22	3.20	3.40	3.71	4.29	3.77
Low	6.65	4.59	4.07	3.73	3.62	3.46	3.27	3.09	3.03	3.50	3.85	4.11	4.01
Medium	6.83	4.45	3.98	3.64	3.57	3.48	3.34	3.17	3.08	3.50	3.87	4.21	3.85
Total	6.48	4.59	3.97	3.70	3.55	3.46	3.32	3.22	3.11	3.50	3.85	4.12	3.88

### Average of Usage\_kWh by humidity\_binned and month

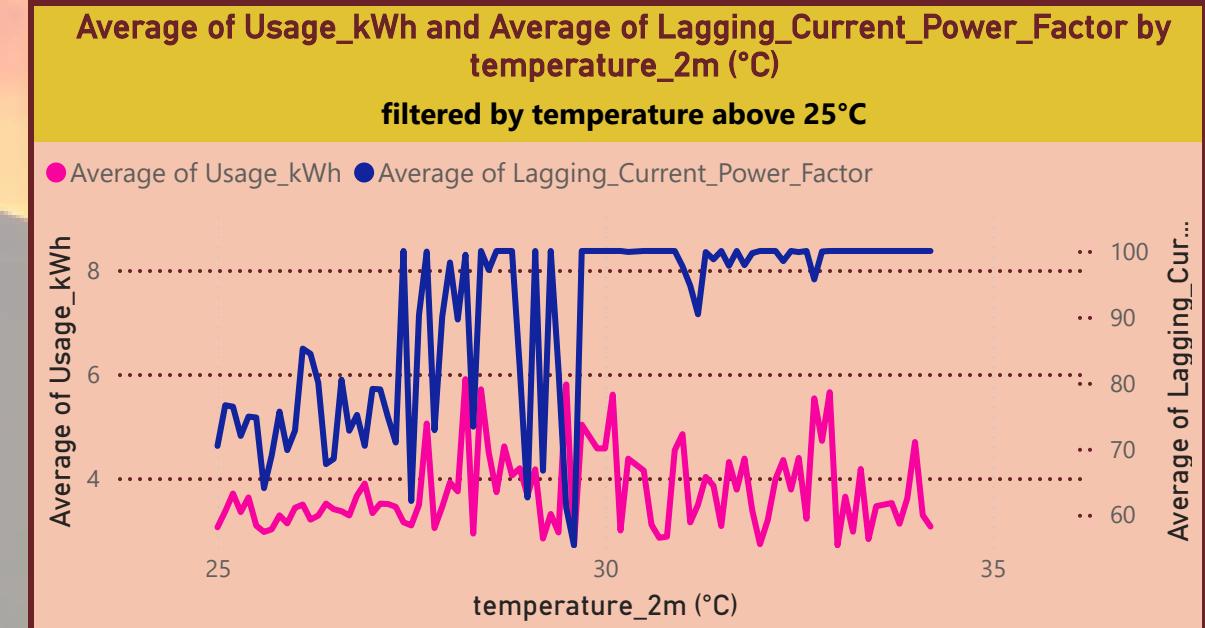
month ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 ● 11 ● 12

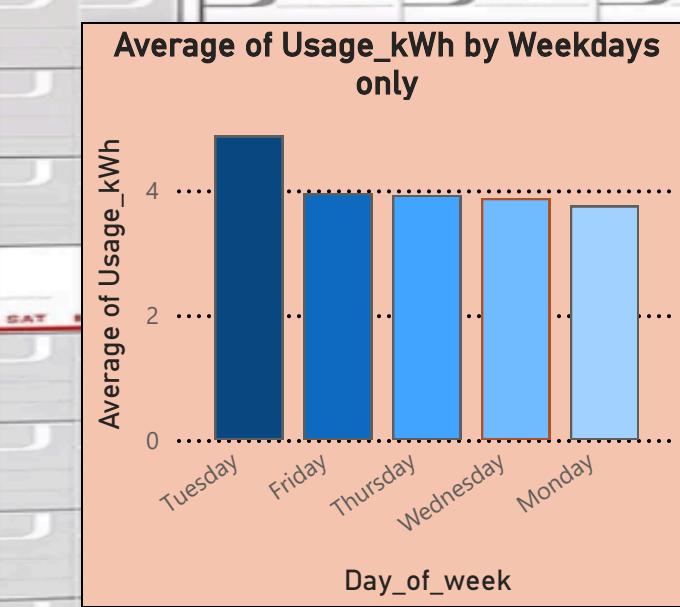
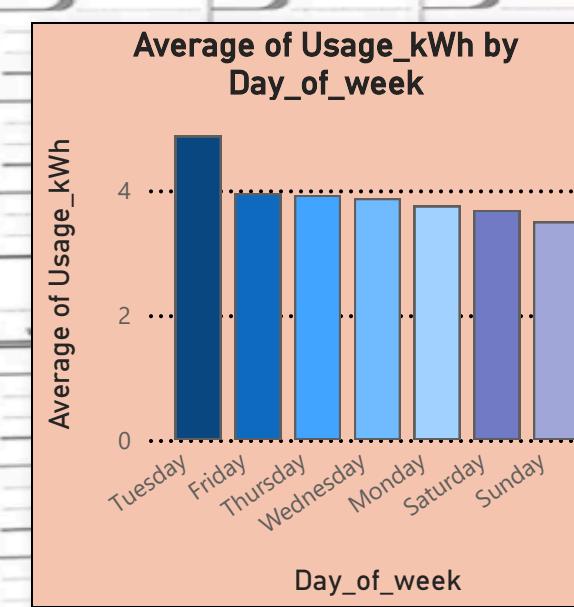
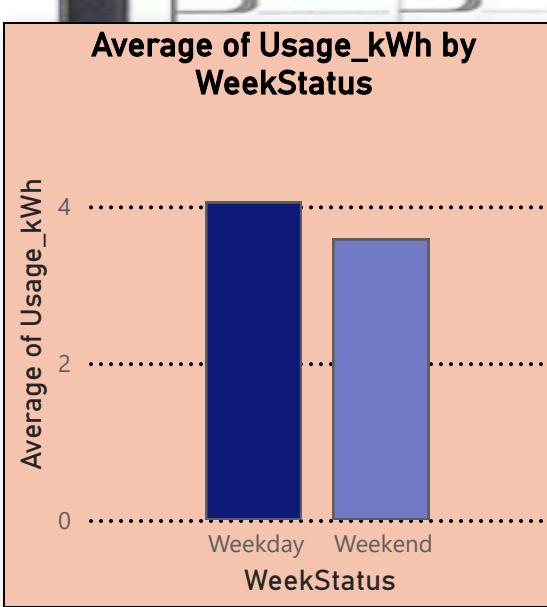
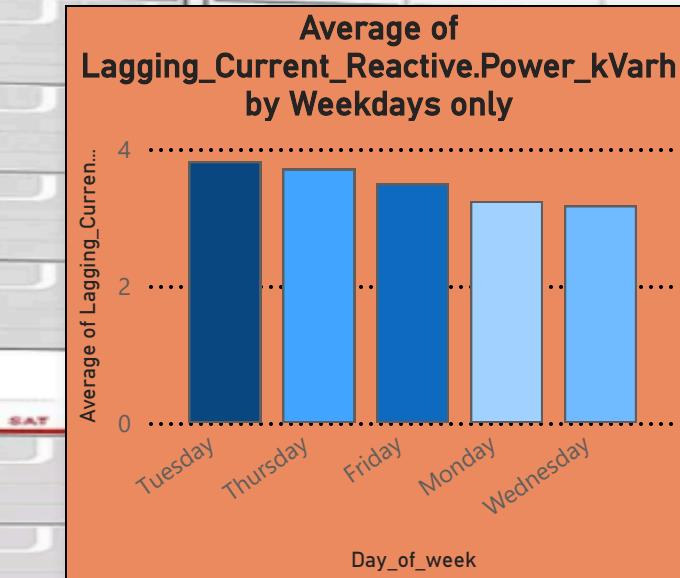
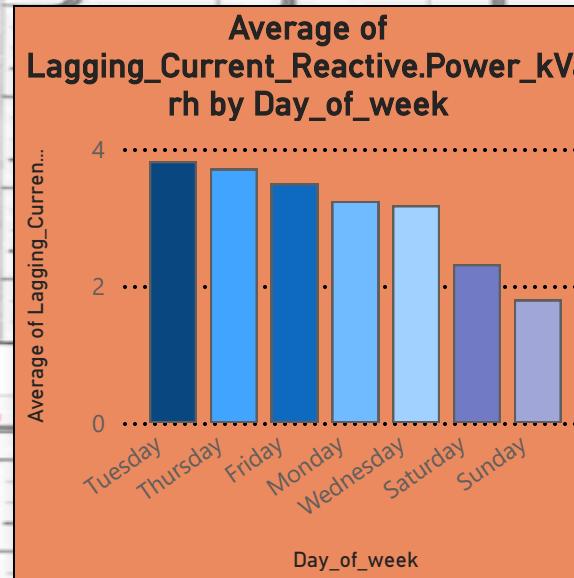
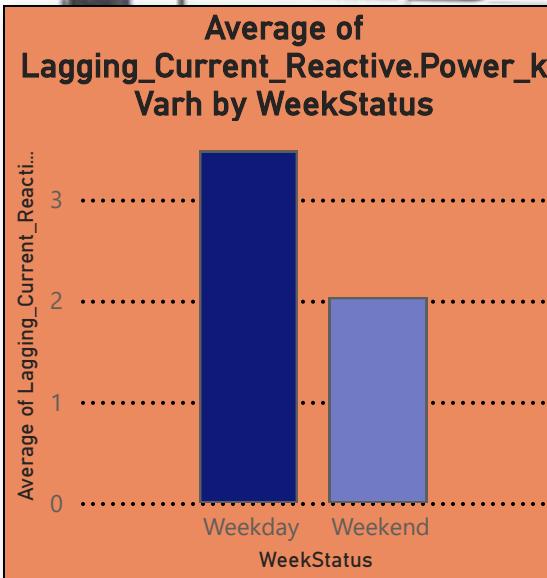




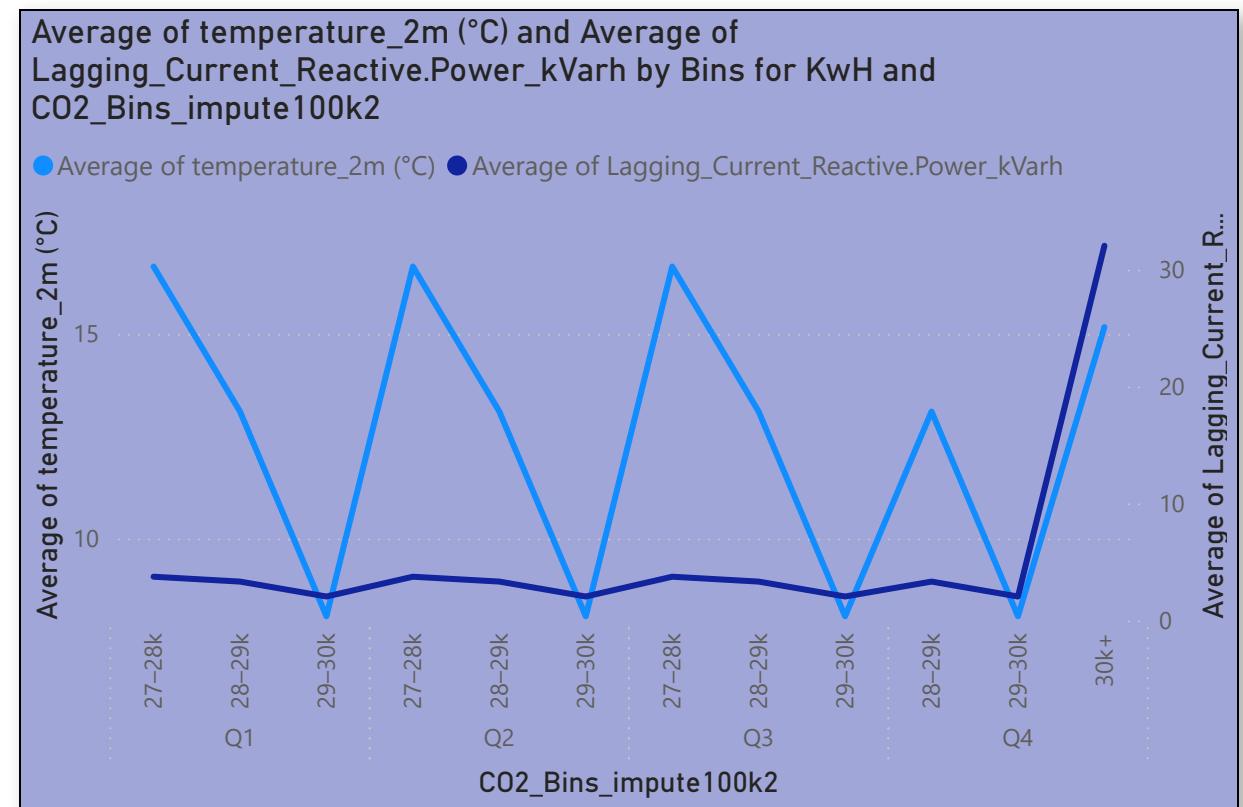
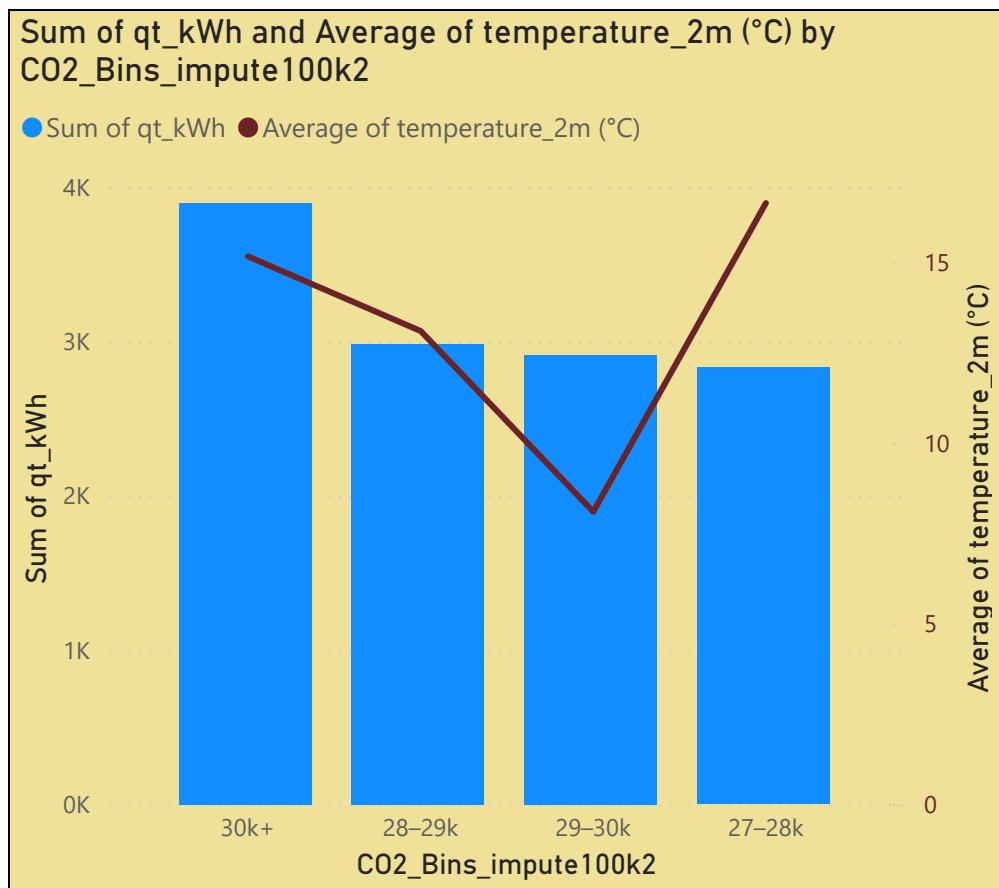
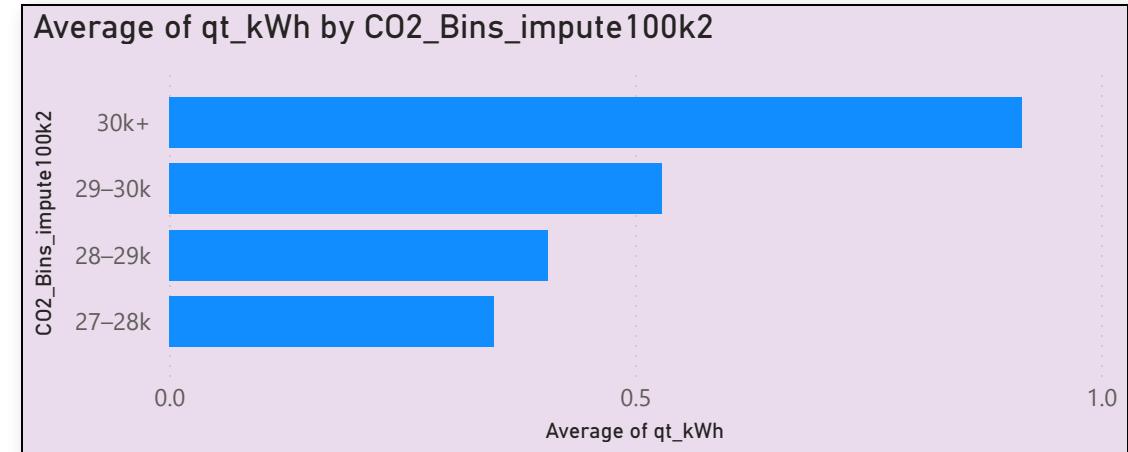
Lagging Power Factor (avg) by humidity bin rank  
column months with 25C or above

humidity_binned	5	6	7	8	9	Total
High	99.88	99.37	83.70	74.46	100.00	81.44
Low	99.91	99.35	82.59	80.87	100.00	85.97
Medium	99.91	99.38	82.75	72.92	100.00	80.70
Total	99.91	99.39	83.81	74.56	100.00	81.64

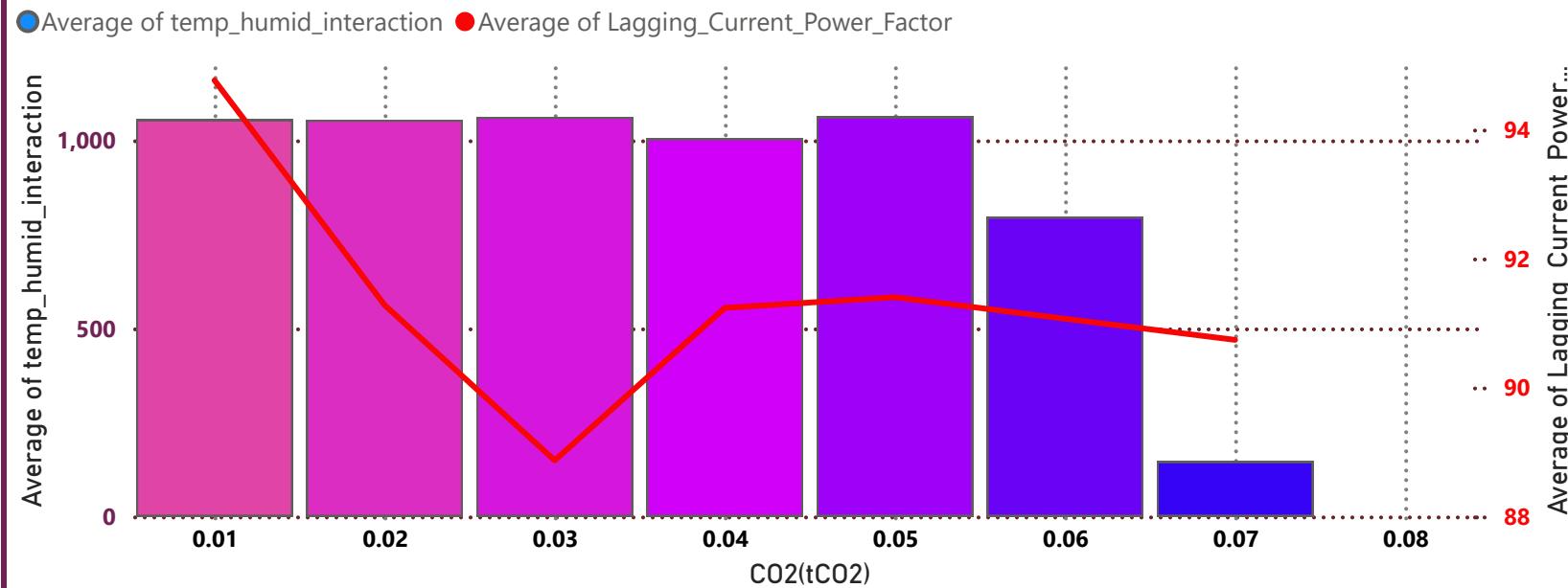




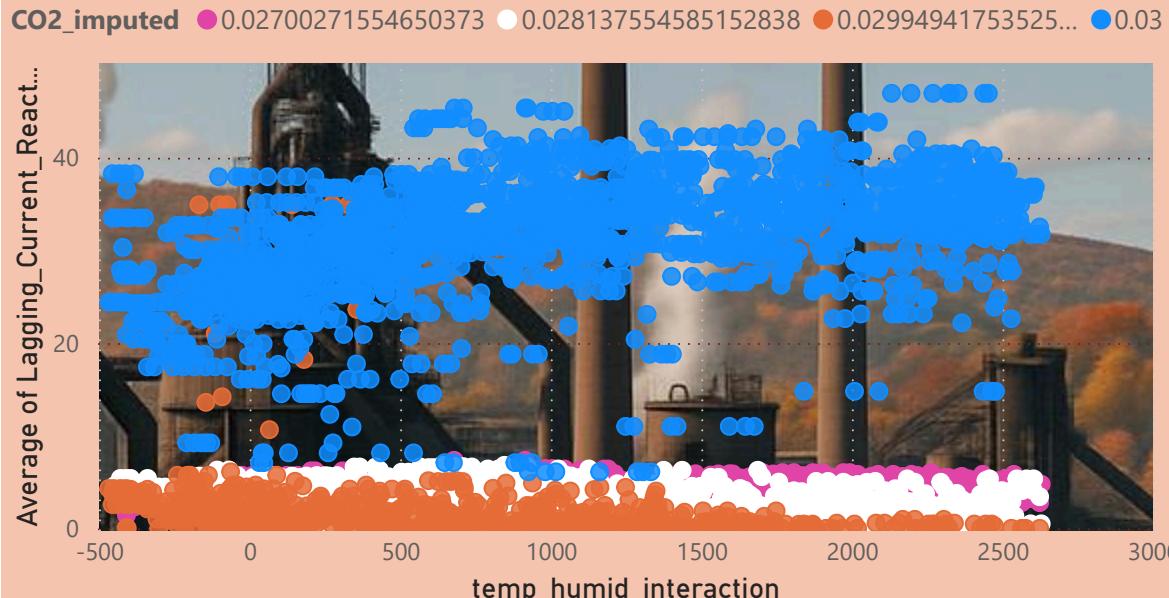
Imputed CO2 Bins by Humidity Bins					
CO2x100 Sums					
humidity_binned	27-28k	28-29k	29-30k	30k+	Total
High	26251			15941	27135
Low		28235		27891	29693
Medium	30506			27733	33205
Total	26251	30506	28235	38593	40381



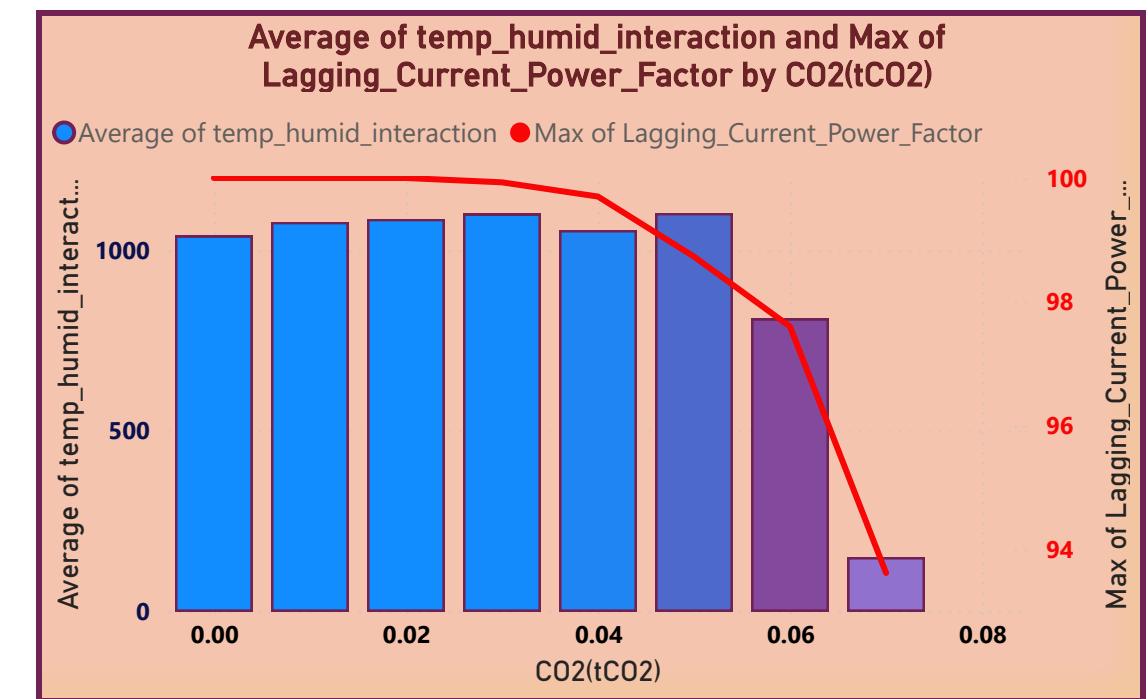
### Average of temp\_humid\_interaction and Average of Lagging\_Current\_Power\_Factor by CO2(tCO2)



### Average of Lagging\_Current\_Reactive.Power\_kVarh by CO2\_imputed and temp\_humid\_interaction



### Average of temp\_humid\_interaction and Max of Lagging\_Current\_Power\_Factor by CO2(tCO2)

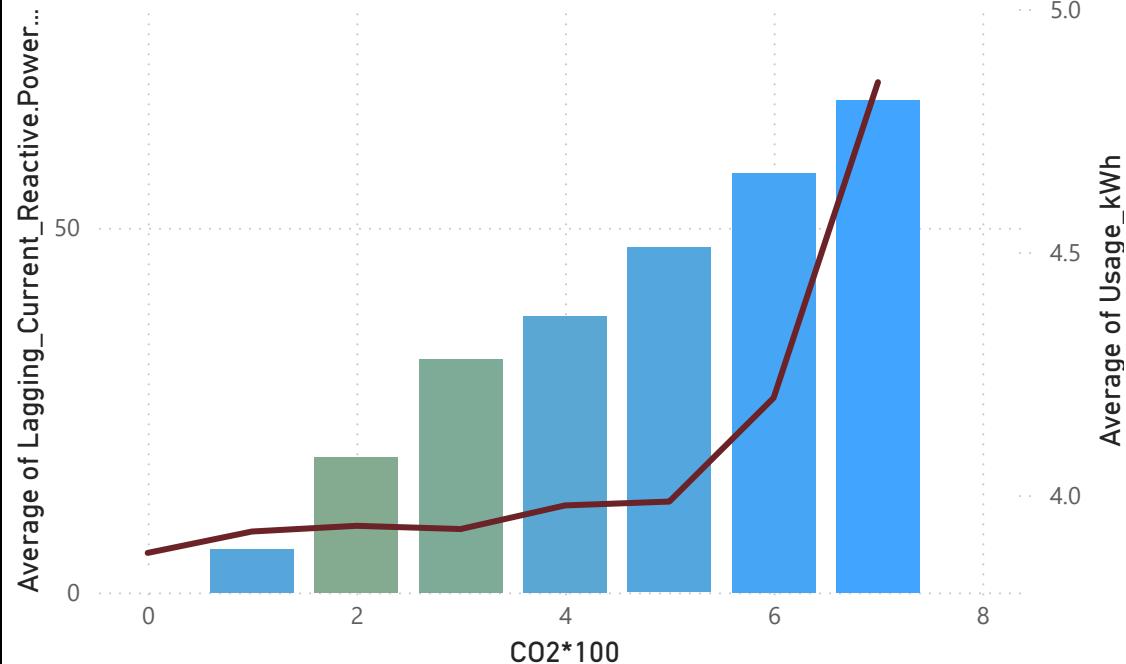


Humidity Bins by Temperature Bins												
CO2x100 Values												
humiditybinby10	-15.00	-10.00	-5.00	0.00	5.00	15.00	20.00	25.00	30.00	Total		
Total	1.5237	1.0548	1.0970	1.0906	1.1431	1.0721	1.1290	1.2871	1.8530	1.1524		
0			0.0000	0.5000						0.4286		
10		0.3333	0.8636	1.6250						1.0357		
20	2.7500	1.8147	1.3077	2.3550		2.8125	2.1667	2.6250		1.9038		
30	2.7813	1.2270	1.8452	1.8806	2.7034	1.9750	2.9211	2.5714		1.9403		
40	1.6445	1.4566	1.8406	1.3413	2.1763	2.0131	1.9511	1.2823	0.3438	1.7433		
50	1.4670	1.0351	1.0195	1.6146	1.7173	2.0519	1.4735	1.8488	1.7599	1.5242		
60	0.2941	0.5678	0.9167	1.2609	1.1852	1.2630	1.5654	1.8208	1.8581	1.2916		
70	0.0000	0.5708	0.7128	0.8191	0.8733	0.9317	1.3878	1.6445	2.3636	1.0732		
80		0.2100	0.9311	0.3827	0.7325	0.5851	1.0577	0.9368	2.6250	0.7443		
90			0.8153	1.0096	0.6266	0.5688	0.7148	0.8796		0.7278		
100			1.5000	0.0000	1.0769	0.2594	0.6637			0.6054		

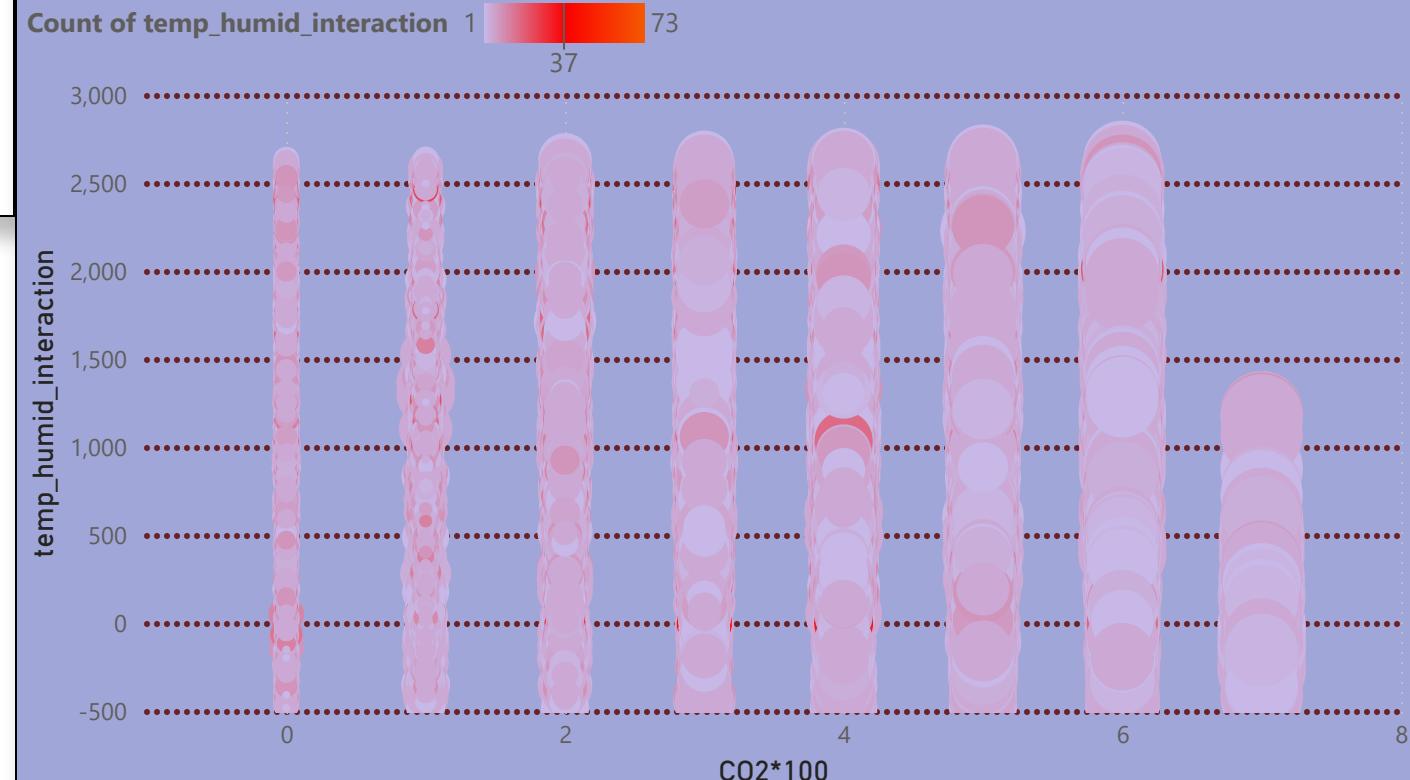
Humidity Bins by Temperature Bins												
Usage kWh (Avg)												
humiditybinby10	-15.00	-10.00	-5.00	0.00	5.00	15.00	20.00	25.00	30.00	Total		
0			3.63	13.82						12.36		
10			13.65	21.39	37.81					25.42		
20	60.22	41.61	31.13	52.76		62.50	47.83	58.44		43.40		
30	59.90	29.57	42.79	44.25	59.24	44.16	64.89	57.21		44.37		
40	35.72	33.34	42.60	35.44	48.57	45.64	43.15	30.37	11.58	40.20		
50	34.06	25.10	25.05	36.62	39.51	46.04	33.29	42.06	39.93	35.10		
60	10.72	15.18	22.53	30.54	28.16	29.37	35.43	40.78	41.71	30.22		
70	4.89	16.32	18.93	20.42	21.47	22.35	32.09	36.99	53.01	25.66		
80		8.43	23.47	11.57	18.54	15.39	24.84	22.55	56.95	18.80		
90			20.41	24.61	16.12	15.12	17.98	21.28		18.34		
100			36.07	3.36	25.90	8.65	16.84			15.80		
Total	34.41	25.56	26.73	26.77	27.10	25.54	26.48	29.81	41.81	27.39		

### Average of Lagging\_Current\_Reactive.Power\_kVarh and Average of Usage\_kWh by CO2\*100

● Average of Lagging\_Current\_Reactive.Power\_kVarh ● Average of Usage\_kWh

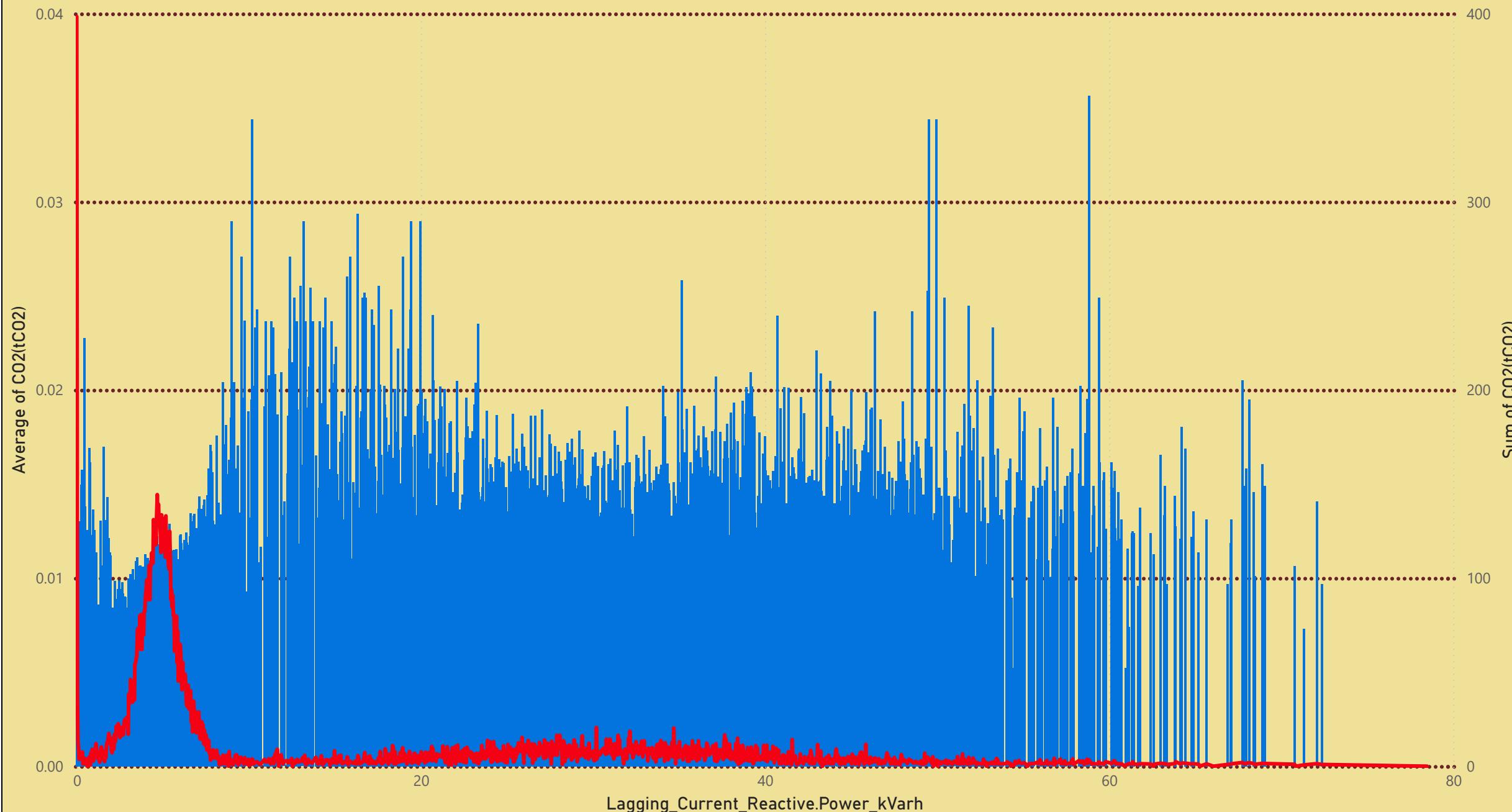


### Average of Lagging\_Current\_Reactive.Power\_kVarh by CO2\*100 and temp\_humid\_interaction



### CO2 (avg & sum) vs. Reactive.Power\_kVarh

● Average of CO2(tCO2) ● Sum of CO2(tCO2)



## Usage kWh and CO2 Emission vs. Load Rank

